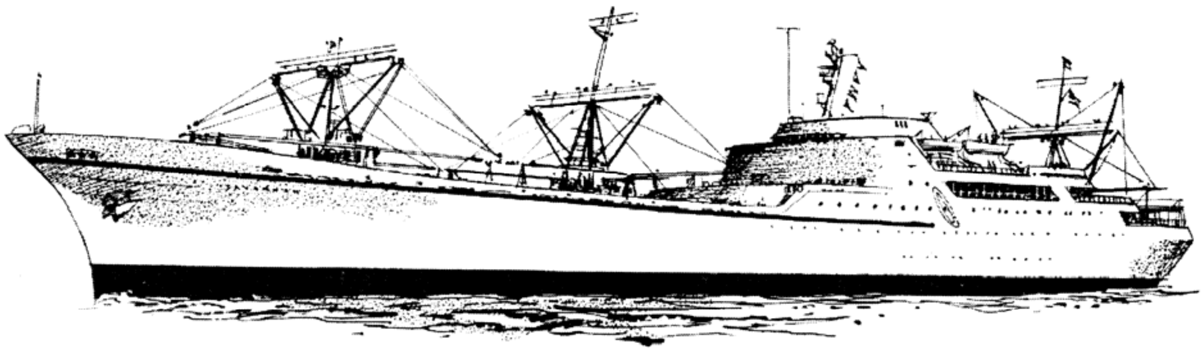

Nuclear Ship SAVANNAH

Radiological and Non-Radiological Spaces Characterization Survey Report

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Prepared for

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Maritime Administration
Office of Ship Operations

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Radiological and Non-Radiological Spaces Characterization Survey Report Addendum

This is the first revision issued for the Radiological and Non-Radiological Spaces Characterization Survey Report

A change indicator appears in the margin where a change has been made from the previously published version

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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.

2. HISTORY/STATUS OF NUCLEAR SHIP SAVANNAH

In 1955, President Eisenhower proposed that the United States build the world's first atomic-powered merchant vessel to demonstrate America's peaceful use of the atom. In 1956, Congress authorized construction of the Nuclear Ship SAVANNAH as a joint project of the Maritime Administration and the Atomic Energy Commission. After the ship was commissioned, MARAD took title to and responsibility for the ship.

The reactor plant achieved initial criticality in December 1961 and operated from 1962 to 1970 at an average plant thermal power of 30%, resulting in 2.4 effective full power years of irradiation on the structures inside the containment vessel (CV). The NSS is currently moored along side the Nuclear Barge STURGIS in the James River Reserve Fleet (JRRF) near Fort Eustis, Virginia.

On 29 January 1973, the U. S. Atomic Energy Commission issued Amendment 13 to the Technical Specifications associated with NSS license NS-1. This amendment acknowledged that the NSS's reactor was no longer operational. This decision was based on the fact that all nuclear fuel had been removed from the ship, and the reactor and associated systems had undergone certain modifications to ensure that they were no longer operable.

The following radioactive material/equipment had previously been removed from the ship:

- All fuel elements (32)
- Main coolant pumps and integral motors (4)
- Loose radioactive material (components and waste)
- Fission chambers and start-up source
- Demineralizer resin tanks

The reactor vessel is closed with the head in place (held by six tensioned studs). The control drive system is disconnected mechanically, hydraulically, and electrically.

The primary system was initially thought to be drained of water, though it was estimated that approximately 1100 gallons of water remained in the lower plenum of the reactor vessel below the inlet nozzles. This estimation was performed by the contractor who was responsible for dewatering the primary system in 1976. During the opening of both port and starboard steam generator primary system inlets, water was observed in both steam generators. It is anticipated that water may also be in the pressurizer surge line. The status of the water level in all of the primary components, which is being evaluated under a change order to this contract, will be documented elsewhere.

3. RADIOLOGICAL CHARACTERIZATION

Materials onboard the NSS might 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 corrosion, cutting, or abrasion) and transported.

Activation products in stainless and carbon steel–based reactor and primary system components could include iron (Fe-55), cobalt (Co-60), and nickel (Ni-59 and Ni-63). With only 2.423 effective full power years of irradiation time, none of these nuclides reached saturation (highest activity attainable by an isotope in a specific neutron flux, i.e., rate of production = rate of decay). Fe-55, with the shortest half-life of the principal nuclides, reached 46% of saturation; Co-60 reached 27%. Ni-59, with a half-life of 7.5×10^5 years, attained less than 0.003% of saturation, while Ni-63 reached 1.7%. Fe-55 would have been present in large quantities on the NSS at final shutdown but has since decayed through more than 13 half-lives and is now present in only trace quantities. Concrete may contain tritium (H-3). Radon was noted in many of the vessel's enclosed areas and was identified during air sampling.

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 to the human body, while contaminated materials are a greater internal exposure concern to the human body. In addition, during characterization or remediation activities such as cutting, grinding, coring, and other intrusive techniques, the potential for internal exposure is increased.

Chemical action of the coolant water flowing through the core can cause gradual corrosion of the materials forming the reactor pressure vessel (RPV), internals, primary piping, steam generators, and pressurizer. These corrosion products, referred to as "crud," have been or will be activated by neutron irradiation and will circulate with the coolant until they decay or are deposited at locations of low water velocity or stagnation flow or are removed by purifiers, leaks, or routine replacements of water. Crud would normally be retained in the primary loop unless leaks in the steam generator tubes caused crud carryover to the secondary loop.

Potential airborne radioactivity areas, which might exceed regulatory limits for concentration and could require the use of respiratory protection, were identified early in the characterization program.

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

4. RADIOLOGICAL CHARACTERIZATION TECHNICAL APPROACH

4A. RADIOLOGICAL CHARACTERIZATION METHODOLOGY

The following describes the methodology that was used to characterize radiological hazards in sufficient detail for MARAD to develop decommissioning strategies. As previously stated, this characterization program was abbreviated in scope compared to the final MARSSIM-based survey, which will be required in preparation for the NRC license termination following decommissioning.

- Containment vessel structures and internal structures may contain trace amounts of radioactivity due to induced activity from exposure to neutron radiation during operation. Samples of the structural metal were taken, and activated nuclides, if any, were identified.

- The reactor vessel, internals, and neutron shield tank were previously characterized by WPI, based on current material standards, actual plant operating data, and the latest analytical computer code (ORIGEN-ARP Version 2.00) accepted by the NRC. This characterization is available in the report entitled, "Nuclear Ship Savannah Reactor Vessel, Internals, and Neutron Shield Tank Characterization and Classification Assessment, revision 0 dated April 3, 2004". The results of the analyses concluded that the reactor vessel, internals, and neutron shield tank satisfied the radionuclide inventory waste acceptance criteria (WAC) for the Barnwell disposal site. To confirm or refine the earlier analytical results, external reactor vessel dose measurements were obtained from inside the neutron shield tank at the elevation of the core mid-plane.

- The containment vessel rests on a support frame surrounded by a concrete shield lined on the inside with a painted carbon steel plate liner. While no contamination or induced activity was expected in the concrete behind the liner, that assumption was 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.

- Several specific locations were investigated, such as the inside surfaces of the primary system (by opening the primary inlet of each steam generator). Other systems were opened as necessary by removing valve bonnets, heat exchanger manways, pipe flanges, etc. to gain access and samples. All system openings were closed to an airtight (but not hydrostatically tested) condition. Air-handling systems (shut down and in use) were opened and investigated

- The steam plant (secondary side) was characterized by opening the condenser near the steam jet air ejector (SJAE) and the port inspection point steam generator steam drum.

- WPI's extremely knowledgeable and experienced staff identified areas of concern and approached the effort in a thorough and efficient manner. Personnel biographies are contained in Appendix A.

4B. INSTRUMENTATION

4B.1 Calibration

Radiation detection instruments used for the project were either rented from an approved vendor or provided by MARAD. Upon arrival, the instruments were checked for function and condition; all instruments were determined to be in good working condition. Calibration data sheets were reviewed, matched to each instrument, and accepted.

All instrument rentals and calibration sources were procured under WPI's NQA-1 program, which is an NRC-compliant Quality Assurance Program.

Air samplers, on loan from MARAD, were also used on this project. A copy of the calibration data sheet was provided for each air sampler. These were verified as current for each air sampler and accepted.

4B.2 Daily Source Checks

To permit daily checks of the instrumentation, operational check sources for alpha and beta instruments were used. These sources were as follows:

- thorium-230 (alpha emitter) 339 Bq (9.16 nCi)
- technetium-99 (beta emitter) 75.8 Bq (2.05 nCi)

Each portable instrument was checked daily for proper background. This background value was established when the instrument was first put into service on this project. A source count value using an appropriate check source was established initially for the portable instruments. From this initial count, a ±20% range was established for each instrument. On a daily basis or more frequently if appropriate, the appropriate check source was counted with each portable instrument and a count value obtained. The daily source count was entered on the Instrument Source Check Log for each instrument and verified to be within this ±20% range.

No gamma source was provided. An alternative method to source-check the portable radiation detectors (Ludlum 19 μR meters) was a stateroom commode with porcelain glaze. This glaze contained enough naturally occurring radioactive material (NORM) to provide a reading of 6–9 μR. The reasons for this method are discussed in Section 4C.2, Frisking. This approach provided a suitable gamma source for a daily source check of the μR meters. Natural background on the NSS was 2–3 μR.

The Teletector, a gamma detector with 17-foot telescoping capability, was checked daily, when used, by comparing readings in radiological areas with a Ludlum 19 μR meter, a method that provided assurance that the Teletector was functioning properly.

A 20-minute average background count was established for the 2929 counters; a daily 20-minute background was performed, and the range verified as ±10% of the average. These daily background values were entered on the Instrument Source Check Log for each instrument.

The 2929s count both alpha and beta simultaneously. Using the Th-230 and Tc-99 check sources, an average 5-minute count value was obtained for each counter when first put into operation for this project. Based on this initial count, a ±10% range was established. Daily count values were obtained from the 2929s using both check sources. These source count values were entered in the Instrument Source Check Log for each 2929 counter and verified to be within this ±10% range. These values were verified by using National Institute of Standards and Testing (NIST) traceable check sources and documented on Instrument Check Source Logs for each instrument.

Copies of the daily source check and background count are included in Appendix B.

4B.3 Instrument Use

Two Radeco Low-Volume Air Samplers were used to detect airborne radioactive particulates. These battery-powered, computer-controlled, totalizer-type air samplers can run for approximately 3 hours on a full battery charge. In addition, augmented battery service was provided through two 800-amp/hour marine batteries purchased for this effort. Air samples were obtained prior to entry into an area without respiratory protection and when opening the primary system.

Ludlum 19 µR meters were used to monitor for low-level gamma radiation upon first entry into radiological areas and for measuring dose rates up to 5 mR throughout the radiological areas.

Ludlum 3, 12, and 2221 count rate meters with pancake probes were used to monitor for very low levels of beta/gamma contamination throughout the ship and were also used to monitor individuals upon exiting radiological areas.

A Ludlum 2221 count rate meter with an alpha probe was used to monitor for alpha contamination in selected areas of the containment vessel and labs.

One teletector telescoping instrument was used in radiological areas above 5 mR/hour, almost exclusively in containment and shipboard laboratories.

Two Ludlum 2929 scalers with 43-10-1 probe were used to count the smears, air samples, metal samples, and paint scapings taken during this project.

Table 4B.3-1 lists shipboard nuclear instrumentation used during the project.

Table 4B.3-1
N.S. Savannah Characterization Project Instrument List

Instrument model	Serial number	Probe model	Probe serial number	Radiation detected	Readout units
Ludlum 3	97416	44-9 pancake	NA	Beta/gamma	cpm
Ludlum 12	75809	44-9 pancake	NA	Bata/gamma	cpm
Ludlum 12	91037	44-9 pancake	NA	Beta/gamma	cpm
Ludlum 19	42972	Internal scintillator	NA	Gamma	μR/hour
Ludlum 19	95499	Internal scintillator	NA	Gamma	μR/hour
Ludlum 19	95469	Internal scintillator	NA	Gamma	μR/hour
Ludlum 2221	197766	43-5 scintillator	127385	Alpha	cpm
Ludlum 2221	94954	44-9 pancake	NA	Beta/gamma	cpm
Ludlum 2929	102001	43-10-1	103276	Beta/gamma	cpm
Ludlum 2929	160019	43-10-1	167229	Beta/gamma	cpm
Teletector 6112D	28991	NA	NA	Gamma	mR/hour
Radeco H-810DC	0864	Air sampler	NA	Air particulate	NA
Radeco H-810DC	0865	Air sampler	NA	Air particulate	NA
Canberra high resolution gamma spectrometer*	S/N 96-5740	Base unit/detector	SAM 935 (90163/S SR593)	Gamma	Kev/Mev

* SERAT team provided.

4C. RADIOLOGICAL SAMPLING LOGISTICS

To adequately characterize the existing radiological conditions aboard the NSS, seven different types of data were collected: smears for surface contamination including samples taken from the interior of the primary system to estimate the extent of crud buildup (or plate-out) in the reactor vessel, frisking for fixed contamination, dose rate measurements, paint scrapings, metal samples for induced activity, core bores for shielding wall samples, and air samples to identify airborne radioactivity.

4C.1 Dose Rate Measurements

Dose rate measurements (primarily in μR/hour) were taken in rooms and compartments throughout the ship to determine the radiation levels from any residual radioactive materials or contamination.

4C.2 Frisking

Frisking measurements (in counts per minute) generally preceded the smear samples to identify any locations with fixed or loose radiological contamination. Frisking is the process of detecting radioactive material on personnel or equipment/structures.

Frisking readings and dose surveys in selected commodes and sinks exhibited slightly elevated readings (typically 7–10 μR/hour) compared to background (2–4 μR/hour). Investigation of this anomaly revealed that prior to the mid-1970s, a glaze commonly used in the manufacture of porcelain products could contain trace amounts of uranium and/or thorium. Use of a portable energy spectrometer did confirm the presence of thorium in some of the porcelain furnishings.

4C.3 Smears

Smears are 10- × 10-cm (4- × 4-inch) samples taken by rubbing a fixed-size sample paper (nominally a circle about 2.5 cm (1 inch) in diameter on a contiguous area). The area may be any set of dimensions that equals 100 cm^2. 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. Count rates for all smears above background were converted to the standard nomenclature for radioactive surface contamination, disintegrations per minute (dpm)/100 cm^2. Surface contamination levels above 10CFR20 regulatory limits (1,000 dpm/100cm^2 for beta/gamma activity) were posted with appropriate warning signs. In all, 1423 smears were taken during the categorization effort depicted on the radiological survey forms in Appendix C.

In determining the sample distribution in an area, emphasis was given to those areas identified by frisking as being potentially contaminated such as sumps, door sills, contaminated systems pipe flanges, any location with evidence of leakage, etc.

In those areas of the ship not expected to be contaminated, such as staterooms, dining and recreation areas, crew quarters, offices and galleys, predetermined smear locations included door sills, door knobs, ventilation ducts, bathroom floors, and sinks. As shown in Appendix C, these areas exhibited radiation levels at or below background.

Smears of the interior piping of the primary system were taken at the inlet to the steam generator and on the inlet side of the tube sheets. Smears of the primary system contamination were obtained via inspection ports located on the steam primary side of the steam generators that were subsequently reinstalled. The principal isotope in the crud was confirmed to be Co-60 through use of gamma spectroscopy. Using the highest activity smear (tube sheet entrance) and assuming this crud level to be uniformly distributed over the interior surface of the RPV, a total crud activity level of 1.1 mCi was obtained. In our 3 April 2004 report, the total RPV crud activity level in 2007 was estimated to be less than 0.3 Ci of Co-60. A gamma energy spectrometer was used to confirm that the principal isotope in the crud was Co-60. Details of the crud analysis are provided in Appendix B. The difference in crud levels are due to the fact that one was an estimate based on a dose rate that was obtained in 1971 at the primary inlet piping where an assumption was that the dose rate was totally Co-60. A conservative estimate was developed assuming this dose rate was an infinite line source. Now the evaluations should be based on actual data obtained during the characterization efforts.

4C.4 Paint Samples

Paint samples were taken using a rasp or scraper to remove all levels (coats) of paint in recognition of the fact that early contaminated coats of paint may have been overcoated with fresh paint and would be impervious to smears. Paint samples included only paint and undercoatings but no metal. Preference was given to locations containing multiple layers of paint and in areas near or around radiological laboratory sinks and any other location with potential for contamination. While the same area planning philosophy as for smears was followed, the paint sampling locations were also selected on the basis of accessibility. Based on the absence of any activity levels above background in the passenger and crew living spaces, as well as other non-radiological portions of the ship, paint samples were taken only in the radiological portions of the ship as shown in the radiological survey forms in Appendix C. The activity levels were nonexistent based on actual results from dose rates and smear samples. Obtaining paint samples in the non-radiological portions of the ship would add no new information to the extensive data base already compiled through dose surveys and smear collection.

The NSS Health Physics staff detected radioactivity levels above background in some samples. Six samples, which showed activity levels above background using shipboard instrumentation, were sent to GEL, a WPI-approved vendor, for confirmatory analysis. Results of GEL's analysis indicated the presence of Co-60 and Cs-137 in the picocurie (pCi) range where 1 pCi=10^{-12} Curies. Co-60 activity levels ranged from 2.61 to 109 pCi/gm with the highest level at the foundation of the RPV and primary containment wall. Cs-137 activity levels ranged from 2.58 to 342 pCi/gm with the highest level at the interior of the primary vent duct, where airborne Cs-137 would tend to concentrate. The detection of Co-60 and Cs-137 confirmed findings of the onboard characterization effort involving smear collection/counting and portable gamma spectroscopy.

A trace amount of Pb-212, which is a decay product of naturally occurring Th-232, was detected (1.81 pCi/gm). K-40, a naturally occurring isotope in elemental potassium that accounts for about one-third of the external and internal whole body dose resulting from natural sources, was detected at a trace level of 2.76 pCi/gm. Details of GEL's analysis are provided in Appendix C.

4C.5 Metal Samples

To identify radiation sources resulting from the neutron activation of metal components during reactor operation, small metal samples (less than 1 square inch) were cut from metal components/structures with saws, drills, or other bulk metal–removal equipment. The objective was to obtain only metal with no paint, coatings, or other foreign materials. Sample locations were determined based on physical structure type and location in the CV. A set of samples was taken from structural components in close proximity to and in direct line-of-sight of the core mid-plane, where maximum neutron irradiation during power plant operation would have occurred. Another set of samples was taken in structural components near the outer wall of the CV at core mid-plane locations to determine the activation of the CV wall, if any. The activity (if any) was measured to determine curie concentration of the activated metal.

Neutron activation in the CV ceased following reactor final shutdown. Fe-55, the principal isotope of radiological concern in structural steel, has since decayed through thirteen half-lives ($T½ = 2.7$ years) and is currently present in only trace quantities.

Though the metal samples showed no activity above background in the NSS Health Physics Lab, four samples were sent to GEL for confirmatory analysis. Results of GEL's analysis indicated no detectable radiation levels except naturally occurring K-40, a radioactive isotope of elemental potassium, that measured 2.97 pCi/gm. Details of GEL's analysis are provided in Appendix C.

4C.6 Core Bores

Six core borings were taken through the steel inner liner of the secondary area and into the shield wall to determine the extent to which the concrete external to the steel wall is contaminated or induced activity exists. In addition, the concrete shielding was considered the only credible location for tritium (H-3), other than residual water in the RPV and primary system piping/steam generators. Selection of core bore locations was based on expected maximum activity levels as well as boring equipment accessibility.

It was also necessary to provide drilling water to the core boring machine, which required use of a water recovery system. Core bores were removed and identified as to orientation (outer and inner end and location). The steel plug removed from the core bore access hole in the wall also provided an induced activity sample. The core bore holes in the steel liner were restored by sealing with a sealing material.

Two of the core bore samples, including the steel plugs, were sent to GEL for analysis, including determination of the presence of tritium, whose characteristic low beta energy (20 keV, max) without accompanying gamma emissions was beyond the detection capabilities of any shipboard instrumentation. GEL's analysis indicated no detectable levels of tritium in either of the two samples. Both samples contained trace amounts (< 1 pCi/gm per isotope) of naturally occurring Th-232 decay products (Ac-228, Pb-212 and Tl-208) and naturally occurring U-238 decay products (Bi-214, Pb-214 and Th-230). The isotope, K-40, a naturally occurring isotope in building materials such as concrete, was present at activity levels in the 12-14 pCi/gm range, a factor of 4-5 higher than the K-40 content measured in paint or metal. This finding confirms the higher concentration of K-40 that would be expected in concrete versus either metal or paint. The broad array of naturally occurring isotopes (K-40, U-238 and Th-232 daughter products) detected in the bore samples are entirely consistent with the predictable isotopic content of a concrete structure.

The steel plugs exhibited no detectable radioactivity, which is an indication of negligible levels of neutron activation at those locations during reactor operation. This finding is corroborated by the absence of any detectable radioactive material except naturally occurring isotopes in either of the bore samples. Details of GEL's analysis are included in Appendix C.

4C.7 Air Samples

Airborne radioactive material was determined through the use of RADECO low-volume air samplers followed by quantitative analysis of residual radioactivity retained on the air filters inserted at the flow intake of the samplers. The high initial alpha levels followed by decay to background levels within 24 hours indicated the presence of naturally occurring radon (Ra-222) on the ship. These findings are consistent with likely sources of shipboard radon that include concrete, floor tiles, and porcelain furnishings. Likely sources of radon include concrete, floor tiles, and porcelain furnishings. Air sampling identified no other sources of airborne radioactivity and the results are included in Appendix C.

4C.8 Water Sample

One water sample (chromated water over-rinse residue) was collected from the empty neutron shield tank. No radioactivity was detected using onboard instrumentation. This finding was verified by GEL's analysis that found no detectable levels of radiation in the water sample. Details of GEL's analysis are included in Appendix C.

4D. SAFETY PRECAUTIONS

WPI implemented the N/S SAVANNAH Preliminary Accident Prevention and Health and Safety Plan that had been previously prepared and accepted by MARAD under another contract. This plan established comprehensive procedures for all feasible issues associated with the characterization effort. In addition, MARAD supplied a marine chemist, who released confined spaces, secondary containment, and primary containment for general access. Upon initial opening, the primary containment was oxygen deficient prior to ventilation being established. The Gas-Free Certificate is provided in Appendix D. Appendix E contains Project Exposure information for the team. All work in radiological areas was performed in accordance with a Radiation Work Permit (RWPs). The RWPs are provided in Appendix F.

4E. WASTE MANAGEMENT

Waste management was performed in accordance with project procedures described in Appendix G. All trash removed from radiologically controlled areas was frisked prior to determining its release status. If an item frisked clean, it was disposed of as normal trash following a confirmatory survey prior to leaving the vessel. If an item was found to contain radioactive material, it was bagged and stored onboard the NSS. In addition, before trash was removed from the NSS, the bags were frisked again as a precaution.

5. RADIOLOGICAL CHARACTERIZATION RESULTS

5A. RADIOLOGICAL PROFILE

One hundred eighty-five areas of the NSS were evaluated for radioactivity, including nine decks and seven compartments or areas that span decks vertically. In excess of 1400 smears were taken in these areas. One hundred and one surveys were documented and are included in Appendix C. Many of these surveys included multiple areas; as an example, five staterooms were usually documented on one survey. Summarizations of these areas are included in Tables 5A.3-1 through 5A.6-1.

5A.1 Dose Rates

For radiological areas outside of primary or secondary containment, general area dose rates ranged from background to 50μR/hour. Contact readings on some pipes reached 2mR/hour.

In non-radiological areas, general area dose rates were at or below background, with one exception in Cargo Hold 4, where shine from the Cold Chemistry Lab produces approximately 250μR/hour at the Cargo Hold 4 aft wall. Shine is radiation emanating from another location on the ship but being measured remotely.

Inside secondary containment, dose rates in the upper levels of secondary containment were essentially background. In lower secondary containment, general area dose rates varied 0.3–1.6 mR/hour, with contact readings of up to 221 mR/hour.

Inside CV general area dose rates varied 0.1–10 mR/hour, with the highest contact reading around the “U” tube end of the steam generators of 35 mR/hour.

Inside the steam generator primary side inlet plenum dose rates were a maximum of 344 mR/hour in the mid-plane of the plenum and the highest contact reading was 812 mR/hour, on the tube sheet.

A dose rate summary is included in the following sections.

5A.2 Radiological Contamination

No loose radiological contamination was found in unexpected places. Very little contamination was found in areas where it was expected. Several stateroom toilets, sinks, and floor tiles were found to contain NORM. A summarization of these areas is included in the following tables.

5A.3 Non-Radiological Areas

The non-radiological areas were clear of detectable radiological contamination. The non-radiological areas evaluated are summarized in the following table.

Table 5A.3-1
Non-Radiological Area Summary

Deck/compartments	Number of areas evaluated	Dose rate found	Contamination found
Navigation Bridge Deck	8	Background	All < background
Boat Deck	10	Background	All < background
Promenade Deck	2	Background	All < background
“A” Deck	20	Background	All < background
“B” Deck	44	Background	All < background
“C” Deck	31	Background	All < background
“D” Deck	11	Background	All < background
Weather Deck (“A” Deck) fwd and aft	15	Background	All < background
14’ Flat Deck	5	Background	All < background
Hold Deck	6	38 μR/hour*	All < background
Cargo Hold Number 4 (aft)	5	250 μR/hour**	All < background
Machinery Casing, boat to “C” Deck	4	Background	All < background
Engine and Control Rooms	8	Background	All < background
Hold Number 5, engineering space	2	Background	All < background

*Hold Deck had a pipe running under the deck plate in the passageway that read 38 μR/hour on contact. This pipe ran through a portion of the crossover area also. The pipe is for the waste transfer system. Lower dose rates were recorded at various areas of the passageway above the deck plates.

**Hold Number 4, "D" Deck Starboard, had readings on the aft wall up to 250 μR/hour. This appears to be shine from the Cold Chemistry Lab.

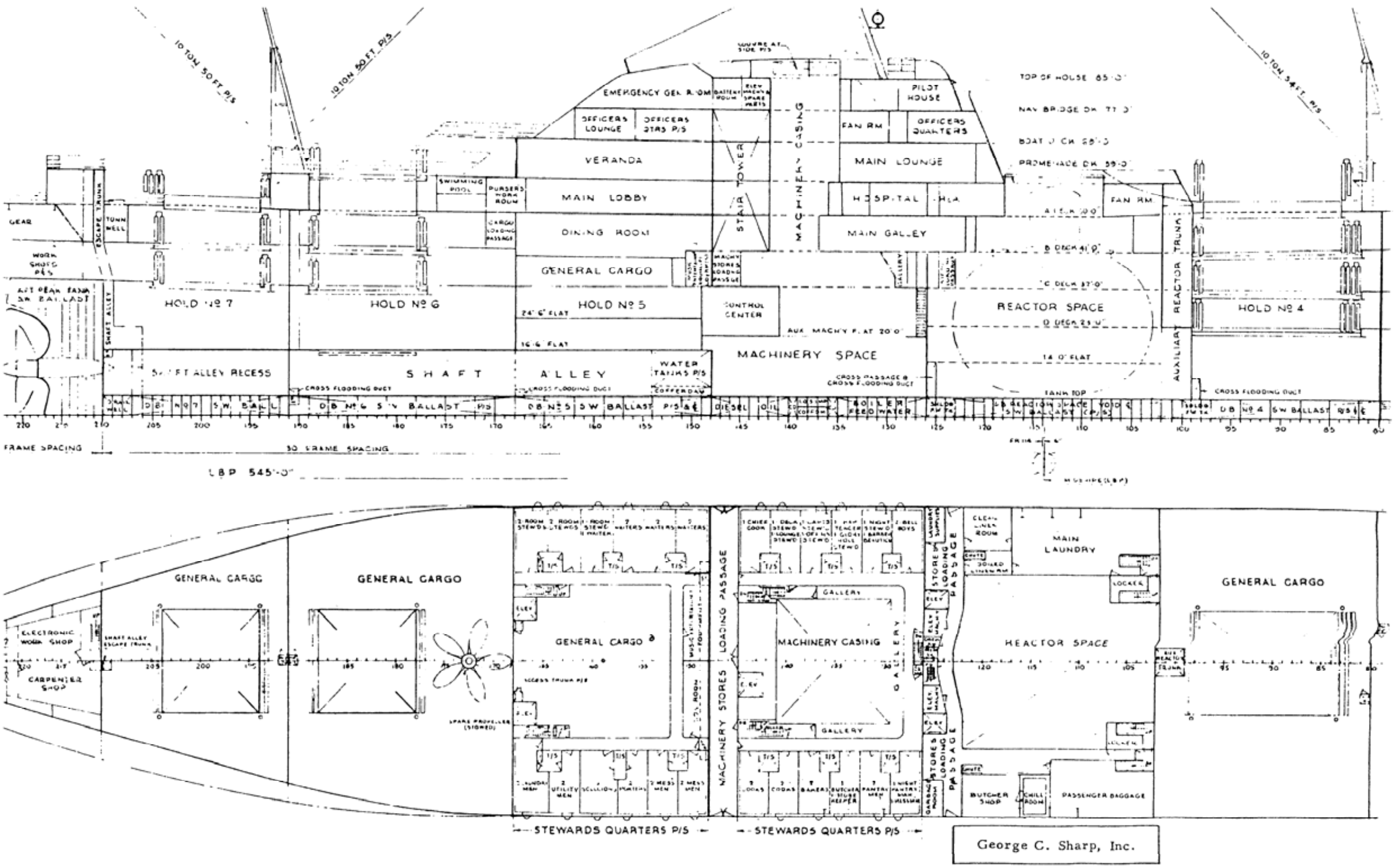
5A.4 Radiological Areas

Table 5A.4-1 provides a summary of radiological condition found during the evaluation of radiological areas excluding containment. The values listed are maximums. Figure 5A.4-1 provides a cross-sectional view of the NSS radiological area. Brief summaries are provided below with detailed information on the Survey Sheets in Appendix C.

Table 5A.4-1
Radiological Area Summary

Deck/compartments	Dose rate found	Contamination found dpm/100cm^2
Hot Chemistry Lab, "D" deck off of the control room	Background	< 1000
Port Forward Stabilizer Room, upper level off of 14' flat	8 μR/hour	All < background
Port Forward Stabilizer Room, lower level	150μ R/hour	All < background
Fan Room "B" Deck, starboard side	Background	All < background
Stateroom B-1 (radiological waste storage)	Background	All < background
Cold Water Chemistry Lab, upper level	50 μR/hour	All < background
Cold Water Chemistry Lab, lower level	2000 μR/hour	Max 3904
Hold #4, "D" Deck, starboard	250 μR/hour	All < background
Charge Pump Rooms, port and starboard	180 μR/hour	All < background
Health Physics Lab., "A" Deck	5 μR/hour	Max 1221
Hold Deck, outside containment, port-to-starboard crossover passage	25 μR/hour	All < background
Hold Deck, outside containment, port and starboard passages	38 μR/hour	All < background

Figure 5A.4-1
N/S SAVANNAH Cross Section, Frames 80–270



Hot Chemistry Lab, "D" Deck off of the Control Room

No radiological readings were found. Two locations had detectable contamination < 1000 dpm/100cm^2. See survey number NSS-0081. Detectable contamination was noted from smear samples taken at the drains in the hot lab. No radiological dose readings were noted above background.

Port Forward Stabilizer Room, upper level off of 14' flat

General area dose rates at mid walkway were 8 μR/hour. Forward of this at end of walkway dose rate was 5 μR/hour. Both appear to be shine from lower level. No radiological contamination was found. See survey number NSS-0059.

Port Forward Stabilizer Room, lower level

General area along walkway ranged 5–50 μR/hour. Green piping (waste transfer piping) on either side of walkway ranged 20–150 μR/hour on contact. No radiological contamination was found. See survey number NSS-0060.

Fan Room "B" Deck, starboard side (connects to Cold Chem. Lab)

No radiological readings were found. No radiological contamination was found. See survey number NSS-0062.

Cold Water Chemistry Lab, upper level, "C" Deck (port entrance)

The lab extends from port to starboard between stairwells. The general area dose rate on the port side is 4 μR/hour. A large, continuous air-monitoring unit covered with lead is stored in the starboard side. Dose rates of 4–50 μR/hour were found in and around this monitor. No radiological contamination was found. See survey number NSS-0064.

Cold Water Chemistry Lab, lower level, access is from upper level

Filter canisters located on port side of room read 200–600 μR/hour on contact. Overhead pipes on starboard side read 2000 μR/hour on contact. One location showed smearable radiological contamination. The sample sink inside the hood was 3904 dpm/100 cm^2. See survey number NSS-0070.

Hold #4, "D" Deck, starboard

The aft portion of this deck in Hold #4 has radiation readings 6–250 μR/hour. An overhead vent pipe has a reading of 38 μR/hour. The highest readings appear to be shine coming from the Cold Chemistry Lab, which is on the other side of the bulkhead. No radiological contamination was found. See survey number NSS-0063.

Charge Pump Rooms, port and starboard, lower level of engineering space

General area dose rate was background (2–4 μR/hour). On contact with the charge pumps, a maximum reading of 180 μR/hour was recorded. No radiological contamination was found. See survey number NSS-0086.

Health Physics Lab, “A” Deck at Hospital

General area in lab was background (2–4 μR/hour). Inside sink dose rate was 5 μR/hour. Frisker read 350 cpm in bottom of sink. Radiological contamination was found in bottom of sink at 1221 dpm/100 cm^2. See survey number NSS-0068.

Hold Deck, outside containment, port to starboard crossover passage

A reading of 25 μR/hour was found on the floor of the passage, port side. No radiological contamination was found. See survey number NSS-0066.

Hold Deck, outside containment, port and starboard passages, for and aft

Slightly elevated dose rate readings were found on the containment wall (7 μR/hour) on the starboard side. On the port side, a reading of 38 μR/hour on contact with a pipe under the deck plate was found. Tracing the pipe for to aft, elevated readings on the deck plate were found from 4 μR/hour to 18 μR/hour. No radiological contamination was found. See survey number NSS-0065.

5A.5 Secondary Containment

Table 5A.5-1 summarizes radiological conditions found during the evaluation of Secondary Containment. The values listed are maximums. Consult the write-ups below the table and survey sheets for details.

During initial entries and during other entries, outer shoe covers and outer gloves were frisked to determine whether radiological contamination was present. No contaminated shoe covers or gloves were found.

Table 5A.5-1
Secondary Containment Radiological Summary

Deck/compartments	Dose rate found*	Contamination found (dpm/100cm^2)*
“B” Deck, access area aft of reactor	Background	All < background
“B” Deck, area forward of reactor	Background	All < background
“C” Deck forward, access from “B” deck	Background	All < background
“A” Deck around cupola	Background	All < background
Top of Cupola	4 μR/hour	All < background
Aft Mezzanine, mid level between ”C” and “D” Decks	3–5 μR/hour	All < background
Lower level of Secondary Containment	221 mR/hour	All < background

*See write-up below for details.

“B” Deck, access area aft of reactor

Dose rates in this area were background (2–4 μR/hour). Frisking showed no locations above background (20–40 cpm). No radiological contamination was found. See survey number NSS-0067. No smearable contamination was noted. Dose rates were present due to activated material or contamination inside of other systems.

“B” Deck, area forward of reactor

Dose rates in this area were background (2–4 μR/hour). No radiological contamination was found. See survey number NSS-0072.

“C” Deck forward, access from “B” Deck

Dose rates in this area were background (2–4 μR/hour). No radiological contamination was found. See survey number NSS-0071.

“A” Deck around cupola

Dose rates in this area were background (2–4 μR/hour). No radiological contamination was found. See survey number NSS-0073.

Top of Cupola

No radiological contamination was found. See survey number NSS-0090.

Aft Mezzanine, mid level between ”C” and “D” Decks and decon shower on ”C” Deck

General area dose rates were 3–5 μR/hour. No radiological contamination was found. See survey number NSS-0075.

Lower level of Secondary Containment, access down ladder tube only

General area starboard side 300–1000 μR/hour, 1400–1600 μR/hour head high. Overhead yellow line emits 221 mR/hour on contact. These lines are posted. Starboard forward general area is 400–500 μR/hour. Port side general area was 60–80 μR/hour. No radiological contamination was found. See survey number NSS-0076.

5A.6 Primary Containment

Table 5A.6-1 provides a summary of radiological condition found during the evaluation of Primary Containment. The values listed are maximums. Consult the write-ups below the table and survey sheets for details. Figures 5A.6-1 through 5A.6-5 provide a layout of the primary containment by elevations and plan views.

During initial entries and during other entries, outer shoe covers and outer gloves were frisked to determine whether radiological contamination was being spread. No contaminated shoe covers or gloves were found.

Table 5A.6-1
Primary Containment Radiological Findings

Deck/compartments	Dose rate found	Contamination found ($dpm/100cm^2$)
Primary Containment, upper hatch closed	15 μR/hour	All < background
Primary Containment, upper hatch open	400 μR/hour	All < background
Primary Containment, 1ST level	500 μR/hour	1200
Primary Containment, inside shield tank upper ring	7 mR/hour	All < background
Primary Containment, 2nd level	3 mR/hour	All < background
Primary Containment, 3rd level	10 mR/hour	< 1000
Primary Containment, 3rd level, area over U-tube steam generator	35 mR/hour	< 1000
Primary Containment, 4th level	3 mR/hour	All < background

Figure 5A.6-1
Primary Containment Equipment Layout

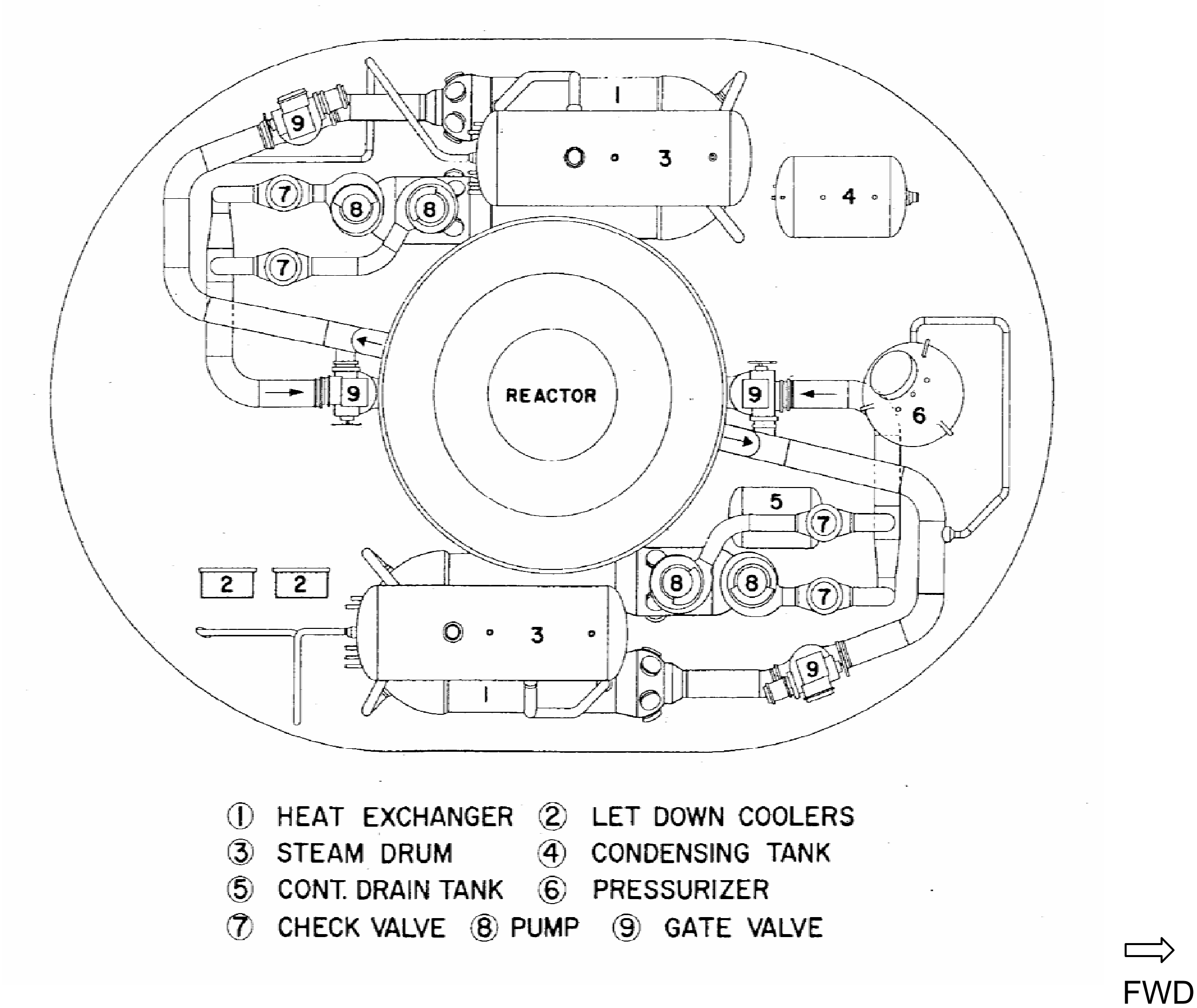


Figure 5A.6-2
Primary Containment Level 1 (Top)

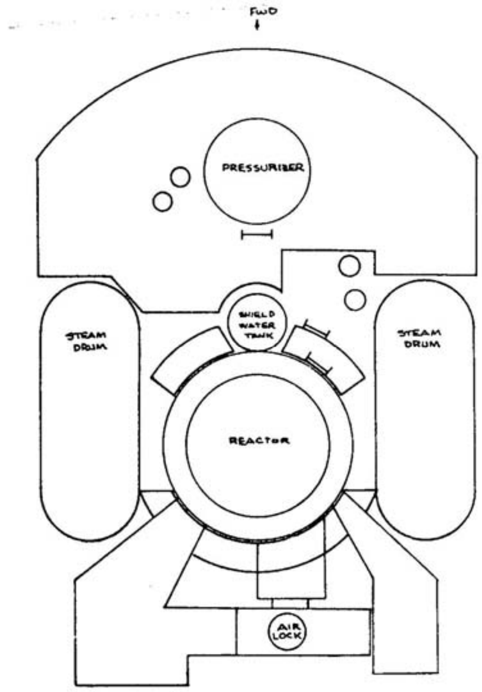


Figure 5A.6-3
Primary Containment Level 2

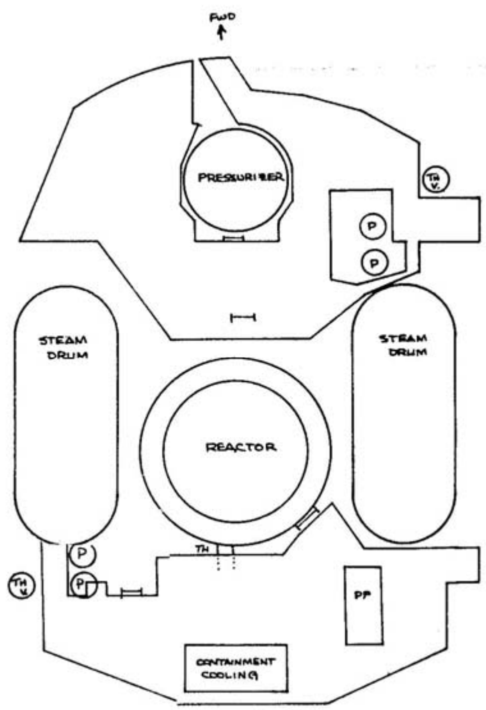


Figure 5A.6-4
Primary Containment Level 3

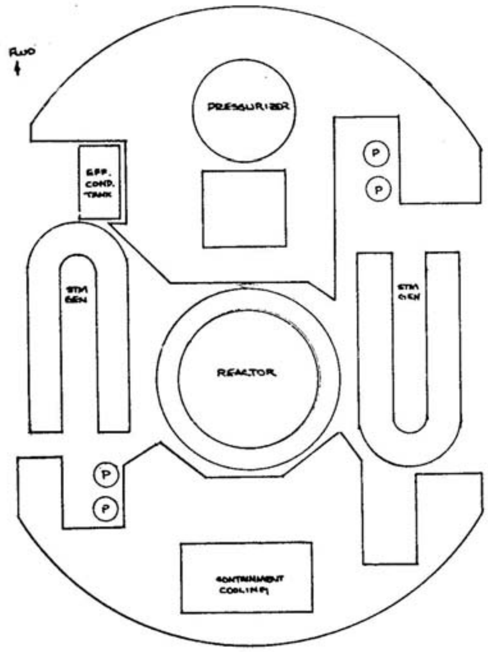
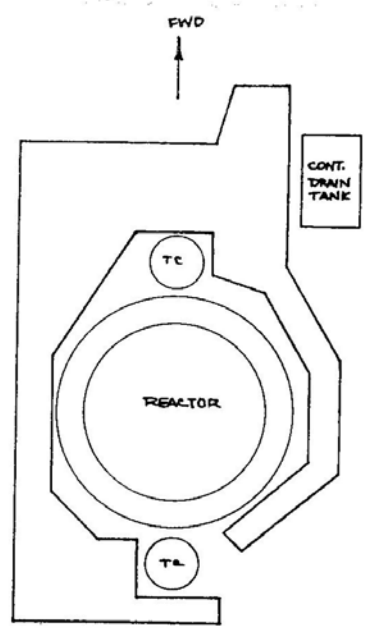


Figure 5A.6-5
Primary Containment Level 4 (Bottom)



Primary Containment, upper hatch closed, after plug removal

Dose rate at gauge on upper hatch 15 μR/hour. No radiological contamination was found. See survey number NSS-0069. No smearable contamination was noted. Dose rates were present due to activated material or contamination inside of other systems.

Primary Containment, upper hatch open

Dose rate in airlock 400 μR/hour. No radiological contamination was found. See survey number NSS-0074 and NSS-0077. No smearable contamination was noted. Dose rates were present due to activated material or contamination inside of other systems.

Primary Containment, 1ST level

The aft area of 1st level general area dose rate is 0.1–0.5 mR/hour. Next to and forward of the reactor, dose rates vary, with the highest being on the starboard side of the pressurizer at 0.7 mR/hour. Radiological contamination found in several locations <1000 dpm/100cm^2. One location to right of pressurizer has radiological contamination at 1200 dpm/100cm^2. See survey numbers NSS-0087, NSS-0079, and NSS-0083.

Primary Containment, inside shield tank upper ring, neutron wells, and inside neutron shield tank access area

General area dose rate 300–500 μR/hour. Readings were taken in neutron detector wells that extend down next to the reactor wall inside the neutron shield tank. There is lead shielding installed on the OD of the neutron detector wells.

Neutron well	Midpoint reading	Bottom reading
Aft well	2.2 mR/hour	3.4 mR/hour
Forward well	2.4 mR/hour	3.7 mR/hour

There is a personnel hatch into the neutron shield tank. Reading taken 7 feet down from flange (core mid-plane) was 7 mR/hour. No radiological contamination was found inside the shield tank upper ring or inside the shield tank. See survey number. NSS-0087 and NSS-0091.

Primary Containment, 2nd level

Dose rates on Level 2 vary 0.1–3 mR/hour. Highest reading is forward starboard near steam drum. No radiological contamination was found. See survey number NSS-0084.

Primary Containment, 3rd level

Dose rates on Level 3 vary 0.1–10 mR/hour. Highest reading is aft starboard near U-tube steam generator. Radiological contamination was detected up to 300 dpm/100cm^2 in two locations. See survey number NSS-0085.

Primary Containment, 3rd level, area over U-tube steam generators

Starboard steam generator dose rate between down-comers was 24 mR/hour. Port steam generator dose rate between down-comers was 35 mR/hour. Radiological contamination was detected ~150–~650 dpm/100 cm^2 in six locations between the down-comers on the U tube steam generator, starboard side. See survey number NSS-0089.

Primary Containment, 4th level

General area dose rate was 1–3 mR/hour. No radiological contamination was found. See survey number NSS-0082.

Primary Containment, 3rd level, opening primary system of steam generator

Port and starboard generators were opened. Unexpectedly, both had significant water in them, which was not indicated to be the case when the plant was originally dewatered.

Dose rates	**Starboard steam generator (mR/hour)**	**Port steam generator (mR/hour)**
Outside inner cover seal	32	34
At opening plane	45	NA
At mid plenum	275	344
At tube sheet	525	812
	Survey number NSS-0096	Survey number NSS-0097

Contamination levels	**Starboard steam generator (dpm/100cm^2)**	**Port steam generator (dpm/100cm^2)**
Inside, top of plenum	14,798	22,000
Inside, left of access opening	13,183	6,096
Inside, right/below of access opening	51,682	4,144
Plenum tube sheet	166,730	378,673
Inside surface of SS	10,211	7,654

cover seal		
	Survey number NSS-0096	Survey number NSS-0097

Surveys after work was performed showed smearable radiological contamination of <500 dpm/100cm^2 in work areas. This is well below the regulatory limit of 1000 dpm/100cm^2.

From the RPV dose rate information taken at the RPV external wall near the core mid-height location, the following is known. The actual reading of 7 mR/hour that is about an order of magnitude lower than expected is attributable to the residual Co-60, which was estimated from previous analytical analysis to be 1108 curies distributed throughout the internals and structural components of the RPV. Though other nuclides are known to reside in the RPV, only the gamma radiation from Co-60 (1.17 and 1.32 MeV) are sufficiently energetic to penetrate the thermal shields, core barrel, and RPV wall resulting in measurable doses above background external to the RPV.

An estimate of dose rate at the exterior of the vessel was made using a point source approximation along the centerline of the vessel at mid-core height as outlined in Appendix B. This analysis gave a dose rate of 85 mR/hour. The higher estimated versus measured dose suggests an overprediction of the total RPV curie content in the original analysis. The difference between measured and calculated is likely attributable to one or more of the following factors:

- overprediction of thermal neutron flux in the core internals
- use of high natural cobalt (Co-59) content (0.141%) for analysis (maximum ASTM values)
- underprediction of Co-60 gamma shielding/absorption by the heterogeneous arrangement of core internals and structural components that tend to depress neutron flux during normal operation.

5A.7 Air Samples

To reduce the time project members spent wearing respirators and to protect them from potential inhalation of radiological material, air samples were taken on initial entry into radiological areas and during evolutions with potential radiological consequences. A total of 11 air samples were taken. Locations are listed below.

All of the air samples were heavy with radon when counted right after sample acquisition. All samples required several counting periods with the last count in excess of 72 hours to thoroughly demonstrate the lack of any airborne radioactivity other then radon. This resulted in excess respirator time for some of the project members. Refer to Appendix H for respiratory protection discussion.

After the last count for each air sample was completed, all samples showed negative for airborne radioactivity. See Appendix C for individual air sample data.

Air sample locations:

- Cold Chemistry Lab, initial
- Access to Secondary Containment
- Charge Pump Room starboard
- Airlock for Primary Containment
- Primary Containment, 1st level
- Charge Pump Room, follow-up
- Cold Water Chemistry Lab, follow-up
- Primary Containment, 2nd level
- Secondary Containment, lower level
- Primary Containment, 4th level
- Primary Containment, 3rd level at port U-tube steam generator access hatch

6. ENVIRONMENTAL CHARACTERIZATION (HAZMAT)

6A. SCOPE

The objective of the NSS hazardous materials characterization program was to support MARAD in its decommissioning planning, cost estimating, radiological engineering, and scheduling efforts. To this end, hazardous materials (e.g., PCBs, lead, asbestos, etc.), which potentially may impact the decommissioning activities and/or downstream waste management will be identified. Under this scope, hazardous materials associated with fixed surfaces on the ship were surveyed and identified in both radiological and non-radiological spaces on the vessel

Personnel used existing vessel data, visual surveys, and sample collection/chemical analysis as part of the hazardous material characterization effort. All efforts were conducted in a manner consistent with the Characterization Plan and specified elements of Quality Assurance Project Plan. Prior to the sampling effort, personnel reviewed available details of the vessel's infrastructure and operational equipment for potential sources, amounts, and relative hazards of potential contaminants. Target sampling items and locations were indexed and located on vessel schematics.

6A.1 Asbestos-Containing Material

Using available information and visual surveys, potential asbestos-containing materials (ACM) were identified, indexed, and mapped. This effort took place within both the radiological and non-radiological parts of the ship. Within the radiological spaces, samples of potential ACM were collected, mapped, and photographed. These samples were analyzed by an off-site laboratory (Aerosol Monitoring and Analysis, Lanham, Md.) to identify asbestos content. Within non-radiological spaces, representative samples of potential ACM were acquired, mapped, and photographed. These samples were placed in labeled bags and left aboard the ship for potential future analysis, as necessary.

Subsequent to the receipt of analytical results of samples collected from the radiological areas of the ship, quantities of ACM were estimated based on observations, data, and available maps of the ship. Personnel did not revisit the ship subsequent to the receipt of the analytical data to develop more accurate estimates of ACM quantities on those surfaces that tested positive for asbestos (i.e., Chrysotile or Amosite).

6A.2 Lead-Based Paint

The lead-based paint (LBP) testing was performed with a Radiation Monitoring Device (RMD) Model LPA-1 X-ray fluorescence analyzer (XRF). The XRF contains a small radioactive (cobalt-57) source, which emits radiation when pressed against a surface and the trigger is depressed. If the paint contains lead, the radiation stimulates the lead atoms to emit characteristic X-rays, which are sensed by a detector in the unit. The XRF then converts these signals to a final reading in milligrams per square centimeter. The LPA-1 XRF is capable of achieving a 95% confidence level in readings to a depth of 3/8-inch.

Calibration of the RMD LPA-1 was conducted in accordance with the manufacturer's instructions. Prior to obtaining readings from suspect surfaces, three calibration readings were collected on a National Institute of Technology (NIST) Level III Standard

Reference Material paint film. The LAP-1 must calibrate to 1.0 mg/cm^2 with a tolerance of ±0.3 mg/cm^2 for the average of the three readings. If the calibration readings fell outside of this range, the equipment was rechecked and recalibrated before use.

For this survey, the XRF was set to a default value of 1.0 mg of lead per square centimeter of surface area tested. The Virginia Lead-Based Paint Activities Regulations, 18 VAC, 15-30-20, defines a lead-containing substance as any coating, paint, plaster, or surface encapsulation material containing greater than or equal to 1.0 mg/cm^2 of lead.

6A.3 Liquids

The location of equipment and tanks which potentially contain fuels, lubricants, and coolants were identified and noted on vessel schematics, and an index was compiled. Samples of liquids identified on the ship were collected for material characterization to assist in future decommissioning activities. This effort included both aqueous samples and oils. Samples from the non-radiological portion of the ship were labeled and left on the vessel for potential future analysis. Liquid samples from the radiological areas of the ship were transferred to a WPI-approved vendor for analytical testing.

6A.4 PCBs

Electrical equipment that potentially contains PCB-containing dielectric and electrical conduit was identified through review of vessel information and visual survey.

6A.5 Mercury

As part of the hazardous materials characterization, thermometers and switches were inspected in an effort to determine whether they potentially contained mercury. As these units were sealed, no samples were collected.

6B. RESULTS

Results of the hazardous materials characterization of the NS Savannah are presented below. With the exception of lead-based paint testing, the multimedia samples collected from the non-radiological areas of the ship were not analyzed. Those samples, which were collected, were transferred to MARAD for potential future analysis. These samples from the non-radiological spaces were not within the scope of the project. The samples were gathered for future analysis if desired.

Table 6B-1 provides an analytical summary of the results of the water and oil samples obtained in the radiological spaces.

Table 6B-1
Radiological Spaces Liquid Sample Summary

Sample ID	Units	Secondary Containment Sump (oil)	Secondary Containment Sump (water)	Primary Containment (hydraulic oil)	Stabilizer Rooms (hydraulic oil)	Stabilizer Rooms (lube oil)
Metals						
Cadmium	mg/L	NA	0.02	NA	NA	NA
Chromium	mg/L	NA	0.3	NA	NA	NA
Mercury	mg/L	NA	0.00027	NA	NA	NA
Lead	mg/L	NA	0.5	NA	NA	NA
PCBs						
Aroclor 1016	mg/kg	76	NA	1180	28	BQL*
Aroclor 1260	mg/kg	197	NA	430	12	BQL*
Total halogens	mg/kg	107	NA	242	73	BQL*

* BQL = below the quantification limit.

6B.1 Asbestos-Containing Materials

To asses the asbestos content of materials on the ship, samples of potential ACM were collected from both the radiological and non-radiological areas. Samples collected from the radiological sections of the ship were submitted to Aerosol Monitoring & Analysis, Inc. (AMA) for analysis. Samples collected from the non-radiological areas of the ship were secured in labeled zip-lock bags, documented on field log sheets, and stored in a box on the vessel for potential future analyses, as determined by MARAD.

Asbestos samples were collected using appropriate coring devices and proper wetting techniques to minimize potential fiber release. Average sample size was approximately 0.5×0.5 inches. The samples were placed in sealed bags and labeled with a unique sample identification number (ID). All sample locations were encapsulated using duct tape and labeled with the appropriate sample ID Number. Sample locations were recorded on the arrangement drawings, and a digital photograph of each sample was taken. Sample location maps and the photographic documentation are presented in Appendix I and Appendix J, respectively.

Three bulk samples of each homogeneous material were taken. Samples taken from the non-radiological areas of the ship were provided to MARAD for cataloging purposes and potential future analysis. Samples taken from the radiological areas were analyzed via polarized-light microscopy (PLM) by AMA. A material that contains ≥1% asbestos is considered an ACM. A material is not considered to be an ACM if the three samples of the homogeneous material contain <1% asbestos. Field datasheets and sampling results are given in Appendix K and Appendix L, respectively. Most of the samples analyzed from the radiological areas of the vessel contained asbestos (i.e., both Chrysotile and Amosite). Subsequent to receipt of the laboratory data, personnel estimated quantities of ACM from the radiological areas of the ship. This rough estimate was based on observations made during sample collection and room dimensions obtained from vessel maps. Personnel did not revisit the ship subsequent to receipt of the lab data to refine these estimates of ACM quantities. The listed estimates in Appendix L are rough orders of magnitudes.

In addition to sample collection logs and diagrams of each deck showing the location of each ACM sample, photographs of all the sample locations were obtained. These photographs are included in Appendix J.

6B.2 Lead-Based Paint

On-site XRF technology was employed for rapid lead content quantification in paints throughout the vessel. Representative locations were analyzed to quantify lead content in real-time using XRF techniques. Excluding calibrations, 523 readings on the accessible painted interior and exterior surfaces of the NS Savannah were collected. WPI was assisted in this task by ERM and AMA of Lanham, Md.

Of the 523 readings, 57 were ≥1.0 mg/cm^2. As noted previously, this is the value at which the state of Virginia classifies materials as "lead-containing." Results for each measurement taken during the screening can be found in the field forms attached in Appendix M. In addition, Tables 1 and 2 within Appendix M summarize the positive analytical readings collected in the radiological and non-radiological areas of the ship, respectively. Tables 1 and 2 in Appendix M also summarize the analytical results obtained from paint chips collected on the ship and analyzed at the AMA laboratory for quality control purposes. Selected photographs of the lead-based sampling effort throughout the ship are presented in Appendix N.

6B.3 Liquids

As part of the ship characterization effort, liquids that remain in the radiological and non-radiological areas of the boat were sampled for characterization. Samples were collected using a dedicated plastic bellows-type sampler and placed in laboratory supplied bottleware. Once collected, the samples were sealed in zip-lock bags and placed in a cooler with ice. Liquids collected from the radiological areas of the boat were analyzed by Froehling & Robertson (F&R), a Virginia-certified environmental laboratory located in Richmond. Liquid samples collected from the non-radiological areas of the boat were documented and placed in a cooler that remained on the ship for analysis at a later time, if desired.

Samples collected from the non-radiological areas of the ship include hydraulic oils from the winches and steering gear, and lubricating oils from the boat emergency generator. Liquid samples collected from the radiological area included water and oil from the sump in the lower Secondary Containment area, hydraulic oil from the Primary Containment area, and lube oil and hydraulic oil collected from the ship stabilizer compartments. These samples were analyzed to assist in the characterization of these materials for the purpose of future disposal options by a decommissioning contractor.

Oils were analyzed for total halogen content and PCBs, and the water sample was analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. Analytical results for the liquid samples collected from the radiological areas of the boat were analyzed, and the results are included in Appendix O. Halogens and PCBs were detected in the Secondary Containment sump oil, Primary Containment hydraulic oil (oil from control rod drive mechanisms), and Stabilizer Room hydraulic oil. Metals were detected in the Secondary Containment sump water. It should be noted that volumetric estimates of the liquid samples could not be obtained, as the size of the liquid containment for the various liquids was not discernable.

6B.4 PCBs

In addition to the liquid oil samples collected for PCB analysis, power transformers on the ship were inspected to evaluate PCB content. According to personnel knowledgeable about historic ship operations, power transformers on the boat were all dry-type transformers. The vessel was checked for liquid-containing transformers by those involved with the characterization and none were found. However, based on the date of ship construction, it is likely that capacitors in the fluorescent light ballasts present throughout the ship contain small quantities of PCBs. These ballasts ended using PCBs content in 1978. Samples of light ballasts and electrical wiring were not collected for analytical testing as part of the characterization.

Polychlorinated Biphenyls (PCBs) are a concern for ships of the SAVANNAH's vintage. WPI characterized several liquids but the description of the non-liquid items that may contain PCBs was a bit brief. Section 6A.4 provides general information related to dielectric and electrical conduit, but you should be aware that PCBs may also be in paint coatings as well as other non-liquid media.

Painted surfaces that contain ≥ 50ppm PCBs may not be torch cut. Combustion of PCBs is prohibited per 40 CFR 761.50. If the decommissioning entails the cutting of painted surfaces, the paint should be analyzed for PCBs or presumed to contain regulated concentrations. "Regulated" painted surfaces must be mechanically removed at and around the burn line to prevent heating of the paint.

The reader should be aware that PCBs may be found in non-liquid media aboard the vessel. "High probability" non-liquid media includes: electrical cable, ventilation gaskets, grease, rubber applications such as electrical channel rubber and pipe hanger liners, adhesives, and caulking/grouting. If these items are removed during the decommissioning, they must be handled and disposed of in accordance with 40 CFR 761 et seq.

6B.5 Mercury

As part of the hazardous materials characterization, thermometers and switches throughout the ship were inspected in an effort to determine the potential presence of mercury-containing materials. Based on the inspection, and in accordance with WPI sources knowledgeable of the ship, no mercury-containing thermometers or switches were documented on the boat. Visual observations of the thermometers did not suggest that any thermometers contained mercury. Based on the year of construction and years of operation, it is possible that some fluorescent light bulbs on the vessel contain mercury.

7. QUALITY ASSURANCE

The characterization effort was performed in accordance with the Quality Assurance Project Plan. WPI's Nuclear QA program was applied to data/sample management, vendor analyses, and instrument calibration/use. Project implementing procedures were developed and followed during the implementation of the project.

8. SERAT REPORT

Thomas Jefferson National Accelerator Facility (Jefferson Lab) entered into an agreement with the MARAD to provide support for the SERAT. Commensurate with its role of health physics support for Savannah Emergency Response Assessment Team (SERAT) efforts, Jefferson Lab conducted a series of measurements to confirm the primary nuclides of concern remaining in the reactor systems of the NSS. The report detailing these findings is contained in Appendix P.

Appendix A
Key Personnel Biographies

R. Jon Stouky **Project Manager**

Mr. Stouky has over 44 years of experience in nuclear-related activities, including decommissioning, waste management, spent fuel, safety, and risk assessment. Currently, he is WPI's Senior Vice President, Energy Services and is responsible for managing the nuclear field services lines. Previously, Mr. Stouky was the owner and president of a company focused on nuclear decommissioning services, as well as being the president and chief operating officer of a nationally known nuclear waste management and disposal company.

Mr. Stouky managed the radiological and non-radiological support for the characterization program on the U.S. Army Nuclear Barge STURGIS. He also served as the Project Manager for the contractor engineering support services for the STURGIS in the Panama Canal Zone and preliminary decommissioning efforts. Mr. Stouky has served in several capacities on the N/S SAVANNAH shore and shipboard staff dating back to 1961.

Mr. Stouky has specific expertise in decommissioning, maintenance, and operational aspects of nuclear power plant management, including spent nuclear fuel handling and storage and waste processing. In addition, he has developed techniques and tools for the processing of irradiated and contaminated equipment/components. Recently, Mr. Stouky has been involved in reviewing and recommending options to a nuclear utility company regarding the development of an Interim Spent Fuel Storage Installation (ISFSI) and the selection of an appropriate spent fuel storage container.

Patsy Hosner **QA Manager**

Ms. Hosner has over 20 years of experience in quality assurance and communications. She has developed, implemented, and managed the WPI Nuclear Quality Assurance (NQA) program used by WPI following the guidance of NQA-1, Quality Assurance Requirements for Nuclear Facility Applications, which complies with NRC requirements. Her responsibilities include developing and maintaining the NQA documentation system (e.g., manual and implementing procedures), developing and maintaining NQA online training, and NQA auditing.

John Bowen **Project Engineer**

Mr. Bowen has over 22 years of experience in the nuclear industry with a focus on decommissioning, spent fuel project management and engineering, spent fuel storage/transport systems design and fabrication, reactor vessel engineering issues, and project management and engineering for nuclear power plant systems startup, installation and maintenance. He currently serves as WPI's Chief Engineer, Nuclear Services.

He has been a project manager for the design, testing, NRC licensing, fabrication, and delivery of a spent fuel dry storage/transport system, including ISFSI design. Additionally, he was involved the fabrication and delivery of a spent fuel management system (dry storage and transportation) with primary interface responsibility for all customer fabrication concerns, questions and managing various fabrication vendors.

Mr. Bowen has extensive nuclear operations experience and held a Senior Reactor Operator certificate for a commercial power plant. In addition, he was intimately involved with several commercial nuclear power plant initial power ascension test programs in both the start-up coordinator and test director positions. He was involved and coordinated major power plant modifications and outages.

Richard Ranellone, P.E. **Nuclear Engineer**

Mr. Ranellone has over 34 years of experience in decommissioning engineering, project management, and technology development. He has supervised up to 50 engineers on design/technology development projects. Mr. Ranellone is knowledgeable of all nuclear power systems, including fuel cycles, disposition of nuclear waste, safeguards and health physics. He has a masters degree in nuclear engineering and is a registered professional engineer.

Mr. Ranellone provided health physics and technical assistance in the radiological and non-radiological characterization of the STURGIS. He also provided services in the selection of sampling points and the equipment used in the analysis. Mr. Ranellone has managed U. S. Department of Energy and commercial programs, including nuclear facilities design, maintenance and characterization, depleted uranium disposition, decontamination and decommissioning, waste management, spent nuclear fuel handling/storage/transportation, and radioactive metal recycle.

Franco Godoy **Environmental Management**

Mr. Godoy, a chemical engineer with over 20 years of experience as an environmental R&D, systems, and consulting engineer, provides the team with life-cycle plant design and operations environmental support. His experience base spans environmental support throughout the process development and design phases, planning and permitting, through operation and closure. Mr. Godoy's experience includes heavy industry, manufacturing, and transportation sectors with representative clients including General Dynamics, Northrup, Lockheed, Rockwell, McDonnell Douglas, Morton Thiokol, General Electric, and Norfolk Southern. His background includes work as a process/systems engineer involved in scale-up of pilot processes and included characterization of materials and wastes to facilitate optimal management/control. He brings an extensive background in hazardous material/waste management in the areas of characterization, control, and regulatory/reporting requirements. He has provided support to both industry and regulatory agencies in the development and/or review of emissions, discharges, and waste management permitting. Mr. Godoy has also been instrumental in the development and implementation of facility and enterprise-wide environmental management systems.

Robert Pennock **Radiological Operations**

Mr. Pennock is a qualified health physicist with 25 years of experience in field and laboratory operations. He has provided services both as a consultant and a direct utility employee in the areas of training, HP management, supervision, industrial hygiene, and safety. In addition, he has worked as a technician on the radiological and non-radiological characterization of a nuclear facility. Mr. Pennock has developed and implemented employee training and ALARA programs. He has also extensive experience in industrial hygiene program development and management.

Loman Scott **Lead Technician**

Mr. Scott is a retired municipal employee who has provided mechanical and electrical services to contractor's facilities, tooling, access to spaces, as well as sampling services in the characterization of the STURGIS. He also assisted in radiological and non-radiological services and was trained/qualified to JRRF requirements.

Appendix B
Radiological Calculations and Calibrations

REACTOR PRESSURE VESSEL EXTERNAL DOSE RATE

A gamma dose rate measurement was taken at the Reactor Pressure Vessel (RPV) external wall near the core mid-height location. The reading was 7 mR/hour, as measured on inside wall of the Neutron Shield Tank. This dose is attributable to the residual Co-60, which was estimated from previous analytical analysis to be 1108 curies distributed throughout the internals and structural components of the RPV. Though other nuclides are known to reside in the RPV, only the gamma rays from Co-60 (1.17 and 1.32 MeV) are sufficiently energetic to penetrate the thermal shields and RPV wall, resulting in measurable doses above background external to the vessel.

Other isotopes within the RPV that contribute to the total curie content include Ni-59 and Ni-63 with trace amounts of Fe-55, C-14, and Nb-94. Ni-59 decays by electron capture and emits K-shell X-rays with a maximum energy of 8 keV. The large attenuation coefficients in stainless and carbon steel resulting from the photoelectric effect for these low energy photons would preclude their contribution to dose rates external to the vessel. Ni-63 decays by beta emission with an average beta energy of 17 keV. Even if it is conservatively assumed that all beta energies are converted to radiation by deceleration in the electric field of a nucleus (bremsstahlung), as with Ni-59, the emitted photons would not penetrate the vessel wall.

In addition, the carbon steel RPV contains no natural nickel or cobalt that would have been activated during reactor operation. Previous calculations also showed that the thin stainless steel liner on the interior of the vessel contributes negligible activity to the current internal curie content.

The distribution of Co-60 activation in the RPV is heterogeneous, being dependent on stainless steel location, geometry, and neutron thermal flux profiles in the reactor during operation. The core basket and upper and lower transition nozzles comprise over 80% of the total Co-60 curie content in the vessel. The core barrel and inner and outer shield are intended to reduce the total neutron fluence on the RPV wall, thereby limiting degradation of the vessel's ability to endure abnormal transients.

An estimate of dose rate at the exterior of the RPV was made using a point source approximation located at the centerline of the vessel at the core mid-height. Though all internals and structural components provide some absorption and attenuation of Co-60 gamma photons, primarily through Compton scattering, shielding credit was taken only for the inner and outer shield, core barrel, RPV wall and steel annulus external to the RPV where the dose measurement was taken.

The following formula was used to estimate the exposure rate from a point that emits gamma rays:

$$D\ (R/hour) = 0.5\ C\ E/r^2 ,$$

where

C	=	activity in curies = 1108 curies from previous analysis,
E	=	gamma energy in MeV = 1.17 MeV + 1.32 MeV = 2.49 MeV, (Note: Co-60 emits two gamma rays in over 99% of its disintegrations)
r	=	distance from point source in meters = 1.12 m,
D_o	=	1108 R/hour.

Using this quantity for the gamma flux incident on the slab shield formed by the inner and outer shield, core barrel, RPV wall and steel annulus for insulation containment, the exposure dose external to the RPV was calculated using the formula for uncollided gamma flux multiplied by a suitable buildup factor:

$$D\ (\text{measurement point})/D_o = B(E, \mu t)\ e^{-\mu t} ,$$

where

μ	=	energy-dependent linear attenuation coefficient for steel = 0.395 /cm,
t	=	thickness of shield material between reference point and measurement point = 9.82 cm,
B	=	buildup factor dependent on gamma energy (E) and relaxation lengths (μt)= 10.

Substituting these values in the above equation and solving for D:

$$D = 85\ mR/hour .$$

CRUD ANALYSIS

Smears of the interior piping of the primary system were taken at the entrance to the port and starboard side steam generators by removing access covers. A total of five smear samples was obtained from inlet of each steam generator hot leg, including three in the vicinity of the access cover, one on the interior of the access cover, and one at the tube sheet entrance. The principal isotope in the crud was confirmed to be Co-60 through use of gamma spectroscopy.

All 10 smears were counted on the Ludlum 2929 counter (#2). The smear taken at the port side tube sheet had a count rate 2.3 higher than any of the other nine smears and was used for crud analysis.

Net count rate = 78,764 counts per minute (cpm)
Counter efficiency = 20.8%

All smears were assumed to be 100 cm^2, so the activity level in disintegrations per second (dps) is:

78,764/0.208 = 378,673 dpm/100cm^2 x 60 sec/min = 6311 dps/100 cm^2 .

1 curie = 3.7E10 dps .

Activity = 6311 dps/100 cm^2 x 3.7E10 = 1.71E-9 C/cm^2 .

Assuming this crud concentration to be uniformly distributed over the interior surface of the reactor pressure vessel:

Reactor Pressure Vessel dimensions = 27 ft. H x 8 ft. D .
Surface area = 6.79E2 ft^2 x 9.29E2 cm^2/ft^2 = 6.30E5 cm^2 .

Activity = (1.71E-9 C/cm^2) x (6.30E5 cm^2) = 1.08E-3 C ~ 1 mC .

This is a negligible quantity compared to the total estimated activity level in the pressure vessel of 4066 curies.

Smear/Air Sample Counting
LLD, MDA, and Activity Determinations

Each counter's average background count rate was determined and source efficiency tests performed. Background and source counts were based on a series of 20-minute counts. Results were as follows:

Counter #1

Alpha		**Beta**	
Background	Efficiency	Background	Efficiency
0.325 cpm	33.6%	39.2 cpm	25.2%

Counter #2

Alpha		**Beta**	
Background	Efficiency	Background	Efficiency
0.525 cpm	31.2%	42.15 cpm	20.8%

Lower limit of detection (LLD) (also referred to as net minimum detectable count rate [MDCR]) and minimum detectable activity (MDA) calculations were performed for several counting times based on NUREG/CR-4007.

$$\text{LLD (net cpm)} = \frac{2.71 + (3.29)\sqrt{\frac{R_b\,(t_S)\,(t_S + t_B)}{t_B}}}{t_S} \qquad \text{MDA (dpm)} = \frac{\text{LLD}}{\text{Eff.}}$$

where:

R_b = background count rate (cpm),
t_B = background count time (min),
t_S = sample count time (min).

Gross minimum detectable counts were determined for each count time by the following formula.

$$\text{MDC} = t_S\,[\text{net MDCR (cpm)} + \text{background (cpm)}]$$

For air samples of 100 ft^3 volume, MDA concentration in μCi/cc were calculated for appropriate counting times using the following formula:

$$\text{MDA } (\mu\text{Ci/cc}) = \frac{\text{MDA(dpm)}}{} \cdot \frac{1\ \mu\text{Ci}}{(2.22\text{E}6\ \text{dpm})} \cdot \frac{1\ \text{ft}^3}{(100\ \text{ft}^3)} \cdot \frac{1\ \text{L}}{(28.32\ \text{L})\ 1000\ \text{cc}}$$

Results for all the above calculations for each counter are tabulated in the following charts.

Counter # 1 (Serial #102001)								
Alpha					Beta			
Count time (minute)					Net MDCR			
Count time (minutes)	Net MDCR (cpm)	Gross MDC	MDA (dpm)	Air MDA** (µCi/cc)	Net MDCR (cpm)	Gross MDC	MDA (dpm)	Air MDA** (µCi/cc)
60	0.529	51	1.57	$2.5E^{-13}$	5.35	2673	21.2	$3.4E^{-12}$
30	0.632	28	1.88	$2.99E^{-13}$	6.03	1357	23.9	$3.8E^{-12}$
10	0.997	13	2.97	$4.7E^{-13}$	8.2	474	32.5	$5.2E^{-12}$
1	4.63	5	13.78	-	23.8	63	94.4	$1.5E^{-11}$
0.5	8.1	4	24.1	-	34.9	37	139	-

** For 100-ft^3 samples only.

Counter #2 (Serial #160019)								
Alpha					Beta			
Count time (minute)					Net MDCR (cpm)			
Count time in (minutes)	Net MDCR (cpm)	Gross MDC	MDA (dpm)	Air MDA** (µCi/cc)	Net MDCR (cpm)	Gross MDC	MDA (dpm)	Air MDA** µCi/cc
60	0.66	71	2.12	$3.36E^{-13}$	5.56	2862	26.7	$4.25E^{-12}$
30	0.779	39	2.50	$3.97E^{-13}$	6.26	1452	30.1	$4.79E^{-12}$
10	1.19	17	3.81	$6.07E^{-13}$	8.54	506	41.1	$6.53E^{-12}$
1	5.15	6	16.52	-	24.6	66	118	$1.88E^{-11}$
0.5	8.8	4	28.3	-	36	39	173	-

** For 100-ft^3 samples only.

Smear Activity Determination

When count rates exceed LLD values, smear activity is determined as follows.

$$\text{Activity (dpm)} = \frac{\text{net cpm}}{\text{Eff}}$$

$$\text{Where net cpm} = \frac{\text{gross count}}{\text{count time}} - \text{background cpm}$$

Values for LLD and smear scanning trigger levels are tabulated below.

Counter #1

Beta counts			
1-minute count		30-second count	
Gross count	Activity (dpm)	Gross count	Activity (dpm)
63	95 (MDA)	37	139 (MDA)
165	500	82	500
291	1000	145	1000
Alpha counts			
1-minute count		30-second count	
Gross count	Activity (dpm)	Gross count	Activity (dpm)
5	14 (MDA)	4	24 (MDA)
7	20	16	100
33	100	-	-

Counter #2

Beta counts			
1-minute count		30-second count	
Gross count	Activity (dpm)	Gross count	Activity (dpm)
66	118 (MDA)	39	173 (MDA)
146	500	73	500
250	1000	125	1000
Alpha counts			
1-minute count		30-second count	
Gross count	Activity (dpm)	Gross count	Activity (dpm)
5	16 (MDA)	4	28 (MDA)
6	20	15	100
31	100	-	-

Air Sample Activity Determinations

When count rates exceed LLD values, air sample activity is determined as follows:

$$\text{Activity } (\mu\text{Ci/cc}) = \frac{\text{net cpm} \qquad 1\ \mu\text{Ci}}{\text{Eff} \qquad 2.22\text{E}6\ \text{dpm} \qquad \text{volume (cc)}}$$

For 100-ft^3 (2.832E^6-cc) air samples, the net count rate can be inserted into the following instrument-specific equations as applicable.

Counter #1
Alpha airborne activity (μCi/cc) = (net cpm) x (4.73E^{-13}).
Beta airborne activity (μCi/cc) = (net cpm) x (6.31E^{-13}).

Counter #2
Alpha airborne activity (μCi/cc) = (net cpm) x (5.1E^{-13}).
Beta airborne activity (μCi/cc) = (net cpm) x (7.65E^{-13}).

Instrument Calibration and Use Logs are attached to this appendix.

RGP
3-24-05

Duratek™

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Rd Kingston, TN 37763		Model: 19	Serial Number: 95469
Contact Name: Thomas F. Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2005-02653	Calibration Method: Electronic And Source	

INSTRUMENT CALIBRATION INFORMATION

Range (µR/hr)	Calibration Standard Value	Tolerances (µR/hr)	Instrument Response As Found (µR/hr)	Instrument Response As Left (µR/hr)	Comments: Calibrated in accordance with CP-IN-WI-211 Rev 1	
5000 Black	4000 µR/hr	3600 - 4400	*N/A	3800	Pulser: 101500	Cal Due: 09/24/05
	2500 µR/hr	2250 - 2750	*N/A	2500	D-812: 2816	Cal Due: 04/15/05
	1000 µR/hr	900 - 1100	*N/A	1000	DVM: TW12663	Cal Due: 03/22/05
500 Black	400 µR/hr	360 - 440	*N/A	390	DTH-1A: 100799	Cal Due: 11/11/05
	250 µR/hr	225 - 275	*N/A	250		
	100 µR/hr	90 – 110	*N/A	100	Temp: 20.5°C	Humidity: 31%
250 Red	Input cpm = 32,600	180 – 220	*N/A	195	Pressure: 742mmHg	
	Input cpm = 19,500	108 - 132	*N/A	120		
	Input cpm = 8,150	45 - 55	*N/A	50	Geotropism: SAT	Over Range: SAT
50 Black	Input cpm = 6,560	36 - 44	*N/A	39.5	Batteries: SAT	Mech. Zero: SAT
	Input cpm = 4,090	22.5 – 27.5	*N/A	25	F/S Response: SAT	Audio: SAT
	Input cpm = 1,440	9 - 11	*N/A	10	Light: SAT	Precision Test: SAT
25 Red	Input cpm = 3,260	18 – 22	*N/A	19.5	Source: Cs-137 049711 Cert. Date: 04/09/04	
	Input cpm = 1,956	10.8 – 13.2	*N/A	12	High Voltage As Found: 800V	As Left: 725V
	Input cpm = 815	4.5 – 5.5	*N/A	5	cpm/µR/hr: As Found: 192	As Left: 163

COMMENTS

Special Remarks: High Voltage: 725Volts cpm/µR/hr: 163
* All As Founds off by more than 20% due to HV being set outside of correct plateau voltage setting.

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: M. Pauli	Reviewed By: Thomas F. Scott	Date: 3-18-05
Calibration Date: 03/18/05	Calibration Due: 03/18/06	

LUDLUM 19 HIGH VOLTAGE PLATEAU DATA SHEET

Date: 03/18/05 **Serial Number: 95469**

High Voltage	Background	uR/hr
575	2	190
600	2	1600
625	3	2200
650	3	2900
675	4	3500
700	4	4100
725 (SET)	**5**	**4600**
750	6	4600
775	7	4900
800	9	offscale

*** Source Geometry on contact with Detector-Cs137 #019455 @ 5uCi***

Performed By: Mike Paul **Date:** 3-18-05

Reviewed By: [illegible signature] **Date:** 3-18-05

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3-24-05

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Kingston, TN 37763
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Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		**Manufacturer:** Ludlum	
Address: 628 Gallaher Rd Kingston, TN 37763		**Model:** 19	**Serial Number:** 95499 ✓
Contact Name: Thomas F. Scott		**Probe:** N/A	**Serial Number:** N/A
Customer Purchase Order Number: N/A	**Work Order Number:** 2005-02653	**Calibration Method:** Electronic And Source	

INSTRUMENT CALIBRATION INFORMATION

Range (µR/hr)	Calibration Standard Value	Tolerances (µR/hr)	Instrument Response As Found (µR/hr)	Instrument Response As Left (µR/hr)	Comments: Calibrated in accordance with CP-IN-WI-211 Rev 1	
5000 Black	4000 µR/hr	3600 - 4400	3800	3800	Pulser: 101500	Cal Due: 09/24/05
	2500 µR/hr	2250 - 2750	2450	2450	D-812: 2816	Cal Due: 04/15/05
	1000 µR/hr	900 - 1100	950	950	DVM: TW12663	Cal Due: 03/22/05
500 Black	400 µR/hr	360 - 440	400	400	DTH-1A: 100799	Cal Due: 11/11/05
	250 µR/hr	225 - 275	250	250		
	100 µR/hr	90 – 110	105	105	Temp: 20.5°C	Humidity: 31%
250 Red	Input cpm = 40,000	180 – 220	205	205	Pressure: 742mmHg	
	Input cpm = 24,000	108 - 132	120	120		
	Input cpm = 10,000	45 - 55	50	50	Geotropism: SAT	Over Range: SAT
50 Black	Input cpm = 7,880	36 - 44	40	40	Batteries: SAT	Mech. Zero: SAT
	Input cpm = 4,990	22.5 – 27.5	25	25	F/S Response: SAT	Audio: SAT
	Input cpm = 1,960	9 - 11	10	10	Light: SAT	Precision Test: SAT
25 Red	Input cpm = 4,000	18 – 22	20	20	Source: Cs-137 049711 Cert. Date: 04/09/04	
	Input cpm = 2,400	10.8 – 13.2	12	12	High Voltage As Found: 650V	As Left: 650V
	Input cpm = 1,000	4.5 – 5.5	5	5	cpm/µR/hr: As Found: 194	As Left: 200

COMMENTS

Special Remarks: High Voltage: 650Volts cpm/µR/hr: 200

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: M. Paul	**Reviewed By:** Thomas F. Scott	**Date:** 3-18-05
Calibration Date: 03/18/05	**Calibration Due:** 03/18/06 ✓	

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RBP 3-24-05

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
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Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Rd Kingston, TN 37763		Model: 19	Serial Number: 42972 ✓
Contact Name: Thomas F. Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2005-02653	Calibration Method: Electronic And Source	

INSTRUMENT CALIBRATION INFORMATION

Range (µR/hr)	Calibration Standard Value	Tolerances (µR/hr)	Instrument Response As Found (µR/hr)	Instrument Response As Left (µR/hr)	Comments: Calibrated in accordance with CP-IN-WI-211 Rev 1	
5000 Black	4000 µR/hr	3600 - 4400	3950	3950	Pulser: 101500	Cal Due: 09/24/05
	2500 µR/hr	2250 - 2750	2500	2500	D-812: 2816	Cal Due: 04/15/05
	1000 µR/hr	900 - 1100	1000	1000	DVM: TW12663	Cal Due: 03/22/05
500 Black	400 µR/hr	360 - 440	410	380	DTH-1A: 100799	Cal Due: 11/11/05
	250 µR/hr	225 - 275	260	250		
	100 µR/hr	90 – 110	110	105	Temp: 20.5°C	Humidity: 31%
250 Red	Input cpm = 42,000	180 – 220	200	200	Pressure: 742mmHg	
	Input cpm = 25,200	108 - 132	120	120		
	Input cpm = 10,500	45 - 55	50	50	Geotropism: SAT	Over Range: SAT
50 Black	Input cpm = 8,450	36 - 44	40	40	Batteries: SAT	Mech. Zero: SAT
	Input cpm = 5,240	22.5 – 27.5	25	25	F/S Response: SAT	Audio: SAT
	Input cpm = 2,070	9 - 11	10	10	Light: SAT	Precision Test: SAT
25 Red	Input cpm = 4,200	18 – 22	20	20	Source: Cs-137 049711 Cert. Date: 04/09/04	
	Input cpm = 2,520	10.8 – 13.2	12	12	High Voltage As Found: 660V	As Left: 660V
	Input cpm = 1,050	4.5 – 5.5	5	5	cpm/µR/hr: As Found: 213	As Left: 210

COMMENTS

Special Remarks: High Voltage: 660Volts cpm/µR/hr: 210

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: M. Paul	Reviewed By: Thomas F. Scott	Date: 3-18-05
Calibration Date: 03/18/05	Calibration Due: 03/18/06 ✓	

Duratek

RJP 3-24-05

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 12	Serial Number: 91037 ✓
Contact Name: Thomas Scott		Probe: 44-9 ✓	Serial Number: N/A
Contract/Task Number: N/A	Work Order Number: 2005-02626	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response Before Calibration	Instrument Response After Calibration	Comments: Calibrated in accordance with OEM Technical Manual	
X 1	100	100	100	Pulser: 101500	Cal Due: 09/24/05
X 1	250	250	250	D-812: 2816	Cal Due: 04/15/05
X 1	400	400	400	DTH-1A: 100799	Cal Due: 11/11/05
X 10	1,000	1,000	1,000		
X 10	2,500	2,500	2,500	Temperature: 23.0 °C	
X 10	4,000	4,000	4,000	Pressure: 738mmHg	
X 100	10,000	10,000	10,000	Humidity: 23%	
X 100	25,000	25,000	25,000		
X 100	40,000	40,000	40,000		
X 1000	100,000	100,000	100,000	Audio: SAT	Batt. Check: SAT
X 1000	250,000	250,000	250,000	Fast/Slow: SAT	Reset: SAT
X 1000	400,000	400,000	400,000	HV Pushbutton: SAT	Overange: SAT
EFFICIENCY DETERMINATION				Geotropism: SAT	
Instrument Range	Source ID and Value	Net cpm	Efficiency	Background: 50cpm	Threshold: 35mV
EFF X1	Tc-99#119720 at 2,562dpm	290	11.3%		
EFF X10	Tc-99#119718 at 20,520dpm	2,600	12.7%		
EFF X100	Tc-99#109408 at 259,518dpm	29,950	11.5%	Limited Use: X1000 Scale for information only. Use with 44-9.	
Average	N/A	N/A	11.8		
High Voltage	900V	897V	897V		

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: Mike Pauli Reviewed By: Thomas G. Scott Date: 3-10-05 ✓

Calibration Date: 03/10/05 Calibration Due: 03/10/06 ✓

RGP
3-24-05

Duratek™

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 12	Serial Number: 75809 ✓
Contact Name: Thomas Scott		Probe: 44-9✓	Serial Number: N/A
Contract/Task Number: N/A	Work Order Number: 2005-02626	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comments	
		Before Calibration	After Calibration	Calibrated in accordance with OEM Technical Manual	
X 1	100	100	100	Pulser: 101500	Cal Due: 09/24/05
X 1	250	250	250	D-812: 2816	Cal Due: 04/15/05
X 1	400	400	400	DTH-1A: 100799	Cal Due: 11/11/05
X 10	1,000	1,000	1,000		
X 10	2,500	2,500	2,500	Temperature: 23.0 °C	
X 10	4,000	4,000	4,000	Pressure: 738mmHg	
X 100	10,000	10,000	10,000	Humidity: 23%	
X 100	25,000	25,000	25,000		
X 100	40,000	40,000	40,000		
X 1000	100,000	100,000	100,000	Audio: SAT	Batt. Check: SAT
X 1000	250,000	250,000	250,000	Fast/Slow: SAT	Reset: SAT
X 1000	400,000	400,000	400,000	HV Pushbutton: SAT	Overange: SAT

EFFICIENCY DETERMINATION

Instrument Range	Source ID and Value	Net cpm	Efficiency	Comments
				Geotropism: SAT
				Background: 40cpm Threshold: 36mV
EFF X1	Tc-99#119720 at 2,562dpm	305	11.9%	
EFF X10	Tc-99#119718 at 20,520dpm	2,460	12.0%	
EFF X100	Tc-99#109408 at 259,518dpm	29,460	11.4%	Limited Use: X1000 Scale for information only. Use with 44-9.
Average	N/A	N/A	11.8%	
High Voltage	900V	901V	901V	

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: Mike Paul	Reviewed By: Thomas G. Scott Date: 3-10-05
Calibration Date: 03/10/05	Calibration Due: 03/10/06 ✓

RGP
3-24-05

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 3	Serial Number: 97416
Contact Name: Thomas F. Scott		Probe: 44-9	Serial Number: N/A
Contract/Task Number: N/A	Work Order Number: 2005-02626	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comments	
		Before Calibration	After Calibration	Calibrated in accordance with CP-IN-WI-219, Rev.0.	
X0.1	100	100	100	Pulser: 101500	Cal Due: 09/24/05
X0.1	250	250	250	DVM: TW12663	Cal Due: 03/22/05
X0.1	400	400	400	D-812: 2816	Cal Due: 04/15/05
X1	1,000	1,000	1,000	DTH-1A: 100799	Cal Due: 11/11/05
X1	2,500	2,500	2,500		
X1	4,000	4,000	4,000	Temperature: 23.0 °C	
X10	10,000	10,000	10,000	Pressure: 738 mmHg	
X10	25,000	25,000	25,000	Humidity: 23 %	
X10	40,000	40,000	40,000		
X100	100,000	100,000	100,000	Audio: SAT	Batt. Check: SAT
X100	250,000	250,000	250,000	Fast/Slow: SAT	Reset: SAT
X100	400,000	400,000	400,000	Background: 40 cpm	Threshold: 35mV

EFFICIENCY DETERMINATION*				Overange: SAT
Instrument Range	Source ID and Value	Net cpm	Efficiency	* Efficiency determined ~ ¼ " from 45 mm disc.
EFF X1	Tc-99#119720 at 2,562dpm	260	10.1%	
EFF X10	Tc-99#119718 at 20,520dpm	2,260	11.0%	
EFF X100	Tc-99#109408 at 259,518dpm	29,460	11.4%	Limited Use: X100 Scale for information only. Use with 44-9.
Average Efficiency	N/A	N/A	%	
High Voltage	900V (±5%)	902V	902V	

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: Mike Paul	Reviewed By: Thomas F. Scott Date: 3-10-05
Calibration Date: 03/10/05	Calibration Due: 03/10/06

Duratek™

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Automess	
Address: 628 Gallaher Road Kingston, TN. 37763		Model: 6112D	Serial Number: 28991
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Contract/Task Number: N/A	Work Order Number: N/A*	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Desired	**Tolerance	Instrument Response		Comments
			Before Calibration	After Calibration	Timer: 02010806 Cal Due: 03/04/05
mR/hr					DVM: TW12662 Cal Due: 03/08/05
mR/h	1	.80-1.20	1	1	D-812: 2816 Cal Due: 04/15/05
mR/h	40	32 - 48	42	40	DTH-1A: 100799 Cal Due: 11/11/05
mR/h	200	160-240	161	170	Sources Used:
mR/h	616	493-739	530	631	Cs137 019701 Cert. Date: 07/16/04
					Cs137 019702 Cert. Date: 04/08/04
R/hr					Cs137 049711 Cert. Date: 04/09/04
R/h	1.88	1.50 – 2.26	2.1	1.9	Temp: 24.1 °C Humidity: 36 %
R/h	21.1	16.9 – 25.3	23.3	21.7	Pressure: 738 mmHg
R/h	98	78.4 -118	111	116	**Per manufacturer manual, instrument precision is ± 20%.
R/h	360	288-432	390	344	Geotropism: N/A
R/h	720	576 - 864	806	700	Sensitivity Check: SAT
mR (Exposure Rate)					Batteries: SAT
mR	10.2	8.2 – 12.3	11	11	Over Range: SAT
Exposed to 616 mR/hr field for 60 seconds					Precision Test: SAT
High Voltage					Digital Zero: SAT
HV	#-600 vdc	#-600	-546	-546	* Returned repaired from Eberline.

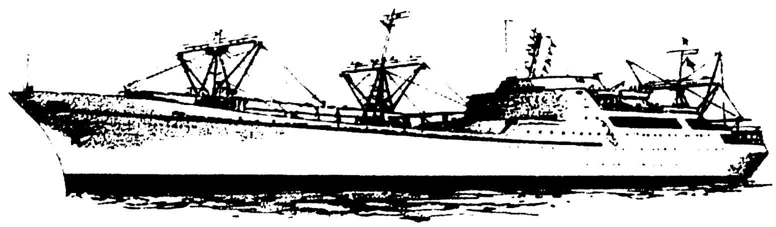
STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By:	Reviewed By: Thomas T. Scott	Date: 2-15-05
Calibration Date: 02/14/05	Calibration Due: 02/14/06	

WPI
Solutions for Government and Industry

WPI – Richmond Office
11 S. 12th Street – Suite 210
Richmond, VA 23219
Tel: (804) 783-0183
Fax: (804) 783-0185



DBR-1 Reader Calibration Certificate

DBR-1 Reader Serial Number: 230011
ROM Version: 1.02
RAM Version: 1.16.53
Calibration Plug Serial Number: 204024
Calibration Plug Calibration Date: 25Feb2005 / Battery Voltage: 8.9V/8.8V

The Calibration of the DBR-1 Reader was performed in accordance with DBR-1 User's Guide version 1.16, Section 3.4 entitled "Calibrating the DBR-1".

As-Found readings for the DBR-1 Reader were:

Parameter	Reading	Tolerance	Parameter	Reading	Tolerance
G	-2	+/- 26	M	42	+/- 26
R	30	+/- 26	L	2	+/- 26
H	325	+/- 101	I	110	+/- 5001

As-Left readings for the DBR-1 Reader were:

Parameter	Reading	Tolerance	Parameter	Reading	Tolerance
G	0	+/- 26	M	0	+/- 26
R	0	+/- 26	L	0	+/- 26
H	12	+/- 101	I	110	+/- 5001

MARAD Contract # DTMA2P05133
Work Performed In Accordance with WPI's Nuclear QA Manual

Calibrated by: ____________ **Date:** 01Apr2005
John Bowen

Reviewed by: ____________ **Date:** 4-01-05
Robert Pennock

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION
Customer Name: WPI		Manufacturer: Radeco
Contact Name: John Bowen		Model: H-810DC
Address: 2000 Kraft Drive, Suite 2100, Blacksburg, VA 24060		Serial Number: 0865
Contract/Task Number: WP105-0079	Work Order : 2005-02636	Calibration Method: Air Flow

INSTRUMENT CALIBRATION INFORMATION

Instrument Range (LPM)	Standard Value (LPM)	Tolerance (±10%)	As Found	As Left	Comments	
14 - 99	43	39-47	42	42	Barometer: 8029	Cal Due: 12/13/05
	70	63 - 77	68	68	Thermometer: 8029	Cal Due: 12/13/05
	93	82 - 102	93	93	Venturi: 8029	Cal Due: 12/13/05
					DTH-1A: 100799	Cal Due: 11/11/05
					Temperature: 20.4 °C	
					Pressure: 739mmHg	
					Humidity: 32%	
					Previous Media: N/A	
					Current Media: Customer Provided Glass Fiber	
					Final Range: 14 – 99 LPM	
					Calibrated IAW OEM	

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	Reviewed By: [signature]	Date: 3-22-05
Calibration Date: 03/17/05		Calibration Due: 03/17/06

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION
Customer Name: WPI		Manufacturer: Radeco
Contact Name: John Bowen		Model: H-810DC
Address: 2000 Kraft Drive, Suite 2100, Blacksburg, VA 24060		Serial Number: 0864
Contract/Task Number: WP105-0079	Work Order : 2005-02636	Calibration Method: Air Flow

INSTRUMENT CALIBRATION INFORMATION

Instrument Range (LPM)	Standard Value (LPM)	Tolerance (±10%)	As Found	As Left	Comments	
14 - 99	42	38-46	31	42	Barometer: 8029	Cal Due: 12/13/05
	68	61 - 75	57	68	Thermometer: 8029	Cal Due: 12/13/05
	89	80 - 98	82	89	Venturi: 8029	Cal Due: 12/13/05
					DTH-1A: 100799	Cal Due: 11/11/05
					Temperature: 20.4 °C	
					Pressure: 739mmHg	
					Humidity: 32%	
					Previous Media: N/A	
					Current Media: Customer Provided Glass Fiber	
					Final Range: 42 – 89 LPM	
					Calibrated IAW OEM	

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature] Reviewed By: [signature] Date: 3-22-05

Calibration Date: 03/17/05 Calibration Due: 03/17/06

Duratek

RKP
3-30-05

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 197766
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-02391	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) ± 10%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 – 110	99	99
X 1	250	250	250	1,000 CPM	.2	180 – 220	200	200
X 1	400	400	400	1,000 CPM	.5	450 – 550	499	499
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	994	994
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	1,987	1,987
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	4,987	4,987
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	250,000	250,000	250,000					
X 1000	400,000	400,000	400,000					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: M. Paul	Reviewed By: Thomas J. Scott	Date: 12-7-04
Calibration Date: 12/07/04	Calibration Due: 12/07/05	

Model: 2221 Serial Number: 197766

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-812	Due Date:	04/15/05	ID:	2816
Pulser	Due Date:	09/24/05	ID	101500	DTH-1A	Due Date:	11/1/05	ID:	100799
Timer	Due Date:	03/04/05	ID	02010806	Temp: 22.1 °C	Pressure: 736 mmHg		Humidity: 54%	

INSTRUMENT CALIBRATION INFORMATION

Special Test

Geotropism	Sat (√) Unsat ( )	Hold	Sat (√) Unsat ( )
BAT > 4.5	Sat (√) Unsat ( )	Volume Test	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )	Audio Divide	Sat (√) Unsat ( )
Digital Zero	Sat (√) Unsat ( )	Window Switch	Sat (√) Unsat ( )
Count	Sat (√) Unsat ( )	Lamp	Sat (√) Unsat ( )

High Voltage Calibration

Voltage	Tolerance ± 2%	As Found	As Left
400	392-408	404	404
1,000	980-1,020	1,001	1,001
1,500	1,470-1,530	1,501	1,501
1,900	1,862-1,932	1,900	1,900

Threshold/Gain Calibration (Desired Ratio 10 mV/100)

Input	As Found Value	As Found Ratio (mV/100)	As Left Value	As Left Ratio (mV/100)
10	96	10.4	96	10.4
20	203	9.9	203	9.9
30	309	9.7	309	9.7
40	411	9.7	411	9.7

Logmeter Scale Linearity Check

Input		±20% Tolerance	As Found	As Left
LOG	400	320-480	400	400
LOG	4,000	3,200-4,800	4,000	4,000
LOG	40,000	32,000-48,000	40,000	40,000
LOG	400,000	320,000-480,000	400,000	400,000

COMMENTS

Calibrated in accordance with the OEM Technical Manual

Instrument Calibrated By: M Paul	Reviewed By: Thomas G. Scott Date: 12-7-04
Calibration Date: 12/07/04	Calibration Due: 12/07/05

Duratek™

QGP
3-30-05

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 94954 ✓
Contact Name: Tom Scott		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: N/A	Work Order Number: 2004-01977	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) ± 10%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 – 110	98	98
X 1	250	250	250	1,000 CPM	.2	180 – 220	198	198
X 1	400	400	400	1,000 CPM	.5	450 – 550	494	494
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	988	988
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	1,975	1,975
X 10	4,000	4,100	4,100	1,000 CPM	5	4.5K-5.5K	4,940	4,940
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	40,500	40,500					
X 1000	100,000	100,000	100,000					
X 1000	250,000	250,000	250,000					
X 1000	400,000	400,000	400,000					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: M. Paul	Reviewed By: Thomas P. Scott Date: 8-5-04
Calibration Date: 08/05/04 ✓	Calibration Due: 08/05/05 ✓

Model: 2221 Serial Number: 94954

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/08/05	ID	TW12662	D-814	Due Date:	10/22/04	ID:	2525
Pulser	Due Date:	09/18/04	ID	101500	Psychron	Due Date:	02/10/05	ID:	7480
Timer	Due Date:	10/23/04	ID	22226011	Temp: 20.4°C	Pressure: 738mmHg		Humidity: 48%	

INSTRUMENT CALIBRATION INFORMATION

Special Test

Geotropism	Sat (√) Unsat ( )	Hold	Sat (√) Unsat ( )
BAT > 4.5	Sat (√) Unsat ( )	Volume Test	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )	Audio Divide	Sat (√) Unsat ( )
Digital Zero	Sat (√) Unsat ( )	Window Switch	Sat (√) Unsat ( )
Count	Sat (√) Unsat ( )	Lamp	Sat (√) Unsat ( )

High Voltage Calibration

Voltage	Tolerance ± 2%	As Found	As Left
400	392-408	388	400
1,000	980-1,020	981	1,003
1,500	1,470-1,530	1,468	1,500
1,900	1,862-1,932	1,855	1,898

Threshold/Gain Calibration (Desired Ratio 10 mV/100)

Input	As Found Value	As Found Ratio (mV/100)	As Left Value	As Left Ratio (mV/100)
10	91	10.9	91	10.9
20	183	10.9	183	10.9
30	289	10.4	289	10.4
40	391	10.2	391	10.2

Logmeter Scale Linearity Check

Input		±20% Tolerance	As Found	As Left
LOG	400	320-480	400	400
LOG	4,000	3,200-4,800	4,000	4,000
LOG	40,000	32,000-48,000	45,000	45,000
LOG	400,000	320,000-480,000	450,000	450,000

COMMENTS

Calibrated in accordance with the CP-IN-WI-237 rev 1

Instrument Calibrated By: Mike Paul	Reviewed By: Norma F. Scott Date: 8-5-04
Calibration Date: 08/05/04	Calibration Due: 08/05/05

RGP
3-30-05

Duratek

DETECTOR CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-5
Contact Name: Thomas Scott		Serial Number: 127385 ✓
Customer Purchase Order Number: N/A	Work Order Number: 2004-01610	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION

1) Source Nuclide: Th^{230}	Serial Number: 119739		Activity (dpm) : 18,600	Certification Date: 10/20/97	
Parameter	As Found	As Left	Linearity Test	CPM (Source #1)	
Count 1	2,270	2,270	Count 1 (Heel)	2,355	
Count 2	2,171	2,171	Count 2 (Center)	2,173	
Count 3	2,230	2,230	Count 3 (Toe)	2,329	
Average	2,224	2,224	Average	2,286	
Background (cpm)	4.6	4.6	Pass/Fail	PASS	
Net Counts	2,219	2,219		Tolerance ±10%	
Efficiency %	11.9%	11.9%		Min: 2,057	Max: 2,515

SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	197766	12/07/05	4.6	550V	100 = 10mV

Detector Setup Report YES NO ✓	Barcode Report YES NO ✓	Voltage Plateau YES ✓ NO

COMMENTS

5 minute background

STATEMENT OF CERTIFICATION

We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).

Detector Certified By: M. Paul   Reviewed By: [signature]   Date: 3-28-05

Certification Date: 04/30/04 ✓   Certification Due: 04/30/05 ✓

RW
7-30-05

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

Customer Information		Instrument Information	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2929	Serial Number: 160019 ✓
Contact Name: Thomas F. Scott		Probe: 43-10-1	Serial Number: 167229 ✓
Customer Purchase Order Number: N/A	Work Order Number: N/A	Calibration Method: Electronic And Source	

Instrument Calibration Information

M&TE	ID Number	Calibration Due Date	Environmental Conditions	
Thermometer	2525	10/22/04	Temperature (°C)	21.8
Barometer	2525	10/22/04	Pressure (mmHg)	748
Hygrometer	7480	02/10/05	Humidity (%)	48
Pulse Generator	762	04/13/05	Calibrated in accordance with OEM.	
DVM	TW12662	03/08/05		

Isotope	Source ID Number	Original Activity (dpm)	Source Cert. Date	Decayed Activity (dpm)
Th^{230}	119701	19,080	10/14/97	19,080
Pu^{239}	019442	13,613	06/01/92	13,608
Tc^{99}	109407	24,288	10/01/94	24,287
Sr/Y^{90}	090213	45,200	08/04/98	39,063

Frequency Calibration

Desired (cpm)	Tolerances (cpm)	Alpha As Found (cpm)	Alpha As Left (cpm)	Beta As Found (cpm)	Beta As Left (cpm)
40	40	40	40	40	40
400	(392-408)	400	400	400	400
4,000	(3,920-4,080)	4,000	4,000	4,000	4,000
40,000	(39.2K-40.8K)	40,004	40,004	40,004	40,004
400,000	(392K-408K)	400,040	400,040	400,041	400,041

Background Determination	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Counts, C_b	20	6	1,374	1,189
Time, T_b (min)	20	20	20	20
Rate, R_b (cpm)	1	0.3	68.7	59.5

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	Reviewed By: Thomas F. Scott	Date: 8-4-04
Calibration Date: 08/04/04 ✓		Calibration Due: 08/04/05 ✓

CROSS TALK SHEET & EFFICIENCY SHEET

Instrument ID: 160019

As Found Alpha Threshold (mv)	As Left Alpha Threshold (mv)
200	175

Alpha Source: Performed using Pu^{239} 019442

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	26,040	25,562	1,510	259
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 5{,}207$	$R_{s[\alpha]} = 5112.4$	$R_{s[\beta]} = 302$	$R_{s[\beta]} = 51.8$
EFF (% c/d) (>25%)	38.3%	37.6%	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{51.8 - 59.5}{5{,}112.4 - 0.3} = 0\%$			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
6.0 mv	4.0 mv	65 mv	50 mv

Beta Source: Performed using Tc^{99} 109407

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	2	2	29,607	25,562
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 0.4$	$R_{s[\alpha]} = 0.4$	$R_{s[\beta]} = 5852.7$	$R_{s[\beta]} = 5{,}112.6$
EFF (% c/d) (>10%)	N/A	N/A	24.1%	20.8%
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} \quad \frac{0.4 - 0.3}{5{,}882.6 - 59.5} = 0.002\%$			

High Voltage Power

Desired Voltage	Tolerance	DVM As Found	DVM As Left	2929 Meter As Found	2929 Meter As Left
600	540 – 660	603	603	600	600
800	720 – 880	807	807	800	800
1,000	900 – 1,100	1,014	1,014	1,000	1,000
1,200	1,080 – 1,320	1,214	1,214	1,200	1,200
1,300	1,170 – 1,430	1,318	1,318	1,300	1,300
High Voltage		As Found	Vern Dial Reading	As Left	Vern Dial Reading
		883V	3.42	800V	3.20

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]

Reviewed By: [signature] Date: 8-4-04

Calibration Date: 08/04/04

Calibration Due: 08/04/05

EFFICIENCY SHEET

Instrument ID: 160019

As Found Alpha Threshold (mv)			As Left Alpha Threshold (mv)	
175			175	
Alpha Source: Th^{230} #119738				
Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	N/A	29,721	N/A	4,300
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]}$ = N/A	$R_{s[\alpha]}$ = 6,759	$R_{s[\beta]}$ = N/A	$R_{s[\beta]}$ = 800.5
EFF (% c/d) (>25%)	N/A	31.2%	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{N/A}{N/A}$ = N/A			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
4.0mv	4.0mv	50mv	50mv

Beta Source: Sr/Y^{90} 090213				
Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	N/A	112	N/A	84,221
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]}$ = N/A	$R_{s[\alpha]}$ = 22.1	$R_{s[\beta]}$ = N/A	$R_{s[\beta]}$ = 16784.7
EFF (% c/d) (>10%)	N/A	N/A	N/A	43.0%
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} = \frac{N/A}{N/A}$ = N/A			

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	**Reviewed By:** [signature]	**Date:** 8-4-04
Calibration Date: 08/04/04		**Calibration Due: 08/04/05**

Detector 43-10-1 #167229 Raw Data (Counts)										
	Background		Pu-239		Tc-99		N/A		N/A	
Voltage	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
600	0	11	4199		0	1835				
650	0	34	4770	203	0	3106				
700	0	41	5028	197	0	4063				
750	0	46	5145	217	0	5106				
800	2	48	5151	272	2	5868				
850	1	84	5200	497	0	5818				
900	0	505	5277	1683	0	5892				
950										
1000										

Source Info

Nuclide	Pu-239	Tc-99	N/A	N/A
ID	19442	109407		
Initial DPM	13613	24288		
Certification Date	6/1/92	10/1/94		
Today's Date	8/4/04	8/4/04	8/4/04	8/4/04
Source Age (Years)	12.18	9.84	104.59	104.59
Half-Life (Years)	2.41E+04	2.13E+05		
Corrected Activity	13608	24287	#DIV/0!	#DIV/0!

Voltage Increments: 50 VDC

Net CPM														
	MDA/Cross-Talk			Beta Eff.	Alpha Eff.	Pu-239		Tc-99		N/A		N/A	
Voltage	Beta MDA	Alpha MDA	Beta-Alpha	(%)	(%)	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
600	241.6	8.8	0.0%	7.51%	30.9%	4199	-11	0	1824	0	-11	0	-11
650	235.9	7.7	0.0%	12.65%	35.1%	4770	169	0	3072	0	-34	0	-34
700	196.3	7.3	0.0%	16.56%	36.9%	5028	156	0	4022	0	-41	0	-41
750	164.5	7.2	0.0%	20.83%	37.8%	5145	171	0	5060	0	-46	0	-46
800	145.8	24.6	0.0%	23.96%	37.8%	5149	224	0	5820	-2	-48	-2	-48
850	192.1	19.3	0.0%	23.61%	38.2%	5199	413	-1	5734	-1	-84	-1	-84
900	483.6	7.0	0.0%	22.18%	38.8%	5277	1178	0	5387	0	-505	0	-505
950	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0
1000	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	0.0%	0	0	0	0	0	0	0	0

[signature] 8-4-04

Thomas F. Scott 8-4-04

RGP
3-30-05

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

Customer Information		Instrument Information	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2929	Serial Number: 102001 ✓
Contact Name: Thomas F. Scott		Probe: 43-10-1	Serial Number: 103276 ✓
Customer Purchase Order Number: N/A	Work Order Number: 2004-02092	Calibration Method: Electronic And Source	

Instrument Calibration Information

M&TE	ID Number	Calibration Due Date	Environmental Conditions	
Thermometer	2525	10/22/04	Temperature (°C)	21.1
Barometer	2525	10/22/04	Pressure (mmHg)	746
Hygrometer	7480	02/10/05	Humidity (%)	76%
Pulse Generator	120935	04/13/05	Calibrated in accordance with CP-IN-WI-235.	
DVM	6565015	10/14/04		

Isotope	Source ID Number	Original Activity (dpm)	Source Cert. Date	Decayed Activity (dpm)
Th^{230}	119739	18,600	10/20/97	18,600
Tc^{99}	119718	20,520	10/14/97	20,520
Pu^{239}	019442	13,613	06/01/92	13,613

Frequency Calibration

Desired (cpm)	Tolerances (cpm)	Alpha As Found (cpm)	Alpha As Left (cpm)	Beta As Found (cpm)	Beta As Left (cpm)
4	4	4	4	4	4
40	(39-41)	40	40	40	40
400	(392-408)	398	398	398	398
4,000	(3,920-4,080)	3,984	3,984	3,982	3,982
40,000	(39.2K-40.8K)	39,836	39,836	39,824	39,824
400,000	(392K-408K)	398,318	398,318	398,345	398,345

Background Determination	Alpha As Found	Alpha As Left	Beta As Found	
Counts, C_b	6	4	1,193	1,088
Time, T_b (min)	20	20	20	20
Rate, R_b (cpm)	.30	.20	59.65	54.4

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature] Reviewed By: Thomas F. Scott Date: 9-13-04

Calibration Date: 09/13/04 ✓ Calibration Due: 09/13/05 ✓

CROSS TALK SHEET

Instrument ID: 102001

As Found Alpha Threshold (mv)	As Left Alpha Threshold (mv)
180	180

Alpha Source: Cross Talk – Performed using Pu^{239} 019442

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	26,546	26,546	982	982
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 5{,}309.2$	$R_{s[\alpha]} = 5{,}309.2$	$R_{s[\beta]} = 196.4$	$R_{s[\beta]} = 196.4$
EFF (% c/d) (>25%)	28.5%	28.5%	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{196.4 - 54.4}{5309.2 - 0.2} = 2.68\%$			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
4mv	4mv	50mv	50mv

Beta Source: Cross Talk-Performed using Tc^{99} 119718

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	5	5	26,119	26,119
Time, T_s (min)	5	5	5	5
Rate, R_s (cpm)	$R_{s[\alpha]} = 1$	$R_{s[\alpha]} = 1$	$R_{s[\beta]} = 5{,}223.8$	$R_{s[\beta]} = 5{,}223.8$
EFF (% c/d) (>25%)	N/A	N/A	25.2%	25.2%
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} = \frac{1.0 - 0.20}{5233.8 - 54.4} = 0.00015\%$			

High Voltage Power

Desired Voltage	Tolerance	DVM As Found	DVM As Left	2929 Meter As Found	2929 Meter As Left
600	540 – 660	600	600	600	600
800	720 – 880	800	800	800	800
1,000	900 – 1,100	1,000	1,000	1,000	1,000
1,200	1,080 – 1,320	1,200	1,200	1,200	1,200
1,300	1,170 – 1,430	1,300	1,300	1,300	1,300
High Voltage		As Found	Vern Dial Reading	As Left	Vern Dial Reading
		750V	3.26	750V	3.26

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature] Reviewed By: [signature] Date: 9-13-04

Calibration Date: 09/13/04 Calibration Due: 09/13/05

EFFICIENCY SHEET

Instrument ID: 102001

As Found Alpha Threshold (mv)	As Left Alpha Threshold (mv)
180	180

Alpha Source: Efficiency determined using Th^{230} #119739

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	31,208	31,208	N/A	N/A
Time, T_s (min)	5	5	N/A	N/A
Rate, R_s (cpm)	$R_{s[\alpha]}$ = 6,241.6	$R_{s[\alpha]}$ = 6,241.6	$R_{s[\beta]}$ = N/A	$R_{s[\beta]}$ = N/A
EFF (% c/d) (>25%)	33.6%	33.6%	N/A	N/A
%Crosstalk [α to β] (< 10%)	$\frac{R_{s[\beta]} - R_{b[\beta]}}{R_{s[\alpha]} - R_{b[\alpha]}} = \frac{N/A}{N/A} = N/A$			

As Found Beta Low Threshold	As Left Beta Low Threshold	As Found Beta High Threshold	As Left Beta High Threshold
4.3mv	4.3mv	50mv	50mv

Beta Source: Efficiency determined using Tc^{99} #119715

Paramter and Tolerance	Alpha As Found	Alpha As Left	Beta As Found	Beta As Left
Source Count, C_s	N/A	N/A	26,119	26,119
Time, T_s (min)	N/A	N/A	5	5
Rate, R_s (cpm)	$R_{s[\alpha]}$ = N/A	$R_{s[\alpha]}$ = N/A	$R_{s[\beta]}$ = 5,223.8	$R_{s[\beta]}$ = 5,223.8
EFF (% c/d) (>25%)	N/A	N/A	25.2%	25.2%
%Crosstalk [β to α] (< 1%)	$\frac{R_{s[\alpha]} - R_{b[\alpha]}}{R_{s[\beta]} - R_{b[\beta]}} = \frac{N/A}{N/A} = N/A$			

Statement of Certification

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	Reviewed By: Thomas F. Scott	Date: 9-13-04
Calibration Date: 09/13/04	Calibration Due: 09/13/05	

N. S. SAVANNAH

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INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum Model 12 Frisker **Serial No.** 75809

Calibration Due Date 3-10-06 Efficiency β 10% α ______

Average α source count ——— cpm Range ______ to ______

Average β source count 800 cpm Range 640 to 960 ±20%

Date	bkg. Count (cpm)	Source Count (cpm)		Results		Initial & Comment
		α	β	pass	fail	
3-31-05	30	—	780	✓		RLP
4-1-05	30	—	700	✓		RLP
4-4-05	30	—	780	✓		RLP
4-5-05	20	—	830	✓		RLP
4-6-05	30	—	800	✓		RLP
4-7-05	30	—	800	✓		RLP
4-8-05	30	—	800	✓		RLP
4-11-05	30	—	800	✓		TEC
4-12-05	30	—	800	✓		RLP
4-13-05	30	—	900	✓		JHL
4-14-05	30	—	800	✓		JHL
4-15-05	30	—	800	✓		JHL
4-18-05	30	—	800	✓		JHL
4-19-05	40	—	750	✓		RLP
4-20-05	30	—	800	✓		JHL
4-21-05	30	—	800	✓		JHL
4-22-05	20	—	800	✓		JHL

N. S. SAVANNAH

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INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum Model 12 Frisker **Serial No.** 91037

Calibration Due Date 3-10-06 Efficiency β 10% α ______

Average α source count ——— cpm Range ______ to ______

Average β source count 800 cpm Range 640 to 960 ±20%

Date	bkg. Count (cpm)	Source Count (cpm) α	Source Count (cpm) β	Results pass	Results fail	Initial & Comment
3-31-05	30	–	760	✓		RGP
4-1-05	40	–	860	✓		RGP
4-4-05	40	–	860	✓		REP
4-5-05	40	–	770	✓		REP
4-6-05	30	–	800	✓		RGP
4-7-05	20	–	800	✓		RGP
4-8-05	20	–	820	✓		RGP
4-11-05	30	–	800	✓		BJS
4-12-05	40	–	800	✓		RGP
4-13-05	30	–	860	✓		JHL
4-14-05	30	–	800	✓		JHL
4-15-05	30	–	850	✓		JHL
4-18-05	20	–	900	✓		RGP
4-19-05	30	–	800	✓		RGP
4-20-05	30	–	800	✓		JHL
4-21-05	30	–	800	✓		JHL
4-22-05	30	–	800	✓		JHL

N. S. SAVANNAH

INSTRUMENT SOURCE CHECK LOG

Instrument 2221 Ludlum Frisker **Serial No.** 94954

Calibration Due Date —

Average source count ______ μR/hr Range ______ to ______

Date	bkg. Count (μR/hr)	Source Count (μR/hr)	Results		Initial & Comment
			pass	fail	
		Not		Used	
				RL	

N. S. SAVANNAH

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INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum Model 44-3 Frisker **Serial No.** 97416

Calibration Due Date 3-10-06 Efficiency β 10.1% α —

Average α source count N/A cpm Range ____ to ____

Average β source count 500 cpm Range 400 to 600 ±20%

Date	bkg. Count (cpm)	Source Count (cpm) α	Source Count (cpm) β	Results pass	Results fail	Initial & Comment
3-31-05	30	—	500	✓		RGP
4-1-05	40	—	500	✓		RGP
4-4-05	30	—	500	✓		RGP
4-5-05	30	—	500	✓		RGP
4-6-05	30	—	500	✓		RGP
4-7-05	30	—	500	✓		RGP
4-8-05	30	—	500	✓		RGP
4-11-05	30	—	500	✓		BJS
4-12-05	30	—	500	✓		RGP
4-13-05	30	—	550	✓		JHL
4-14-05	30	—	550	✓		JHL
4-15-05	30	—	550	✓		JHL
4-18-05	30	—	500	✓		JHL
4-19-05	30	—	500	✓		RGP
4-20-05	30	—	500	✓		JHL
4-21-05	30	—	500	✓		JHL
4-22-05	30	—	500	✓		JHL
4-25-05	30	—	500	✓		TEC

N. S. SAVANNAH

INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum Model 2221 α Frisker **Serial No.** 197766 / 127395 probe

Calibration Due Date 12-7-05 / 4-30-05 **Efficiency** β — α 11.9%

Average α source count 2700 cpm **Range** 2160 to 3240

Average β source count N/A cpm **Range** ______ to ______

Date	bkg. Count (cpm)	Source Count (cpm)		Results		Initial & Comment
		α	β	pass	fail	
4-6-05	0	2700	—	✓		RGP
4-14-05	0	2750	—	✓		RGP

N. S. SAVANNAH

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INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum 19 μR Meter **Serial No.** 42972

Calibration Due Date 3-18-06

Average source count 7.5 μR/h μR/hr Range 6 μR/h to 9 μR/h

Date	bkg. Count (μR/hr)	Source Count (μR/hr)	Results pass	Results fail	Initial & Comment
3-31-05	3	7	✓		RGP
4-1-05	3	7.5	✓		RGP
4-4-05	2	8	✓		RGP
4-5-05	2	7	✓		RGP
4-6-05	2	7.5	✓		RGP
4-7-05	2	7.5	✓		RGP
4-8-05	3	6.5	✓		RGP
4-11-05	3	7.0	✓		JHL
4-12-05	2	8	✓		RGP
4-13-05	3	8	✓		JHL
4-14-05	3	8	✓		JHL
4-15-05	3	8	✓		JHL
4-18-05	3	8	✓		JHL
4-19-05	2	7.5	✓		RGP
4-20-05	2	7	✓		JHL
4-21-05	2.5	8	✓		JHL
4-22-05	2.5	8	✓		JHL

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INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum 19 µR Meter **Serial No.** 95469

Calibration Due Date 3-18-06

Average source count 7 µR/hr Range 5.6 to 8.4

Date	bkg. Count (µR/hr)	Source Count (µR/hr)	Results pass	Results fail	Initial & Comment
3-31-05	2.5	7	✓		RGP
4-1-05	3	7.5	✓		RGP
4-4-05	2	7	✓		RGP
4-5-05	2	7	✓		RGP
4-6-05	2	7	✓		RGP
4-7-05	2	6.5	✓		RGP
4-8-05	2	7	✓		RGP
4-11-05	3	~~6.5~~ JHL 6.5	✓		JHL
4-12-05	2	6	✓		RGP
4-13-05	2.5	6	✓		JHL
4-14-05	2	6	✓		JHL
4-15-05	2	6	✓		JHL
4-18-05	3	6	✓		JHL
4-19-05	2	6	✓		RGP
4-20-05	2	6	✓		JHL
4-21-05	3	6	✓		JHL
4-22-05	2.5	6	✓		JHL
4-25-05	3	7	✓		RGP

N. S. SAVANNAH

Page ___ of ___

INSTRUMENT SOURCE CHECK LOG

Instrument Ludlum 19 μR meter **Serial No.** 95 499

Calibration Due Date 3-19-06

Average source count 8 μR/hr Range 6.4 to 9.6 ±20%

Date	bkg. Count (μR/hr)	Source Count (μR/hr)	Results pass	Results fail	Initial & Comment
3-31-05	3	8	✓		RGP
4-1-05	2.5	8	✓		RGP
4-4-05	2	8	✓		RGP
4-5-05	3	8	✓		JHL
4-6-05	2	7.5	✓		RGP
4-7-05	2	8	✓		JHL
4-8-05	3	8	✓		JHL
4-11-05	3	8	✓		JHL
4-12-05	2.5	7.5	✓		RGP
4-13-05	3	8	✓		JHL
4-14-05	3	8	✓		JHL
4-15-05	3	8	✓		JHL
4-18-05	3	8	✓		JHL
4-19-05	2	8	✓		RGP
4-20-05	3	7.5	✓		JHL
4-21-05	3	8	✓		JHL
4-22-05	3	8	✓		JHL

N.S. SAVANNAH
DAILY DOSIMETRY READER
CALIBRATION CHECK

RADOS DBR-1
Dosimeter reader

Limits: G = ±26, R = ±26, H = ±101, M = ±26, L = ±26, I = ±5001

Date 4-2-05		4-4-05		4-5-05		4-6-05		4-7-05		4-8-05	
Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	Code	Value
G	1	G	1	G	2	G	2	G	2	G	2
R	0	R	4	R	3	R	2	R	2	R	0
H	41	H	97	H	65	H	15	H	3	H	48
M	6	M	19	M	17	M	6	M	7	M	3
L	4	L	9	L	16	L	4	L	5	L	0
I	110	I	110	I	110	I	110	I	110	I	110
Pass	REP		REP		REP		REP		REP		REP

Date 4-11-05		4-12-05		4-13-05		4-14-05		4-15-05		4-18-05	
Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	Code	Value
G	1	G	2	G	2	G	2	G	2	G	1
R	4	R	3	R	5	R	4	R	3	R	5
H	28	H	27	H	8	H	26	H	40	H	35
M	9	M	1	M	7	M	1	M	7	M	10
L	3	L	1	L	2	L	0	L	4	L	4
I	110	I	110	I	110	I	110	I	110	I	110
Pass	REP		REP		REP		REP		REP		REP

Date 4-19-05		4-20-05		4-21-05		4-22-05		4-25-05		4-26-05	
Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	Code	Value
G	2	G	1	G	2	G	1	G	1	G	1
R	7	R	3	R	4	R	4	R	0	R	1
H	5	H	37	H	71	H	85	H	8	H	5
M	8	M	3	M	11	M	22	M	0	M	1
L	3	L	2	L	6	L	9	L	0	L	1
I	110	I	110	I	110	I	102	I	108	I	108
Pass	REP		REP		JWS		JWS		JWS		JWS

Date											
Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	Code	Value
G		G		G		G		G		G	
R		R		R		R		R		R	
H		H		H		H		H		H	
M		M		M		M		M		M	
L		L		L		L		L		L	
I		I		I		I		I		I	
Pass											

Initial under Value column for Pass

APPENDIX C
RADIOLOGICAL DATA SHEETS

(Log summary, radiological data sheets NSS – 0001 through 0101 with sample location maps and confirmatory lab analyses)

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	Location	
NSS-0001	3/28/05	PORT SIDE "A" DECK STATEROOMS & OTHER ROOMS	
NSS-0002	3/28/05	PORT SIDE "A" DECK STATEROOMS & OTHER ROOMS	
NSS-0003	3/28/05	STARBOARD STATEROOMS "A" DECK	
NSS-0004	3/28/05	STARBOARD STATEROOMS "A" DECK	
NSS-0005	3/28/05	"A" DECK STARBOARD BARBER SHOP	
NSS-0006	3/28/05	STARBOARD SIDE "B" DECK CREW STATEROOMS	
NSS-0007	3/28/05	STARBOARD SIDE "B" DECK CREW & OFFICER STATEROOMS	
NSS-0008	3/28/05	"B" DECK PORT SIDE UNIVERSITY OF SOUTH CAROLINA OFFICES	
NSS-0009	3/28/05	"B" DECK PORT SIDE CREW PANTRY	
NSS-0010	3/29/05	STATEROOM 34 PORTSIDE "A" DECK	
NSS-0011	3/29/05	"B" DECK PORT CAPT. MESS ROOM & CAPT. LOUNGE	
NSS-0012	3/29/05	"B" DECK PORT SIDE OFFICERS MESS	
NSS-0013	3/29/05	"B" DECK PORT SIDE STATEROOMS, OFFICE, CLEANING GEAR LOCKER	
NSS-0014	3/29/05	"B" DECK CENTER LINE ROOMS FAN ROOM CONFERENCE ROOM	
NSS-0015	3/29/05	"B" DECK CTR. LINE MAIN GALLEY	
NSS-0016	3/29/05	"B" DECK CTR LINE DINING ROOM	
NSS-0017	3/29/05	"B" DECK INBOARD PORT SIDE STEWARD LAUNDRY	
NSS-0018	3/29/05	"B" DECK CREW BARBER SHOP	
NSS-0019	3/29/05	PROMENADE DECK VERANDA & MAIN LOUNGE	
NSS-0020	3/29/05	BOAT DECK OFFICERS QTRS	
NSS-0021	3/29/05	BOAT DECK OFFICERS QTRS	
NSS-0022	3/29/05	NAVIGATION BRIDGE DECK & PILOT HOUSE	

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	Location	
NSS-0023	3/30/05	"C" Deck Crew Cabins	
NSS-0024	3/30/05	"C" Deck Machine Loading Passage	
NSS-0025	3/30/05	"C" Deck CO^2 Room	
NSS-0026	3/30/05	"C" Deck ~~Starboard~~ Port Side Rooms	
NSS-0027	3/30/05	"C" Deck ~~Port~~ Starboard Rooms	
NSS-0028	3/30/05	Engine Room Upper Landing To Machine Passageway	
NSS-0029	3/30/05	Engine Room Upper Level	
NSS-0030	3/30/05	"C" Deck Lockers For Breathing Gear	
NSS-0031	3/30/05	"A" Deck Bottom Drain of Exhaust Vent To Top of Mast In Front of #4 Hold Cover	
NSS-0032	3/31/05	"C" Deck Laundry & Linen Rms	
NSS-0033	3/31/05	"C" Port & Starboard Passageways	
NSS-0034	3/31/05	"C" Hallway and Laundry Entrance	
NSS-0035	3/31/05	Source Reciept	
NSS-0036	3/31/05	Navigation Deck - Emerg. Gen. Rm	
NSS-0037	3/31/05	"B" Deck Hydrolic Equipment Platform	
NSS-0038	3/31/05	"B" Deck Crew Laundry, Lighting Load Ctr. Cleaning Gear Locker	
NSS-0039	3/31/05	Boat Deck → Promenade Deck → "A" Deck → "B" Deck → "C" Deck Machinery Casing Space	
NSS-0040	3/31/05	Navigation Deck - Boron Dump Control Rm	
NSS-0041	3/31/05	Engineering Work Station Hold #5	
NSS-0042	3/31/05	Main Engine Rm Lower Level Port Side of Shaft	
NSS-0043	3/31/05	Main Engine Rm Lower Level Starboard Side of Shaft	
NSS-0044	3/31/05	Main Shaft Alley	

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	Location	
NSS-0045	4/1/05	CONTROL ROOM FOR REACTOR	
NSS-0046	4/1/05	14' FLAT DECK STARBOARD SIDE	
NSS-0047	4/1/05	14' FLAT DECK PORT SIDE	
NSS-0048	4/1/05	"D" DECK FOOD STORES STARBOARD SIDE	
NSS-0049	4/1/05	"D" DECK SPECIAL STORES PORT SIDE	
NSS-0050	4/1/05	"A" DECK AFT HOUSE	
NSS-0051	4/1/05	"B" DECK STERN COMPARTMENTS	
NSS-0052	4/1/05	"C" DECK EMERG. H.P. LAB	
NSS-0053	4/1/05	"C" DECK (AFT OF H.P. LAB) COMPARTMENTS	
NSS-0054	4/1/05	CARGO HOLD #4 B, C, D, HOLD DECKS	
NSS-0055	4/4/05	"A" DECK PORT SIDE FAN ROOM AND PLENUM	
NSS-0056	4/4/05	"B" DECK STATEROOM B-1, RAD WASTE STORAGE	
NSS-0057	4/4/05	14' FLAT FWD STABLIZER RM STARBOARD	
NSS-0058	4/4/05	FWD STABLIZER RM STARBOARD LOWER LEVEL AND CROSS OVER TO PORT	
NSS-0059	4/4/05	FWD STABILIZER RM PORT UPPER LEVEL	
NSS-0060	4/4/05	FWD STABLIZER RM PORT LOWER LEVEL	
NSS-0061	4/4/05	FWD WEATHER DECK HOUSES BETWEEN HATCHES 1&4	
NSS-0062	4/5/05	"B" DECK FAN ROOM	
NSS-0063	4/5/05	HOLD #4 "D" DECK STARBOARD	
NSS-0064	4/5/05	"C" DECK COLD WATER CHEM LAB UPPER LEVEL	
NSS-0065	4/5/05	HOLD DECK PORT & STARBOARD	
NSS-0066	4/5/05	HALLWAY (CROSSOVER) ON HOLD DECK	

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	Location
NSS-0067	4/6/05	SECONDARY CONTAINMENT "B" DECK AFT OF REACTOR
NSS-0068	4/6/05	"A" DECK HP LAB AT HOSPITAL
NSS-0069	4/7/05	PRIMARY CONTAINMENT INSIDE HATCH CONTROLS AND PLUG
NSS-0070	4/7/05	"D" DECK (COLD CHEM LAB)(FROM "C" DECK) RAD SAMPLING ROOM GAS ABSORPTION, EQUIP ROOM, WASTE STORAGE
NSS-0071	4/8/05	"C" DECK SECONDARY CONTAINMENT FWD
NSS-0072	4/8/05	"B" DECK SECONDARY CONTAINMENT
NSS-0073	4/8/05	"A" DECK SECONDARY CONTAINMENT
NSS-0074	4/8/05	PRIMARY CONTAINMENT AIR LOCK
NSS-0075	4/8/05	SECONDARY CONTAINMENT "D" DECK AFT MEZZANINE AND LOWER AREAS
NSS-0076	4/8/05	SECONDARY CONTAINMENT LOWER LEVEL (HOLD DECK)
NSS-0077	4/11/05	PRIMARY CONTAINMENT HATCH (LOWER)
NSS-0078	4/11/05	PRIMARY CONTAINMENT ("C" DECK) 1ST LEVEL PRELIMINARY SMEARS
NSS-0079	4/14/05	PRIMARY CONTAINMENT ("C" DECK) 1ST LEVEL FWD
NSS-0080	4/11/05	STEAM CONDENSOR HATCH (ENGINE ROOM)
NSS-0081	4/11/05	"D" DECK HOT CHEM. LAB AT CONTROL ROOM
NSS-0082	4/12/05	PRIMARY CONTAINMENT 4TH LEVEL (HOLD DECK)
NSS-0083	4/12/05	PRIMARY CONTAINMENT 1ST LEVEL ("C" DECK)
NSS-0084	4/12/05	PRIMARY CONTAINMENT 2nd LEVEL ("D" DECK)
NSS-0085	4/12/05	PRIMARY CONTAINMENT 3rd LEVEL (14' FLAT)
NSS-0086	4/12/05	CHARGE PUMP ROOMS (PORT & STBD)
NSS-0087	4/13/05	PRIMARY CONTAINMENT 1ST LEVEL ("C" DECK)
NSS-0088	4/14/05	SECONDARY CONTAINMENT LOWER LEVEL CORE BORE LOCATIONS

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	Location	
NSS-0089	4/14/05	"U" SHAPED STEAM GENERATORS IN PRIMARY CONT.	
NSS-0090	4/19/05	TOP OF CUPOLA STBD NITROGEN VALVE FLANGE	
NSS-0091	4/~~20~~ 19 RGH /05	PRIMARY WATER SMALL TANK	
NSS-0092	4/~~20~~ 19 RGH /05	LEAD SAMPLE LOCATION - OUTER REACTOR WALL	
NSS-0093	4/21/05	PRIMARY CONTAINMENT - STBD STEAM GEN WORK AREA	
NSS-0094	4/21/05	PRIMARY CONTAINMENT FWD OF REACTOR 1ST & 2ND LEVEL	
NSS-0095	4/21/05	PRIMARY CONTAINMENT PORT U TUBE STEAM GEN ACCESS COVER	
NSS-0096	4/20/05	PRIMARY CONTAINMENT STBD U TUBE STEAM GEN. INSIDE PRIMARY SIDE	
NSS-0097	4/21/05	PRIMARY CONTAINMENT PORT U TUBE STEAM GEN. INSIDE PRIMARY SIDE	
NSS-0098	4/22/05	PRIMARY CONTAINMENT PORT U TUBE STEAM GEN. POST JOB SURVEY	
NSS-0099	4/25/05	SURVEY OF METERS USED ON JOB	
NSS-0100	4/25/05	PORT STEAM DRUM SECONDARY	
NSS-0101	4/26/05	PIPE FROM NITROGEN LINE IN PRIMARY CONT.	
NSS-0102			
NSS-0103			
NSS-0104			
NSS-0105			
NSS-0106			
NSS-0107			
NSS-0108			
NSS-0109			
NSS-0110			

N. S. SAVANNAH
SURVEY LOG

Survey No.	Date	AIR SAMPLES Location
NSS-0111	4/5/05	COLD CHEM LAB "C" DECK
NSS-0112	4/6/05	ACCESS TO SECONDARY CONTAINMENT
NSS-0113	4/7/05	CHARGE PUMP RM STBD.
NSS-0114	4/8/05	AIR LOCK FR PRIMARY CONTAINMENT
NSS-0115	4/8/05	PRIMARY CONTAINMENT 1ST LEVEL
NSS-0116	4/8/05	CHARGE PUMP RM STBD RECHECK
NSS-0117	4/11/05	"C" DECK COLD CHEM LAB RECHECK
NSS-0118	4/11/05	PRIMARY CONTAINMENT 2nd LEVEL
NSS-0119	4/11/05	SECONDARY CONTAINMENT LOWER LEVEL
NSS-0120	4/12/05	PRIMARY CONTAINMENT 4TH LEVEL
NSS-0121	4/22/05	PRIMARY CONTAINMENT U TUBE STEAM GEN. ACCESS COVER OPENING.
NSS-0122		
NSS-0123		
NSS-0124		
NSS-0125		
NSS-0126		
NSS-0127		
NSS-0128		
NSS-0129		
NSS-0130		
NSS-0131		
NSS-0132		

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0001

Date 3/28/05 Time 9:00 AM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature J Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor —	Eff. 10%	
	BKG 4 μR/hr	Bkg. 30 cpm	cpm

AREA PORT SIDE A DECK

COMPONENT

Room THRESHOLD - 1
DOOR KNOB - 2
BATH FLOOR - 3
AIR VENT-OVHD - 4
BATH DOOR KNOB - 5

TOILET PORCELAIN & GLAZE
READS 7-8 μR/hr DUE
TO URANIUM or THORIUM

LESS THAN BKGD

PASS. LAUNDRY
< BKGD
< 100 CPM

STRM #2 TC
~~LADIES LOUNGE~~
< BKGD
< 100 CPM

LADIES LOUNGE
#6
< BKG < 100 cpm

STRM
12-15 mRm
RESTRM > BKGD
* > 100 cpm TOILET
STRM 12
(Chain locked)

> 100 cpm IN TOILET
12-15 mRm
RESTROOM
*
STRM 14
(CHAIN LOCKED)

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	1	< BKG	1	< BKG	1	< BKG	1	< BKG
2	< BKG	2	< BKG	2	< BKG	2	< BKG	2	< BKG
3	< BKG	3	< BKG	3	< BKG	3	< BKG	3	< BKG
4	< BKG	4	< BKG	4	< BKG	4	< BKG	4	< BKG
5	< BKG	5	< BKG	5	< BKG	5	< BKG	5	< BKG

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0002

Date 3/28/05 Time 10:15 AM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Robert E. Pennah	β⁻ Factor	Eff. 10%	
	BKG 4 µR/h	Bkg. 30 cpm	cpm

AREA PORT SIDE A DECK

COMPONENT

ROOM THRESHOLD - 1
DOOR KNOB - 2
BATH FLOOR - 3
AIR VENT (OVHD) - 4
BATH ROOM KNOB - 5

TOILET GLAZE or PORCELAIN
READS 7-8 µR/h
DUE TO URANIUM or THORIUM

RESTRM >BKGD
NEAR TOILET

RESTROOM AREAS
>BKGD >1000 CPM

RESTRM TOILET >1000 CPM
7 TO 8 µR/HR
FLOOR < 1000 CPM

<BKGD
STRM #20 < 1000 CPM

<BKGD
STRM 26

<BKGD
SRM 32

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	1	< BKG	1	< BKG				
2	< BKG	2	< BKG	2	< BKG				
3	< BKG	3	< BKG	3	< BKG				
4	< BKG	4	< BKG	4	< BKG				
5	< BKG	5	< BKG	5	< BKG				

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN µrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0003

Date 3-28-05 Time 8100	DOSE RATE	CONTAMINATION	
Surveyor Lamar Scott	Inst. Type Lud MDI 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lamar Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [signature]	β⁻ Factor /	Eff. 10 %	
	Background 4 uR/hr	Bkg. 40 cpm	cpm

AREA ~~Portside~~ State Rooms
Starboard + offices A Deck

COMPONENT

Room Thres [illegible] - 1
Door [illegible] - 2
B[illegible] [illegible] - 3
[illegible] - [illegible] AD - 4
Bath Door [illegible] - 5

STR 3
FRSK <100cpm
DR < Background

STR 9
FRSK <100cpm
DR < BKG

STR 15
FRSK <100cpm
DR < BKG

CHIEF STEWARD OFFICE ~~PURSER~~ Room
STR
FRSK <100cpm
DR < BKG

STR 21
FRSK < 100 cpm
DR < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD
3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD
4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD
5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0004

Date 3/28/05 Time	DOSE RATE	CONTAMINATION	
Surveyor LOMAN SCOTT	Inst. Type LUDMD119	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Loman Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [signature]	β⁻ Factor 1	Eff. 10 %	
	Background 4 ~~MR~~ μR/hr	Bkg. 40 cpm	cpm

AREA STARBOARD STATE ROOMS + OFFICE A DECK

COMPONENT

1 Room Threshhold
2 Door Knob
3. Bath Floor
4 AIR Vent overhead
5. Bath Door Knob

~~STAR~~ STARBOARD - CLEANING ROOM
1. Threshold
2. Floor
3. SINK
4 DOOR KNOB

~~STAR~~ STARBOARD LINEN LOCKER
1 DOOR KNOB
2 THRESHOLD
3. FLOOR
4 OPEN HATCH
5 VALVE HANDLES

STR 27
FRSK <100
DR < BKG

(CREW) NURSE
STR 33
FRSK <100
DR < BKG

CLEANING ROOM
FRSK <100
DR <BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B – BETA/hr mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD		
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD		
3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD		
4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD		
5	< BKGD	5	< BKGD	~~5~~		5	< BKGD		
				RAS					

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0005

Date 3/28/05 Time 1210	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [illegible]	β^- Factor /	Eff. 10%	
	BKG 4.0 µR/hr	Bkg. 40 cpm	cpm

AREA ~~B Deck~~ A. Deck Barber Shop

COMPONENT

1 - Door Threshold
2 - Door Handle
3 - Inner Air vent
4 - outer Airvent
5 - Forward Sink
6 - Aft Sink
7 - Floor (Aft chair)

Barber Shop
FRSK < 100
DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

PAGE

NSS-01

SURVEY NO. NSS-0006

Date 3/28/05 Time 1210	DOSE RATE	CONTAMINATION	
Surveyor LOMAN SCOTT	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed Robert E Brunah	β⁻ Factor —	Eff. 10 %	
	BKG 4.0 μR/hr	Bkg. 40 cpm	cpm

AREA B DECK CREW STATEROOMS
STARBOARD SIDE

COMPONENT

1- Threshold
2- Door Knob
3- Bath Floor
4- Bath Knob
5- Air vent
6- Floor in front of bath

Crew B-5 FRSK < 100 DM < BKG	Crew B-11 FRSK < 100 DM < BKG	Crew B-17 FRSK < 100 DM < BKG	Crew B-23 FRSK < 100 DM < BKG	Crew B-29 FRSK < 100 DM < BKG

SMEAR RESULTS ~~N DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD
3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD
4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD
5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD
6	< BKGD	6	< BKGD	6	< BKGD	6	< BKGD	6	< BKGD

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0007

Date 3/28/05 Time 1100	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type LUDM D119	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lonnie Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [signature]	β⁻ Factor /	Eff. 10%	
	BKG 4.0 μR/hr	Bkg. 40 cpm	cpm

AREA B DECK CREW + OFFICER QUARTERS
STARBOARD SIDE

COMPONENT

1 - THRESHOLD
2 - DOOR KNOB
3 - BATH FLOOR
4 - BATH DOORKNOB
5 - AIR VENT
6 - FLOOR IN FRONT OF BATH

CREW | CREW | OFFICERS QUARTERS | OFFICERS QUARTERS | OFFICERS QUARTERS

B-35 FRSK <100 DM <BKG
B-41 FRSK <100 DM <BKG
B-45 FRSK <100 DM <BKG
B-49 FRSK <100 DM <BKG
B-53 FRSK <100 DM <BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	1	<BKGD	1	<BKGD	1	<BKGD	1	<BKGD
2	<BKGD	2	<BKGD	2	<BKGD	2	<BKGD	2	<BKGD
3	<BKGD	3	<BKGD	3	<BKGD	3	<BKGD	3	<BKGD
4	<BKGD	4	<BKGD	4	<BKGD	4	<BKGD	4	<BKGD
5	<BKGD	5	<BKGD	5	<BKGD	5	<BKGD	5	<BKGD
6	<BKGD	6	<BKGD	6	<BKGD	6	<BKGD	6	<BKGD

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

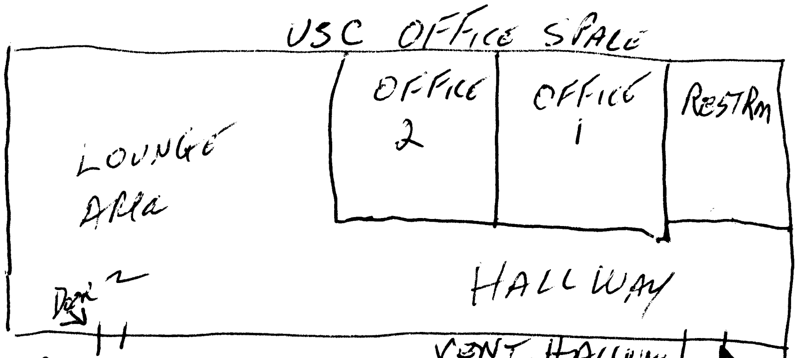
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0008

Date 3/28/05 Time 1:00 PM	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor 10%	Eff. 10%	
	BKG 4 uR/hr	Bkg. 30 cpm	cpm

AREA UNIVERSITY of SOUTH CAROLINA OFFICE SPACES
B DECK PORT

COMPONENT



1. ~~Restrm~~ DOOR 1 THRESHOLD
2. DOORKNOB #1
3. FLOOR of HALLWAY
4. DECK RESTRM
5. DOOR KNOB RM
6. ~~DECK OFFICE~~ VENT HALLWAY
7. DOOR KNOB OFFICE 1 NA
8. DECK OFFICE 2 N/A
9. DOOR KNOB OFFICE 2 NA
10. THRESHOLD DOOR 2
11. DOOR KNOB # Door 2
12. VENT IN LOUNGE
13. VENT OFFICE #2
14. VENT OFFICE #1
15. VENT RESTRM

USC OFFICE SPACES
DR < BKGD
FRISK < 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	6	< BKGD	11	< BKGD				
2	< BKGD	7	NA	12	< BKGD				
3	< BKGD	8	NA	13	< BKGD				
4	< BKGD	9	NA	14	< BKGD				
5	< BKGD	10	< BKGD	15	< BKGD				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0009

Date 3/28/05 Time 1:30 PM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha ____	Beta ✓ Alpha ____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β^- Factor 10%	Eff. 10%	
	BKG 4uR/hr	Bkg cpm	30 cpm

AREA CREW PANTY B DECK PORT

COMPONENT

1 - THRESHOLD
2 - DOOR KNOB
3 - DECK
4 - VENTILATION
5 DK DRAIN

< BKGD
< 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-~~0~~0010 REP

Date 3/29/05 Time 8:00 AM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor ~~10%~~ N/A	Eff. 10%	
	4 μR/HR BKGD	Bkg. 30 cpm	cpm

AREA STATE ROOM 34 PORT A DECK

COMPONENT

1 - THRESHOLD of DOORWAY
2 - DOORKNOB of SR DOOR
3 - VENTILATION DUCK
4. BATH ROOM DECK
5. BATH ROOM DOORKNOB

DOSE RATE - < BKGD
COUNT RATE < 100 CPM (30-40 CPM)

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								
3	<BKG								
4	<BKG								
5	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

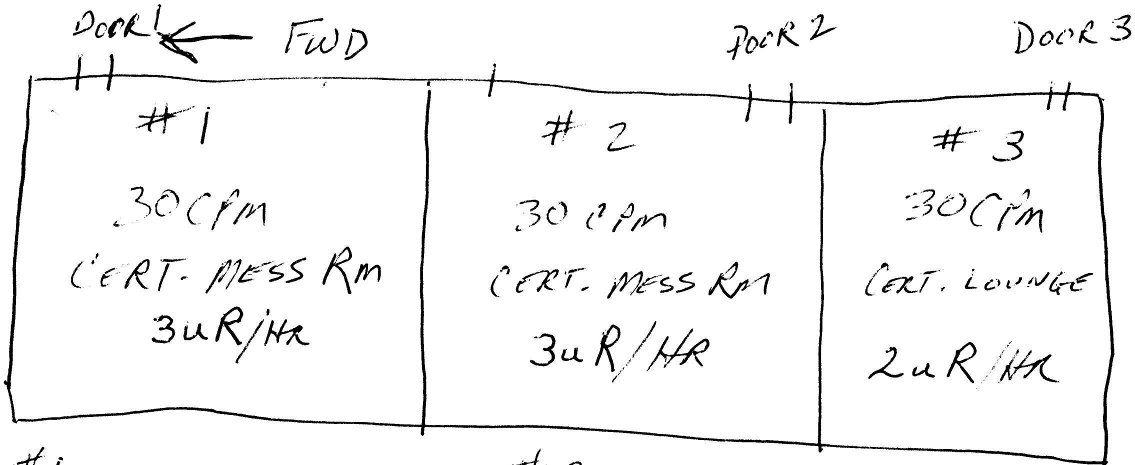
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0011

Date 3/29/05 Time 8:30 AM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature Craddock	Serial No. 95499	Inst.Sn ~~[illegible]~~ 97416	
Reviewed [signature]	β⁻ Factor 10%	Eff. 10%	
	BKG 4 μR/hr	Bkg. 30 cpm	cpm

AREA "B" DECK CERT. MESS ROOM + CERT. LOUNGE

COMPONENT



#1
1. THRESHOLD
2. DOOR KNOB
3. VENTILATION
4. WATER FOUNTAIN

#2
1. THRESHOLD
2. DOOR KNOB
3. VENTILATION

#3
1. THRESHOLD
2. DOOR KNOB
3. VENTILATION
4 WATER FOUNTAN

MESS RM BACKGOUND 3 uR/HR 30 CPM

MESS RM BACKGOUND 3 uR/HR 30 CPM

LOUNGE BACKGOUND 2 uR/HR 30 CPM

#1 MESS RM. | #2 MESS RM / #3 LOUNGE

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD				
2	< BKGD	2	< BKGD	2	< BKGD				
3	< BKGD	3	< BKGD	3	< BKGD				
4	< BKGD			4	< BKGD				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

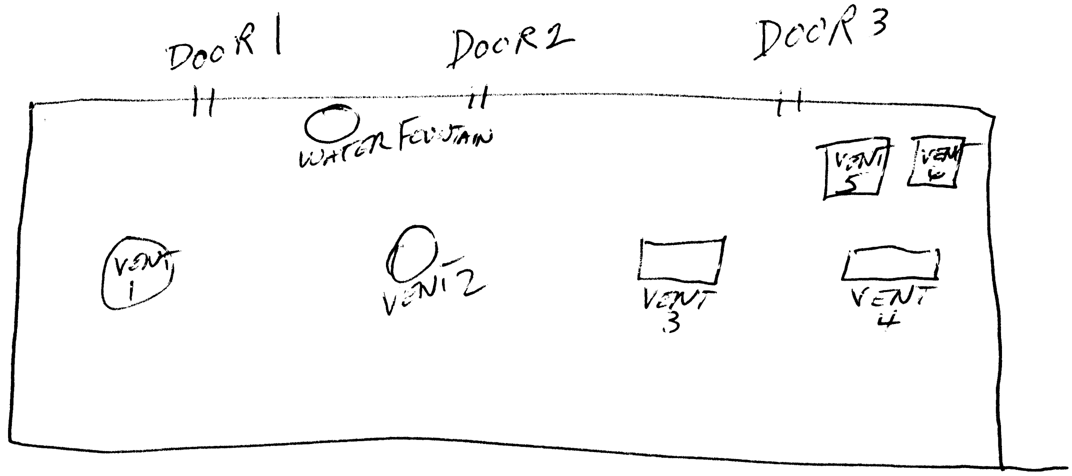
NSS-01

SURVEY NO. NSS-0012

Date 3/29/05 Time 9:00 AM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor 10%	Eff. 10%	
	BKG 2uR/HR	Bkg. 30 cpm	cpm

AREA B DECK PORT OFFICERS MESS

COMPONENT



1 - THRESHOLD DOOR 1
2 - DOOR KNOB DOOR 1
3 - VENT 1
4 - WATER FOUNTAIN
5 - VENT 2
6. THRESHOLD DOOR 2
7 DOORKNOB DOOR 2
8 - VENT 3
9 - VENT 4
10 - VENT-5
11. THRESHOLD DOOR 3
12. DOOR KNOB DOOR 3
13. VENT 6

DR < 2uR/HR BKGD
Frisk < 30 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD	12	< BKGD						
5	< BKGD	13	< BKGD						
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0013

Date 3/29/85 Time 9:20	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature S. Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	@ 2uR/Hr	Bkg. 30 cpm	cpm

AREA B DECK PORT B-8 STATE ROOM, B14 STATE RM, B18 STATE RM
CLEANING GEAR LOCKER, OFFICE

COMPONENT

1 THRESHOLD
2 DOOR KNOB
3 VENTILATION
4 DECK BATH RM
5 BATH RM DOOR KNOB

CLEANING GEAR LOCKER
1. THRESHOLD
2. DOOR KNOB
3 - DECK
4 - VENT

OFFICE
1. THRESHOLD
2. DOOR KNOB
3 VENT

STATE RM B8	STATE RM B14	STATEROOM B18	CLEANING GR LOCKER	OFFICE NEXT TO CLEANING LOCKER
FRISK 30 CPM DR < 3 uR/HR BKGD	FRISK 30 CPM DR < 2 uR/HR	FRISK 30 CPM DR < 2 uR/HR	DR < 2 uR/HR FRISK 30 CPM	DR < 2 uR/HR FRISK 30 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD
3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD
4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD		
5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD		

RA – RADIATION AREA　　CA – CONTAMINATION AREA　　ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA　　AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

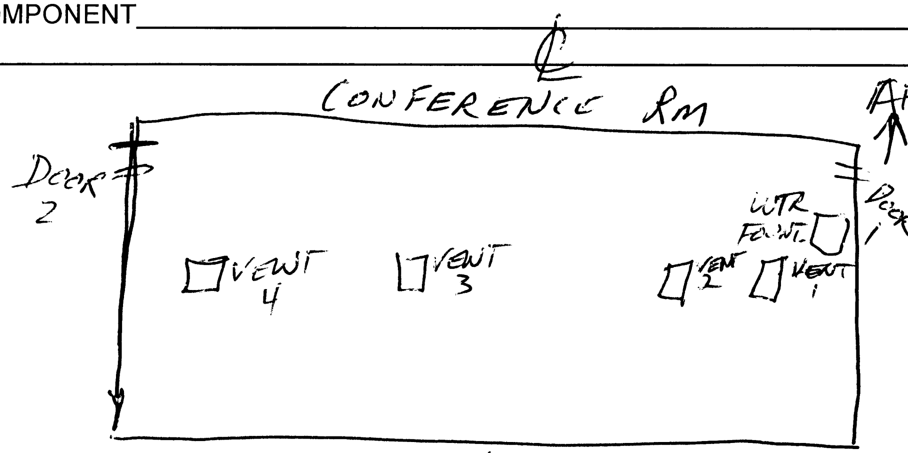
NSS-01

SURVEY NO. NSS-0014

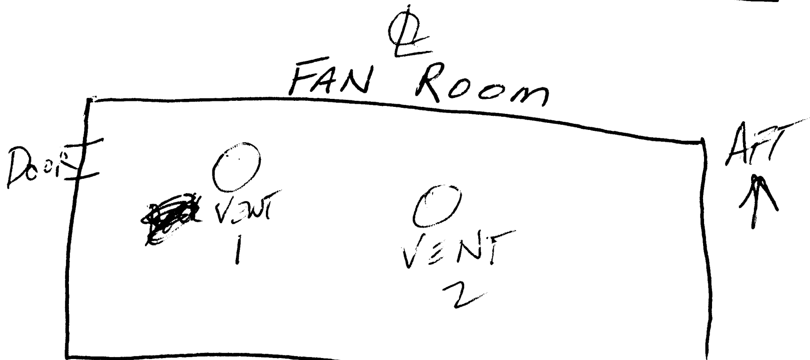
Date 3-29-05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha___	Beta___ Alpha___
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β^- Factor 10%	Eff. 10%	
	2uR/Hr	Bkg. 30 cpm	cpm

AREA B DECK ~~[illegible]~~ CONFERENCE Rm FAN ROOM CENTER LINE RMS

COMPONENT



SWIPES
1. THRESHOLD DOOR 1
2. DOOR KNOB DOOR 1
3. WATER FOUNTAIN
4. VENT 1
5. VENT 2
6. VENT 3
7. VENT 4
8. THRESHOLD DOOR 2
9. DOOR KNOB DOOR 2



SWIPES
1. THRESHOLD
2. DOOR KNOB
3. VENT 1
4. VENT 2
5. DECK

30 CPM
2uR/HR

30 CPM
2uR/HR

CONFERENCE Rm. FAN Rm

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD	1	<BKGD				
2	<BKGD			2	<BKGD				
3	<BKGD			3	<BKGD				
4	<BKGD			4	<BKGD				
5	<BKGD			5	<BKGD				
6	<BKGD								
7	<BKGD								
8	<BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0015

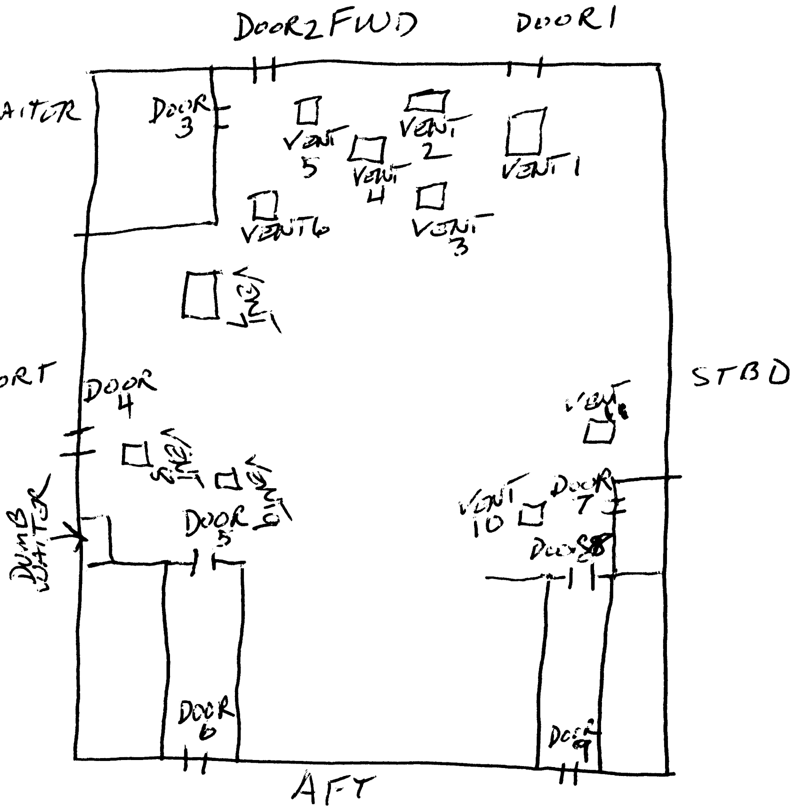
Date 3/29/05 Time ~~[illegible]~~	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β Factor ~~4uR/HR~~ TC	Eff. 10%	
	4uR/H BKG	Bkg. 30 cpm	cpm

AREA B DECK CENTER LINE MAIN GALLEY

COMPONENT

SWIPES

1. DOOR 1 THRESHOLD
2. " KNOB
3. DOOR 2 THRESHOLD
4. " KNOB
5. DOOR 3 THRESHOLD
6. " KNOB
7. DOOR 4 THRESHOLD
8. " KNOB
9. DOOR 5 THRESHOLD
10. " KNOB
11. DOOR 6 THRESHOLD
12. " KNOB
13. DOOR 7 THRESHOLD
14. " KNOB
15. DOOR 8 THRESHOLD
16. " KNOB
17. DOOR 9 THRESHOLD
18. " KNOB
19. DUMBWAITER
20. VENT 1
21. " 2
22. " 3
23. " 4
24. " 5
25. " 6 PORT
26. " 7
27. " 8
28. " 9
29. " 10
30. " 11



D.R. < BKGD
FRISK < 100 CPM FOR ENTIRE MN. GALLEY

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD	17	< BKGD	25	< BKGD		
2	< BKGD	10	< BKGD	18	< BKGD	26	< BKGD		
3	< BKGD	11	< BKGD	19	< BKGD	27	< BKGD		
4	< BKGD	12	< BKGD	20	< BKGD	28	< BKGD		
5	< BKGD	13	< BKGD	21	< BKGD	29	< BKGD		
6	< BKGD	14	< BKGD	22	< BKGD	30	< BKGD		
7	< BKGD	15	< BKGD	23	< BKGD				
8	< BKGD	16	< BKGD	24	< BKGD				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

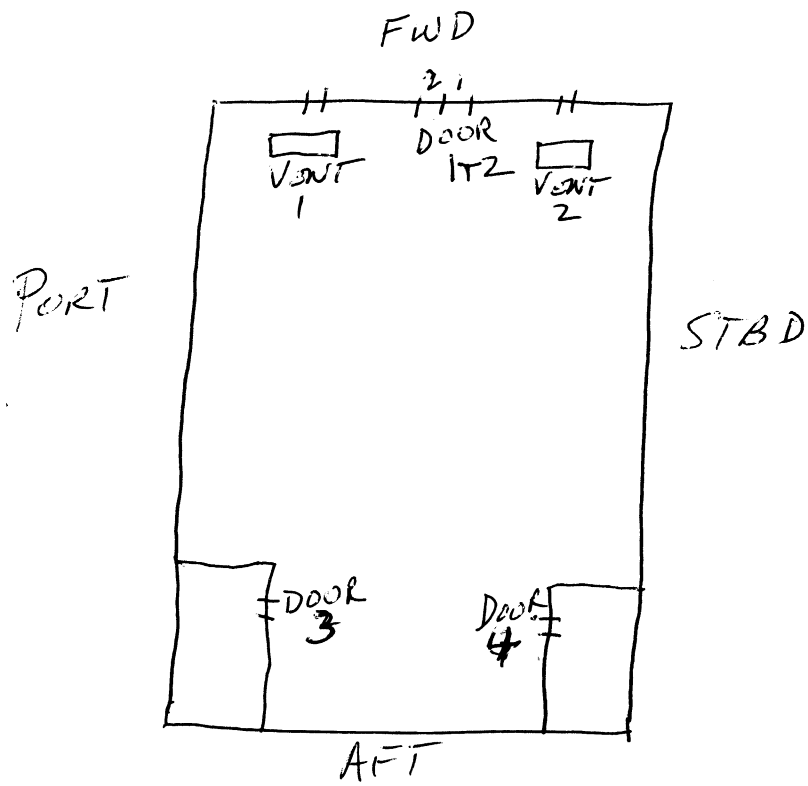
NSS-01 SURVEY NO. NSS - 0016

Date 3/29/05 Time	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Ralph E. Pennard	β⁻ Factor ~~4 mR/hr~~	Eff. 10%	
	4uR/H BKG	Bkg. 30 cpm	cpm

AREA B DECK CENTER LINE DINING ROOM

COMPONENT

1. DOOR 1 THRESHOLD
2. DOOR 1 KNOB
3. DOOR 2 THRESHOLD
4. " KNOB
5. DOOR 3 THRESHOLD
6. " KNOB
7. DOOR 4 THRESHOLD
8. DOOR 4 KNOB
9. VENT 1
10. VENT 2



DR < BKGD ENTIRE DINING RM
FRISK 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~			~~B = BETA in mRAD/hr/100 CM²~~						
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0017

Date 3-29-05 Time 1355	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature S Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Rick T Pennock	β⁻ Factor ~~4uR/H~~ TC	Eff. 10%	
	4uR/H	Bkg. 30 cpm	cpm

AREA B Deck Inboard Portside Steward Laundry

COMPONENT

DR <BKGD
FRISK < 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~									
NO.	RESULTS	N O.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD								
2	<BKGD								
3	<BKGD								
4	<BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0018

Date 3-29-05 Time 1345	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type Ludlum	Beta ✓ Alpha	Beta Alpha
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed R. W. Pennah	~~β Factor~~ BKG 4 uR/H	Eff. 10%	
		Bkg. 30 cpm	cpm

AREA B Deck CERT BARBER Shop (CREW)

COMPONENT

3 - FLOOR
4 - DOOR KNOB
5 - Threshold

D.R. METER ~~FRSK~~ <BKGD
FRSK <100CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	NA								
2	NA								
3	<BKGD								
4	<BKGD								
5	<BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0019

Date 3-29-05 Time 0800-0900	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor 1	Eff. 10 %	
	BKG 40 µR/hr	Bkg. 40 cpm	cpm

AREA Promenade Deck VERANDA & MAIN LOUNGE

COMPONENT

1 SWIMMING Pool DOOR HANDLE PORTSIDE
2 MIDDLE of DANCE FLOOR
3 CLENING ROOM LOCKER PORTSIDE threshold
4 PANTRY Kitchen HAND CLEANING SINK PORTSIDE
5 MENS BAthroom PORTSIDE HAND SINK
6 PROMENADE threshold STARBOARD
7 LADIES POWDER Room HAND SINK
8 Projection Room Port Exit DOOR HANDLE
9 FAN ROOM STARBOARD FLOOR
10 FAN Room PORT FLOOR

FSKR - < 100
DM - < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B – BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0020

Date 3-29-05 Time 0900	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha	Beta Alpha
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor 1	Eff. 10%	
	BKG 4 μR/hr	Bkg. 40 cpm	cpm

AREA Boat Deck

COMPONENT

1. Officers Lounge threshold
2 Officers Lounge Hand Sink
3. Officers Lounge Door Knob
4. Officers Lounge Vent
5 Officers Lounge Floor

1. Officers Laundry Floor
2 Officers Laundry Sink

Staterooms (Officers)
1 threshold
2 Door Knob
3 Bath Floor
4 Bath Door Knob
5 Air Vent
6 Floor

Officers Lounge
FRSK < 100cpm
DM < BKG

Port Side Officers Laundry
FRS < 100cpm
DM < BKG

State Room BT 12
FRS < 100cpm
DM < BKG

#3 120cpm Gross Reading 80 Net cpm

State Room Bt 8
FRSK < 100cpm
DM < BKG

Chief Rad 1st Engr State Room
FRSK < 100cpm
DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD
3	< BKGD			3	< BKGD	3	< BKGD	3	< BKGD
4	< BKGD			4	< BKGD	4	< BKGD	4	< BKGD
5	< BKGD			5	< BKGD	5	< BKGD	5	< BKGD
				6	< BKGD	6	< BKGD	6	< BKGD

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS - 0021

Date 3-29 Time 1010	DOSE RATE	CONTAMINATION	
Surveyor LOMAN SCOTT	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor /	Eff. 10%	
	BKG 40 uR/hr	Bkg. 40 cpm	cpm

AREA OFFICERS DECK (BOAT DECK)

COMPONENT

OFFICERS STATEROOMS
1 threshold
2 DOOR KNOB
3 BATH FLOOR
4 BATH DOOR KNOB
5 AIR VENT
6 FLOOR
7 SINK

1st ASST. ENG (2ND ENGR) BT-6 — FRSK < 100 cpm DM < BKG
CAPTAINS QUATERS — FRSK < 100 cpm DM < BKG
BT-11 (ELEVEN) — FRSK < 100 cpm DM < BKG
BT-13 — FRSK < 100 cpm DM < BKG
CLEANING GEAR LOCKER — FRSK < 100 cpm DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	2	< BKGD
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD	6	SKIP
3	< BKGD	3	< BKGD	3	< BKGD	3	< BKGD	6	< BKGD
4	< BKGD	4	< BKGD	4	< BKGD	4	< BKGD	7	< BKGD
5	< BKGD	5	< BKGD	5	< BKGD	5	< BKGD		
6	< BKGD	6	< BKGD	6	< BKGD	6	< BKGD		

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0022

Date 3-29-05 Time 1300	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β^- Factor 1	Eff. 10%	
	BKG 4.0 µR/h	Bkg. 40 cpm	cpm

AREA Navigation Bridge Deck

COMPONENT

1. threshold
2. DoorKnob
3. Bathroom Floor
4. Bathroom Door Knob
5. AIR Vent
6. Floor
7. SINK
8. Elevator Equipment platform Right
9. Elevator Equipment platform Left

NOT ALL LOCATIONS TAKEN IN EACH ROOM

FRSK<100cpm DM<BKG Bridge Toilet / FRSK<100cpm DM<BKG Cleaning Gear locker / FRSK<100cpm DM<BKG NB-2 / FRSK<100cpm DM<BKG NB-4 / FRSK<100cpm DM<BKG Elevator Room

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	7	<BKGD	1	<BKGD	1	<BKGD	2	<BKGD
2	<BKGD	1	<BKGD	2	<BKGD	2	<BKGD	6	<BKGD
7	<BKGD	3	<BKGD	3	<BKGD	3	<BKGD	8	<BKGD
				4	<BKGD	4	<BKGD	9	<BKGD
				5	<BKGD	5	<BKGD		
				6	<BKGD	6	<BKGD		

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0022

Date 3-29-05 Time 1300	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor 1	Eff. 10 %	
	BKG 4 µR/hr	Bkg. 40 cpm	cpm

AREA NAVIGATION BRIDGE DECK (Pilot HOUSE)

COMPONENT

BRIDGE

1. STARBOARD threshold
2. StARBOARD DOOR KNOB
3 PORT threashold
4 PORT DOORKNOB
5. BRIDGE CENTER Floor
6. BRIDGE GRAB RAIL STARBOARD SIDE FRONT GLASS.

FRSK <100 cpm
DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN µrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0023

Date 3-30-05 Time 0830	DOSE RATE HVG 50V	CONTAMINATION	
Surveyor LOMAN SCOTT	Inst. Type DURATEC	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 95499	Inst.Sn 97499	
Reviewed Rob T G Pennock	~~β Factor~~ N/A	Eff. 10%	
	4 μR/Hr	Bkg. 30 cpm	cpm

AREA C-DECK CREW CABINS

COMPONENT

1. Threshold
2. DOORKNOB
3. BATH FLOOR
4. BATH DOORKNOB
5. Vent
6. ROOM FLOOR
7. SINK

FRSK <100
DM < BKG

C-11 STARBOARD
FRSK <100
DM <BKG

C-5 STARBOARD
FRSK <100
DM <BKG

CLEANING GEAR LOCKER OPPOSITE C-2
FRSK <100
DM <BKG

C-2 PORT
FRSK <100
DM <BKG

C-4 PORT (BLUE PRINT ROOM?)

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B = BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD
2	< BKGD	2	< BKGD	6	< BKGD	2	< BKGD	2	< BKGD
3	< BKGD	3	< BKGD	7	< BKGD	3	< BKGD	3	< BKGD
4	< BKGD	4	< BKGD			4	< BKGD	4	< BKGD
5	< BKGD	5	< BKGD			5	< BKGD	5	< BKGD
6	< BKGD	6	< BKGD			6	< BKGD	6	< BKGD

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0023

Date 3-30-05 Time 1100	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type HV650V DURATEC	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 95499	Inst.Sn 97499	
Reviewed [signature]	~~β Factor~~ NA	Eff. 10%	
	4 uR/Hr	Bkg. 30 cpm	cpm

AREA C-DECK CREW CABINS

COMPONENT

1. threshold
2. Door Knob
3. Bath Floor
4. Bath Door Knob
5. VENT
6. Room Floor

FRSK < 100
DM-BKG

C-10

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

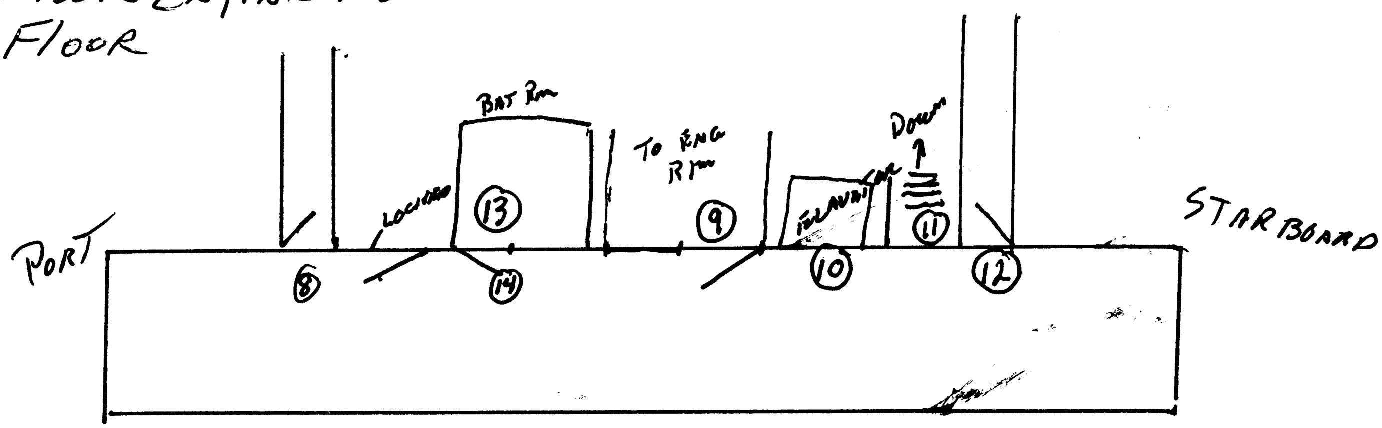
NSS-01 SURVEY NO. NSS-0024

Date 3-30-05 Time	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type AVG50V DURATEC	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	~~β Factor~~ NA	Eff. 10%	
	4 uR/Hr	Bkg. 30 cpm	cpm

AREA C DECK - MACHINE LOADING PASSAGE

COMPONENT

#8 PORT - MACHINE LOADING AREA (CREW)
BOW
#9 FLOOR ENGINE ROOM ACCESS (PORT)
#10 ELEVATOR FLOOR
#11 FLOOR ENGINE ROOM ACCESS
#12 FLOOR



13 - FLOOR
14 - DOOR HANDLE BAT Rm

FRSK < 100
DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
8	< BKGD								
9	< BKGD								
10	< BKGD								
11	< BKGD								
12	< BKGD								
13	< BKGD								
14	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

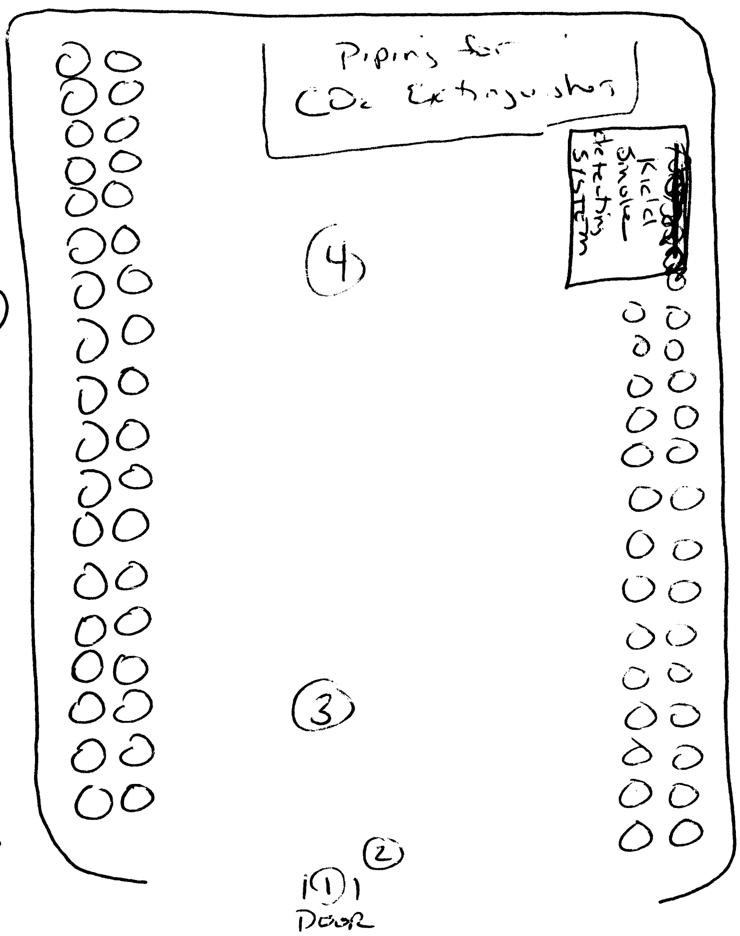
SURVEY NO. NSS-0025

Date 3-30-05 Time 10:45	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	~~β Factor~~ 4 uR/hr BKG	Eff. 10%	
		Bkg. 30 cpm	cpm

AREA C DECK STARBORD SIDE CO2 ROOM (FIRE EXTINGUISHER)

COMPONENT

#1 Threshold
#2 doorknob
#3 deck (front)
#4 deck (REAR)



< BKGD DR
< 100 CPM FRISK

SMEAR RESULTS ~~IN DPM/100 CM²~~	~~B = BETA in mRAD/hr/100 CM²~~								
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0026

Date 3 30-05 Time 10.30	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type Ludlum	Beta ✓ Alpha_____	Beta_____ Alpha_____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed	β⁻ Factor ~~4~~ BS N/A	Eff. 10%	
	BKG 4 μR/hr	Bkg. 30 cpm	cpm

AREA C DECK PORT SIDE
AFT OF MACHINE LOADING PASSAGE

COMPONENT

1. Threshold
2. Door Handle
3. Bath Floor
4. Bath Door Handle
5. Air Vent
6. Main Floor
7. sink

C 24
DR < BKGD
FRISK 100 CPM

C 18
< BKGD
< 100 CPM

TC
~~Cleaning~~
~~Gear~~
~~Locker~~
Cleaning
Gear Locker
< BKGD
< 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD				
2	< BKGD	2	< BKGD	6	< BKGD				
3	< BKGD	3	< BKGD	7	< BKGD				
4	< BKGD	4	< BKGD						
5	< BKGD	5	< BKGD						
6	< BKGD	6	< BKGD						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0027

Date 3/20/05 Time 11:00	DOSE RATE	CONTAMINATION ✓	
Surveyor Craddock	Inst. Type Ludlum	Beta ✓ Alpha	Beta Alpha
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor ✓	Eff. 10%	
	BKG 4 µR	Bkg. 30 cpm	cpm

AREA C-DECK STARBOARD SIDE
AFT OF MAIN LOADING PASSAGE.

COMPONENT

1. THRESHOLD
2. DOOR HANDLE
3. BATH FLOOR
4. BATH DOOR HANDLE
5. AIRVENT
6. MAIN CABIN FLOOR
7. SINK

DR < BKG
FRISK < 100 cpm

C-13 ACCROSS FROM FIRE ROOM
< BKG
< 100 CPM

C-19 1 ROOM AFT OF STEPS
< BKG
< 100 CPM

C-23 END OF HALL TOWARD RCP BOILER STEAM
< BKG
< 100 CPM

ENTERTAINMENT

MUSIC ROOM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	1	< BKGD	1	< BKGD	1	< BKGD		
2	< BKGD	2	< BKGD	2	< BKGD	2	< BKGD		
3	< BKGD	3	< BKGD	3	< BKGD	6	< BKGD		
4	< BKGD	4	< BKGD	4	< BKGD				
5	< BKGD	5	< BKGD	5	< BKGD				
6	< BKGD	6	< BKGD	6	< BKGD				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0028

Date 3-30-65 Time	DOSE RATE	CONTAMINATION	
Surveyor R Pannak / J Stouky	Inst. Type µR meter	Beta ✓ Alpha___	Beta___ Alpha___
Signature R W Pannak	Serial No. 95469	Inst.Sn 91039	
Reviewed	β⁻ Factor —	Eff. 10%	
	D.R. BKG < 4 µR/hr	Bkg. < 30 cpm	cpm

AREA Engine Room Upper Landing to Machinery Passage

COMPONENT

See Attached Drawing

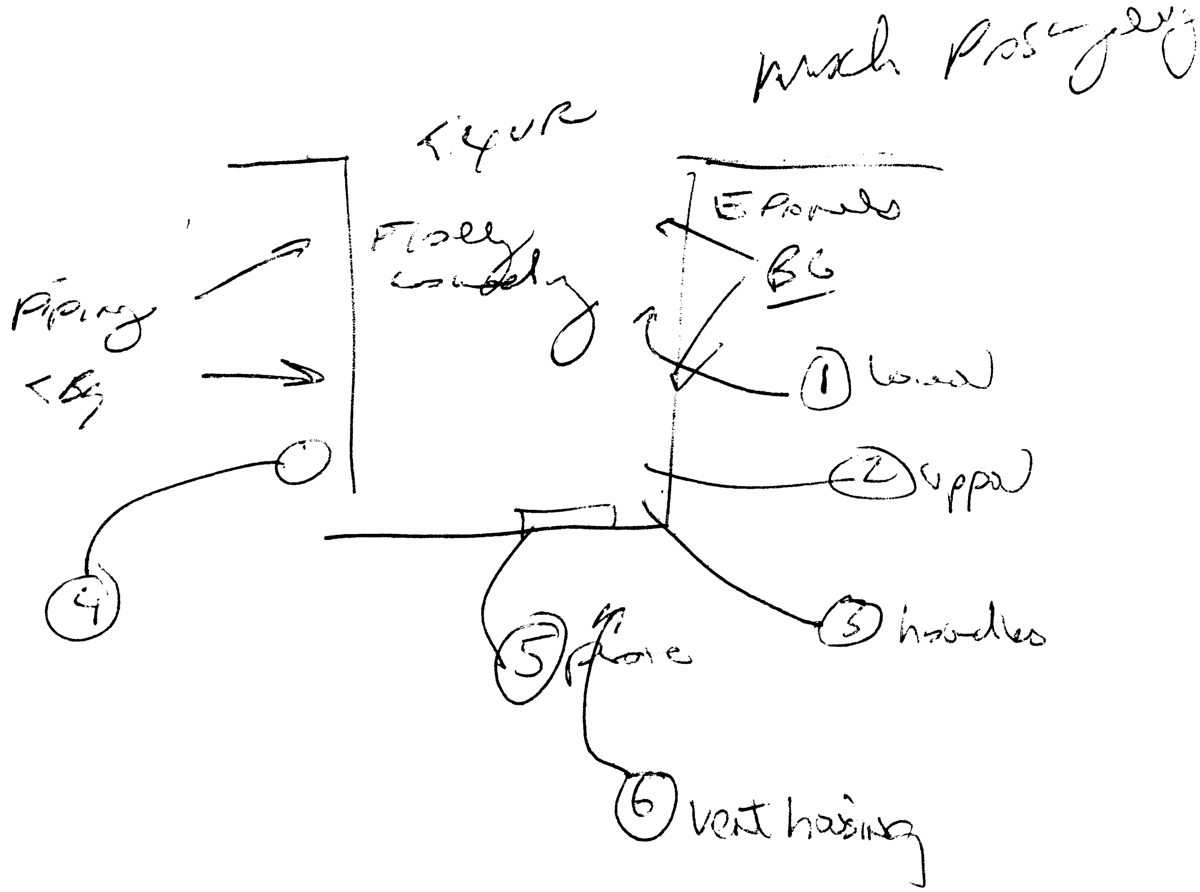
DR < BKG
Frisk < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B – BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA


Piping
1 lower
2 upper
4
5
6 vent housing

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0029

Date 3-30-05 Time	DOSE RATE	CONTAMINATION	
Surveyor R Piennack / J Stoary	Inst. Type µR Meter	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95469	Inst.Sn Frisker 91039	
Reviewed [signature]	β⁻ Factor —	Eff. ~10%	
	D.R Bkg < 4 µR/hr	Bkg. < 30 cpm	cpm

AREA Engine Room Upper Level

COMPONENT

See Attached Drawing

DR < BKG
Frisk < BKG

SMEAR RESULTS ~~in DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

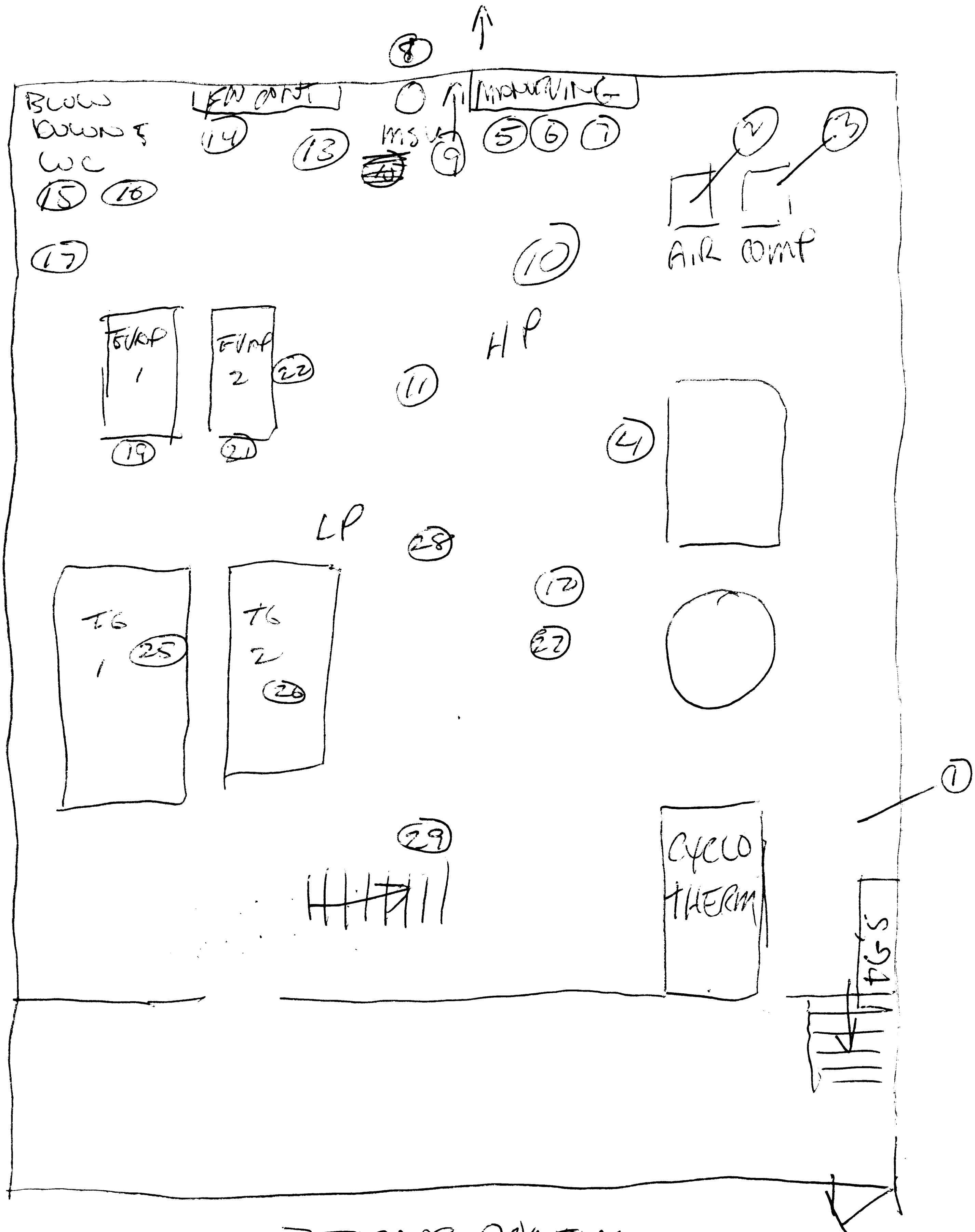
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG	17	< BKG	25	< BKG		
2	< BKG	10	< BKG	18	< BKG	26	< BKG		
3	< BKG	11	< BKG	19	< BKG	27	< BKG		
4	< BKG	12	< BKG	20	< BKG	28	< BKG		
5	< BKG	13	< BKG	21	< BKG	29	< BKG		
6	< BKG	14	< BKG	22	< BKG				
7	< BKG	15	< BKG	23	NA				
8	< BKG	16	< BKG	24	< BKG				

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

3/31/05

ENGINE ROOM - UPPER FLAT



REACTOR CONTROL ROOM

N.S. SAVANNAH
RADIOLOGICAL SURVEY

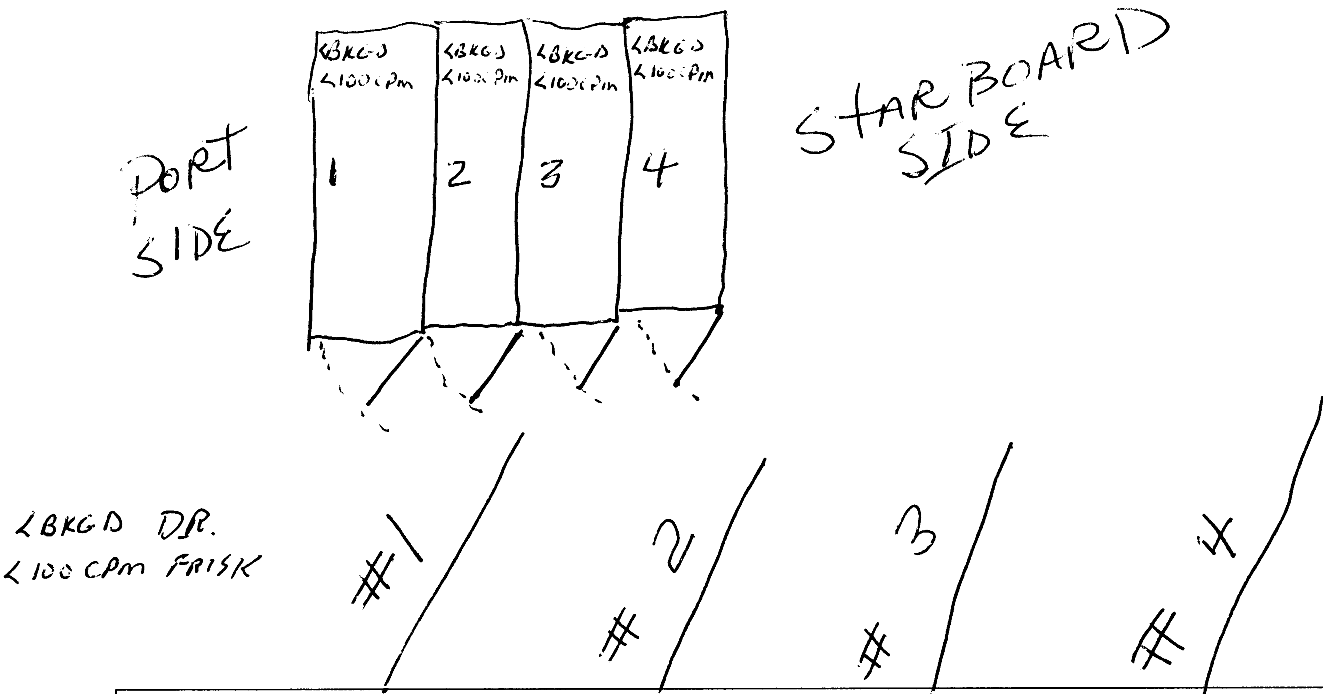
NSS-01 SURVEY NO. NSS-0030

Date 3-30-05 Time 1130	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor N/A	Eff. 10%	
	BKG 4uR/H	Bkg. 30 cpm	cpm

AREA C DECK HALLWAY LOCKERS FOR BREATHING APPARATUS

COMPONENT

1. DOOR HANDLE
2. INSIDE LOCKER



SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	1	<BKGD	1	<BKGD	1	<BKG		
2	<BKGD	2	<BKGD	2	<BKGD	2	<BKG		

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0031

Date 3-30-05 Time 9:20 AM	DOSE RATE	CONTAMINATION	
Surveyor ROBT E PANNACK	Inst. Type N/A	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No.	Inst.Sn 75869	
Reviewed [signature]	β⁻Factor	Eff. 16%	
		Bkg. 30 cpm	cpm

AREA BOTTOM DRAIN OF EXHAUST VENT TO TOP OF MAST "A" DECK IN FRONT OF #4 HOLD COVER

COMPONENT

FRISKER < BKG

1 VALVE RETRACTOR (INSIDE)
2 VALVE PLATES
3 VALVE BODY (INSIDE)

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

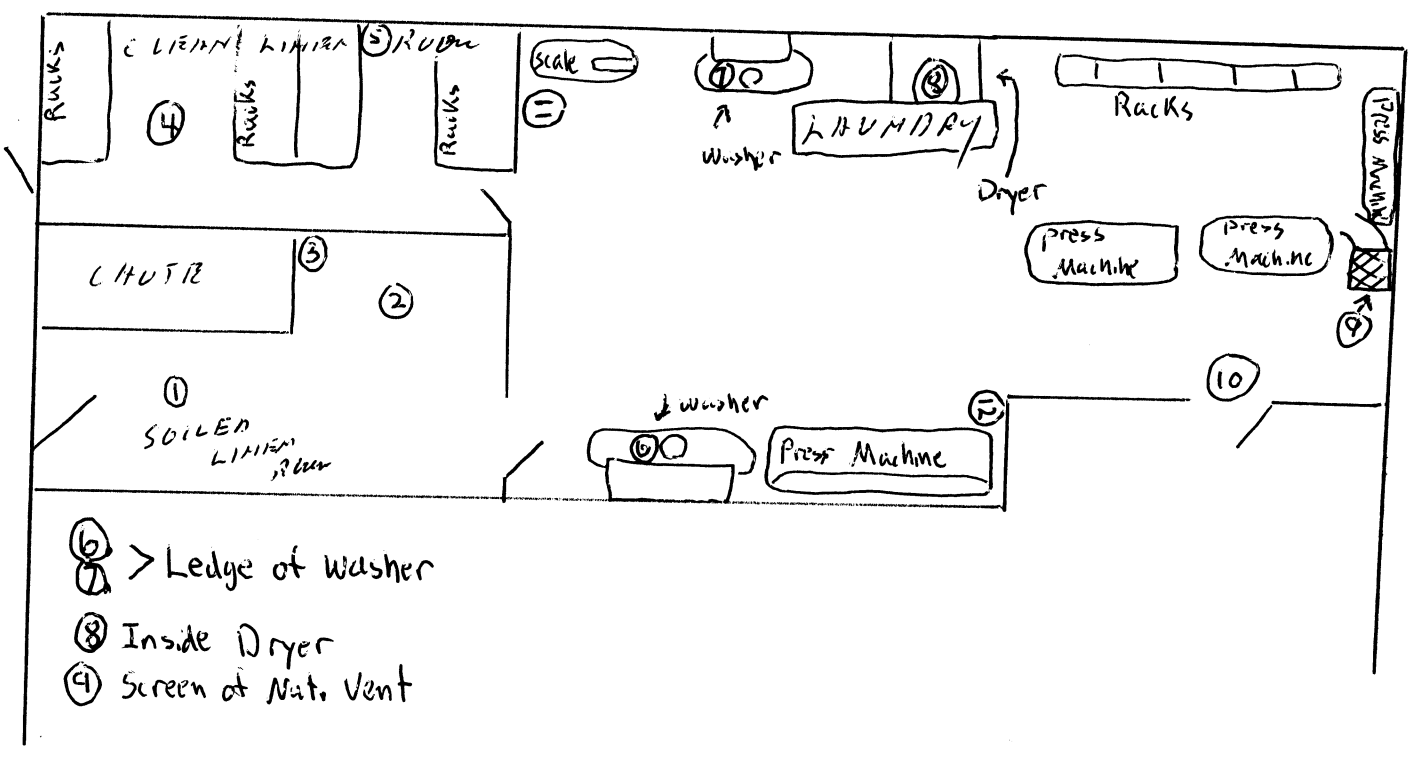
NSS-01 SURVEY NO. NSS-0032

Date 3-3105 Time 1045	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG 4 µR/H	Bkg. 40 cpm	cpm

AREA Laundry & Linen Rooms - C Deck

COMPONENT

PORT



(6)(7) > Ledge of washer
(8) Inside Dryer
(9) Screen at Nat. Vent

FRISK < 100 cpm
DR < 4 µR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~β = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD	12	< BKGD						
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

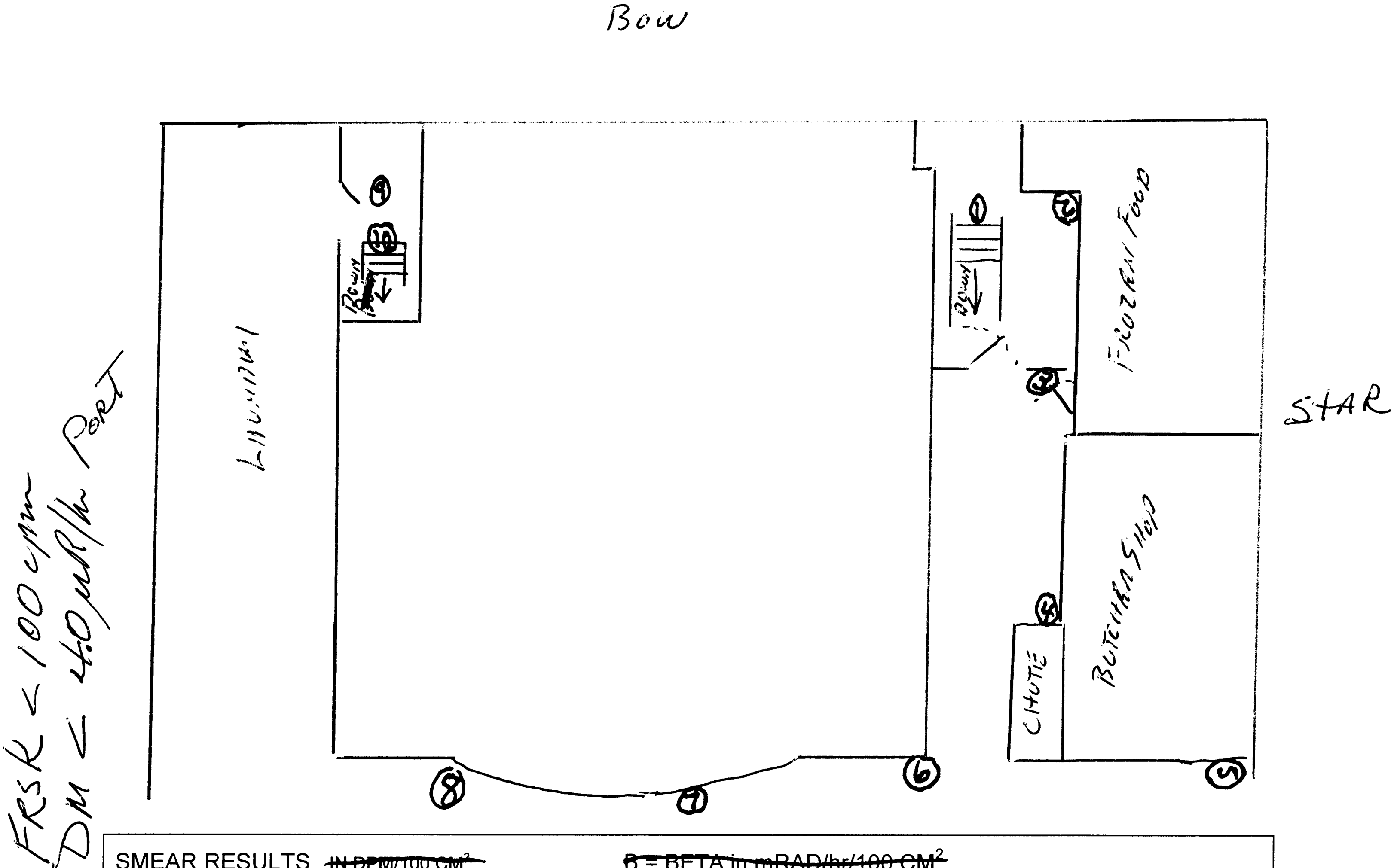
NSS-01

SURVEY NO. NSS-0033

Date 3-31 Time 0800	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lowman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [illegible]	β⁻ Factor ——	Eff. 10%	
	BKG 4 uR/h	Bkg. 40 cpm	cpm

AREA C-DECK PORT & STARBOARD PASSAGEWAYS

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

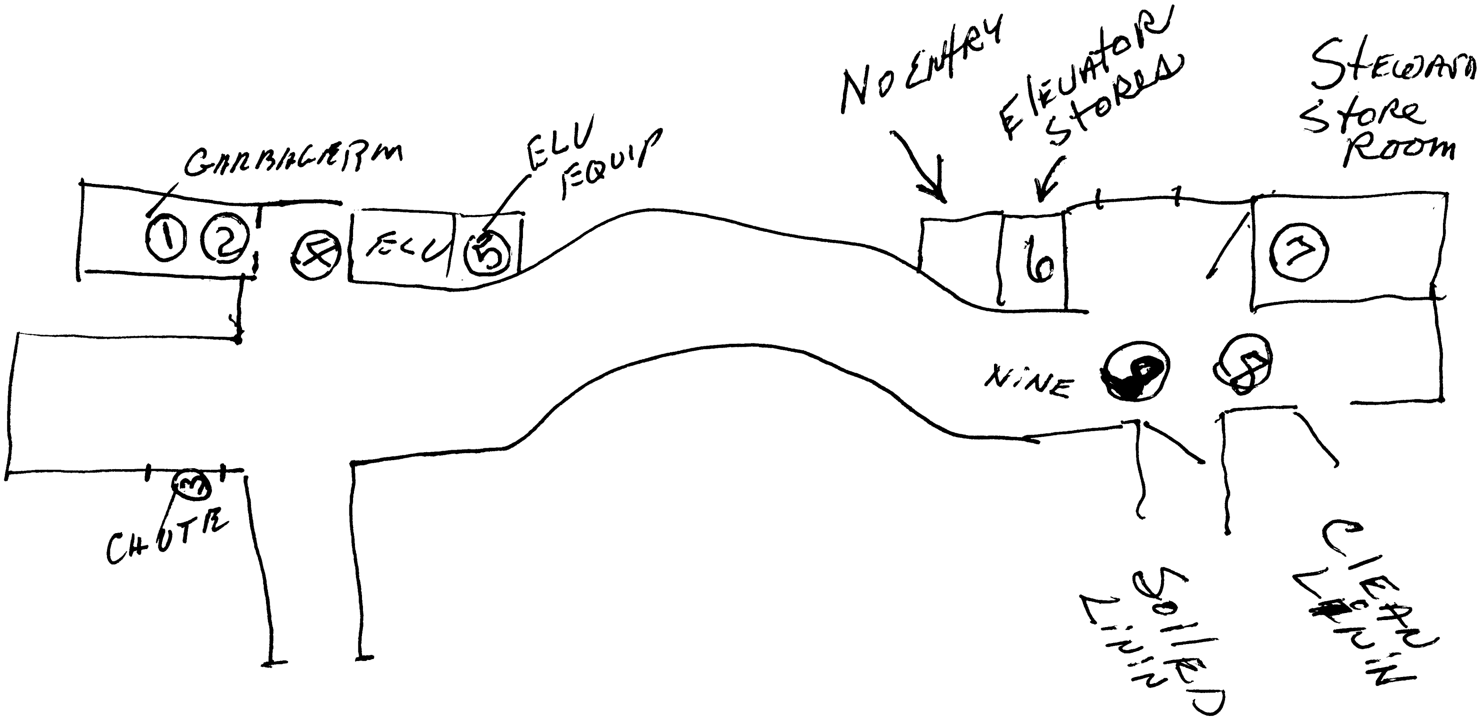
NSS-01 SURVEY NO. NSS-0034

Date 3-31-05 Time 0800	DOSE RATE LUDMIN	CONTAMINATION	
Surveyor Lamar Scott	Inst. Type DURATEC	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lamar Scott	Serial No 95499	Inst.Sn 97416	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG - 4 μR/hr	Bkg. 40 cpm	cpm

LAS AREA ~~D~~ DECK C — HALLWAY & LAUNDRY ENTRANCE

COMPONENT STORES LOADING PASSAGE

O = FLOOR



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD						
2	<BKGD								
3	<BKGD								
4	<BKGD								
5	<BKGD								
6	<BKGD								
7	<BKGD								
8	<BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0035

Date 3-31-05 Time 11:00	DOSE RATE	CONTAMINATION	
Surveyor Bob Pennock	Inst. Type uR Meter	Beta ✓ Alpha____	Beta____ Alpha____
Signature Robert E Pennock	Serial No. 95469	Inst.Sn 91037	
Reviewed M. W. D.	β⁻ Factor —	Eff. ~10%	
	BKG 2 uR/hr	Bkg. 30 cpm	cpm

AREA

COMPONENT Source Receipt

DR ≤ BKG

FISK ≤ BKG

SMEARS

1 Source Can

2 Tc99 case

3 Th230 case

4 Tc99 source

5 Th230 source

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< MDA								
3	< BKG								
4	< BKG								
5	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

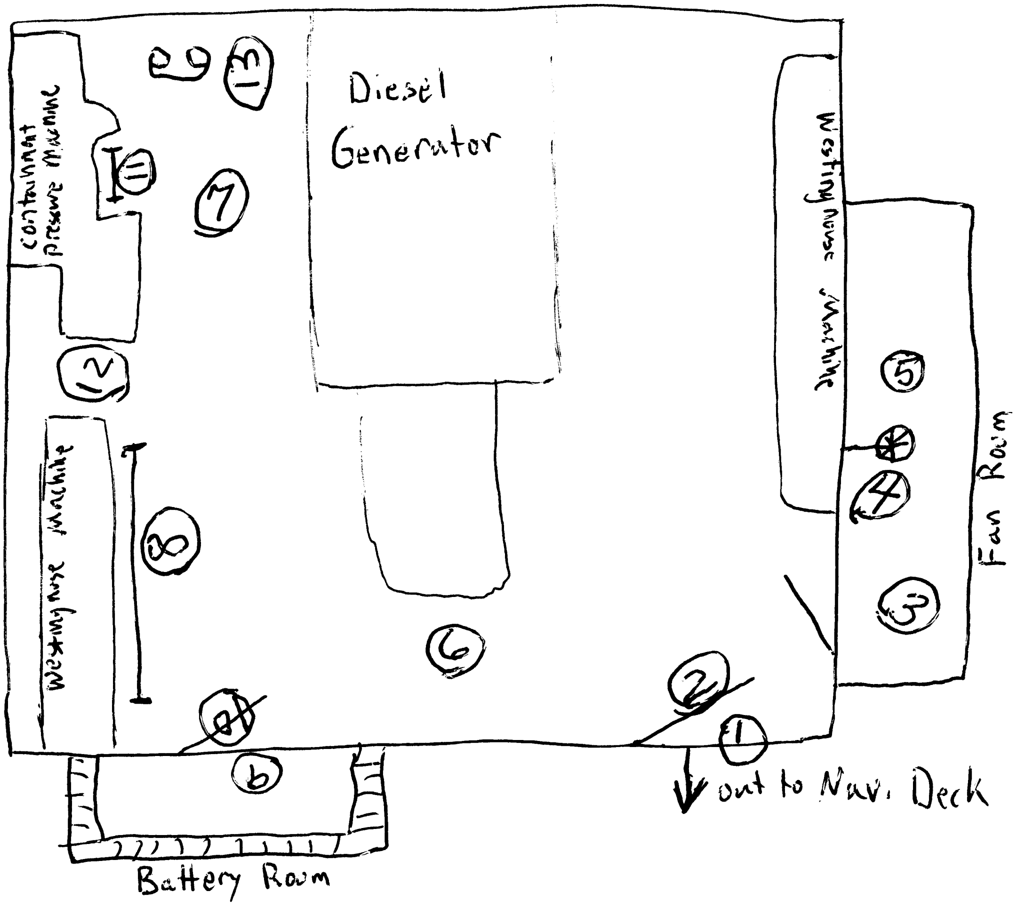
SURVEY NO. NSS-0036

Date 3/31/05 Time 0810	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Lud/umc 19	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG μR/hr	Bkg. 40 cpm	cpm

AREA Navigation Deck

COMPONENT Emergency Generator Room

#13 TELEPHONE



Port

#2 DOOR HANDLE

#4 VALVE HANDLE FOR CIRCULATING WATER FROM COOLING COIL

8 GRAB BAR

#10 DOOR HANDLE BATT

#11 GRAB HANDLE CONTAINMENT PRESSURE MACHINE

FRISK < 100 ~~dpm/100~~ Bkg
DM < 40 μR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKGD						
2	< BKG	10	< BKGD						
3	< BKG	11	< BKGD						
4	< BKG	12	< BKGD						
5	< BKG	13	< BKGD						
6	< BKG								
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

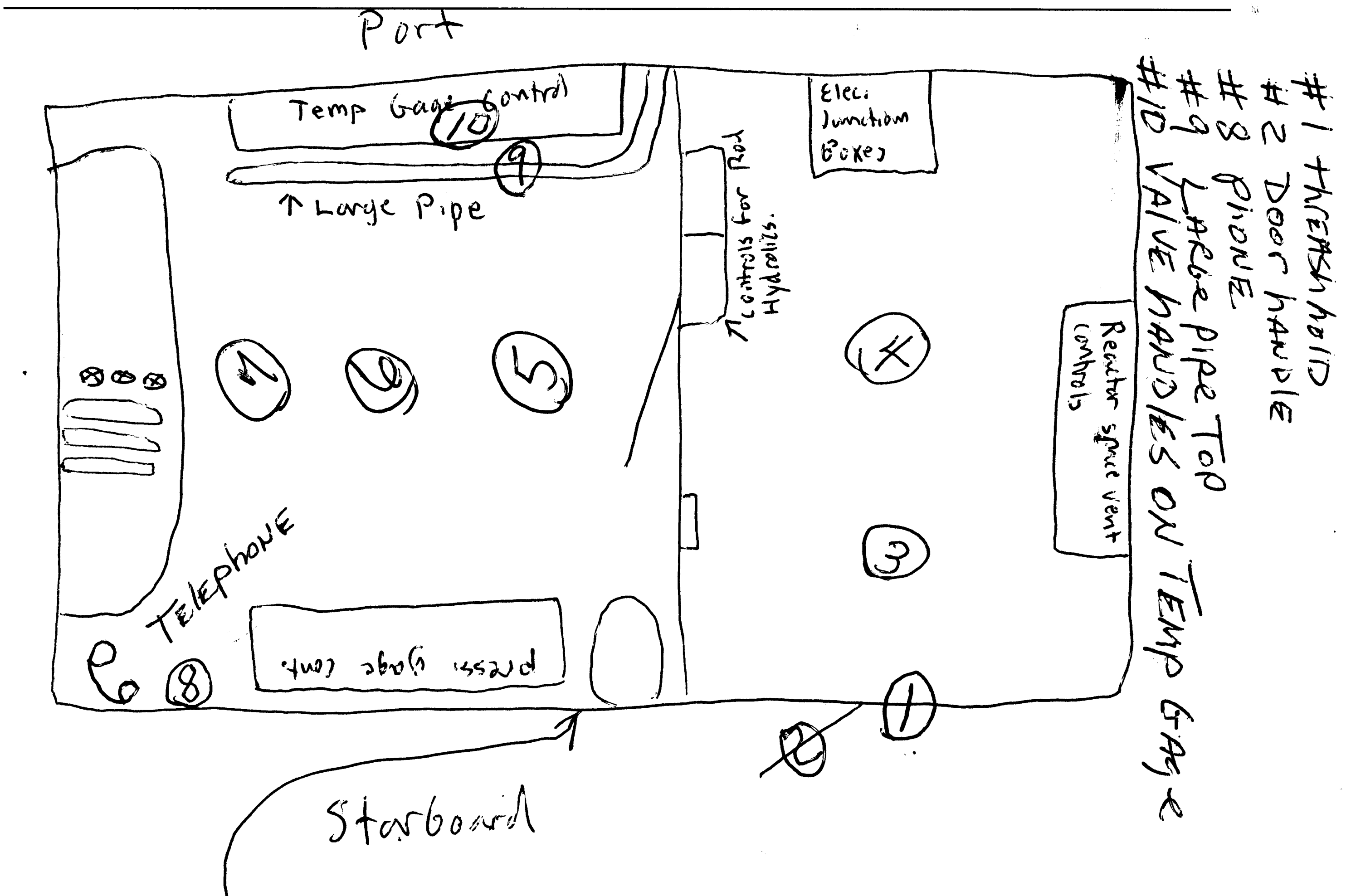
NSS-01

SURVEY NO. NSS-0037

Date 3/31/65 Time	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha	Beta Alpha
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [illegible]	~~β Factor~~	Eff. 10%	
	BKG 4 μR/h	Bkg. 40 cpm	cpm

AREA ~~Forecas~~ ~~Lobby~~ EHS (HYDRAULIC EQUIPMENT PLATFORM)

COMPONENT B-DECK



1-RSK < 100 cpm
DM < 40 μR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~β = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD						
2	<BKGD	10	<BKGD						
3	<BKGD								
4	<BKGD								
5	<BKGD								
6	<BKGD								
7	<BKGD								
8	<BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0038

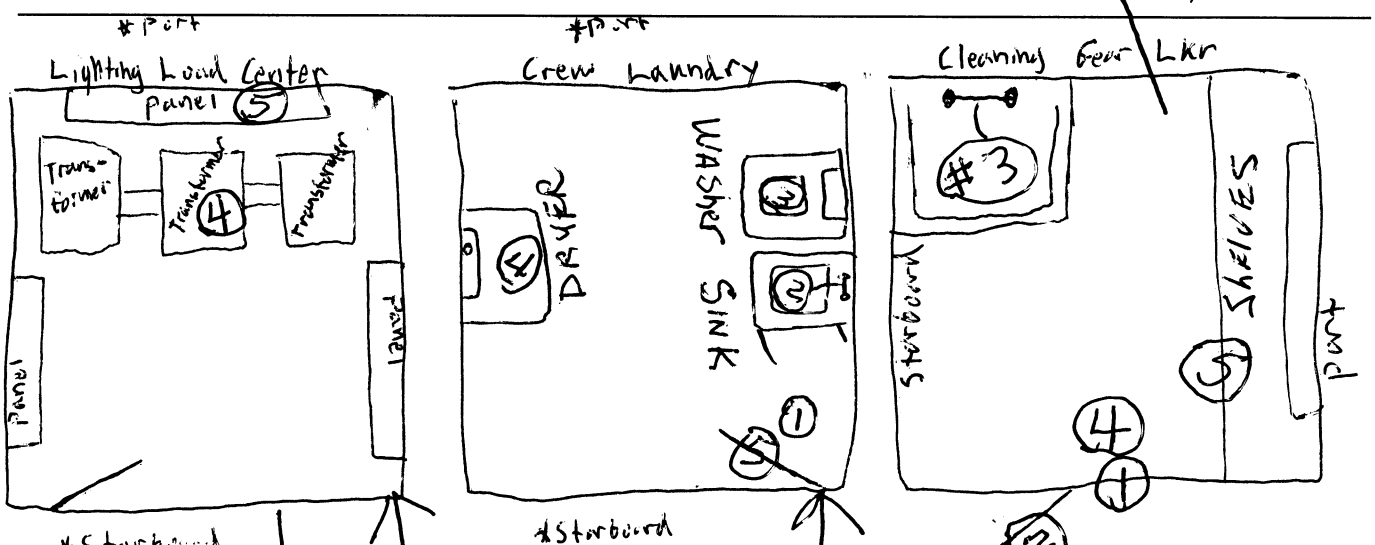
Date 3-31-05 Time 0945	DOSE RATE	CONTAMINATION	
Surveyor LOMAN SCOTT	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG 4 µR/hr	Bkg. 40 cpm	cpm

AREA B DECK

FRSK < 100 cpm

COMPONENT CREW LAUNDRY

DM < 4.0 µR/hr



FRSK < 100 cpm
DM < 4.0 µR/hr

#1 threshold
#2 Floor
#3 Door Handle
#4 Top Middle
#5 Pannel (Main)

#1 Floor
#2 Sink Basin
#3 Inside Washer
#4 Inside Dryer
#5 Door Knob

FRSK < 100 cpm
DM < 4.0 µR/hr

#1 threshold
#2 Door Knob
#3 Sink
#4 Floor
#5 Shelf

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD			1	<BKGD	1	<BKGD		
2	<BKGD			2	<BKGD	2	<BKGD		
3	<BKGD			3	<BKGD	3	<BKGD		
4	<BKGD			4	<BKGD	4	<BKGD		
5	<BKGD			5	<BKGD	5	<BKGD		

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN µrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

Page 1 of 2

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0039

Date 3/31/05 Time	DOSE RATE	CONTAMINATION	
		Beta ✓ Alpha ____	Beta ____ Alpha ____
Surveyor Craddock	Inst. Type LUDLUM		
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed	β⁻ Factor	Eff. 10%	
	2.5 ~~2.5~~ mR/HR	Bkg. 30 cpm	cpm

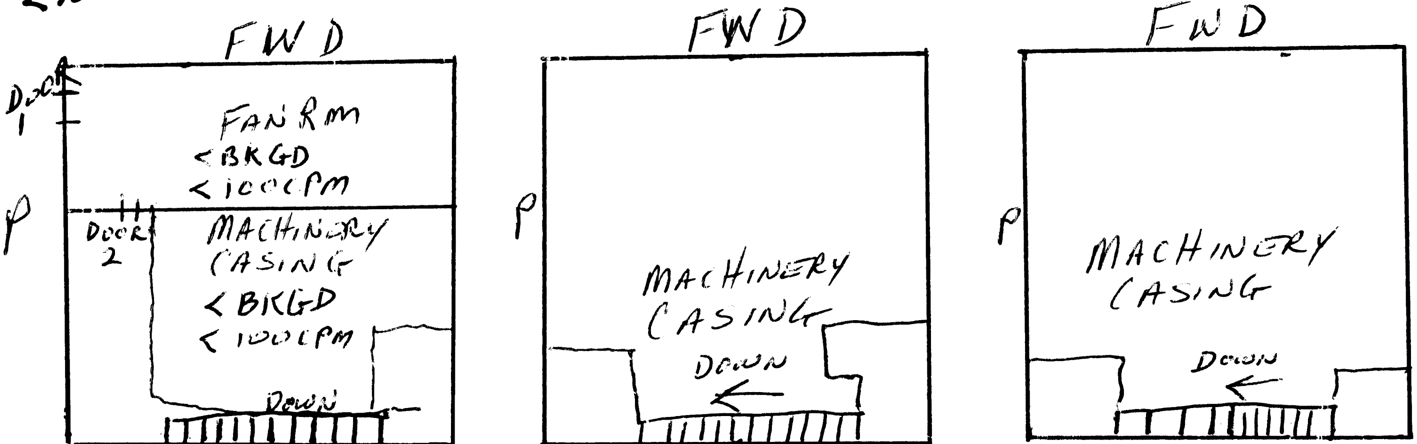
AREA FAN ROOM BOAT DECK,

COMPONENT ____

<BKG <100 CPM

<BKG <100 CPM

<BKG <100 CPM



FAN RM BOAT DECK

PROMENADE DECK

"A" DECK

FAN RM SWIPES
1. DOOR 1
2. DOOR 2
3. THRESHOLD 1
4. THRESHOLD 2

MACHINERY CASING STACE
1. VALVE DCV10
2. VALVE LG TOP 3RD STAGE HTR
3. 3RD STAGE VENT VALVE
4. DOOR TO BILGE DCV120
5. DCV300 VALVE
6. GRATING TOP STEPS
7. HANDRAIL

PROMENADE DECK SWIPES
8. VALVE MOV60
9. MCV11 VALVE
10. MCV12 VALVE
11. HAND HOLD OFF STAIRWAY
12. HAND HOLD ON WALL MACHINERY CASING

SWIPES
13. HANDRAIL BESIDE LO TK
14. " OPPOSITE LO TK
15. " BELOW LO TK
16. " OPPOSITE #15 SWIPE
17. SMALL HAND GRAB ON LO TANK

FAN RM BOAT DECK — MACHINERY CASING BOAT DK. — MACHINERY CASING PROM DK — MACHINERY CASING A DECK

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	1	<BKGD	8	<BKGD	13	<BKGD		
2	<BKGD	2	<BKGD	9	<BKGD	14	<BKGD		
3	<BKGD	3	<BKGD	10	<BKGD	15	<BKGD		
4	<BKGD	4	<BKGD	11	<BKGD	16	<BKGD		
		5	<BKGD	12	<BKGD	17	<BKGD		
		6	<BKGD						
		7	<BKGD						

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0039

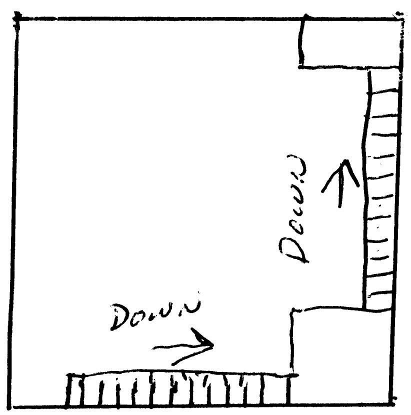
Date 3/31/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed	β⁻Factor	Eff. 10%	
	2.5 ~~2.3~~ mR/hr	Bkg. 30 cpm	cpm

AREA B DECK TO C DECK ACCESS STAIRWELL TO BOAT DECK THRU MACHINERY CASING SPACE FROM MAIN MACHINERY RM

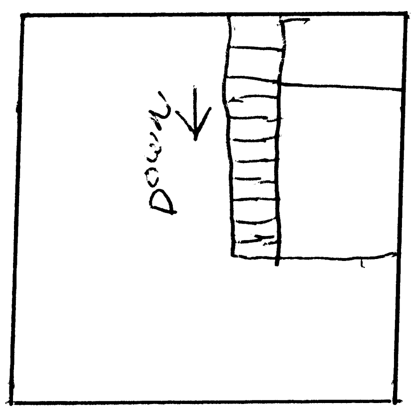
COMPONENT

<BKG
<100 CPM

<BKG
<100 CPM



B DECK



C DECK

SWIPES
18. TOP STEP TO GRV. TK
19. 3RD STEP FROM BOTTOM OF B DK.
20. LANDING B DECK
21. LO V 7 VALVE

SWIPES
22. HANDRAIL STRB
23. HANDRAIL PORT
24. BOTTOM STEP C D "

STAIRWAY
B DECK

STAIRWAY
C DECK

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
18	<BKGD			22	<BKGD				
19	<BKGD			23	<BKGD				
20	<BKGD			24	<BKGD				
21	<BKGD								

RA – RADIATION AREA　CA – CONTAMINATION AREA　ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA　AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0040

Date 3-31-05 Time 0930	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG 4 µR/hr	Bkg. 40 cpm	cpm

AREA BEHIND BRIDGE

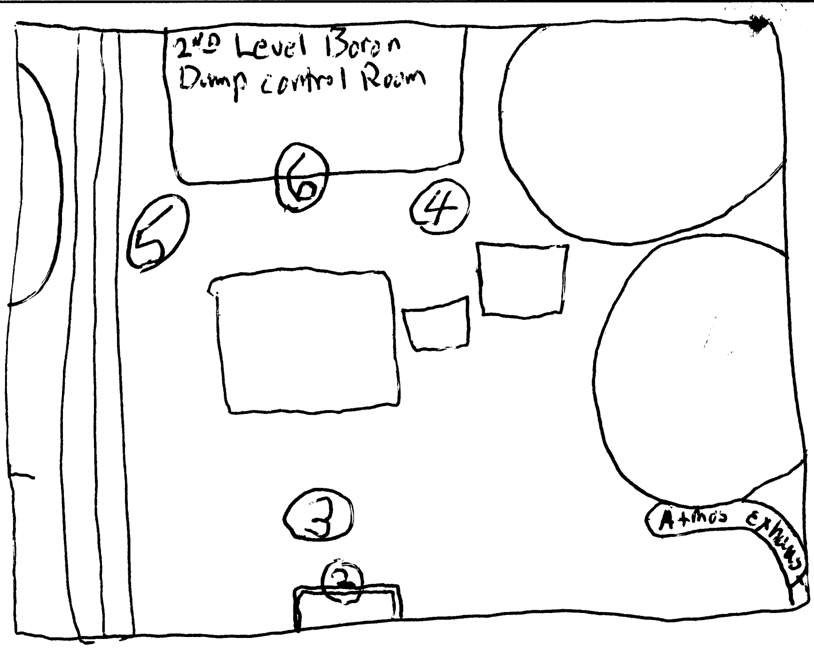
COMPONENT BORON DUMP CONTROLL ROOM

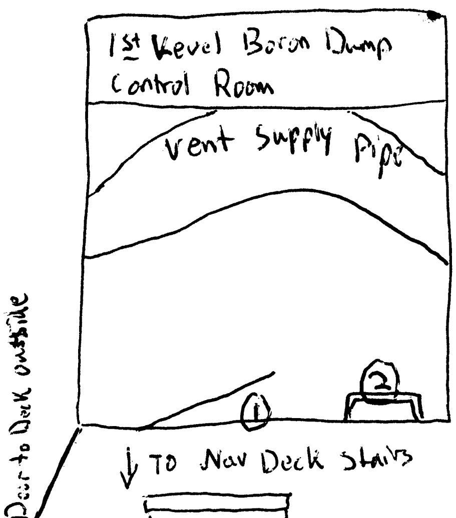
~~#1 Threshold~~ S&S

~~#2 LADDER~~ S&S
P

FRSK < 100

DM < 40





1. Threshold of door
2. Rung of stairs down to Second Level of control Room

#6 HONEYWELL MACHINERY CONTROLLS

SMEAR RESULTS ~~IN DPM/100 CM²~~	~~β = BETA in mRAD/hr/100 CM²~~								
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

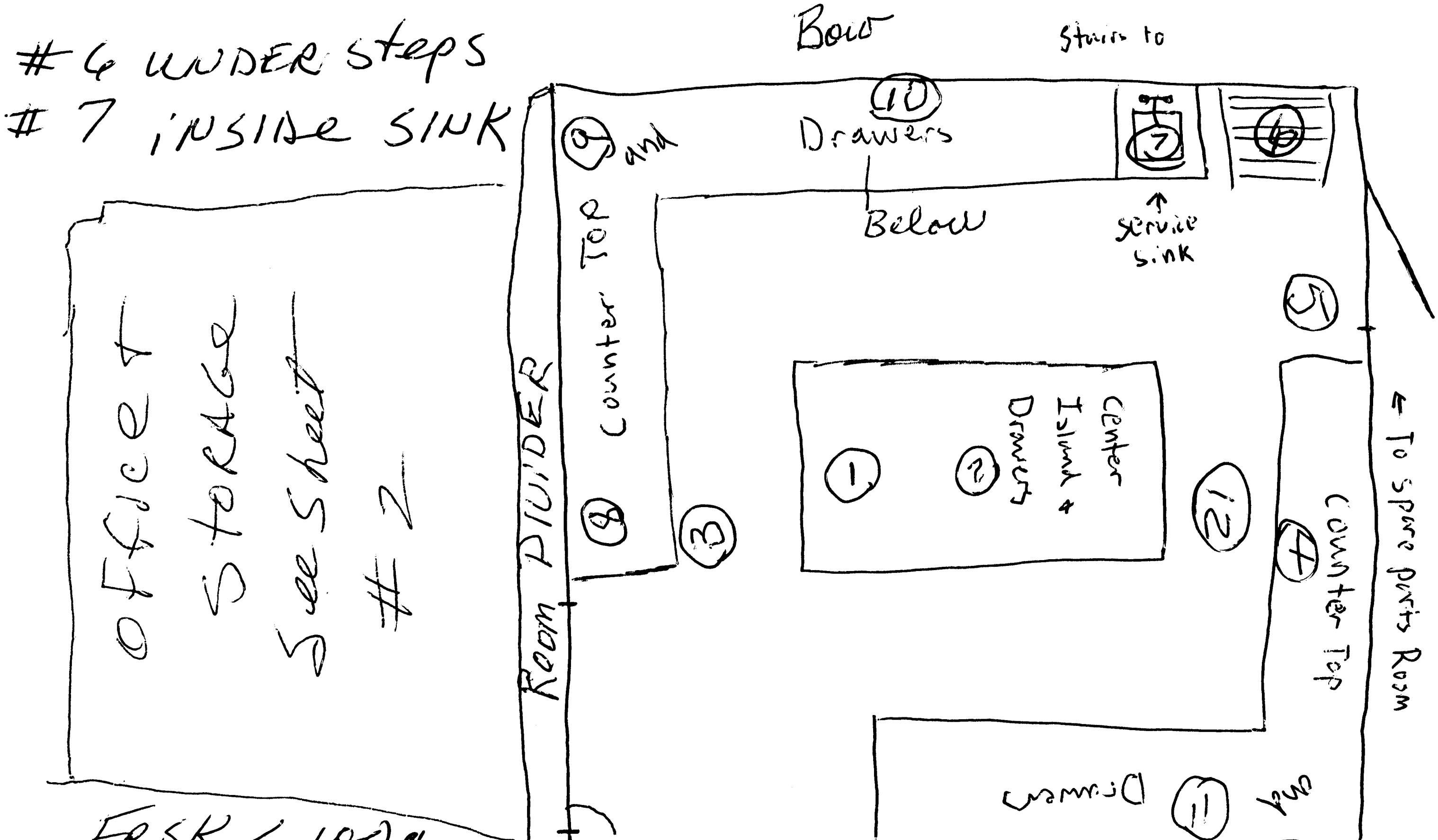
NSS-01

SURVEY NO. NSS-0041 #1

Date 3/3/05 Time 1300	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Lud Num 19	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature Loman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10 %	
	BKG 1 μR/Hr	Bkg. 10 cpm	cpm

AREA Hold #5 Engineering (Workstation)

COMPONENT Workshop



FRSK < 100 dpm/100 cm²
DM ≤ 1 μR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD						
2	<BKGD	10	<BKGD						
3	<BKGD	11	<BKGD						
4	<BKGD	12	<BKGD						
5	<BKGD								
6	<BKGD								
7	<BKGD								
8	<BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

#2

N.S. SAVANNAH
RADIOLOGICAL SURVEY

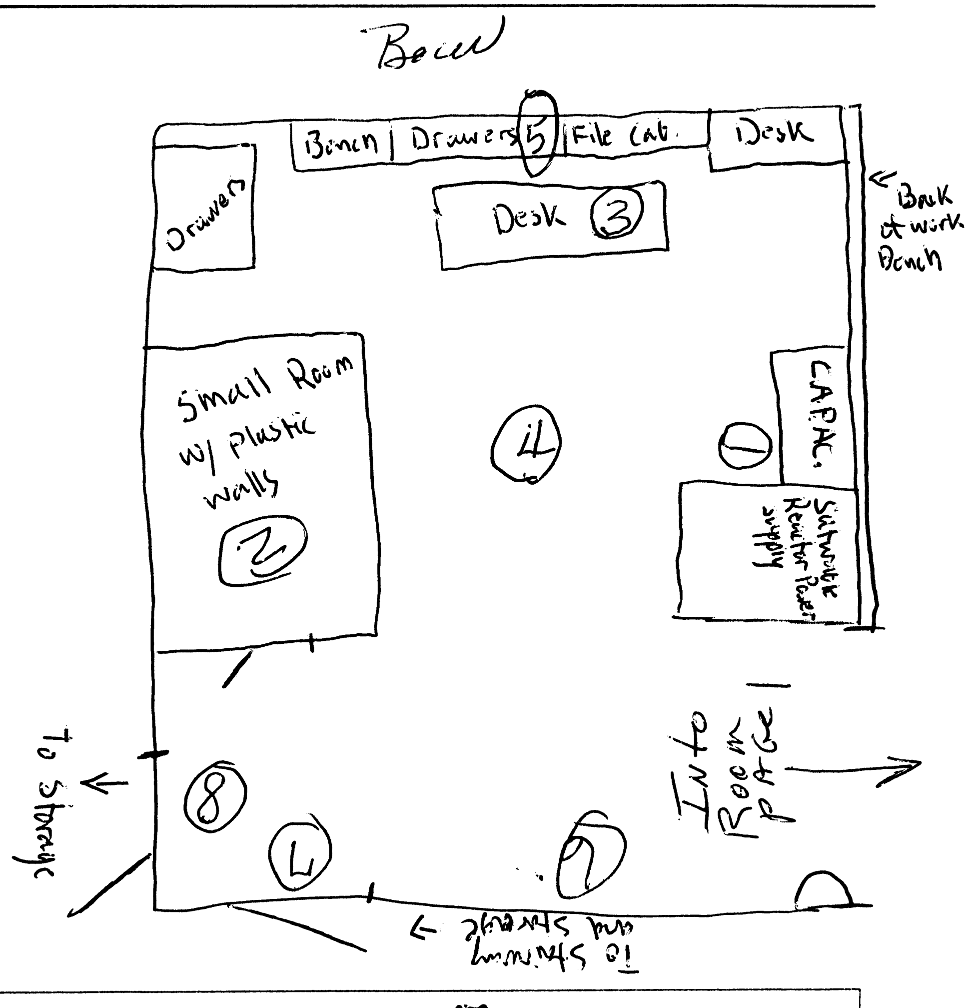
NSS-01

SURVEY NO. NSS-0041

Date 3-31-05 Time 1300	DOSE RATE	CONTAMINATION	
Surveyor Lyman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha	Beta Alpha
Signature Lyman Scott	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10 %	
	BKG 1 μR/hr	Bkg. 10 cpm	cpm

AREA Hold #5 Engineering (office and storage)

COMPONENT M-5 EDA Equipt Room



FRSK <100 cpm
DM <1 μR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

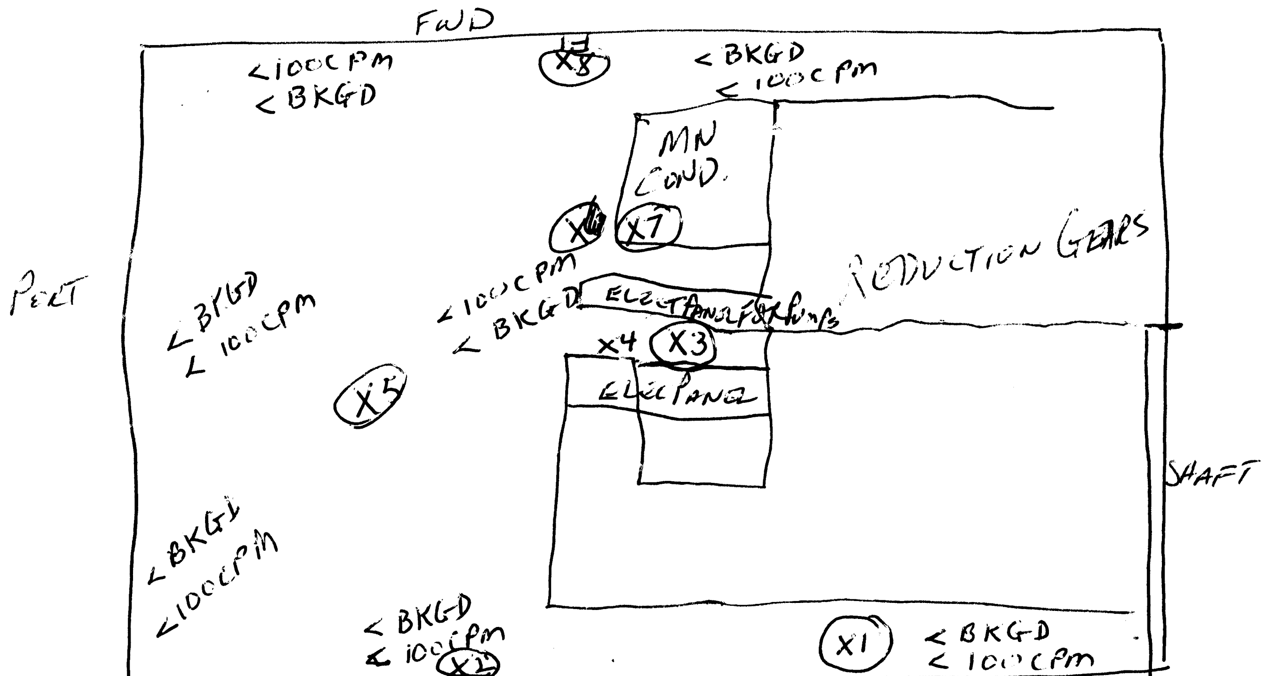
NSS-01

SURVEY NO. NSS-0042

Date 3/31/05 Time 13:00	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature J. Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻Factor	Eff. 10%	
	4mR/HR	Bkg. 30 cpm	cpm

AREA LOWER LEVEL MAIN ENGINE RM. PORT SIDE OF SHAFT

COMPONENT



SWIPE
1 DECK PLATE AFT PORT OF SHAFT
2 DECK PLATE AFT FIRE & BILGE PUMP PORTSIDE
3 DECK PLATE AFT ELECT PANELS FOR CHG PUMPS
4 HAND HOLD ON PORT FEED PUMP
5 DECK PLATE UNDER RED TAG #4
6, DECK PLATE UNDER MN CONDENSOR OPENING
7 MAN WAY OPENING MN COND.
8, DECK PLATE TOP OF STEPS TO PORT CHARGE RM

X-DENOTES SWIPE

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								
3	<BKG								
4	<BKG								
5	<BKG								
6	<BKG								
7	<BKG								
8	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0043

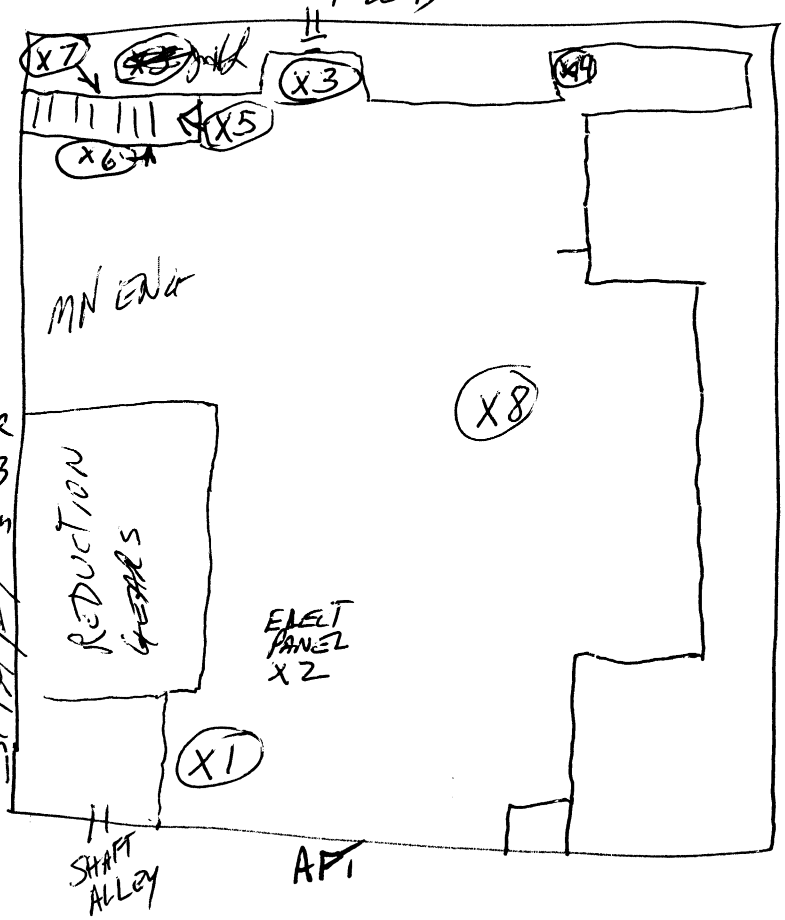
Date 3/31/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻Factor + [illegible]	Eff. 10%	
	4 mR/HR	Bkg. 30 cpm	cpm

AREA LOWER LEVEL MAIN ENGINE RM STBD SIDE OF SHAFT

COMPONENT

FWD

#1 deck under new Elec box NS SAVANNAH
#2 Hand Rail under diesel Eng Start Box #1 & 2
#3 Deck STBD side charge Pump Ent. way
4 DECK STBD FWD UNDER POWER PANEL H-126-3
5. DECK STBD FWD BOTTOM OF LADDER
6. HAND RAIL FWD & LADDER NEXT COND
7. HAND RAIL FWD & OPPOSITE #6
8. DECK BETWEEN DIESEL GEN.



ALL AREAS < BKGD < 100 CPM

STBD

AFT

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B = BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

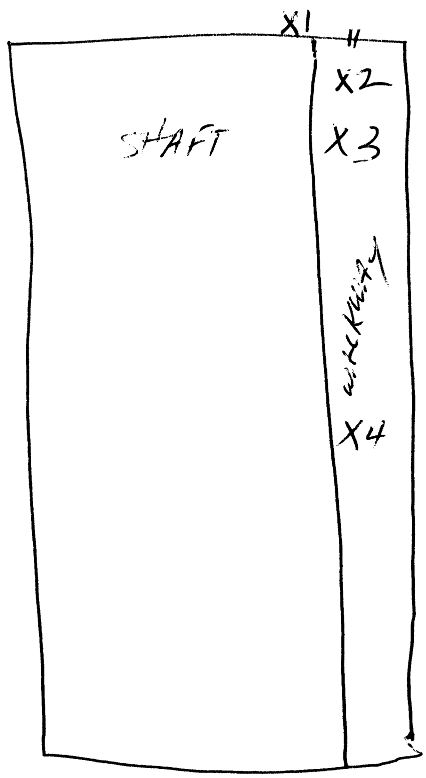
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0044

Date 3-31-05 Time	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4 mR/HR	Bkg. 30 cpm	cpm

AREA SHAFT ALLY

COMPONENT



1. HAND CRANK FOR DOOR
2. HAND RAIL
3. DECK GRADING
4. DECK GRADING

ENTIRE SHAFT ALLEY
DR < BKGD
FRISK < 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								
3	<BKG								
4	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0045

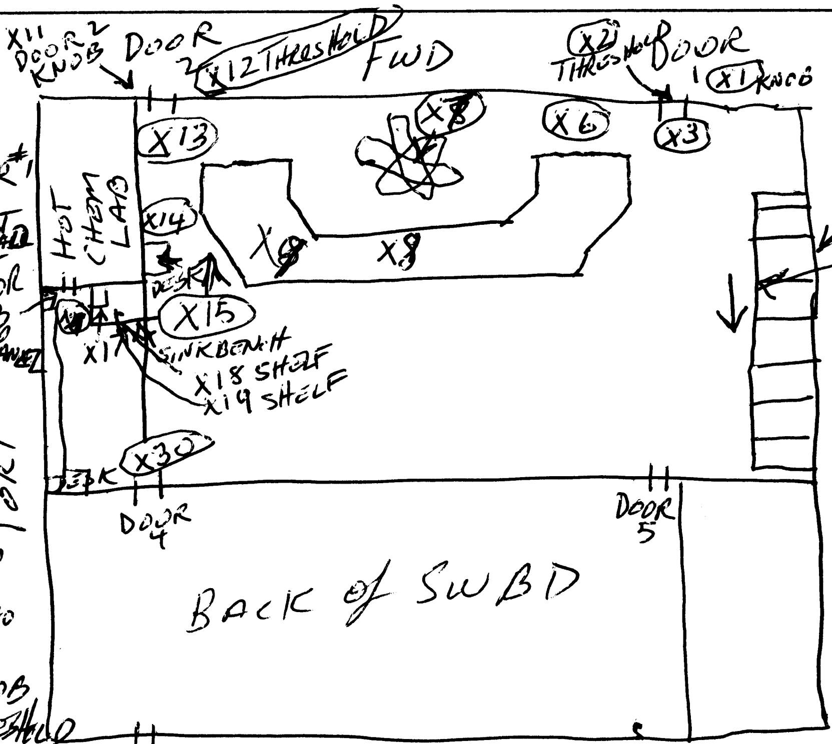
Date 4/1/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4mR/Hr	Bkg. 30 cpm	cpm

AREA MAIN ENGINE ROOM'S CONTROL ROOM

COMPONENT

1. DOOR #1 KNOB
2. DOOR #1 THRESHOLD
3. ~~DECK~~ INSIDE DOOR #1
4. HANDRAIL AGAINST BHD
5. HANDRAIL OPPOSITE SIDE
6. DECK BESIDE CONT. PANEL
7. DECK NUC SYM.
8. HANDLE ON LEFT ROD CONT PANEL
9. FACE of PANEL BETWEEN ROD CONTROL & GROUP SELECTOR
10. DECK PORT SIDE OF CONTROL PANEL
11. DOOR #2 KNOB
12. DOOR #2 THRESHOLD
13. DECK INSIDE DOOR #2
14. DECK UNDER DESK
15. DECK PORT of CONT PANEL

ALL AREAS < BKGD
< 30 CPM JH



SWIPES

#4 HANDRAIL

#5 HANDRAIL

16. WORK BENCH OUTSIDE HOT CHEM LAB.
17. INSIDE SINK
18. WORK BENCH TOP SHELF
19. WORK BENCH BOTTOM SHELF
20. DOOR KNOB TO HOT CHEM LAB
21. DECK OUTSIDE HOT CHEM LAB AT DOOR
22. VENT OVER HOOD LIGHT
23. HANDLES FOR DOOR TO MIXING STATION
24. ~~INSIDE~~ MIXING STATION BOTTOM LEDGE
25. INSIDE MIXING STATION BOTTOM SURFACE
26. WORK BENCH STBD.
27. 2 SHELF WC CABINET E
28. DESK TOP
29. DECK UNDER DESK

X-DENOTES SWIPES

30. DECK OUTSIDE DOOR BEHIND SWBD.

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG	17	<BKG	25	<BKG		
2	<BKG	10	<BKG	18	<BKG	26	<BKG		
3	<BKG	11	<BKG	19	<BKG	27	<BKG		
4	<BKG	12	<BKG	20	<BKG	28	<BKG		
5	<BKG	13	<BKG	21	<BKG	29	<BKG		
6	<BKG	14	<BKG	22	<BKG	30	<BKG		
7	<BKG	15	<BKG	23	<BKG				
8	<BKG	16	<BKG	24	<BKG				

RA – RADIATION AREA　　CA – CONTAMINATION AREA　　ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA　　AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

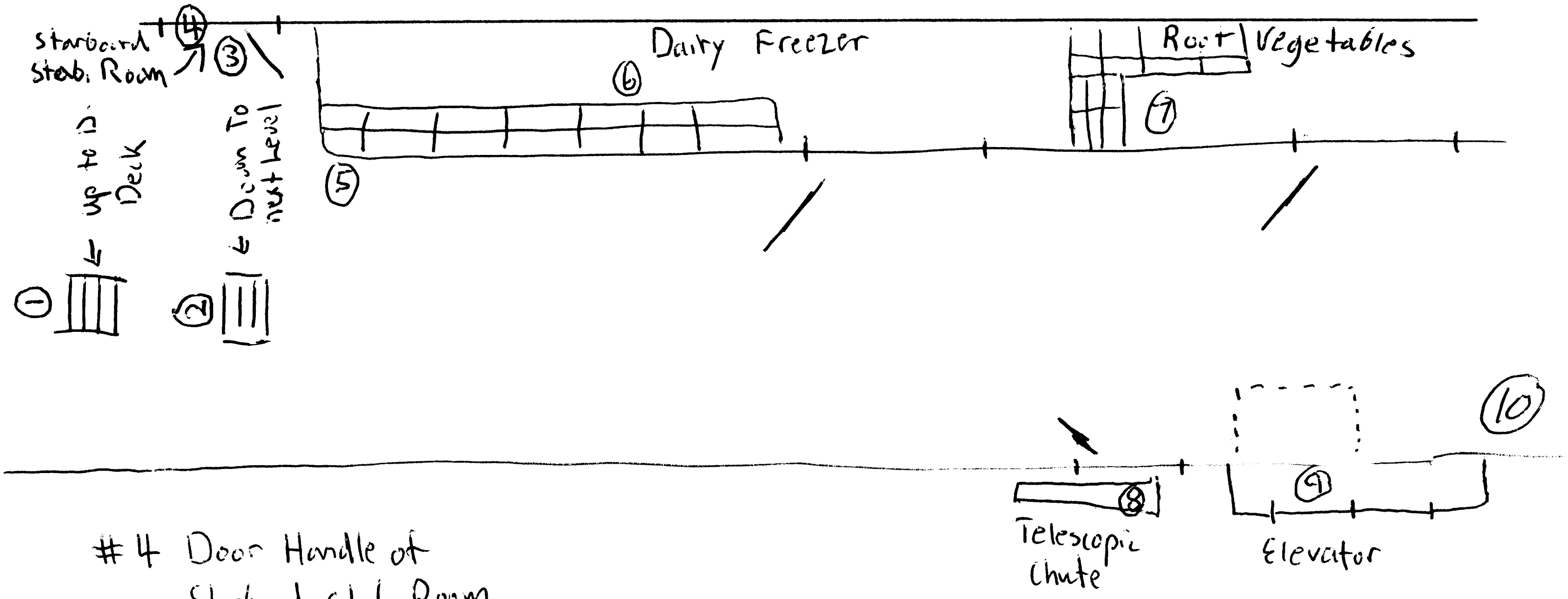
NSS-01

SURVEY NO. NSS-0046

Date 4/1/05 Time 10:00	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature	Serial No. 42472	Inst.Sn 91037	
Reviewed	β⁻Factor /	Eff. 10%	
	BKG < 4 µR/Hr	Bkg. 40 cpm	cpm

AREA 14' Flat (~~Hold Deck~~ B3) Starboard Side

COMPONENT



\#4 Door Handle of Starboard stab. Room

\# 8 Top of Chute

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B - BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD						
2	<BKGD	10	<BKGD						
3	<BKGD								
4	<BKGD								
5	<BKGD								
6	<BKGD								
7	<BKGD								
8	<BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

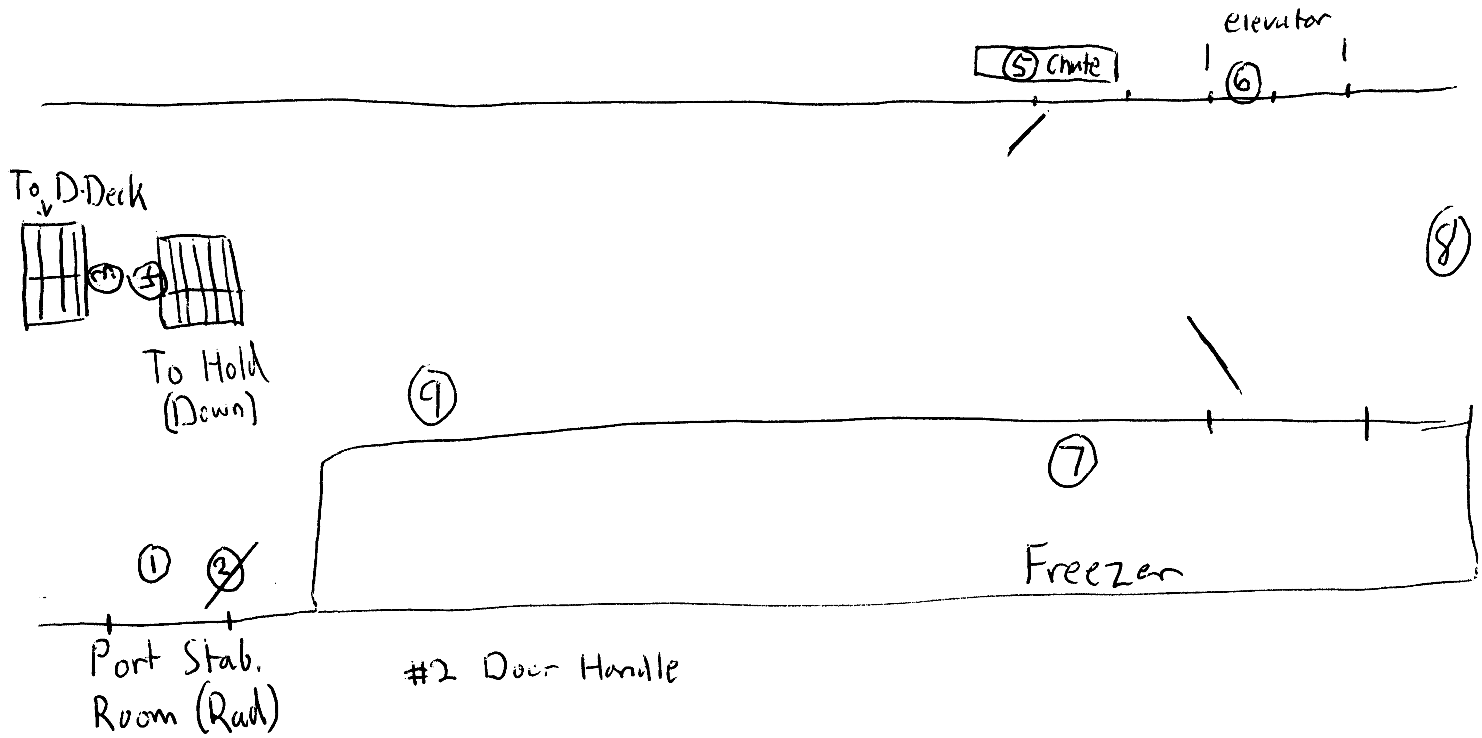
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0047

Date 4/1/05 Time 10:00	DOSE RATE	✓ CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor /	Eff. 10%	
	BKG < 4 μR/Hr	Bkg. 40 cpm	cpm

AREA 14' Flat (Port)

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD					•	
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

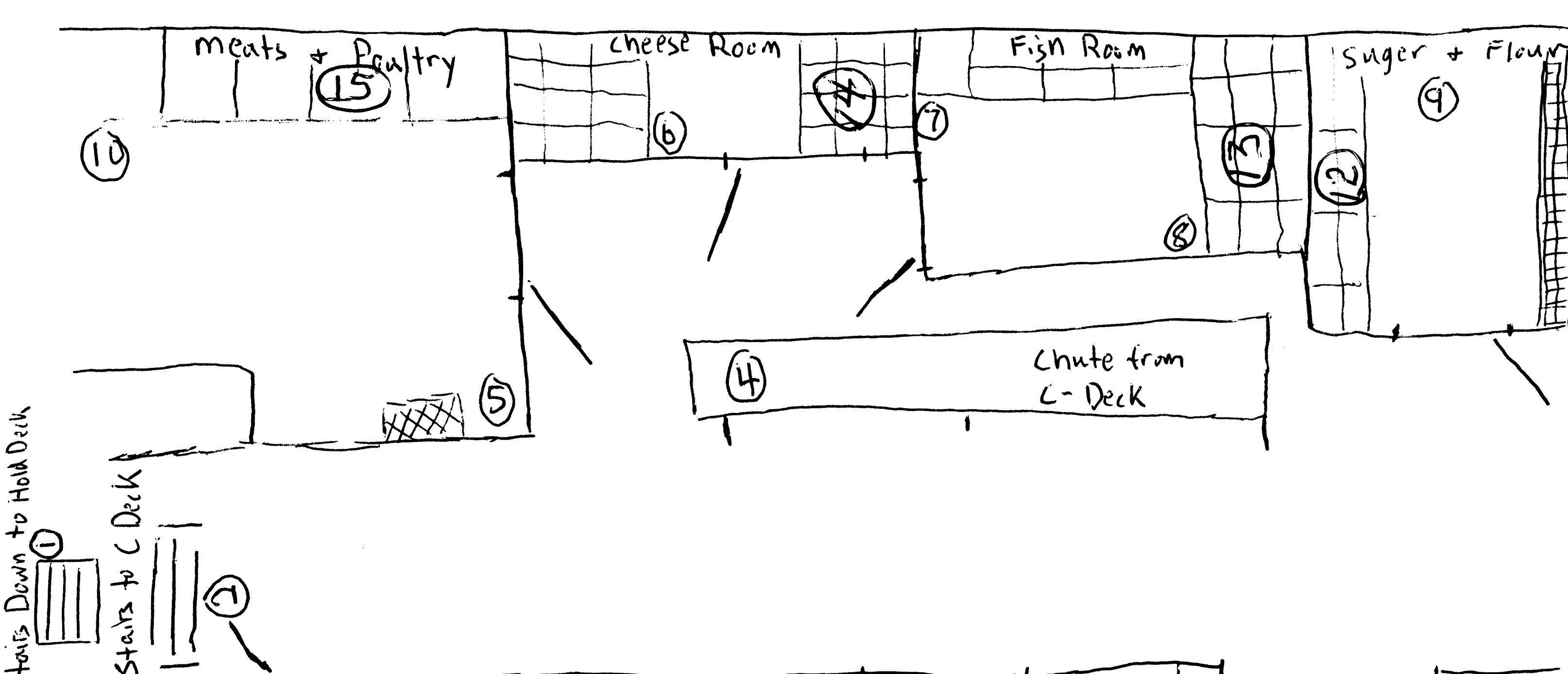
SURVEY NO. NSS-0048

Date 4-1-05 Time 8:45	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Loman Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG 4 μR/h	Bkg. 40 cpm	cpm

AREA D - Deck Food Stores

COMPONENT

STARBOARD SIDE



#1 Top of Stairs To hold (Down)
#12 Metal Shelves Sugar + Flour
#13 Metal Shelves Fish Room
#14 Metal Shelves Cheese Room
#15 Metal Shelves Meat + Poultry

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD	12	< BKGD						
5	< BKGD	13	< BKGD						
6	< BKGD	14	< BKGD						
7	< BKGD	15	< BKGD						
8	< BKGD								

FRSK < 100
DML BKG

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

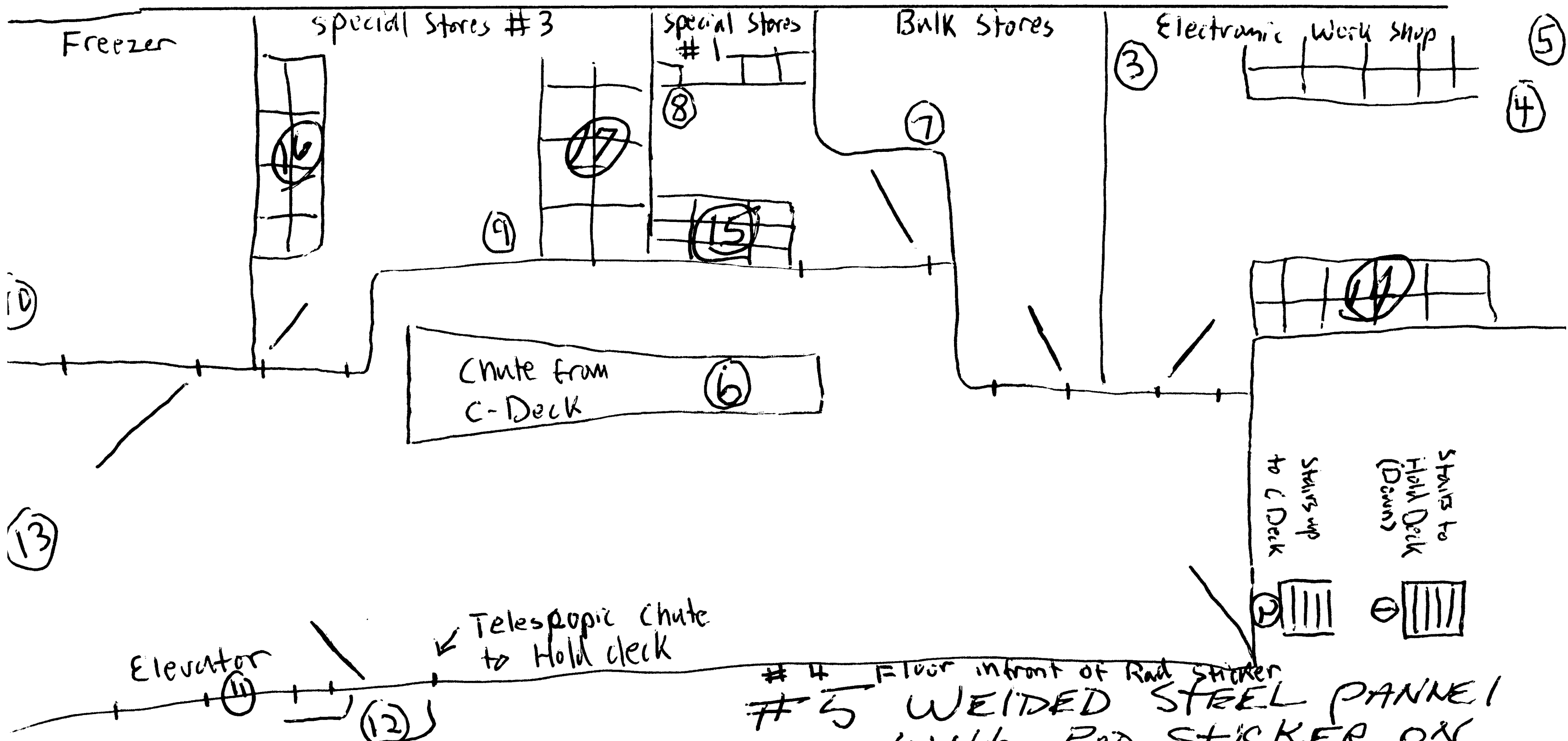
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0049

Date 4-1-05 Time 1030	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Lud/um 19	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature Loman Scott	Serial No. 42972	Inst.Sn 75809	
Reviewed [signature]	~~β Factor~~	Eff. 10 %	
	BKG 4 μR/h	Bkg. <40 cpm	cpm

AREA D-Deck Special Stores, Ect.
Port

COMPONENT Port SIDE



#4 Floor infront of Rad sticker
#5 WEIDED STEEL PANNEl WITH RAD STICKER ON WALL
#11 threshold of Elevator
#14, 15, 16, 17 - SHELVING SMEARS

FRSK < 100
DM < Background

SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD	17	< BKGD				
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD	12	< BKGD						
5	< BKGD	13	< BKGD						
6	< BKGD	14	< BKGD						
7	< BKGD	15	< BKGD						
8	< BKGD	16	< BKGD						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

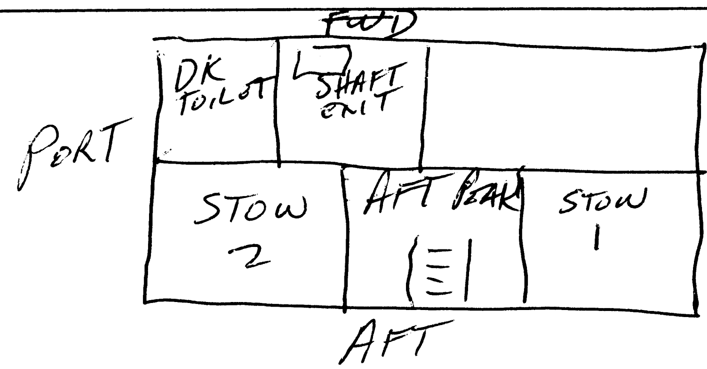
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0050

Date 4/1/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Caddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Caddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Robert E Pennock	β⁻ Factor	Eff. 10%	
	4 mR/HR	Bkg. 30 cpm	cpm

AREA A DECK AFT HOUSE

COMPONENT



SWIPES
STOW #1 STBD
1. OUTSIDE DOOR LATCH
2. INSIDE " "
3 AFT PEAK
3 OUTSIDE DOOR LATCHES
4 INSIDE DOOR LATCHES
STOW #2 PORT
5. OUTSIDE DOOR LATCHES
6. INSIDE DOOR LATCHES
DK TOILET PORT
7. OUTSIDE DOOR LATCH
8. INSIDE DOOR LATCH
SHAFT ALLEY EXIT
9. TOP RUNG ON LADDER
10. EXIT DOOR LATCH
11 ENTER DOOR LATCH

ALL AREA IN DIA
DR< BKGD
FRISK< 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B – BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

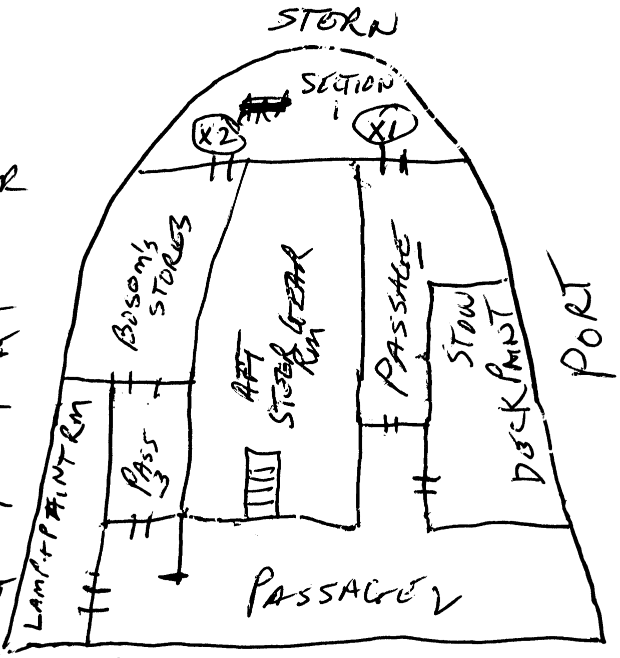
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0051

Date 4-1-05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4 mR/HR	Bkg. 30 cpm	cpm

AREA B DECK STERN COMPARTMENTS

COMPONENT



BOSOM'S STORES
15. DECK INSIDE DOOR

LAMP + PAINT RM
16. DOOR HANDLE ~~INSIDE~~ EXIT
17. DOOR HANDLE ENTER

AFT STEER GEAR RM
18. ENTER DOOR OPENER
19. EXIT DOOR KNOB
20 DECK INSIDE COMPT AT DOOR
21 DECK AFT STEER GEAR RM
22 STEP OVER STBD STEER GEAR RM
ALL AREAS IN DIA-
DR < BKGD
FRISK < 100 CPM

SWIPES
SECTION 1
1 DOORWAY
2 DOORWAY
PASS 1
3. ENTER DOOR KNOB
4 EXIT DOOR KNOB
5 DECK INSIDE PASS 1
PASS 2
8 DECK OUTSIDE PT. STOW.
9 HAND RAIL
DECK PAINT STORAGE
6. DOOR HANDLE ENTER
7. DOOR HANDLE EXIT
PASSAGEWAY 2
10. DECK BOTTOM of LADDER
11 PORT HAND RAIL
12 STBD HAND RAIL
13 ~~DECK~~ PASS 2 STBD
14 PASS 2 HANDRAIL STBD
~~15 B~~

ENTIRE AREAS IN DIA. FR B DK
DR < BKGD
FRISK < 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD	17	< BKGD				
2	< BKGD	10	< BKGD	18	< BKGD				
3	< BKGD	11	< BKGD	19	< BKGD				
4	< BKGD	12	< BKGD	20	< BKGD				
5	< BKGD	13	< BKGD	21	< BKGD				
6	< BKGD	14	< BKGD	22	< BKGD				
7	< BKGD	15	< BKGD						
8	< BKGD	16	< BKGD						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

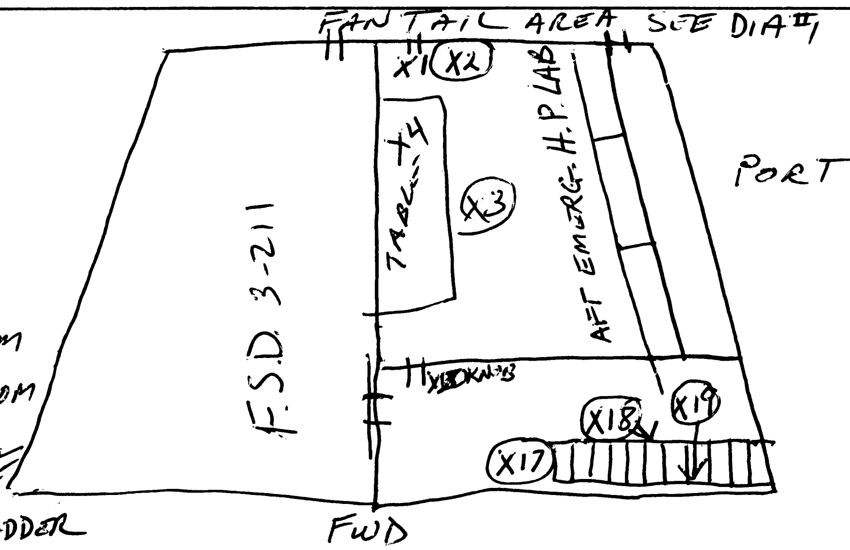
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0052

Date 4/1/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β^- Factor	Eff. 10%	
	4mR/HR	Bkg. 30 cpm	cpm

AREA STERN "C" DECK EMERG. HP LAB

COMPONENT



SWIPES

14 2ND TOP SHELF FROM
15. 3RD SHELF FROM TOP
16. BOTTOM SHELF
17. DECK Bottom of LADDER
18 HAND RAIL LADDER AFT
19 HANDRAIL LADDER FWD
20 DOOR KNOB HP EMER LAB
21 DECK OUTSIDE HP LAB DOOR
22 DOOR KNOB TO FSD 3-211
23 DECK ON PASS. OUTSIDE 3-211
24. DECK INSIDE 3-211
25. DOOR KNOB AFT IN 3-211

1. AFT INSIDE DOOR KNOB OF HP LAB
2. DK AT AFT DOOR
3. DK AT WORK TABLE
4. TABLE TOP
5. ~~TAB~~ SHELF ABOVE TABLE
6. PHONE
7. VENT DUCTING
8. EXH VENT
9. TABLE TOP WITH DRAWERS
10. TABLE TOP WITH SHELVES
11. ~~EXTR~~ DOOR KNOB
12. DECK ~~AT~~ DOOR
13. TOP SHELF INSIDE CABINET

ENTIRE AREA IN DIA.
DR < BKGD
FRISK < 100 CPM

DIA. # 2

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD			9	< BKGD	17	< BKGD	25	< BKGD
2	< BKGD			10	< BKGD	18	< BKGD		
3	< BKGD			11	< BKGD	19	< BKGD		
4	< BKGD			12	< BKGD	20	< BKGD		
5	< BKGD			13	< BKGD	21	< BKGD		
6	< BKGD			14	< BKGD	22	< BKGD		
7	< BKGD			15	< BKGD	23	< BKGD		
8	< BKGD			16	< BKGD	24	< BKGD		

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

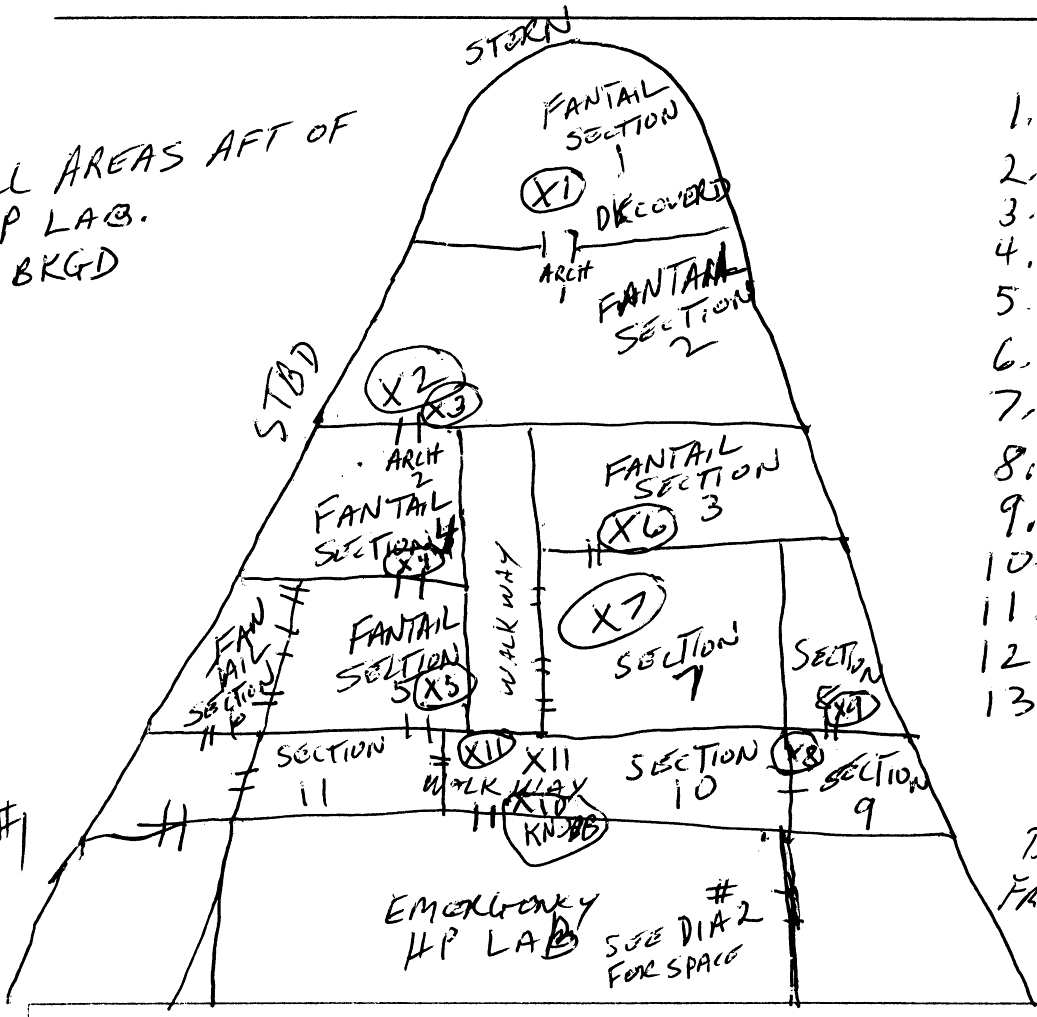
SURVEY NO. NSS - 0053

	DOSE RATE	CONTAMINATION	
Date 4/1/05 Time			
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Robert E Pennock	β⁻ Factor	Eff. 10%	
	4mR/HR	Bkg. 30cpm	cpm

AREA C DECK AFT OF EMERGENCY HP LAB

COMPONENT

ALL AREAS AFT OF HP LAB.
< BKGD



SWIPES

1. BASEPLT BEAM ℄
2. ACCESS RING
3. STBD ACCESS RING SIDE
4. ACCESS ENTERING-SECTION 2
5. DK SECTION 5
6. DK SECTION 3
7. DECK SECTION 7
8. ACCESS RING-SECTION 9
9. ACCESS RING-SECTION 8
10. DOOR KNOB OUTSIDE LAB
11. PASS AFT of LAB
12. DK SECTION 11
13. ACCESS RING TO SECTION 6

ENTIRE C DECK STERN AREAS
DR < BKGD
FRISK ~~300~~ 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD						
2	< BKGD	10	< BKGD						
3	< BKGD	11	< BKGD						
4	< BKGD	12	< BKGD						
5	< BKGD	13	< BKGD						
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

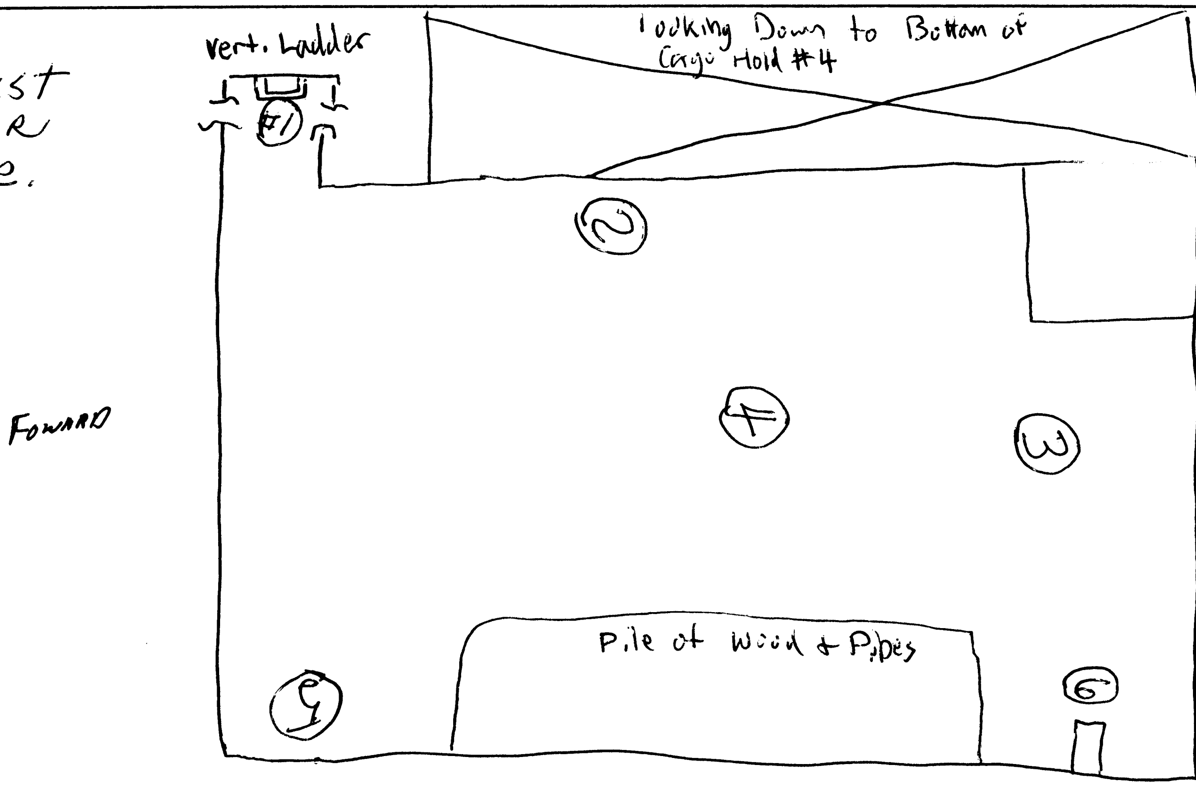
SURVEY NO. NSS-0054

Date 4/1/05 Time 2:00	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β⁻ Factor /	Eff. 10%	
	BKG < 4 μR/hr	Bkg. 40 cpm	cpm

AREA Cargo Hold #4 - 2nd from bottom (D-Deck)

COMPONENT

#6 Exhaust VENT FOR REACTOR. FRONT



Frisk < 100 CPM / DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B - BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								

RA - RADIATION AREA   CA - CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA - RADIATION CONTROL AREA   AA - AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0054

Date 4/4/05 Time 9:40	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β^-Factor /	Eff. 10%	
	BKG < 4 uR/Hr	Bkg. 40 cpm	cpm

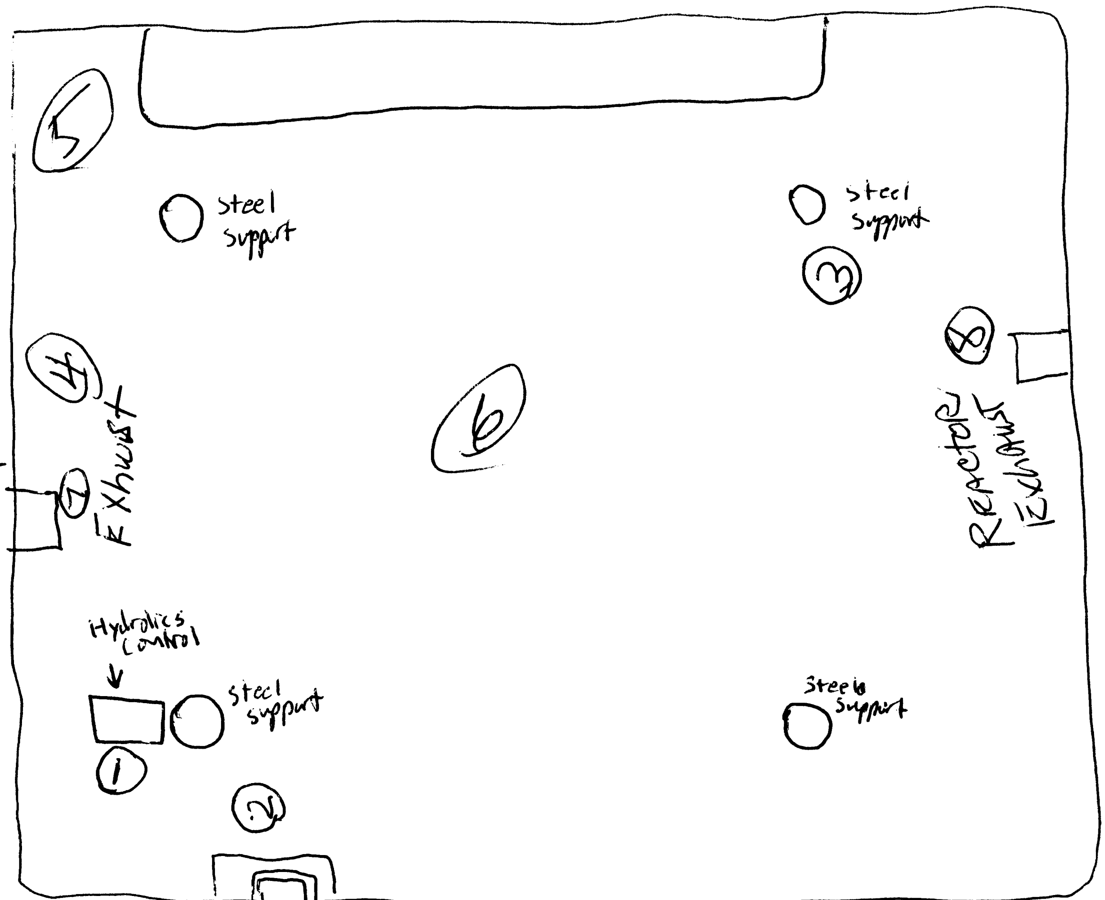
AREA Cargo Hold #4 - 3RD from bottom (C Deck)

COMPONENT

#1 Hydro Controll Leavers

#7 on Front of Exhaust Vent

#8 on Front of Exhaust Vent (Reactor)



Frisk < 100cpm / DM < BKG Vent. Ladder

Foward

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

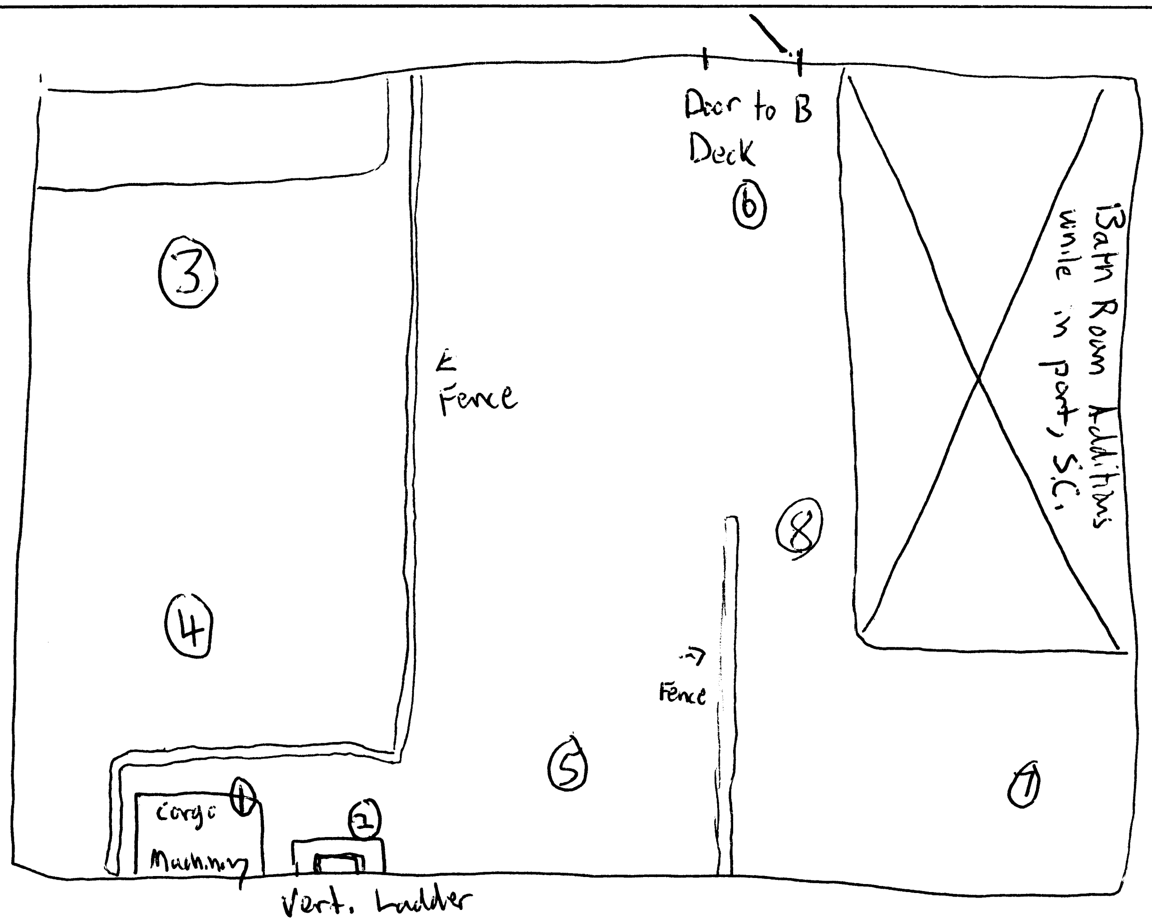
NSS-01 SURVEY NO. NSS-0054

Date 4/4/05 Time 10:00	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn 91037	
Reviewed [signature]	β^- Factor /	Eff. 10%	
	BKG < 4 µR/Hr	Bkg. 40 cpm	cpm

AREA Cargo Hold # 4 - B Deck

COMPONENT

#1 ON Top



Forward

Frisk < 100cpm / DM < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								
5	< BKGD								
6	< BKGD								
7	< BKGD								
8	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

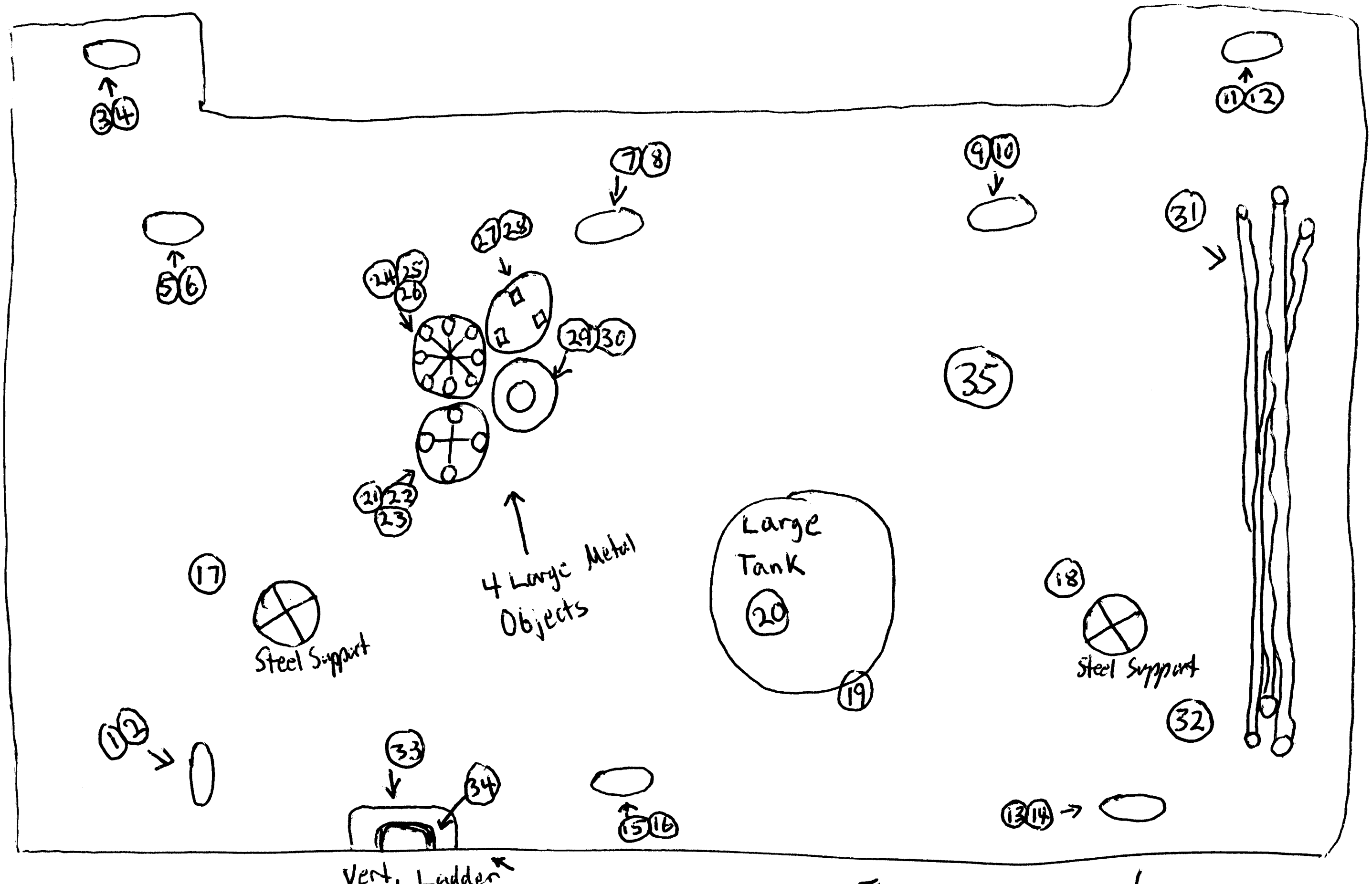
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0054

Date 4/1/05 Time 12:30	DOSE RATE	CONTAMINATION
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____ / Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn 91037
Reviewed [signature]	β⁻ Factor —	Eff. 10%
	BKG < 4 μR/Hr	Bkg. 40 cpm / cpm

AREA

COMPONENT Cargo Hold #4 (Hold and 14' Flat Decks)



FORWARD Frisk < 100 CPM/DM & BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKGD	17	< BKGD	25	< BKGD	33	< BKGD
2	< BKGD	10	< BKGD	18	< BKGD	26	< BKGD	34	< BKGD
3	< BKGD	11	< BKGD	19	< BKGD	27	< BKGD	35	< BKGD
4	< BKGD	12	< BKGD	20	< BKGD	28	< BKGD		
5	< BKGD	13	< BKGD	21	< BKGD	29	< BKGD		
6	< BKGD	14	< BKGD	22	< BKGD	30	< BKGD		
7	< BKGD	15	< BKGD	23	< BKGD	31	< BKGD		
8	< BKGD	16	< BKGD	24	< BKGD	32	< BKGD		

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0054 CONTINUED

Date 4-1-05 Time	DOSE RATE	CONTAMINATION	
Surveyor	Inst. Type	Beta____ Alpha____	Beta____ Alpha____
Signature	Serial No.	Inst.Sn	
Reviewed	β^- Factor	Eff.	
		Bkg. cpm	cpm

AREA Cargo Hold # 4 (Hold + 14' Flat Deck)

COMPONENT DESCRIPTIONS

#1 Top of Hatch
#2 Inside of Hatch
#3 " "
#4 " "
#5 " "
#6 " "
#7 " "
#8 " "
#9 " "
#10 " "
#11 " "
#12 " "
#13 " "
#14 " "
#15 " "
#16 " "

#17 Side of Steel Support
#18 Side of Steel Support
#19 Side of Large Tank
#20 Valve on Bottom of Tank
#21 Top Lip of Object
#22 Metal on inside
#23 Bottom
#24 Side
#25 Spindles
#26 Inside
#27 Top
#28 Side
#29 Side
#30 Top
#31 Inside Discarded Flex. pipe
#32 Other End " "
#33 Floor outside Ladder
#34 Floor inside Ladder
#35 Floor Smear

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1		9		17		25		33	
2		10		18		26		34	
3		11		19		27		35	
4		12		20		28			
5		13		21		29			
6		14		22		30			
7		15		23		31			
8		16		24		32			

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

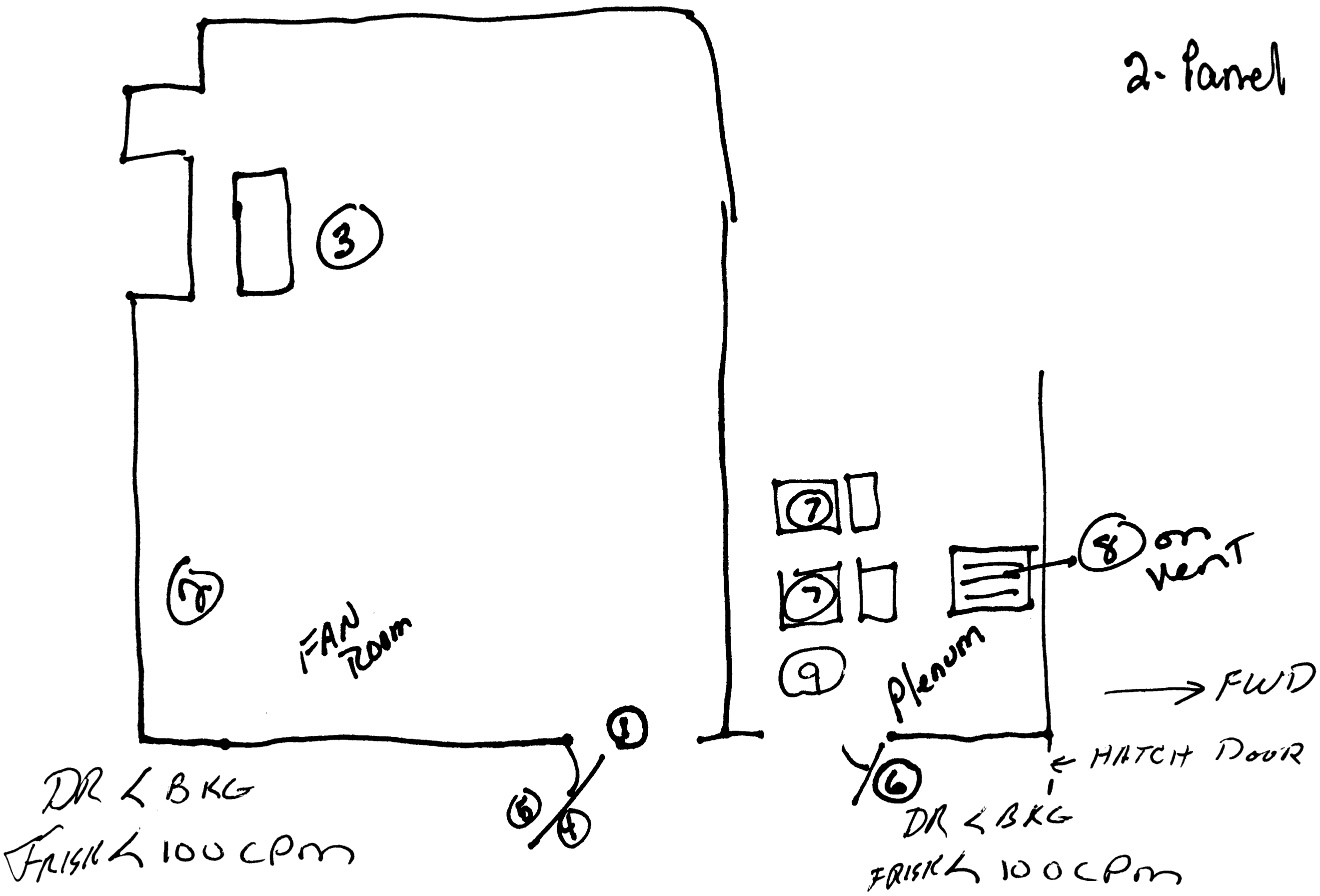
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0055

Date 4-4-05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type Ludlum	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Robert Bunnah	β^- Factor	Eff. 10%	
	4uR/Hr	Bkg. 30 cpm	cpm

AREA A deck FAN Rm + Plenum Port side

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKGD						
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

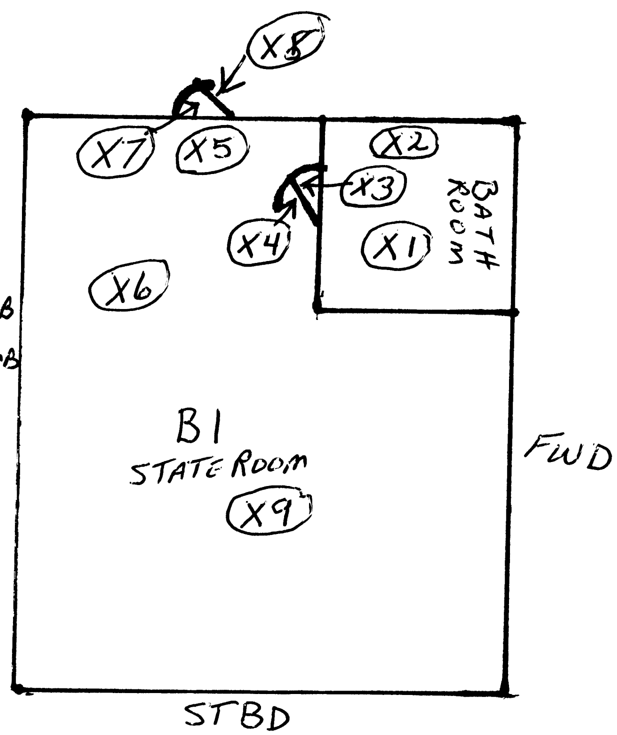
NSS-01 SURVEY NO. NSS-0056

Date 4/4/05 Time	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4uR/HR/hr	Bkg. 30 cpm	cpm

AREA B-1 STATEROOM AND BATH "B" DECK STBD

COMPONENT WASTE STORAGE ROOM FOR RADWASTE

1. DECK BATH Rm
2. BATH VENT
3. BATH EXIT DOOR KNOB
4. BATH ENTER DOOR KNOB
5. STATEROOM VENT
6. STATEROOM DECK
7. EXIT STATEROOM DOORKNOB
8. ENTER STATEROOM DOORKNOB
9. STATEROOM DECK NEXT TO BARRELS



ALL AREAS IN DIAGRAM
< BKGD
< 100cpm

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG						
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

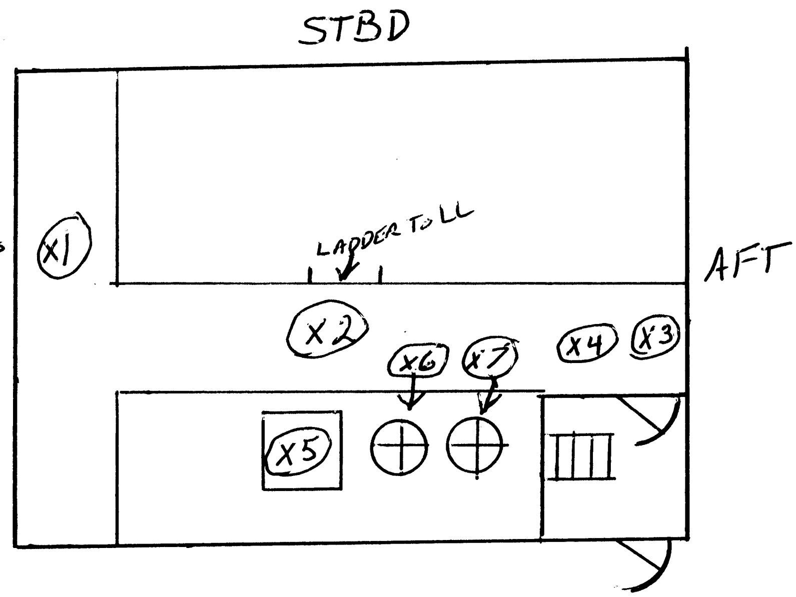
SURVEY NO. NSS-0057

Date 4/4/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β^- Factor	Eff. 10%	
	4uR/HR	Bkg. 30 cpm	cpm

AREA FWD STBD STABLIZER RM. 14 FOOT FLAT

COMPONENT

SWIPES
1. DECK FWD WALK WAY
2. DECK AT LADDER To LL
3. LIGHT SWITCH AFT BHD
4. DECK AT LIGHT SWITCH
5. DECK OF GRATING FWD OF VALVES
6. FWD LARGE VALVE
7. AFT LARGE VALVE



ALL AREAS IN DIAGRAM
DR < BKGD
FRISK 100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								
7	< BKG								

RA – RADIATION AREA
CA – CONTAMINATION AREA
ALL DOSE RATES IN µrem/hr
RCA – RADIATION CONTROL AREA
AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

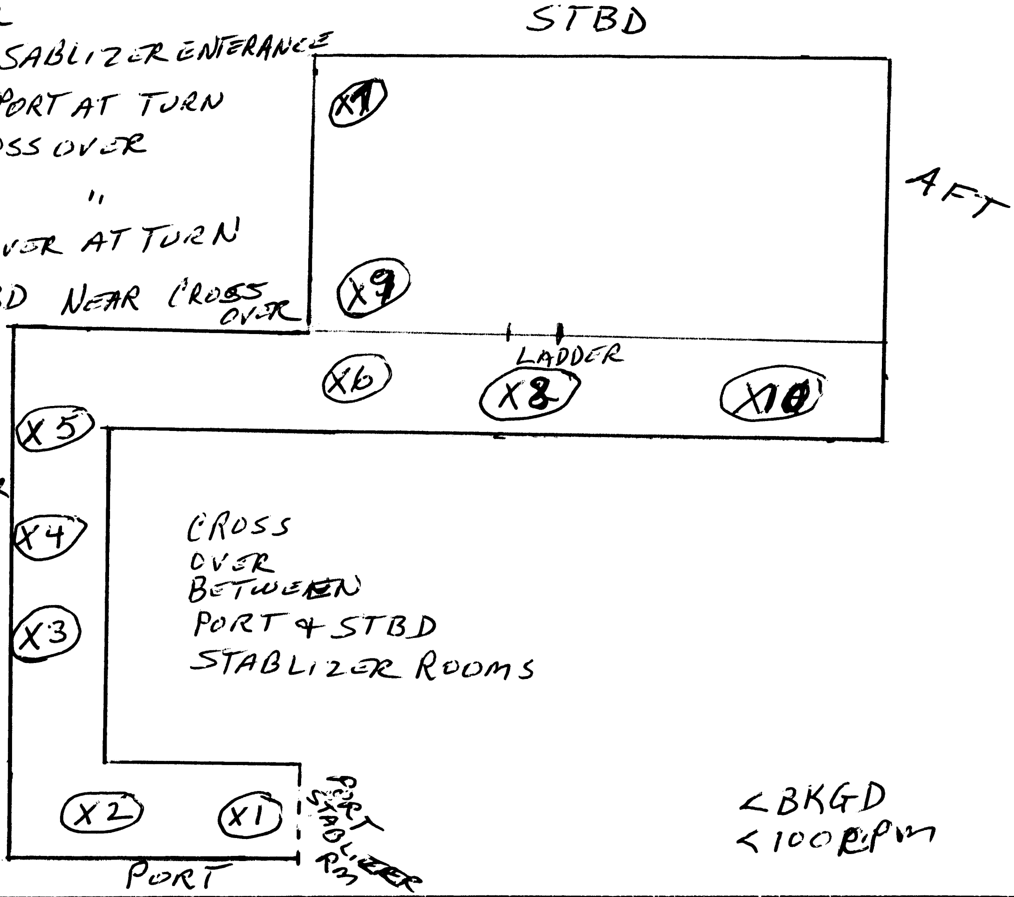
NSS-01 SURVEY NO. NSS-0058

Date 4/4/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4uR/HR	Bkg. 30cpm	cpm

AREA FWD STBD STABLIZER RM AND CROSS OVER LOWER LEVEL HOLD DECK

COMPONENT

SWIPES
1. DECK ~~STBD~~ CROSSOVER AT PORT SABLIZER ENTERANCE
2. DECK ~~STBD~~ 2nd CROSSOVER PORT AT TURN
3. DECK PORT of ℄ CROSSOVER
4. DECK STBD of ℄ " "
5. DECK STBD CROSSOVER AT TURN
6. BILGE AREA STBD NEAR CROSS OVER
7. TANK TOP FWD STBD
8. WALKWAY BOTTOM LADDER
9. FWD DECK TANK TOP AT CROSSOVER OPENING
10. WALKWAY DECK AFT



<BKGD
<100 DPM

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG								
4	<BKG								
5	<BKG								
6	<BKG								
7	<BKG								
8	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

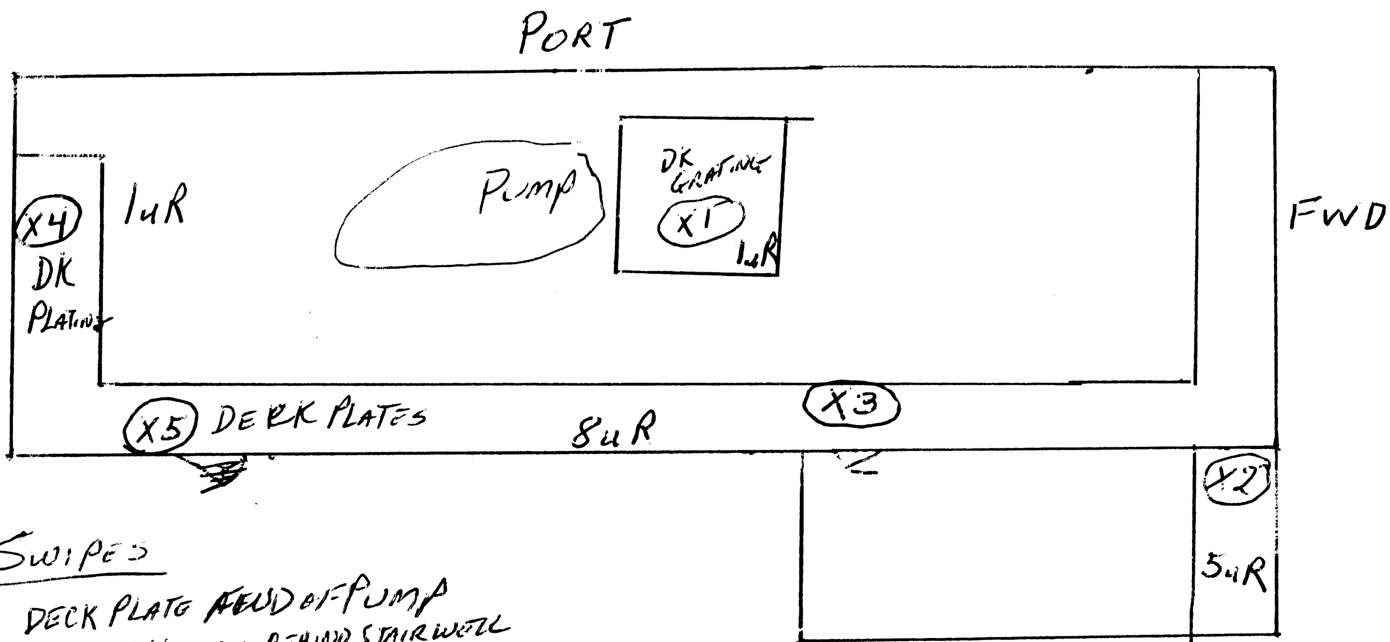
NSS-01

SURVEY NO. NSS-0059

Date 4/4/05 Time	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β^- Factor	Eff. 10 %	
	4uR/HR	Bkg. 30 cpm	cpm

AREA PORT FWD STABLIZER ROOM UPPER LEVEL
14 FLAT

COMPONENT



SWIPES
1. DECK PLATE FWD OF PUMP
2. FWD WALKWAY BEHIND STAIRWELL
3. WALKWAY INSIDE DOOR ACCESS TO STABLIZER
4. AFT DECK PLATING OUTBD.
5. AFT DECK AT LL LADDER

DR <BKG
FRISK <100 CPM

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B = BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								
3	<BKG								
4	<BKG								
5	<BKG								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0060

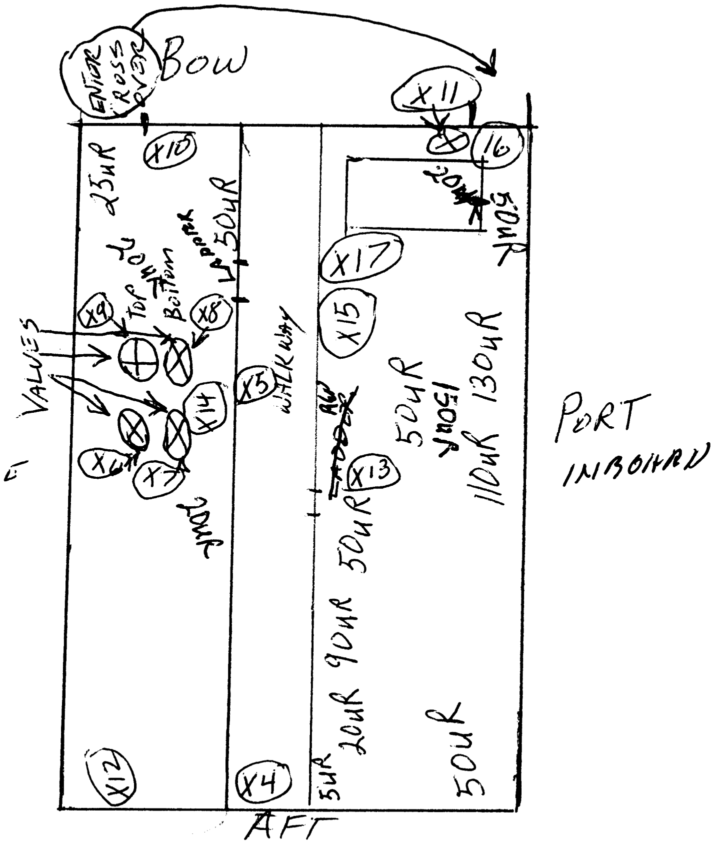
Date 4/4/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha	Beta Alpha
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻Factor	Eff. 10%	
	4uR/HR	Bkg. 30 cpm	cpm

AREA PORT FWD STABLIZER ROOM LOWER LEVEL

COMPONENT

SWIPES

1. UL
2. UL
3. UL
4. DECK PLATES AFT END
5. DECK AT 4 LARGE VALVES
6. AFT TOP LARGE VALVE FLANGE + GLAND SEAL
7. AFT BOTTOM " " " " "
8. BOTTOM FWD " " " " "
9. TOP FWD " " " " "
10. TANK TOP SURFACE FWD AT CROSS OVER ENTERANCE
11. INBOARD PORT VALVE FLANGE + GLAND SEAL
12. DECK AFT PORT OUTBOARD
13. DECK TANK TOP INBOARD OF LADDER
14. DECK BETWEEN 4 LARGE VALVES
15 DECK BELOW WALKWAY INBOARD
16. DECK BELOW AIR OPERATE VALVE
17. FWD DECK AREA



NO FRISK DATA

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
4	< BKGD	12	< BKGD						
5	< BKGD	13	< BKGD						
6	< BKGD	14	< BKGD						
7	< BKGD	15	< BKGD						
8	< BKGD	16	< BKGD						
9	< BKGD	17	< BKGD						
10	< BKGD								
11	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

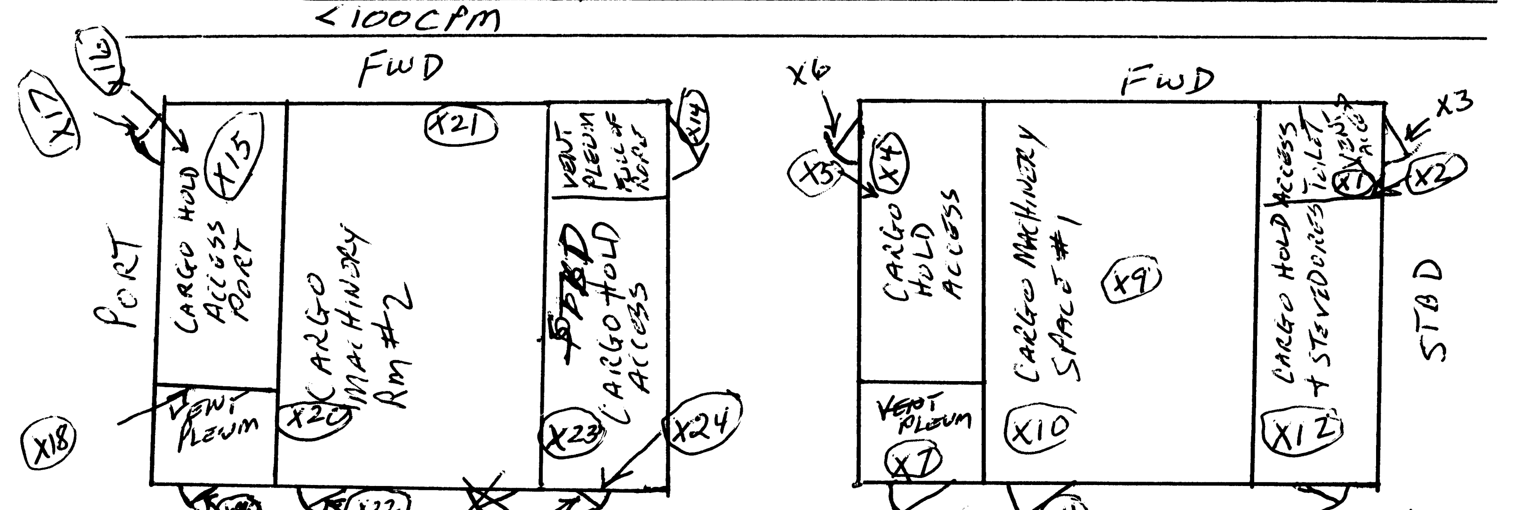
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0061

Date 4/5/4/05 Time 08:30	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Rob T Rumak	β⁻ Factor	Eff. 10%	
	4mR/HR BKG	Bkg. 30 cpm	cpm

AREA FWD WEATHER DECK HOUSES BETWEEN HATCHES 1 & 4

COMPONENT ALL AREAS SHOWN ON DIAGRAMS ARE <BKGD & <100CPM



#2 HOUSE BETWEEN HATCHES 3+4

#1 HOUSE BETWEEN HATCHES 1+2

SWIPES

1. #1 HOUSE STBD VENT TRUNK DECK
2. SUPPY VENT SWITCHES
3. ACCESS DOOR HANDLES
4. #1 HOUSE CARGO HOLD ACCESS DECK
   #1 HOUSE " " " LIGHT SWITCH
5. #1 HOUSE " " " DOOR HANDLES
6. #1 HOUSE PORT VENT ACCESS DK
7. #1 HOUSE PORT " " DOOR HANDLES
8. #1 HOUSE PORT " " DOOR HANDLES

SWIPES

9. FWD VENT CARGO MACHY SP #1
10. CARGO MACHY SP #1 DK
11. CARGO MACHY SP #1 DOOR HANDLES
12. STEVEDORE TOILET DK
13. STEVEDORE TOILET DOOR HANDLES
14. #2 HOUSE CARGO VENT RM DOOR HANDLES STBD
15. #2 HOUSE PORT CARGO ACCESS DECK
16. " " " " LIGHT SWITCH
17. " " " " DOOR HANDLES
18. #2 HOUSE PORT VENT PLEUM. VENT SWITCH
19. " " " " DOOR HANDLES

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKGD	9	<BKGD	17	<BKGD	20	<BKGD		
2	<BKGD	10	<BKGD	18	<BKGD				
3	<BKGD	11	<BKGD	19	<BKGD				
4	<BKGD	12	<BKGD	21	<BKGD				
5	<BKGD	13	<BKGD	22	<BKGD				
6	<BKGD	14	<BKGD	23	<BKGD				
7	<BKGD	15	<BKGD	24	<BKGD				
8	<BKGD	16	<BKGD	25	<BKGD				

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

(OVER)

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0061

Date 4/4/05 Time 0830	DOSE RATE	CONTAMINATION	
Surveyor	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature	Serial No. 95499	Inst.Sn 97416	
Reviewed	β⁻ Factor	Eff. 10 %	
	4mR/Hr BKGD	Bkg. 30 cpm	cpm

AREA FWD WEATHER DECK HOUSES BETWEEN HATCHES 1 AND 4

COMPONENT ALL AREAS SHOWN ON DIAGRAMS ARE < BKGD AND < 100 CPM

CONTINUATION OF PAGE 1

SWIPES

20. #2 HOUSE CARGO MACHINERY SP. #2 DECK
21. " " " " " VENT
22. " " " " " DOOR LATCH
23. #2 HOUSE CARGO HOLD ACCESS HAND HOLD
24. " " " " DOOR LATCH EXIT
25. " " " " " " ENTERANCE

Page 2 of 2

SMEAR RESULTS IN DPM/100 CM²		B = BETA in mRAD/hr/100 CM²							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

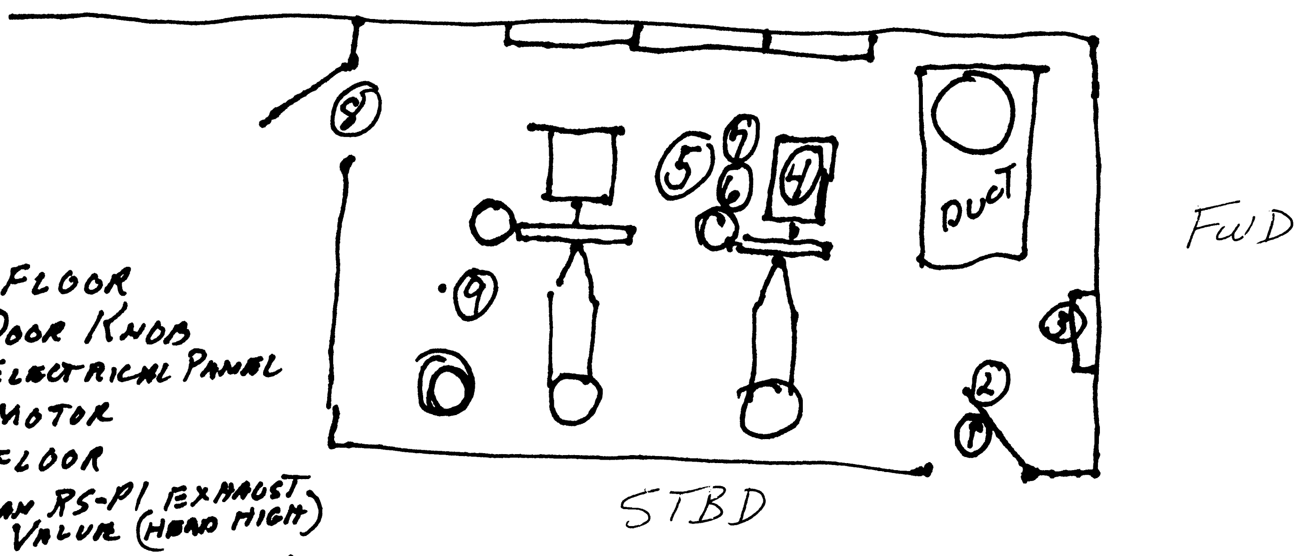
NSS-01

SURVEY NO. NSS-0062

Date 4-5-05 Time 9:30	DOSE RATE	CONTAMINATION	
Surveyor Craddock	Inst. Type LUDLUM	Beta ✓ Alpha	Beta Alpha
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4uR/HR BKG	Bkg. 30 cpm	cpm

AREA B DECK FAN ROOM TO COLD CHEM LAB

COMPONENT



1 - FLOOR
2 - DOOR KNOB
3 - ELECTRICAL PANEL
4 - MOTOR
5 - FLOOR
6 - FAN RS-P1 EXHAUST VALVE (HEAD HIGH)
7 - EXHAUST BYPASS VALVE HEAD HIGH
8 - THRESHOLD

DR < BG
FRISK < 100 cpm

SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B = BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG						
2	< BKG	~~10~~ BKG							
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

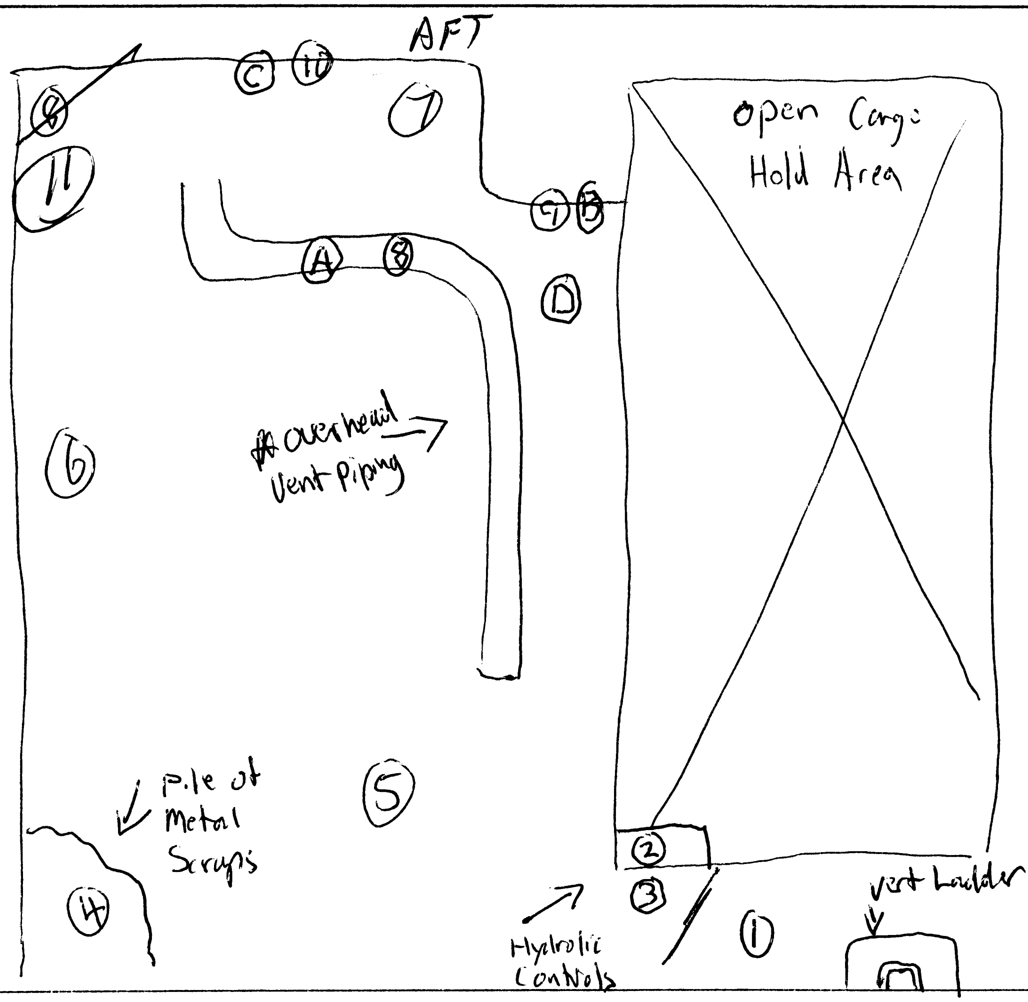
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0063

Date 4-5-05 Time 1315	DOSE RATE	CONTAMINATION	
Surveyor Loman Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Loman Scott	Serial No. 47972	Inst.Sn 91037	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	BKG 4 μr/h	Bkg. 40 cpm	cpm

AREA Hold #4 D Deck (Starboard)

COMPONENT



#2 Hydrolic controls
#8 Overhead vent Pipe
#9 Back Wall

D M Readings
IN μR/hr
A-38 - Vent
B ~~1,000~~ 250 PAS - Back Wall
C-6 - Back Wall
D- ~~10,000~~ 250 PAS - Floor

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG	11	<BKG						
4	<BKG								
5	<BKG								
6	<BKG								
7	<BKG								
8	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

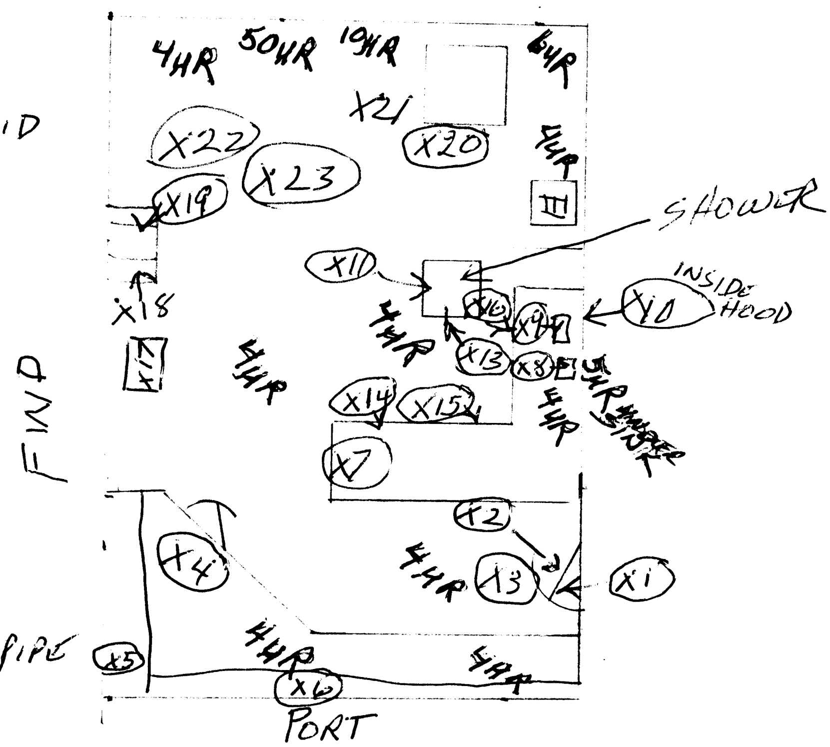
SURVEY NO. NSS-0064

Date 4/5/05 Time 09:00	DOSE RATE	CONTAMINATION	
Surveyor	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature Craddock	Serial No. 95499	Inst.Sn 97416	
Reviewed Craddock	β⁻ Factor	Eff. 10%	
[signature]	4uR/HR BKG	Bkg. 30 cpm	cpm

AREA UPPER LEVEL "C" DECK COLD WATER CHEMICAL LABORATORY RADIATION MONITORING ROOM FWD

COMPONENT

1. ENTER DOOR LATCH
2. EXIT DOOR LATCH
3. DECK INSIDE DOOR
4. DECK INSIDE STORAGE
5. POLY 5 GAL BOTTLE FULL OF FLUID
6. ~~PORT~~ SHELF 4TH FROM BOTTOM
7. DRAIN TABLE FWD PORT END
8. DRAIN TABLE AT 1ST SINK INSIDE
9. ~~SINK~~ UNDER HOOD SINK
10. INSIDE HOOD ~~OVER~~ SINK
11. SHOWER HANDLE
12. SHOWER DECK
13. SHOWER DOOR WAY
14. 1ST SHELF FROM TOP FWD PORT TABLE
15. 2ND " " " "
16. DK INSIDE SINK CABINET UNDER DRAIN PIPE
17. EXH VENT OVERHEAD
18. CROSS OVER STEP PORT ℄
19. CROSS OVER STEP STBD ℄



(Page 1 of 2)

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG	17	< BKG				
2	< BKG	10	< BKG	18	< BKG				
3	< BKG	11	< BKG	19	< BKG				
4	< BKG	12	< BKG	20	< BKG				
5	< BKG	13	< BKG	21	< BKG				
6	< BKG	14	< BKG	22	< BKG				
7	< BKG	15	< BKG	23	< BKG				
8	< BKG	16	< BKG	2'					

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH

RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0064

Date 4/5/05 Time 0900	DOSE RATE	CONTAMINATION	
Surveyor	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature	Serial No. 95499	Inst.Sn 97416	
Reviewed	β⁻ Factor	Eff. 10%	
		Bkg. 30 cpm	cpm

AREA UPPER LEVEL "C" DECK COLDWATER CHEMICAL LABORATORY RADIATION MONITORING ROOM

COMPONENT

CONT' FROM PAGE 1

SWIPES

20. TOP OF LEAD BRICKS UNDER ITEM COVERED WITH LEAD
21. DECK IN FRONT OF ITEM LISTED ABOVE
22. DECK BESIDE RC VENT
23. INSIDE ORANGE VENT DUCT IN OVERHEAD

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

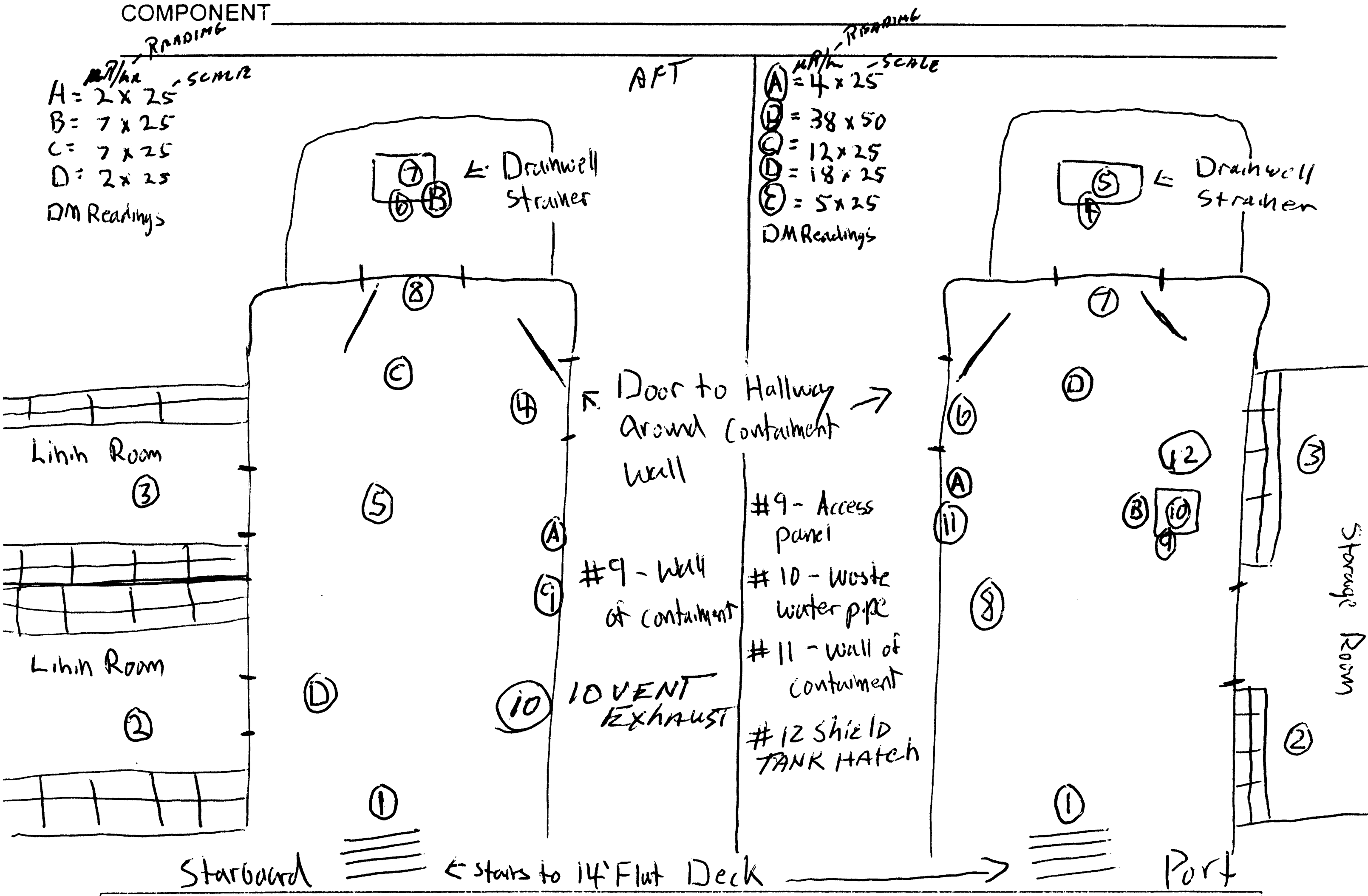
NSS-01

SURVEY NO. NSS-0065

Date 4-5-05 Time 1100	DOSE RATE	CONTAMINATION	
Surveyor Lamar Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lamar Scott	Serial No. 42972	Inst.Sn 90137	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	4 μR/h	Bkg. 4 cpm	cpm

AREA Hold Deck Starboard & Port

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG			1	<BKG	9	<BKG
2	<BKG	10	<BKG			2	<BKG	10	<BKG
3	<BKG					3	<BKG	11	<BKG
4	<BKG					4	<BKG	12	<BKG
5	<BKG					5	<BKG		
6	<BKG					6	<BKG		
7	<BKG					7	<BKG		
8	<BKG					8	<BKG		

RA – RADIATION AREA　　CA – CONTAMINATION AREA　　ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA　　AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

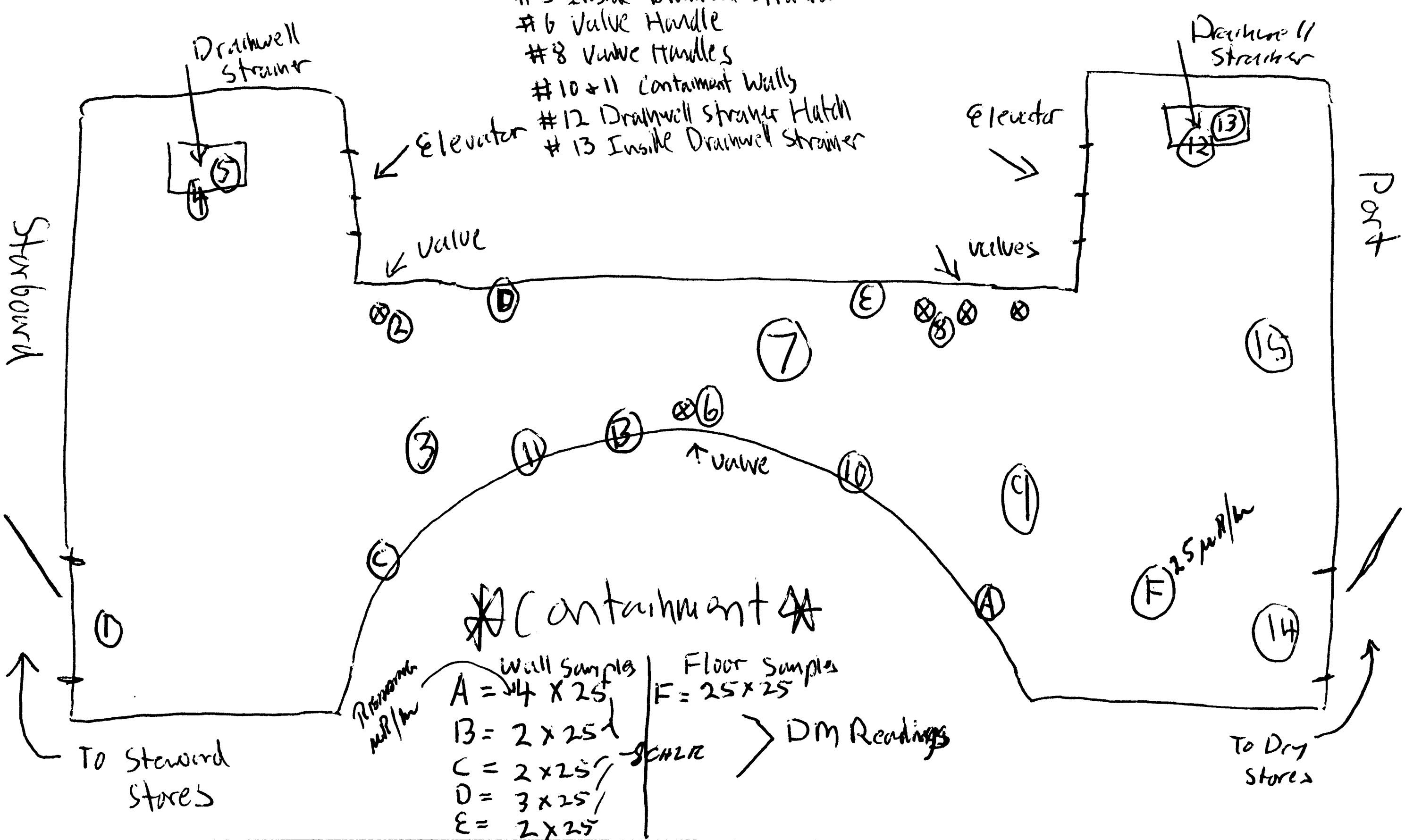
SURVEY NO. NSS-0066

Date 4-5-05 Time 1100	DOSE RATE	CONTAMINATION	
Surveyor Lemuel Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature Lemuel Scott	Serial No. 42978	Inst.Sn 90137	
Reviewed [signature]	~~β Factor~~	Eff. 10%	
	4 μR/hr	Bkg 40cpm cpm	cpm

AREA Hallway Inbetween Port + Starboard on Hold Deck (Around Containment)

COMPONENT

#2 Valve Handle
#4 Drainwell Strainer Hatch
#5 Inside Drainwell Strainer
#6 Valve Handle
#8 Valve Handles
#10+11 Containment Walls
#12 Drainwell Strainer Hatch
#13 Inside Drainwell Strainer



SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG	11	<BKG						
4	<BKG	12	<BKG						
5	<BKG	13	<BKG						
6	<BKG	14	<BKG						
7		15	<BKG						
8									

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

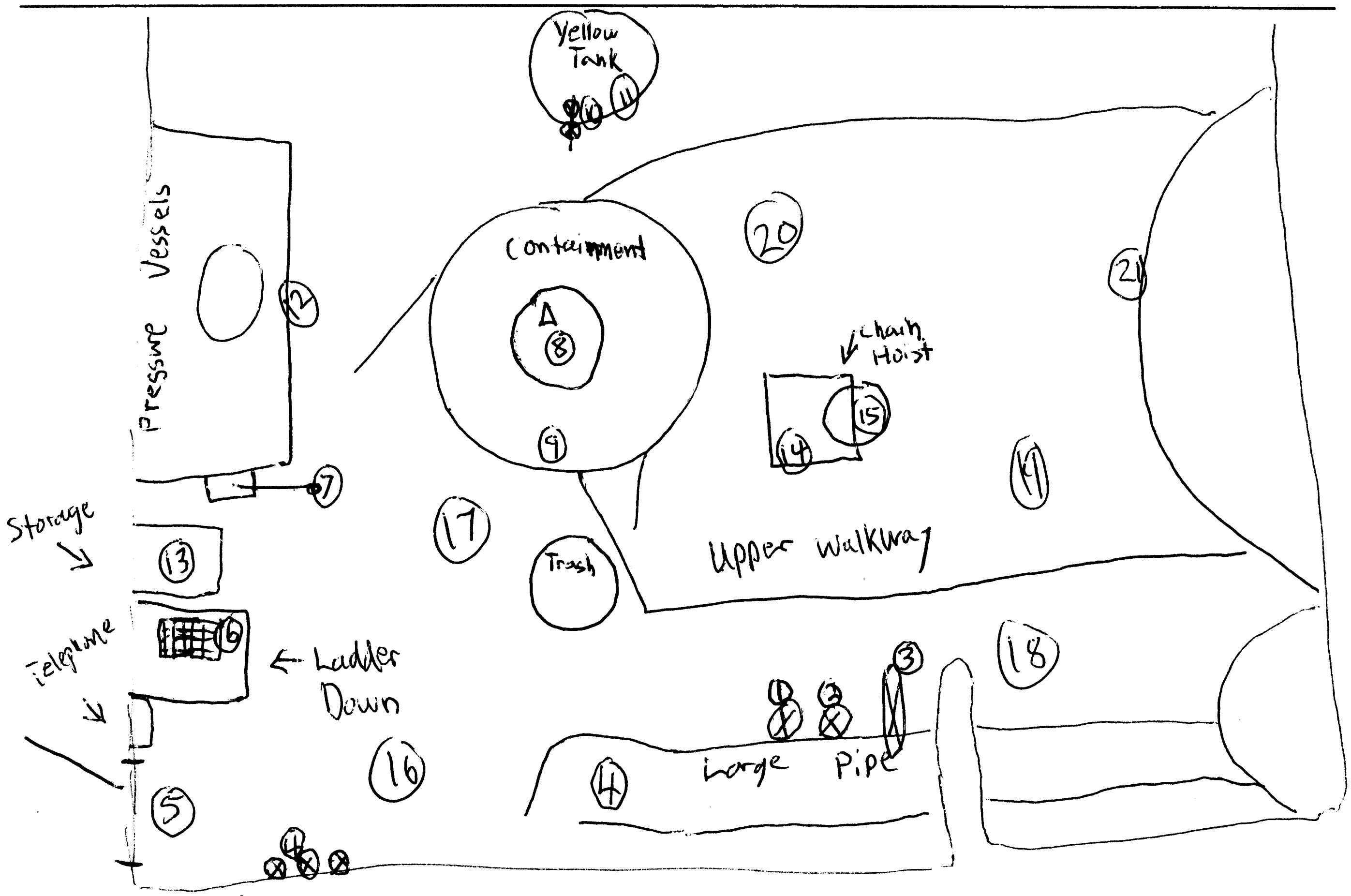
NSS-01

SURVEY NO. NSS-0067

Date 4/6/05 Time 1:00	DOSE RATE	CONTAMINATION ✓	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature	Serial No. 95499	Inst.Sn 42972	
Reviewed	β⁻ Factor /	Eff. 10%	
	BKG 4 µR/Hr	Bkg. 40 cpm	cpm

AREA ~~Main~~ Secondary Containment - B Deck AFT OF REACTOR

COMPONENT



DR< BKG/< 100 CPM FRISK

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG	17	< BKG				
2	< BKG	10	< BKG	18	< BKG				
3	< BKG	11	< BKG	19	< BKG				
4	< BKG	12	< BKG	20	< BKG				
5	< BKG	13	< BKG	21	< BKG				
6	< BKG	14	< BKG						
7	< BKG	15	< BKG						
8	< BKG	16	< BKG						

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0067

Date Time	DOSE RATE	CONTAMINATION	
Surveyor	Inst. Type	Beta_____ Alpha_____	Beta_____ Alpha_____
Signature	Serial No.	Inst.Sn	
Reviewed	β^- Factor	Eff.	
		Bkg. cpm	cpm

AREA ~~Main~~ SECONDARY Containment – B Deck AFT OF REACTOR

COMPONENT

#1 + #2 – Valve Controls
#3 - Large Valve Control
#4 – Side of Large Pipe
#6 - Ladder Down
#7 – Handle for Pressure Vessel
#8 – Removable steel cover
#9 – Containment Housing
#10 – Valve controls
#11 – Side of Large Yellow Tank
#12 – Side of Pressure Vessell
#13 – Top of Storage Cab.
#14 – Chain on Chain Hoist
#15 – Main Part of Chain Hoist
#21 Side of Reactor

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH

RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0068

Date 4/6/05 Time 10:00	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor —	Eff. 10%	
	BKG 2 μR/H	Bkg. 40 cpm	cpm

AREA HP Lab – A Deck

COMPONENT

#2 – #~~20~~ 10 – Upper Cabinets

#13 – Top of Scaler

#14 – Counter in front of Scaler

#16 – Top of Scaler

#17 – Counter in front of Scaler

#20 – Inside Reg. Sink

#21 " "

#22 – Inside Hot Sink

#23 – Top of Drain inside Hot Sink

#24 – Outside of trap of Hot Sink

#32 – #38 – Lower Cabinets + Shelves

#40 – Air Vent

#41 – " "

DM Readings

- 4 μR above Hot Sink
- 5 μR inside Hot Sink

CPM Readings

- 350 inside Hot Sink
- Rest of the Room < 100 CPM

* Smear No. 22 and 23 had activity levels above background ~~but below MDA (minimum detectable activity) 160 dpm~~. RDR

Smear #23 ~~1410~~ 1221 dpm/100cm² counter #2

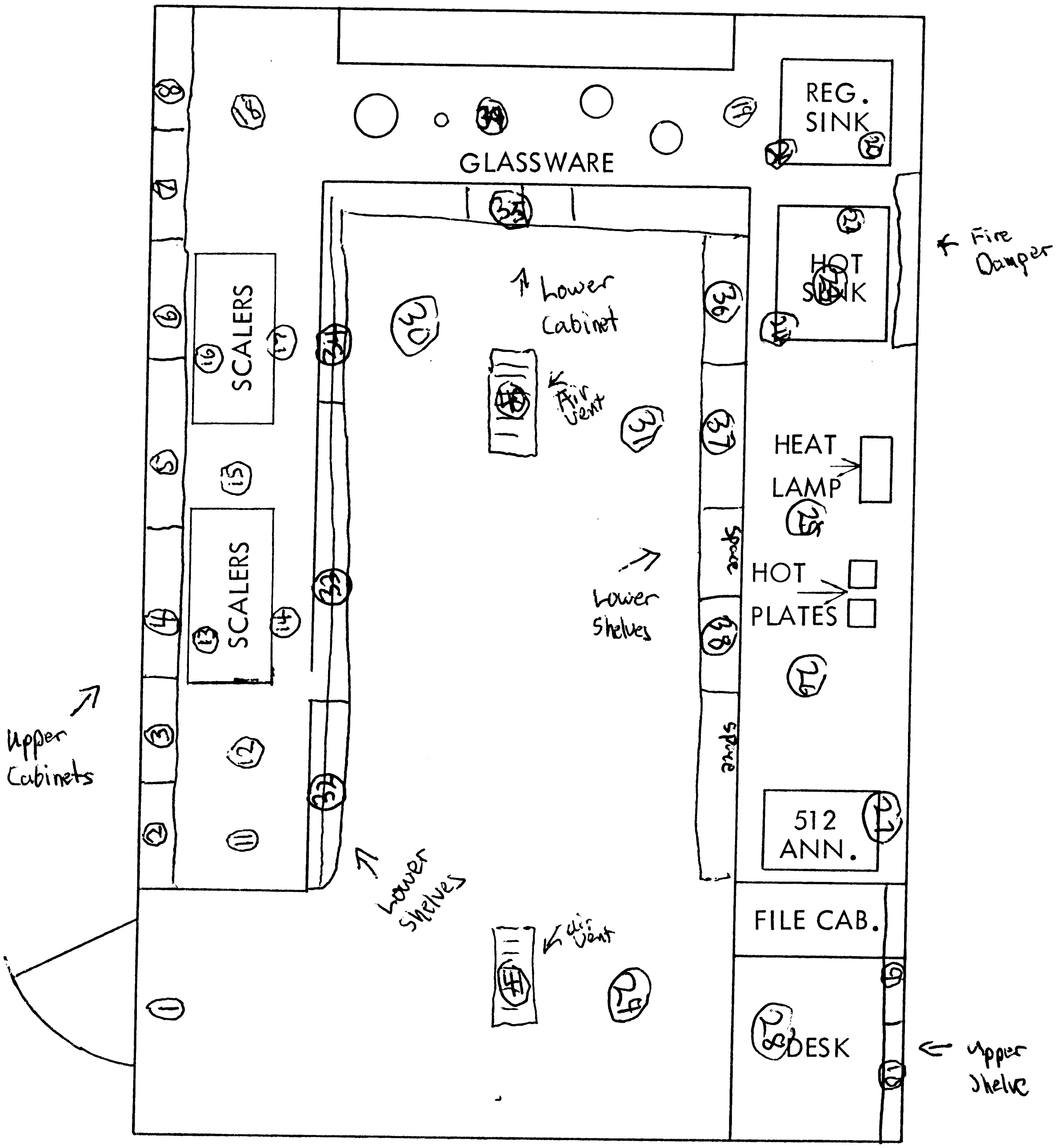
Smear #22 ~~800~~ 646 dpm/100cm² counter #1

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG	17	< BKG	25	< BKG	33	< BKG
2	< BKG	10	< BKG	18	< BKG	26	< BKG	34	< BKG
3	< BKG	11	< BKG	19	< BKG	27	< BKG	35	< BKG
4	< BKG	12	< BKG	20	< BKG	28	< BKG	36	< BKG
5	< BKG	13	< BKG	21	< BKG	29	< BKG	37	< BKG
6	< BKG	14	< BKG	22*	~~< BKG~~ 102	30	< BKG	38	< BKG
7	< BKG	15	< BKG	23*	148	31	< BKG	39	< BKG
8	< BKG	16	< BKG	24	< BKG	32	< BKG	40	< BKG
								41	< BKG

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/h

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA



GLASSWARE
REG. SINK
HOT SINK
Fire Damper
Lower Cabinet
Air Vent
SCALERS
SCALERS
HEAT LAMP
HOT PLATES
Lower Shelves
Space
Space
Upper Cabinets
512 ANN.
Lower Shelves
FILE CAB.
air vent
DESK
Upper Shelve

N.S. SAVANNAH
RADIOLOGICAL SURVEY

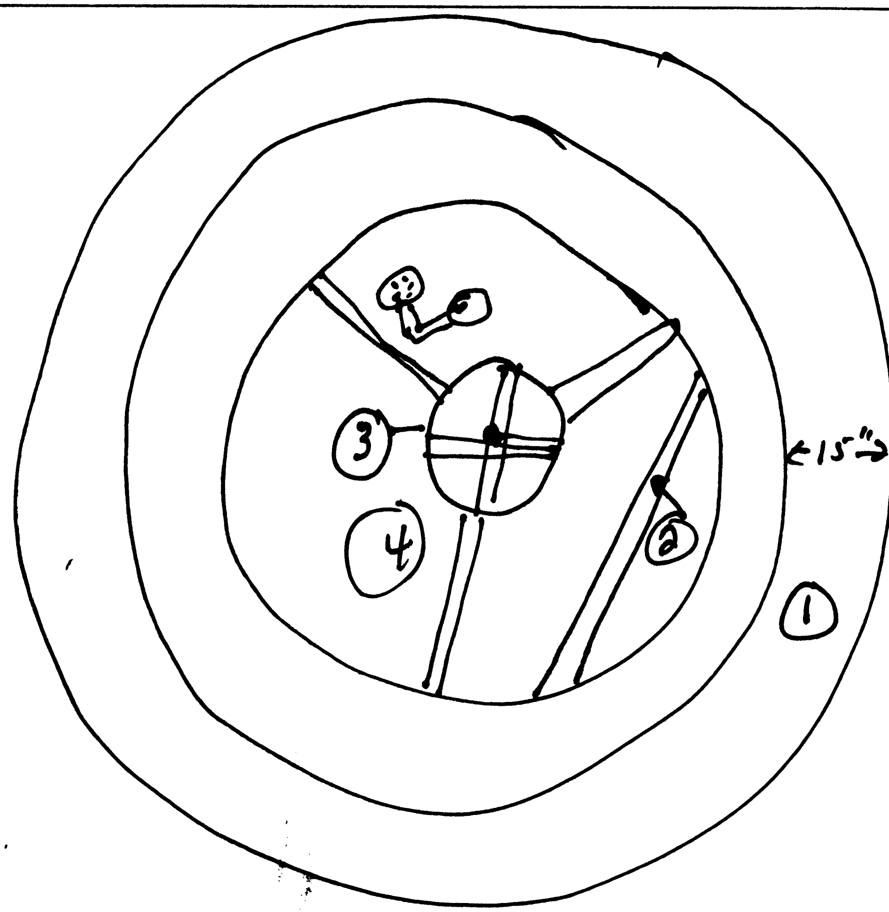
NSS-01 SURVEY NO. NSS-0069

Date 4-7-05 Time 900	DOSE RATE	CONTAMINATION	
Surveyor Logan Scott	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [illegible signature]	Serial No 35469	Inst.Sn 75809	
Reviewed [illegible signature]	~~β Factor~~ 2 uR/h	Eff. 10%	
[illegible initials]	~~CRML 100~~	Bkg. 30 cpm	cpm

AREA CONTAINMENT VESSEL PLUG & INSIDE HATCH CONTROLS

COMPONENT

1 - inside plug wall
2 - hand handle
3 - wheel
4 - under wheel
5 - on guage



15 uRh @ guage

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN urem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0070

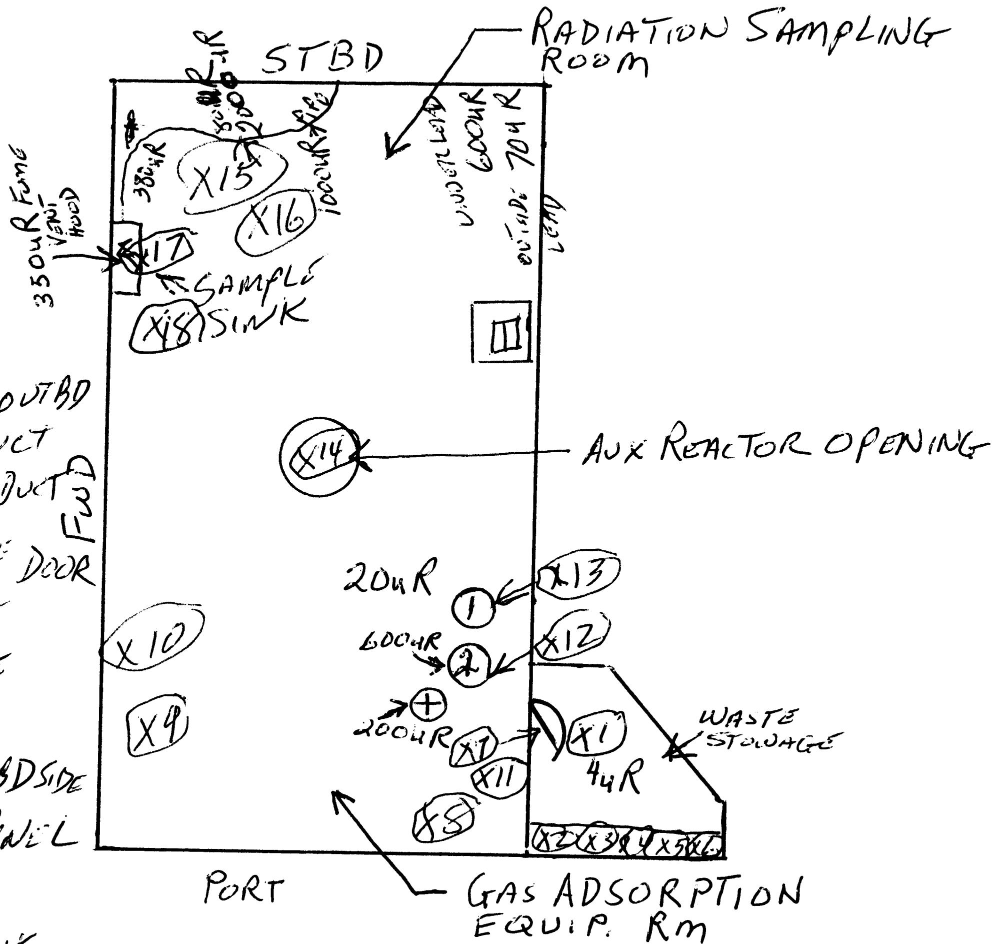
Date 4-7-05 Time	DOSE RATE	CONTAMINATION	
Surveyor JAMES H. LOVGDAHL	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4uR/HR	Bkg. 30 cpm	cpm

AREA LOWER LEVEL "D" DECK RADIATION SAMPLING RM, GAS ADSORPTION EQUIP. RM, WASTE STOWAGE RM

COMPONENT ACCESS THROUGH "C" DECK, COLD WATER CHEMISTRY LAB

SWIPES

1. INSIDE WASTE STORAGE DECK
2. TOP SHELF " "
3. 2ND SHELF " "
4. 3RD " "
5. 4TH " "
6. BOTTOM " "
7. ENTER DOOR KNOB
8. DK RADIATION SAMPL. RM PORT OUTBD
9. INSIDE HANGING VENT DUCT
10. INSIDE OPPOSITE END VENT DUCT
11. DK AT WASTE STORAGE DOOR
12. FILTER #2 CANISTER FLANGE
13. FILTER #1 CANISTER FLANGE
14. TOP of AUX REACTOR PLUG
15. ELECT SWITCH PANEL STBD SIDE
16. DECK UNDER SWITCH PANEL
17. INSIDE SAMPLE SINK
18. DECK AT SAMPLE SINK



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	~~12~~ 9	< BKG	17	* ~~[illegible]~~ 427				
2	< BKG	~~13~~ 10	< BKG	18	< BKG				
3	< BKG	~~14~~ 11	< BKG						
4	< BKG	~~15~~ 12	< BKG						
5	< BKG	~~16~~ 13	< BKG						
~~#6~~ 6	< BKG	~~17~~ 14	< BKG						
~~#7~~ 7	< BKG	~~18~~ 15	< BKG						
~~#8~~ 8	< BKG	16	< BKG						

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN urem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

	cts	cpm	Bkg cpm	Eff	dis/100cm²
* [redacted]	427	854	42	20.8%	3904 dpm

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0071

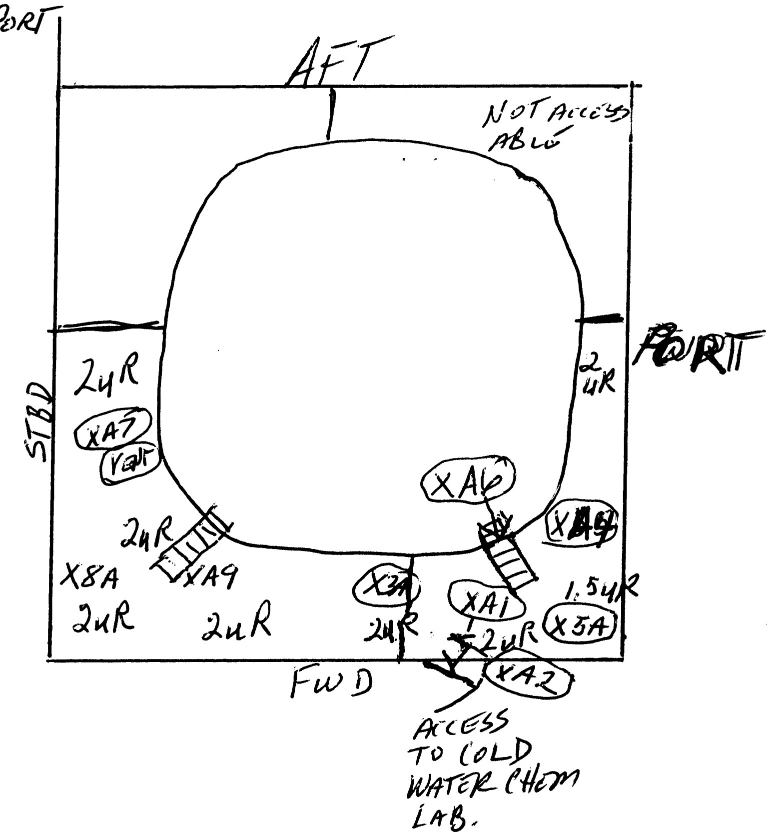
Date 4/8/05 Time	DOSE RATE	CONTAMINATION	
Surveyor JAMES H. LOVEDAHL	Inst. Type LUDLUM	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature James H. Lovedahl	Serial No. 95499	Inst.Sn 97416	
Reviewed Robert Rumrah	β⁻ Factor	Eff. 10%	
	4uR/HR	Bkg. 30 cpm	cpm

AREA "C" DECK LEVEL UNDER UPPER LEVEL OF SECONDARY CONTAINMENT

COMPONENT

SWIPES

A1. DOOR HANDLE TO COLD WTR CHEM LAB PORT
A2. DECK AT ACCESS DOOR
A3. HAND RAIL AT DOOR
A4. REACTOR COOLING VALVE FLANGE PORT
A5. DECK FWD PORT
A6. PORT FWD LADDER
A7. VENT OPENING
A8. VENT MOTOR
A9. STBD FWD LADDER



No Frisking

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
A1	<BKG	A9	<BKG						
A2	<BKG								
A3	<BKG								
A4	<BKG								
A5	<BKG								
A6	<BKG								
A7	<BKG								
A8	<BKG								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

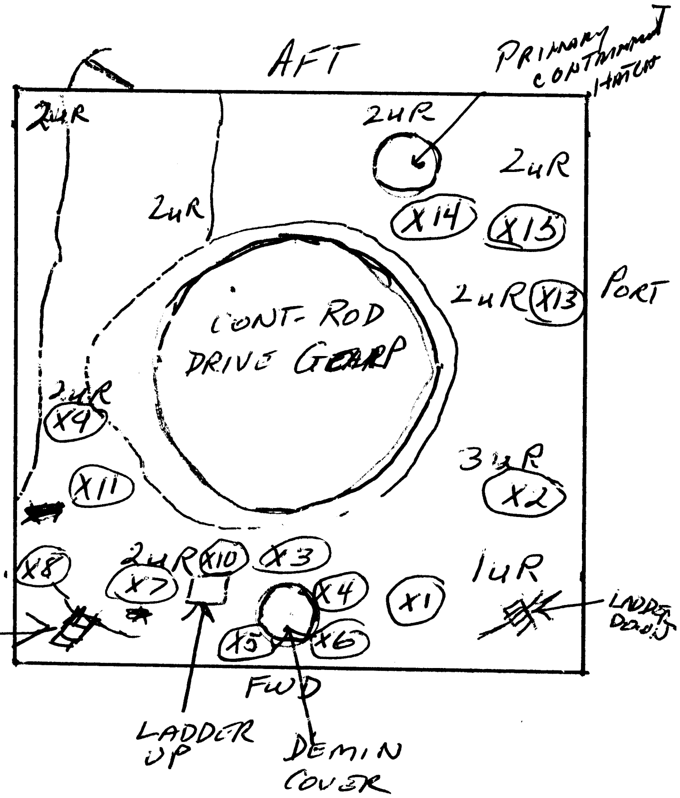
NSS-01 SURVEY NO. NSS-0072

Date 4-8-05 Time	DOSE RATE	CONTAMINATION	
Surveyor James H. Lovedahl	Inst. Type Ludlum	Beta ✓ Alpha ___	Beta ___ Alpha ___
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	4uR/HR	Bkg. 30 cpm	cpm

AREA "B" Deck Upper Level Secondary Containment Area

COMPONENT

1. FWD Port Deck at Ladder
2. FWD Port Deck under Vent
3. OVHD Chain Fall Clamp Handle over Demin Cover
4. Aft Chain on Chain Fall
5. FWD Chain on Chain Fall
6. Top of Demin. Cover
7. ~~B~~FWD Vert Ladder to A Deck
8. Deck at STBD LL Ladder FWD.
9. Deck STBD of CRDC
10. ~~Vert~~ up FWD Ladder
11. FWD. Inlet/Outlet Valve Flange + Gland
12. Reactor Space Vent Damper STBD FWD.
13. Port Elimitor QU Valve
14. Port Aft Deck to LL
15. Vent Duct Opening Port of CRDG



No Frisking

SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG	11	<BKG						
4	<BKG	12	<BKG						
5	<BKG	13	<BKG						
6	<BKG	14	<BKG						
7	<BKG	15	<BKG						
8	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0073

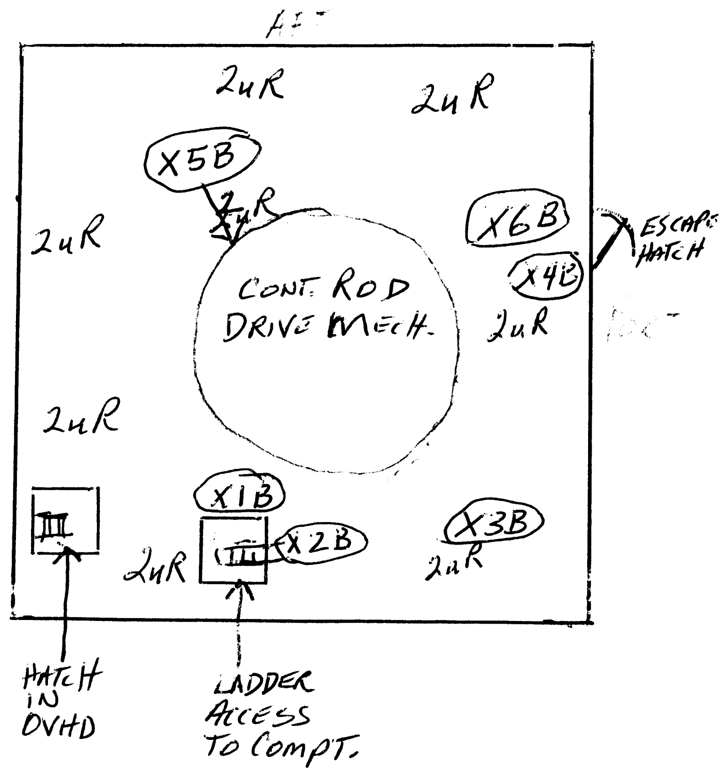
Date 4/8/05 Time	DOSE RATE	CONTAMINATION	
Surveyor James H. Lovedahl	Inst. Type Ludlum	Beta ✓ Alpha ____	Beta ____ Alpha ____
Signature James H. Lovedahl	Serial No. 95499	Inst.Sn 97416	
Reviewed	β^- Factor	Eff. 10%	
	4uR/Hr	Bkg. 30 cpm	cpm

AREA "A" Deck Above Secondary Containment

COMPONENT

Swipes

1B. Rail on Fwd ~~Stbd~~ STBD ~~Stbd~~ Access Ladder
2B. Deck at Access Ladder
3B. Escape Hatch Handle
4B. Deck at Escape Hatch
5B. Ring Gasket Seal on CRDM
6B. Vent Duck on ~~Stbd~~ Port at Hatch



Frisk < 100 cpm

SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1B	< BKG								
2B	< BKG								
3B	< BKG								
4B	< BKG								
5B	< BKG								
6B	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

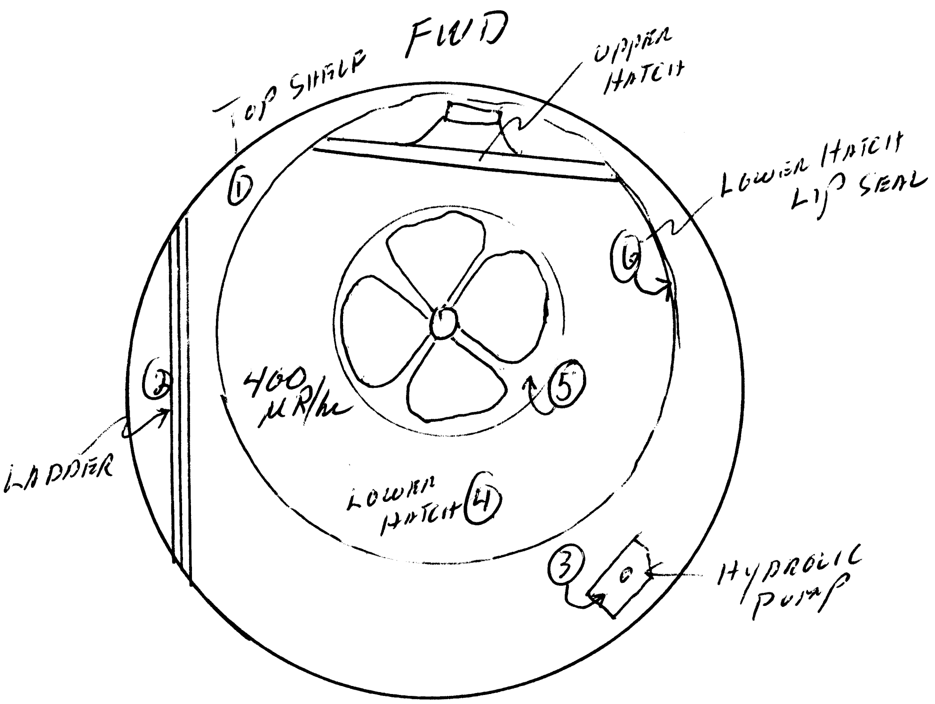
NSS-01

SURVEY NO. NSS-0074

Date 4-8-05 Time 1:00 PM	DOSE RATE	CONTAMINATION	
Surveyor CRADDOCK	Inst. Type LUDLUM µR	Beta ✓ Alpha	Beta Alpha
Signature [signature]	Serial No. 95499	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	BKG 4µR/hr	Bkg. 30 cpm	cpm

AREA Primary Containment Air Lock

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B - BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								
5	< BKG								
6	< BKG								

RA – RADIATION AREA　　CA – CONTAMINATION AREA　　ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA　　AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

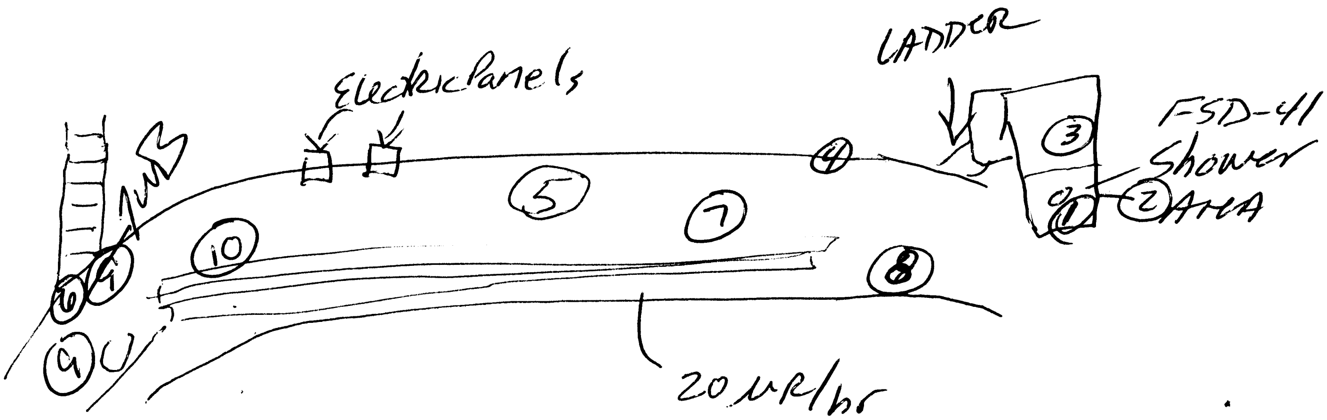
SURVEY NO. NSS-0075

Date 4-8-05 Time 1300	DOSE RATE	CONTAMINATION	
Surveyor Scott / Bowen	Inst. Type Lud/Mun 19	Beta____ Alpha____	Beta____ Alpha____
Signature Lomar Scott	Serial No. 42972	Inst.Sn NA	
Reviewed [signature]	~~β Factor~~ ~~BKG~~ < 100	Eff.	
	2 uR/h	Bkg. cpm	cpm

AREA Secondary Cont. AFT - Mezzine & lower area (mid level)

COMPONENT

General Area dose rate 3-5 uR/hr



SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG								
4	<BKG								
5	<BKG								
6	<BKG								
7	<BKG								
8	<BKG								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

DURATEC 28991 TELETECTOR

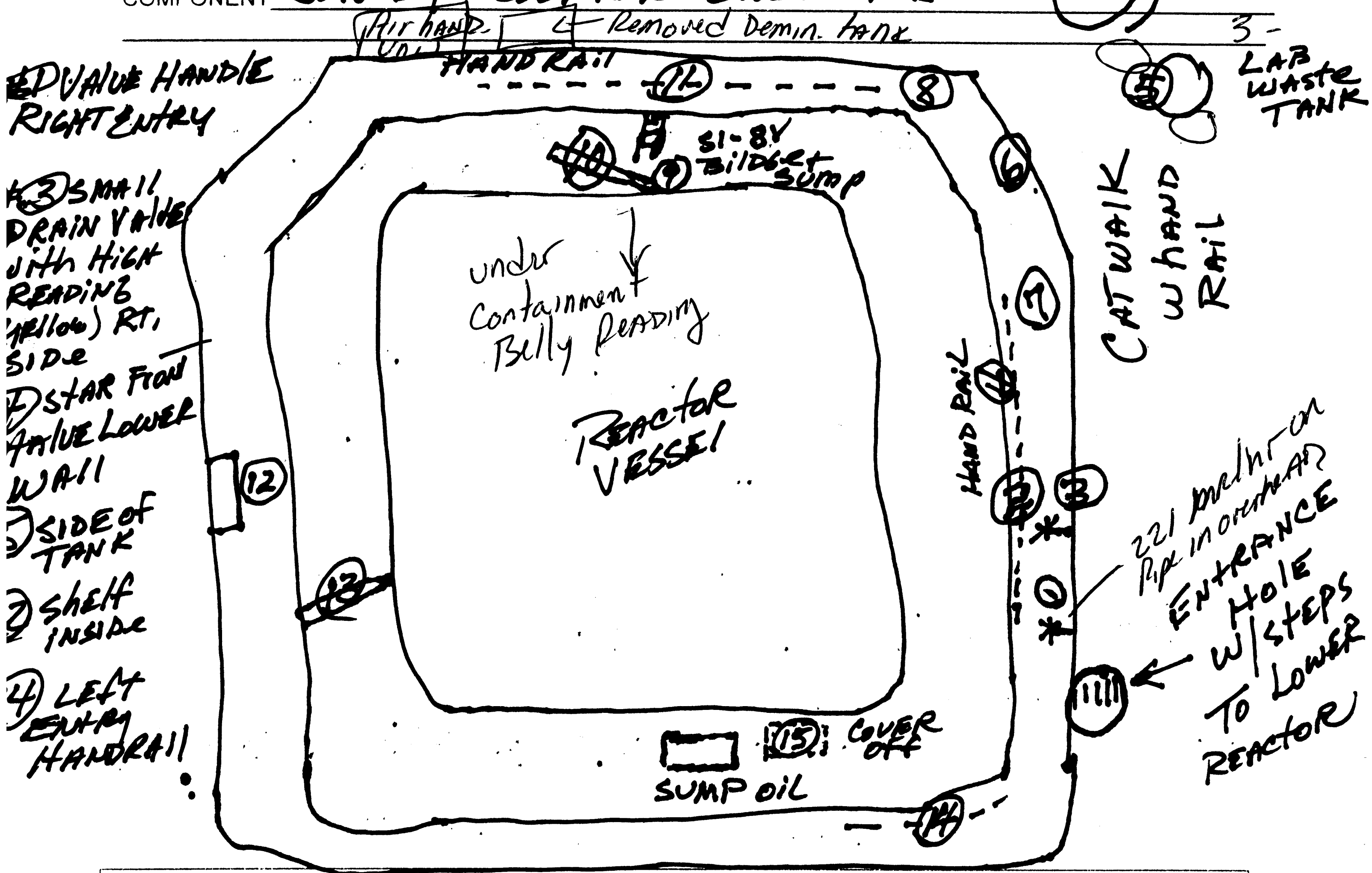
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 | SURVEY NO. NSS-0076

Date 4-8-05 Time 1400	DOSE RATE	CONTAMINATION	
Surveyor Scott ~~Bowden~~ Bowen	Inst. Type Ludlum 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
	BKG < ~~400~~ 1uR/hr	Bkg. cpm	cpm

AREA Lower Reactor Secondary Containment

COMPONENT SURVEY COUNTER CLOCKWISE



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9*	< BKG						
2	< BKG	10	< BKG						
3	< BKG	11*	< BKG						
4	< BKG	12	< BKG						
5	< BKG	13	< BKG						
6	< BKG	14	< BKG						
7	< BKG	15	< BKG						
8	< BKG								

RA – RADIATION AREA | CA – CONTAMINATION AREA | ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA | AA – AIRBORNE AREA

* 10 min count for Alpha

ALSO USED ~~DURATEC~~ 2899 / TELETECTOR

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0076

Date 4-8-05 Time 1400	DOSE RATE	CONTAMINATION	
Surveyor SCOTT-BOWDEN	Inst. Type LUD/LUM 19	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 42972	Inst.Sn	
Reviewed [signature]	~~β Factor~~	Eff.	
	BKG < 1 µR/hr	Bkg. cpm	cpm

AREA SURVEY NOTES

COMPONENT LOWER CONTAINMENT AREA

22 mR/hr DRAIN VALVE RIGHT ENTRY MARKED

HEAD LEVEL - 1.4 1.6 MR/hr

1-3 TANKS 400 - 600 µR/hr (LAB WASTE TANKS)

STAR FRONT HALF - ~~400~~ - 500 MR/hr (Gen. Area)

LAB WASTE TANK - 600 µR/hr BKG (#2 tank)

400 MR/hr STAR - FORWARD primary on Relief Valve

FORWARD READING UNDER Containment Vessel / BELLY 130-150 mr

PORT AFT ~~GENERATOR~~ general Area 60-80 AFT Gen. Area - 60 µR/hr

PENETRATION #56 (WALL on PORT SIDE) - 80 µR/hr

PORT SIDE Gen. Area - 60 - 80 µR/hr

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

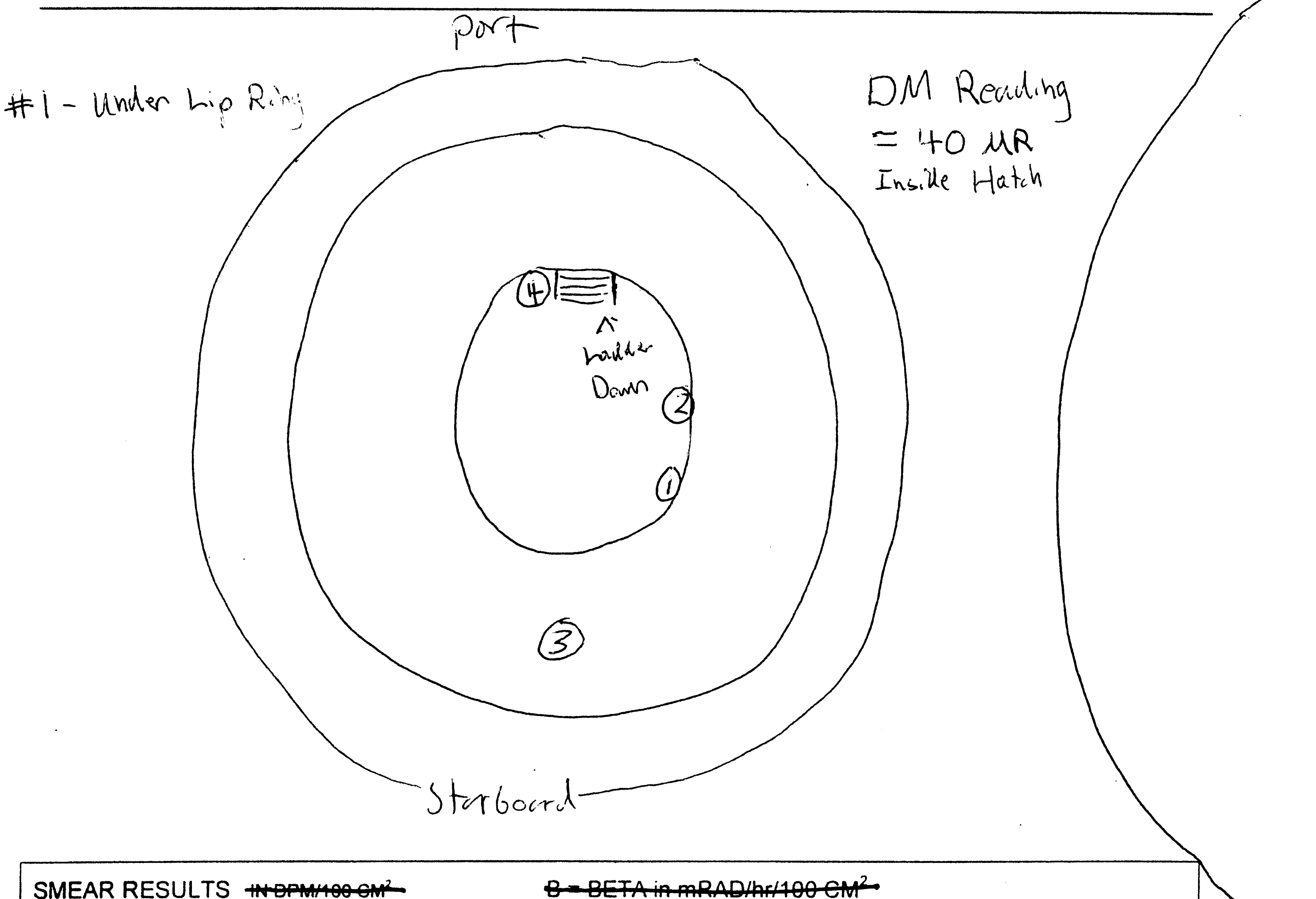
NSS-01

SURVEY NO. NSS-0077

Date 4/1/05 Time 8:45	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type Ludlum 14	Beta ✓ Alpha____	Beta____ Alpha____
Signature	Serial No. 95499	Inst.Sn 37416	
Reviewed	β⁻ Factor ✓	Eff. 10%	
		Bkg. 30 cpm	cpm

AREA Primary Cont. Hatch (LOWER) - Upper hatch to Primary containment - Lower hatch STILL SEALED AT this POINT

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~		~~B = BETA in mRAD/hr/100 CM²~~							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								
3	< BKG								
4	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0078

Date 4/11/05 Time	DOSE RATE	CONTAMINATION	
Surveyor J. Bowen	Inst. Type	Beta_____ Alpha_____	Beta_____ Alpha_____
Signature	Serial No.	Inst.Sn	
Reviewed	β⁻Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment 1st Level (Preliminary)

COMPONENT

Upon 1st Entry - General Location Smears - no map - Perform Rough Assessment - Detail survey will follow.

JWB

#11 250dpm
#15 96dpm — < 1000dpm/100cm²

SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD	9	< BKG						
2	< BKGD	10	< BKG						
3	< BKGD	11	47 cts						
4	< BKG	12	< BKG						
5	< BKG	13	< BKG						
6	< BKG	14	< BKG						
7	< BKG	15	~~< BKG~~ 31 cts						
8	< BKG								

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-6079

Date 4-14-05 Time 9 AM	DOSE RATE	CONTAMINATION	
Surveyor Robt Pennock	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature Rob. E. Pennock	Serial No.	Inst.Sn (See Below)	
Reviewed K Blady	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment 1st Level Forward

COMPONENT Re Smearing Suspect Areas From Survey Number

Counter # 1 102001
Beff 25.2%
2 160019
Beff 20.8%

1X – Top of Pressurizer

1 Large Valves off of Press Line to Reactor
2 Medium size Valves to Rt of Pressurizer
3 Contaminated Valving on Floor
4 SS Lines & Valves to Rt of Press.
5 Floor
6 Pressurizer Lines Left of Press.

1B – Pressurizer at pipe out of top 6"
2B – " Pipe 2 Rt of Pres.
3B Floor Rt of Contaminated Area
4B " Lt of " "
5B " Lt of Pressurizer

~~X~~ BKG

Sample #	Counter	gross counts	gross cpm	BKG cpm	Net cpm	dpm 100 cm²
1 X	2	52	104	42	62	298
3	1	50	100	37	63	250
4	2	68	136	42	94	452
5	1	171	342	37	305	1210

Smear #5
1-hour Count
α activity = 2.8 dpm/100cm²
Smear #4
< MDA

4-14 Smear #5 (Floor) α = 77, β = 23067   Smear #4 (SS lines) α = 19, β = 6701

30 min ct
2:01

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1X	52 (2*)	1A	< BKG	9A	< BKG	1B	< BKG		
1	< BKG	2A	< BKG	10A	< BKG **	2B	< BKG		
2	< BKG	3A	< BKG		JWB	3B	< BKG		
3	50 (1)	4A	< BKG			4B	< BKG		
4	68 (2)	5A	< BKG			5B	< BKG		
5	171 (1)	6A	< BKG **						
6	< BKG	7A	< BKG JWB						
~~X~~ BKG		8A	< BKG						

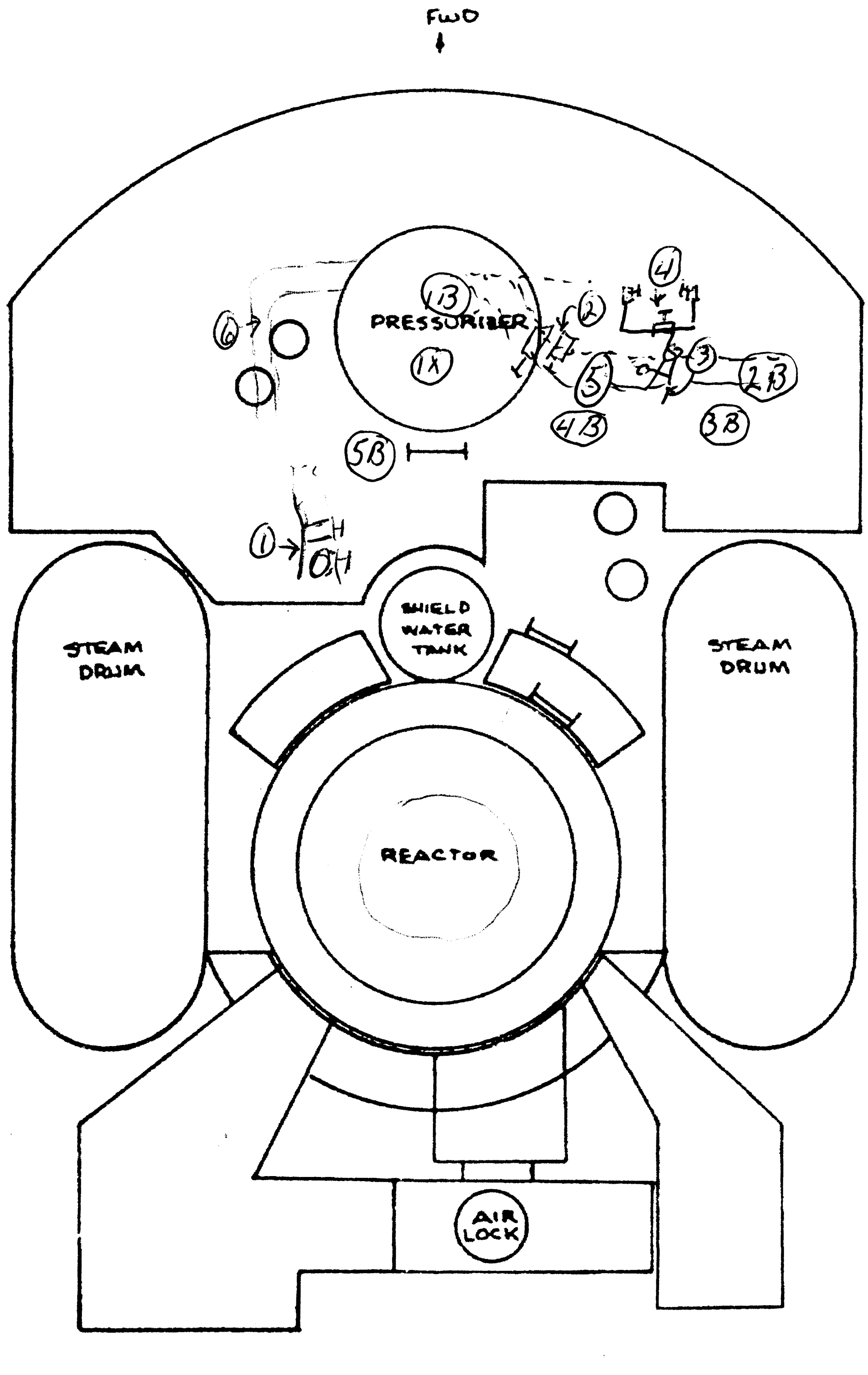
RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA   ** – see U-tube smear data JWB

* Instrument (Counter) #1

Inst. Type:	Ser. No.:
Probe:	Cal. Date:

CONTAINMENT VESSEL
1ST LEVEL



CONTAINMENT VESSEL

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

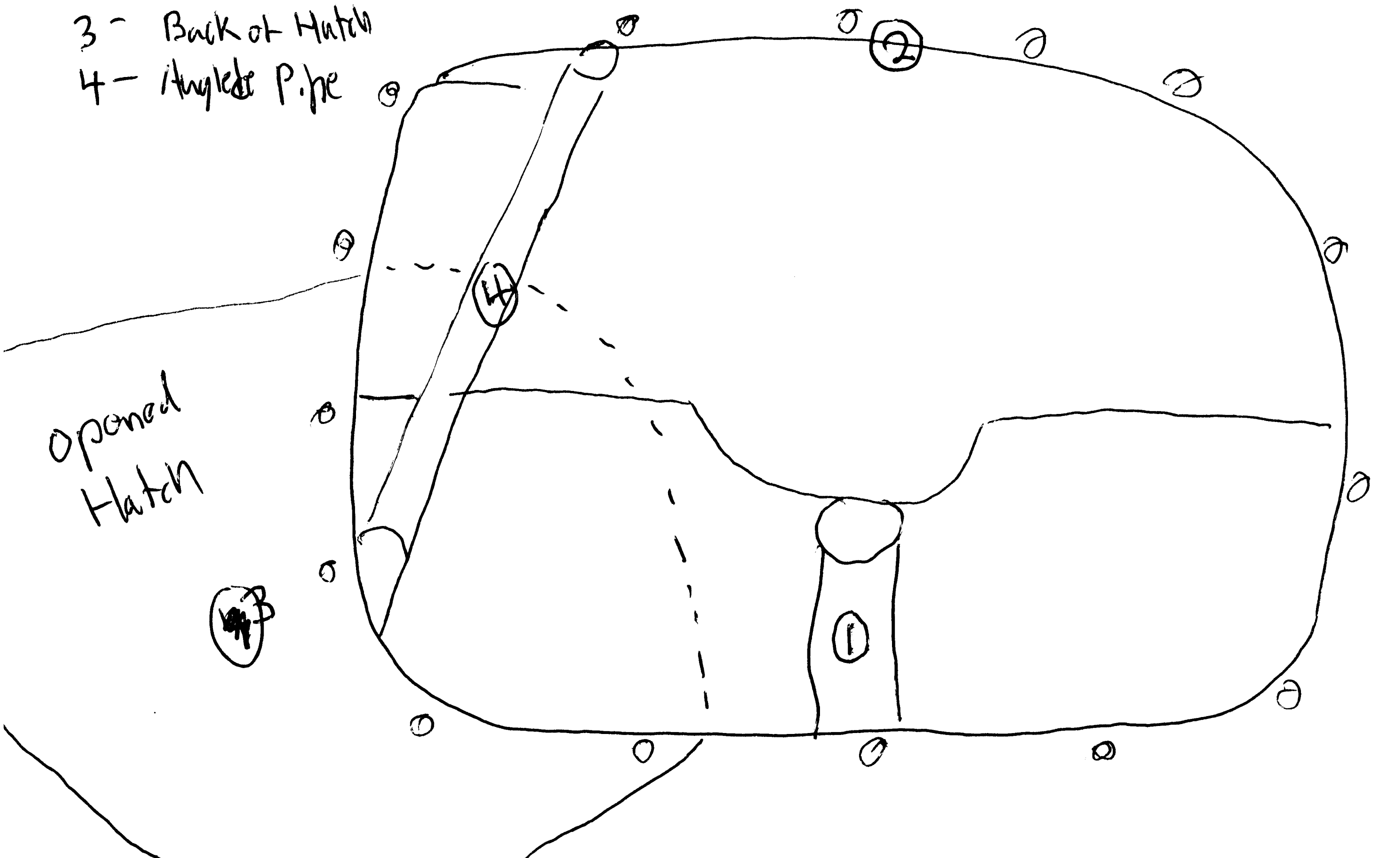
SURVEY NO. NSS-0080

Date 04/11/05 Time 2:00	DOSE RATE	CONTAMINATION	
Surveyor Ben Scott	Inst. Type N/A	Beta___ Alpha___	Beta___ Alpha___
Signature Ben S—	Serial No.	Inst.Sn N/A	
Reviewed	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Steam Cond. Hatch (Engine Room)

COMPONENT

1 - Cross Pipe
2 - Hatch Wall
3 - Back of Hatch
4 - Angled Pipe



SMEAR RESULTS ~~IN DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								
3	<BKG								
4	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0081

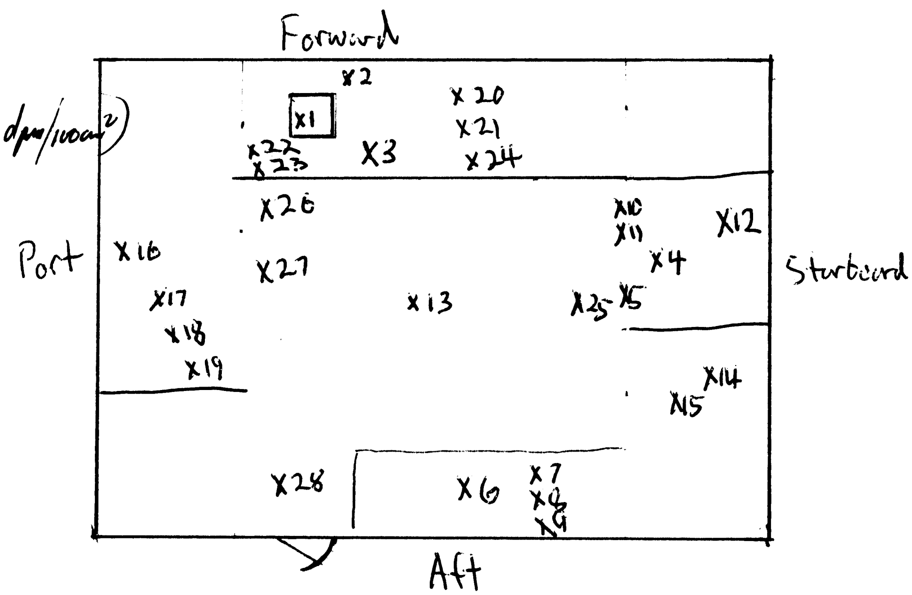
Date 4/11/05 Time 1100 Am	DOSE RATE	CONTAMINATION	
Surveyor JAMES LOVEDAHL	Inst. Type LUDLUM	Beta ✓ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95469	Inst.Sn 97416	
Reviewed [signature]	β⁻ Factor	Eff. 10%	
	~~3mR~~ 3uR/hr	Bkg. 30 cpm	cpm

AREA "D" DECK HOT CHEM LAB AT CONTROL ROOM

COMPONENT Seal # 7603

SWIPES

#1 Sink
#2 Inside Collection tank (waste) (369dpm/100cm²)
#3 Top of countertop
#4 Inside Hood
#5 Outside Hood Door
#6 Aft countertop
#7 1st shelf inside Aft Countertop
#8 2ND Shelf inside Aft Countertop
#9 Bottom shelf " "
#10 Top Shelf under Hood
#11 Bottom " "
#12 Hood Vent
#13 Overhead Vent
#14 Shelf Aft of Hood (top)
#15 " (Bottom)
#16 Port Top Shelf
#17 Port Top of Cabinet
#18 Middle Shelf Port Side



#19 Bottom Shelf Port
#20 Top Shelf Forward
#21 Middle Shelf Forward
#22 Drain under Sample Sink
#23 Bottom shelf under sink — (346dpm/100cm²)
#24 Bottom Shelf Forward
#25 Floor infront of Hood
#26 Floor infront of Sample Sink
#27 Deck Drain
#28 Floor infront of Door
#29 Light Switch
#30 Inside Door knob

DM Readings < BKG

SMEAR RESULTS ~~IN DPM/100 CM²~~ IN cp.5m B = ~~BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG	17	<BKG	25	<BKG		
2	65cts	10	<BKG	18	<BKG	26	<BKG		
3	<BKG	11	<BKG	19	<BKG	27	<BKG		
4	<BKG	12	<BKG	20	<BKG	28	<BKG		
5	<BKG	13	<BKG	21	<BKG	29	<BKG		
6	<BKG	14	<BKG	22	<BKG	30	<BKG		
7	<BKG	15	<BKG	23	57cts				
8	<BKG	16	<BKG	24	<BKG				

RA – RADIATION AREA   CA – CONTAMINATION AREA   ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA   AA – AIRBORNE AREA

Smear #	ct	cpm	Bkgd	Net cts	dpm/100 cm²
2	65	130	37	93	369
23	57	114	42	72	34[illegible]

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0082

Date 4-12-05 Time 1000	DOSE RATE	CONTAMINATION	
Surveyor BOWEN SCOTT	Inst. Type Tele	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. Detector	Inst.Sn	
Reviewed [signature]	β⁻ Factor 28991	Eff.	
		Bkg. cpm	cpm

AREA PRIMARY

COMPONENT CONTAINMENT VESSEL ~~3RD~~ FS LEVEL 4TH

SEE DRAWING.

* SMEARS FROM CONTAINMENT - 1st LVL AFT. DATA MOVED TO APPROPRIATE SURVEY

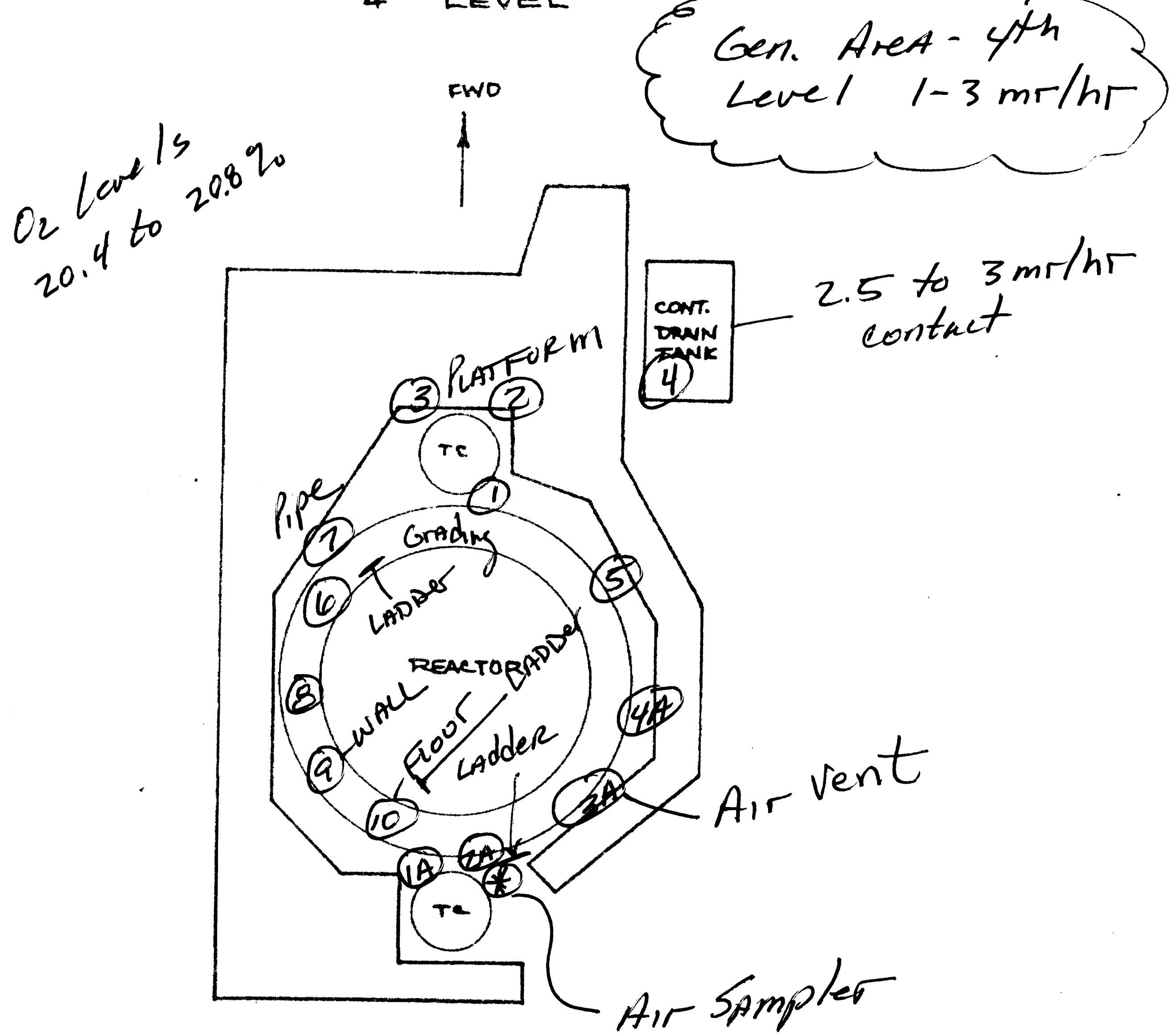
SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1A	< BKG	~~9A~~	~~< BKG~~ *	6	< BKG				
2A	< BKG	~~10A~~	~~< BKG~~	7	< BKG				
3A	< BKG			8	< BKG				
4A	< BKG	1	< BKG	9	< BKG				
~~5A~~	~~< BKG~~	2	< BKG	10	< BKG				
~~6A~~	~~< BKG~~	3	< BKG						
~~7A~~	~~< BKG~~ *	4	< BKG						
~~8A~~	~~< BKG~~	5	< BKG						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

CONTAINMENT VESSEL
4th LEVEL



~~TSC-ND 127~~

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0083

Date 4-12-05 Time 1000	DOSE RATE	CONTAMINATION	
Surveyor Bowen Scott	Inst. Type TELE	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. Detector	Inst.Sn N/A	
Reviewed [signature]	β⁻Factor 28991	Eff.	
		Bkg. cpm	cpm

AREA Containment Vessel / 1st Level /
PRIMARY

COMPONENT

SEE ATTACHED DRAWING

μR/hr METER
SN 95469

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

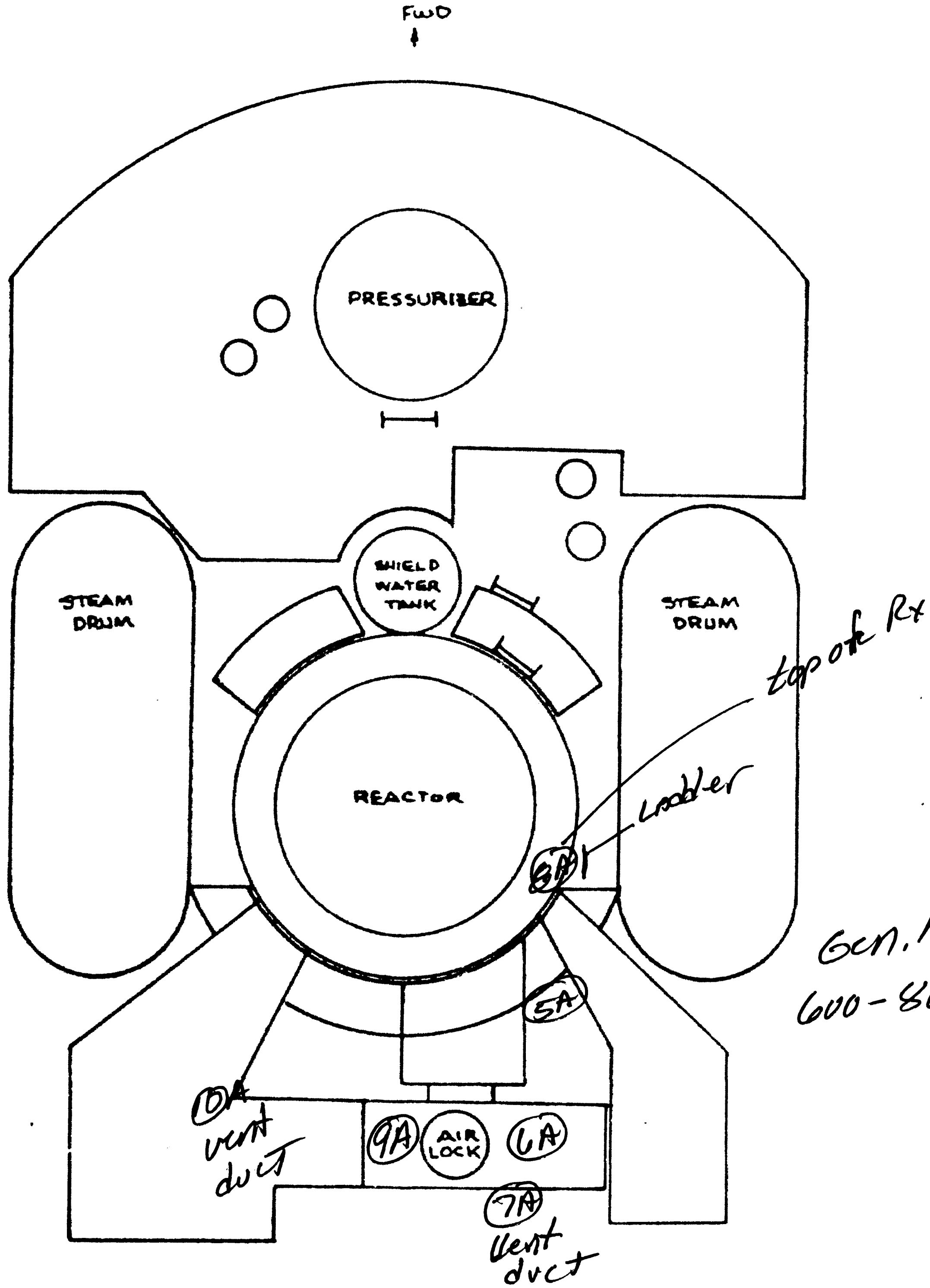
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
5A	< BKG								
6A	< BKG								
7A	< BKG								
8A	< BKG								
9A	< BKG								
10A	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

Probe:	Cal. Date:

CONTAINMENT VESSEL
1ST LEVEL



Gen. Area
600-800 μr/hr

~~CONTAINMENT VESSEL~~
~~3RD LEVEL~~

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0084

Date 4-12-05 Time 1000 AM	DOSE RATE	CONTAMINATION	
Surveyor Steven Scott	Inst. Type tele detector	Beta ____ Alpha ____	Beta ____ Alpha ____
Signature [signature]	Serial No. 28991	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment - 2nd Level

COMPONENT

SEE ATTACHED DRAWING

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG	1B	< BKG	9B	< BKG		
2	< BKG	10	< BKG	2B	< BKG	10B	< BKG		
3	< BKG			3B	< BKG				
4	< BKG			4B	< BKG				
5	< BKG			5B	< BKG				
6	< BKG			6B	< BKG				
7	< BKG			7B	< BKG				
8	< BKG			8B	< BKG				

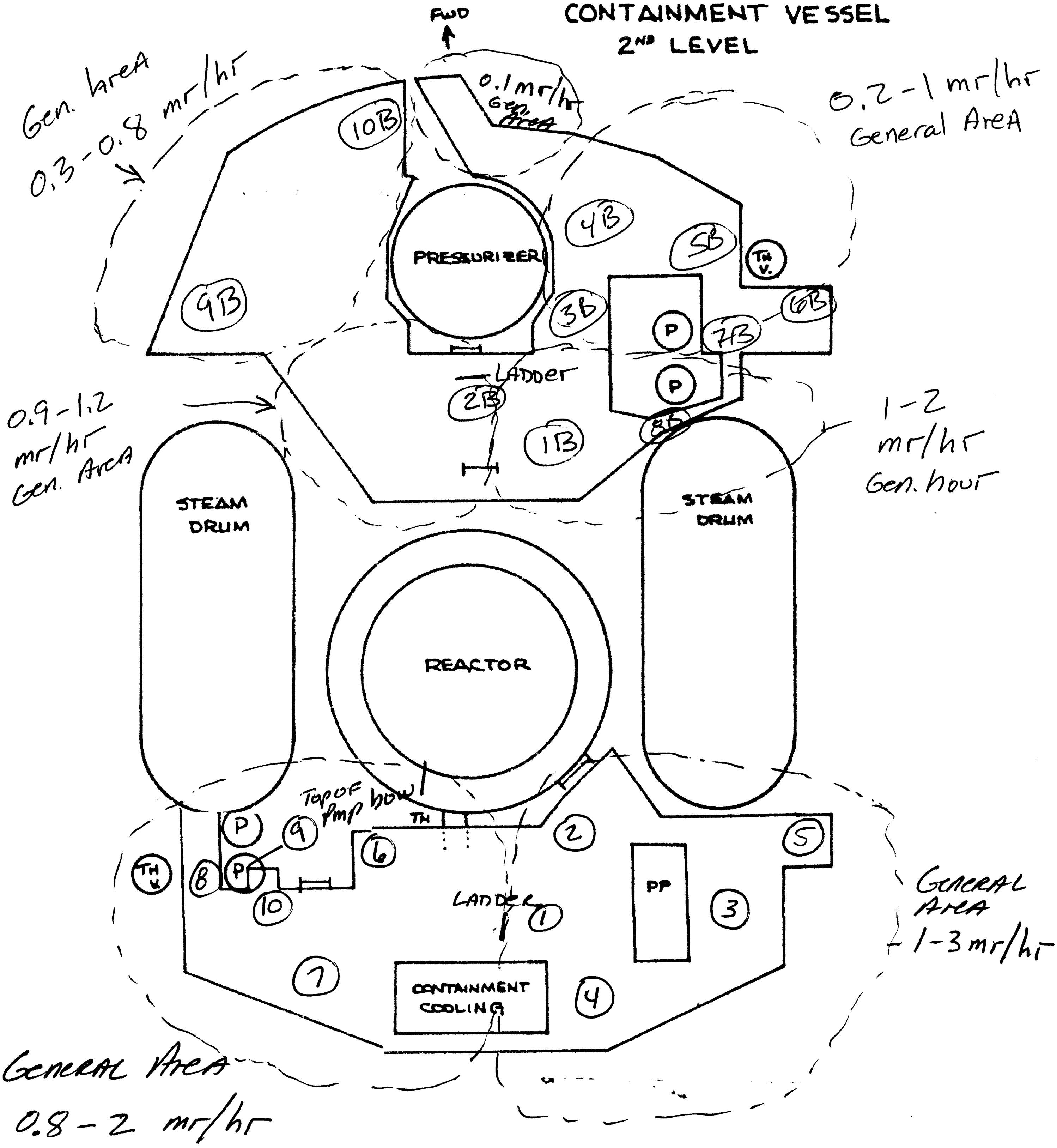
RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

Containment Vessel Survey

Scaler:	Bgr: c/m
Eff. : %	Eff. Date:

CONTAINMENT VESSEL
2ND LEVEL



N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0095

Date 4-12 Time 1000	DOSE RATE	CONTAMINATION	
Surveyor Bowen, Scott	Inst. Type Teletector	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. Ditto	Inst.Sn	
Reviewed [signature]	~~β Factor~~ 28991	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment

COMPONENT 3rd level Vessel Containment

SEE ATTACHED MAP

smear
10A = 273 dpm/100cm²
7 = 269 dpm/100cm²

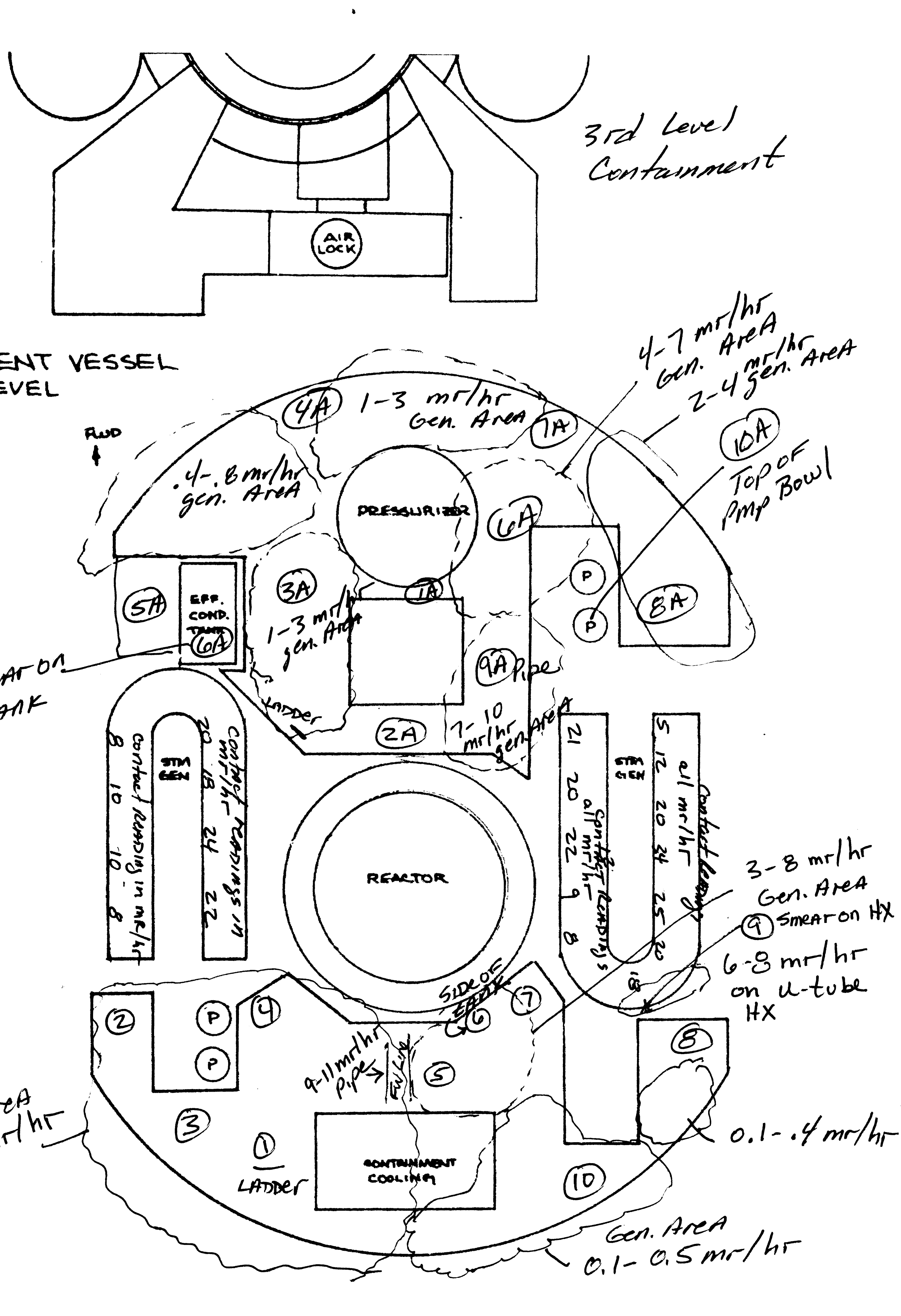
SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1A	< BKG	9A	< BKG	1	< BKG	9	< BKG		
2A	< BKG	10A	*53 ct (106 cpm)	2	< BKG	10	< BKG		
3A	< BKG			3	< BKG				
4A	< BKG			4	< BKG				
5A	< BKG			5	< BKG				
6A	< BKG			6	< BKG				
7A	< BKG			7	*49 (98 cpm)				
8A	< BKG			8	< BKG				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

* Smears 10A + 7 retained



3rd Level
Containment
AIR LOCK
AINMENT VESSEL
3RD LEVEL
FWD
4A
1-3 mr/hr
Gen. Area
7A
4-7 mr/hr
Gen. Area
2-4 mr/hr
Gen. Area
10A
Top of
Pmp Bowl
.4-.8 mr/hr
gen. Area
PRESSURIZER
6A
3A
1-3 mr/hr
gen. Area
1A
5A
EFF. COND. TANK
6A
Smear on
tank
P
P
8A
9A
Pipe
Ladder
2A
7-10
mr/hr
gen. Area
STM GEN
STM GEN
8 10 10 8
Contact readings in mr/hr
20 18 24 22
Contact readings in mr/hr
21 20 22 9 8
Contact readings
all mr/hr
5 12 20 24 25 20
Contact readings
all mr/hr
REACTOR
3-8 mr/hr
Gen. Area
9
Smear on HX
6-8 mr/hr
on U-tube
HX
18
Side of
tank
6
7
2
P
P
4
9-11 mr/hr
Pipe
FW line
5
8
Gen. Area
3-6 mr/hr
3
1
Ladder
CONTAINMENT COOLING
10
0.1-.4 mr/hr
Gen. Area
0.1-0.5 mr/hr

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-008X6

Date 4/12/05 Time	DOSE RATE	CONTAMINATION	
Surveyor Ron Scott	Inst. Type 42972	Beta ✓ Alpha	Beta Alpha
Signature	Serial No. Ludlum 19	Inst.Sn 91037	
Reviewed	β Factor	Eff. 10%	
	BKG 4 μR/H	Bkg. 40 cpm	cpm

AREA Charge Pumps 1-3

COMPONENT

Charge Pump #2 STBD.

#1 Floor
#2 Top of Catch Tank
#3 Floor
#4 Controls for Sump Pump (Aft)
#5 Large Valve (Pump SL-P1 Suct. SL-1V)
#6 Large Machine (Worthington)
#7 Controls for Sump Pump (Forward)
#8 Large Metal Bell with Large Bolts
#9 Controls for Waste Dilution Pump
#10 Floor
#11 Floor
#12 Flow Gages

* up against Charge Pump - D. Meter was 180 μR/H / FSKR was 280 CPM

STB Chg Pump Rm
< BKG / FSKR < 100 CPM (General)

Charge Pump # 1 & 3 Port.

#1 Floor
2 Primary Gate Valve Control
3 main feed H2O Control
4 floor
5 floor
6 walkway deck @ motor
7 - Floor btw motors
8 - floor btw chg. pumps
9 top of Elec Motor chg Pump #3
10 Housing btw Elec motor & chg Pump
11 Charge Pump #3
12 top of Elec Motor chg Pump #1
13 Housing btw motor & chg Pump #1
14 chg Pump #1
15 - Catch tank
16 - main feed Pump controls. #2
17 - main feed pump control #1

* Up against Charge Pumps - D meter was around 180 μR/H / FSKR was 280 CPM

Port chg Room Pos 2
< BKG / FSKR < 100 CPM (General)

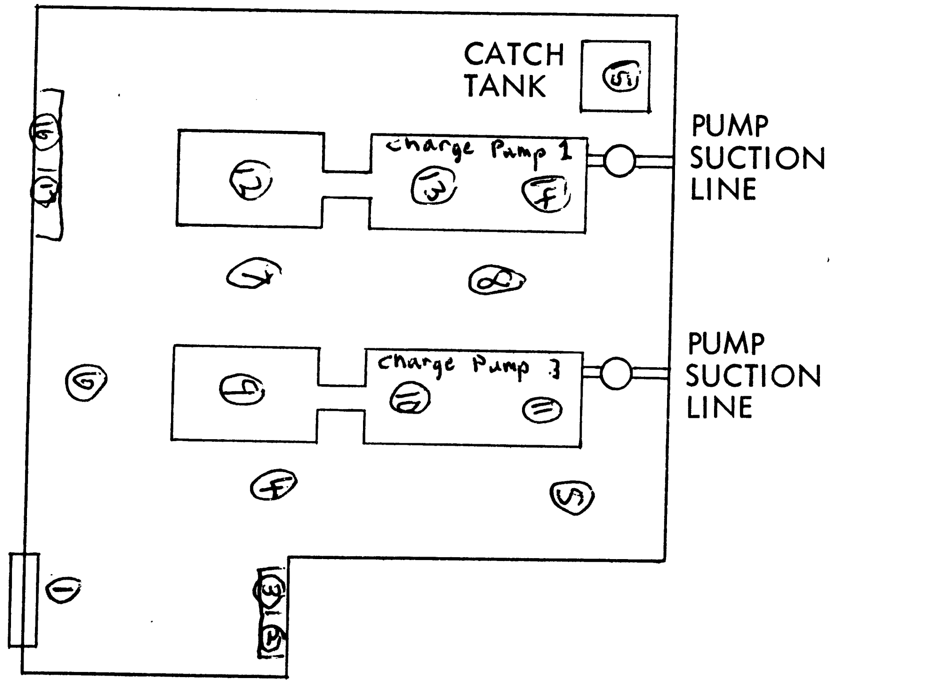
SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B - BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG			1	< BKG	9	< BKG
2	< BKG	10	< BKG			2	< BKG	10	< BKG
3	< BKG	11	< BKG			3	< BKG	11	< BKG
4	< BKG	12	< BKG			4	< BKG	12	< BKG
5	< BKG					5	< BKG	13	< BKG
6	< BKG					6	< BKG	14	< BKG
7	< BKG					7	< BKG	15	< BKG
8	< BKG					8	< BKG	16	< BKG
								17	< BKG

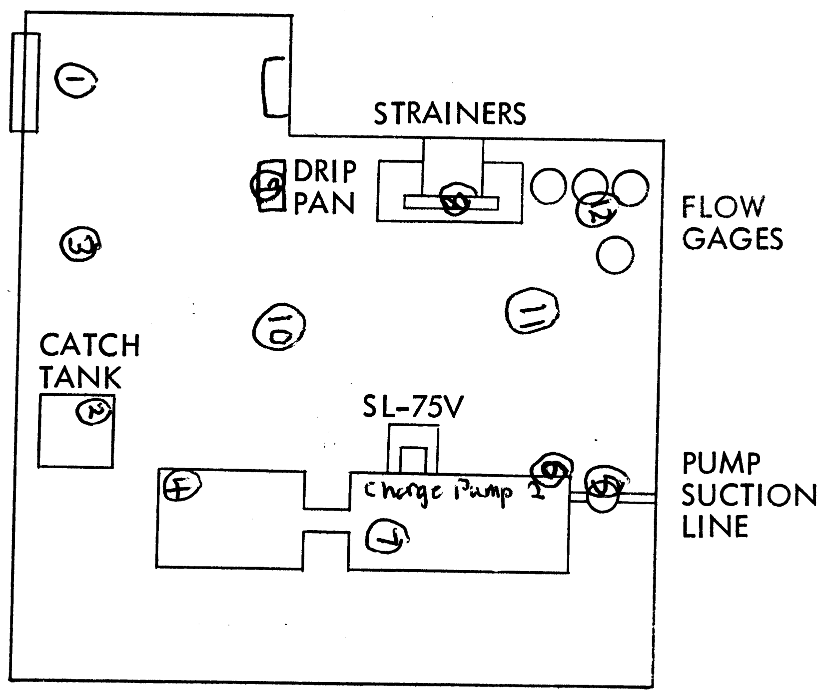
RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

PORT
CHARGE PUMP



STBD
CHARGE PUMP



N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0087

Date 4-13-04 Time 9:15 am	DOSE RATE	CONTAMINATION	
Surveyor Robt Pennock	Inst. Type μ R meter	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 95469	Inst.Sn N/A (see Below)	
Reviewed [signature]	β⁻ Factor	Eff.	
	Bkg 2 μR/hr	Bkg. cpm	cpm

AREA Primary Containment - 1st Level
Over Reactor & Forward

Contamination ~~COMPONENT~~ Inst. Ludlum 2929 #2 SN 160019 EFF .208
BKG 42 cpm 30 sec counts

SEE ATTACHED DRAWING

TELETECTOR
28991

RECOUNT FOR ALPHA
4-14-05
10 min count (ctr #2)

			dpm/100cm²
6	α = 2ct (0.2cpm)	β = 1838 (184)	683
6A	α = 2ct (0.2cpm)	β = 1153 (115)	351
8A	α = 1ct (0.1cpm)	β = 1140 (114)	346
9A	α = 1ct (0.1cpm)	β = 2061 (206)	788

All count rates < MDA
< 3.81 dpm

4 = 173 dpm/100 cm²
6 = 415 dpm/100 cm²
6A = 490 dpm/100 cm²
8A = 327 dpm/100 cm²
9A = 884 dpm/100 cm²
10A = 106 dpm/100 cm²

Gross Counts/30 Sec

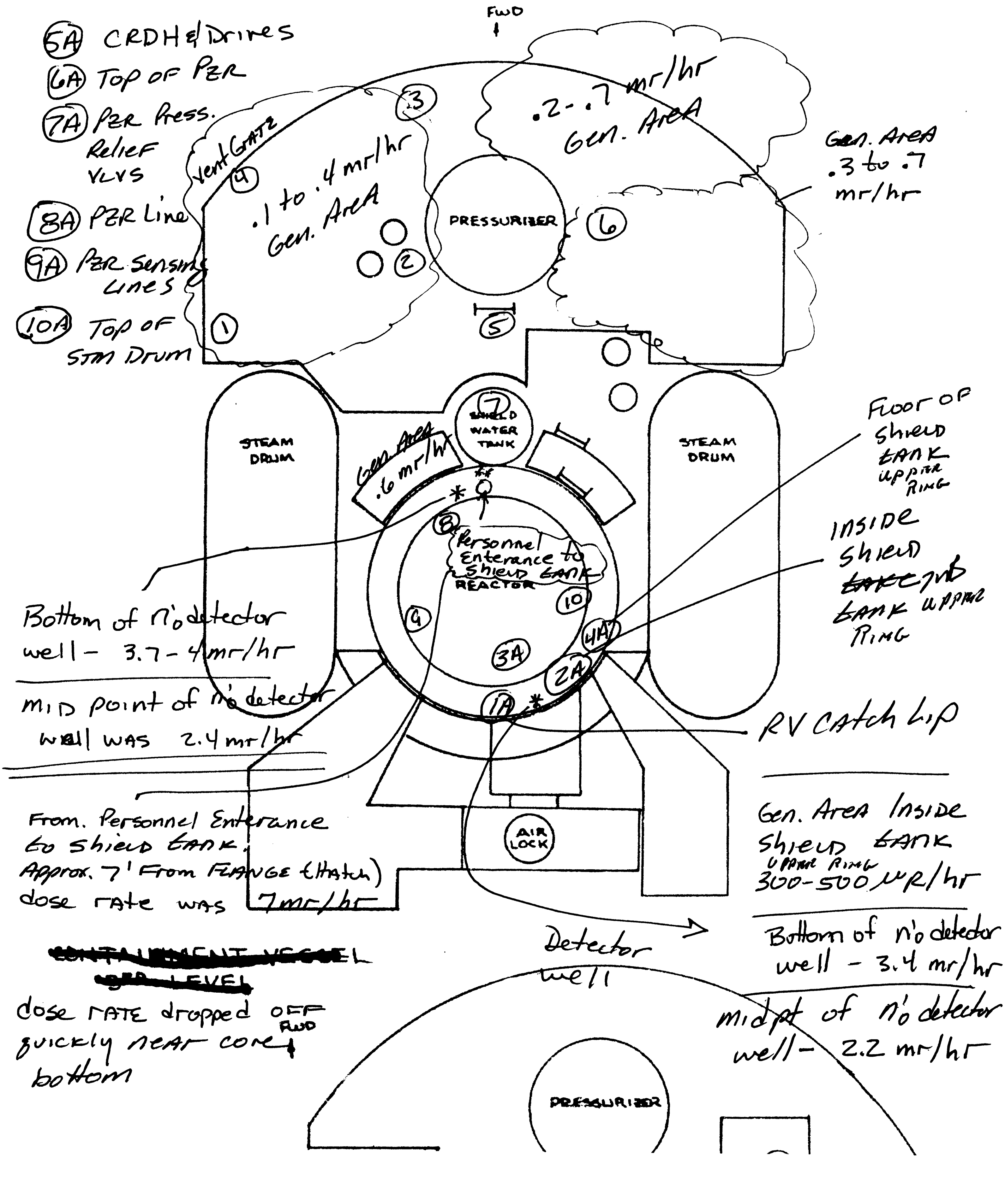
SMEAR RESULTS IN ~~DPM/100 CM²~~ gross cpm ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG	1A	<BKG	9A	113		
2	<BKG	10	<BKG	2A	<BKG	10A	32		
3	<BKG			3A	<BKG				
4	39			4A	<BKG				
5	<BKG			5A	<BKG				
6	85			6A	72				
7	<BKG			7A	<BKG				
8	<BKG			8A	55				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

CONTAINMENT VESSEL
1st LEVEL



N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0088

Date 4-14-05 Time 9:30 AM	DOSE RATE	CONTAMINATION	
Surveyor Robt E Pennock	Inst. Type Teletector	Beta_____ Alpha_____	Beta_____ Alpha_____
Signature Robt E Pennock	Serial No. 28991	Inst.Sn	
Reviewed	β⁻ Factor	Eff.	
	BKG < .1 mR/h	Bkg. cpm	cpm

AREA Secondary Containment Lower Level

COMPONENT Dose Rate Throughout Lower Level of Secondary varies from .5 mR/h to ~20 mR/h General Area.
Hot spots of ~250 mR/h on contact with piping (yellow) on starboard side was found.

1B - Core Bore Sampler site #1 Port side
2B - " " " " #3 Port side
3B - " " " " #4 AFT
4B - " " " " #2 Port side

1 - " " " " #5 Starboard side
2 - " " " " #6 Foward
3 - " " " " #6 Floor

Sample 3 (Counter #2)	gross cts	gross cpm	BKG cpm	Net cpm	dpm/100cm²
	32	64	42	22	106

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1B	< BKG	1	< BKG						
2B	< BKG	2	< BKG						
3B	< BKG	3	32						
4B	< BKG	4	Not taken						
		5	Not taken						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0089

Date 4-14-05 Time 10:00	DOSE RATE	CONTAMINATION	
Surveyor JOHN BOWIEN/BOB PENNIMAN	Inst. Type TELETECTOR	Beta_____ Alpha_____	Beta_____ Alpha_____
Signature [signature]	Serial No. 28991	Inst.Sn See Below	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA U SHAPED STEAM GENERATORS IN PRIMARY CONTAINMENT

~~COMPONENT~~ Smears Counted w/ Lud 2929 (#1) SN: 102001 (#2) SN: 160019

SEE ATTACHED DRAWING

STARBOARD STEAM GEN. DOSE RATE BETWEEN DOWN COMER 24 mR/hr MAX
PORT " " " " " " " 35 mR/hr MAX

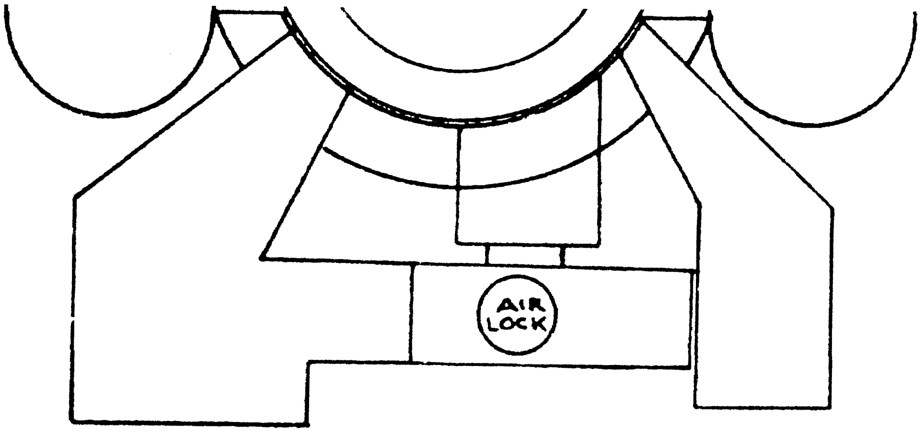
Smear No.	Counter	gross counts	gross cpm	BKG cpm	Net cpm	dpm/100cm²
1	(2)	52	104	42	62	298
6	(1)	49	98	37	61	242
7	(2)	87	174	42	132	635
8	(1)	64	128	37	91	361
9	(2)	38	76	42	34	163
10	(1)	60	120	37	83	329

SMEAR RESULTS ~~IN DPM/100 CM²~~ Gross Counts/30 Seconds ~~β – BETA in mRAD/hr/100 CM²~~

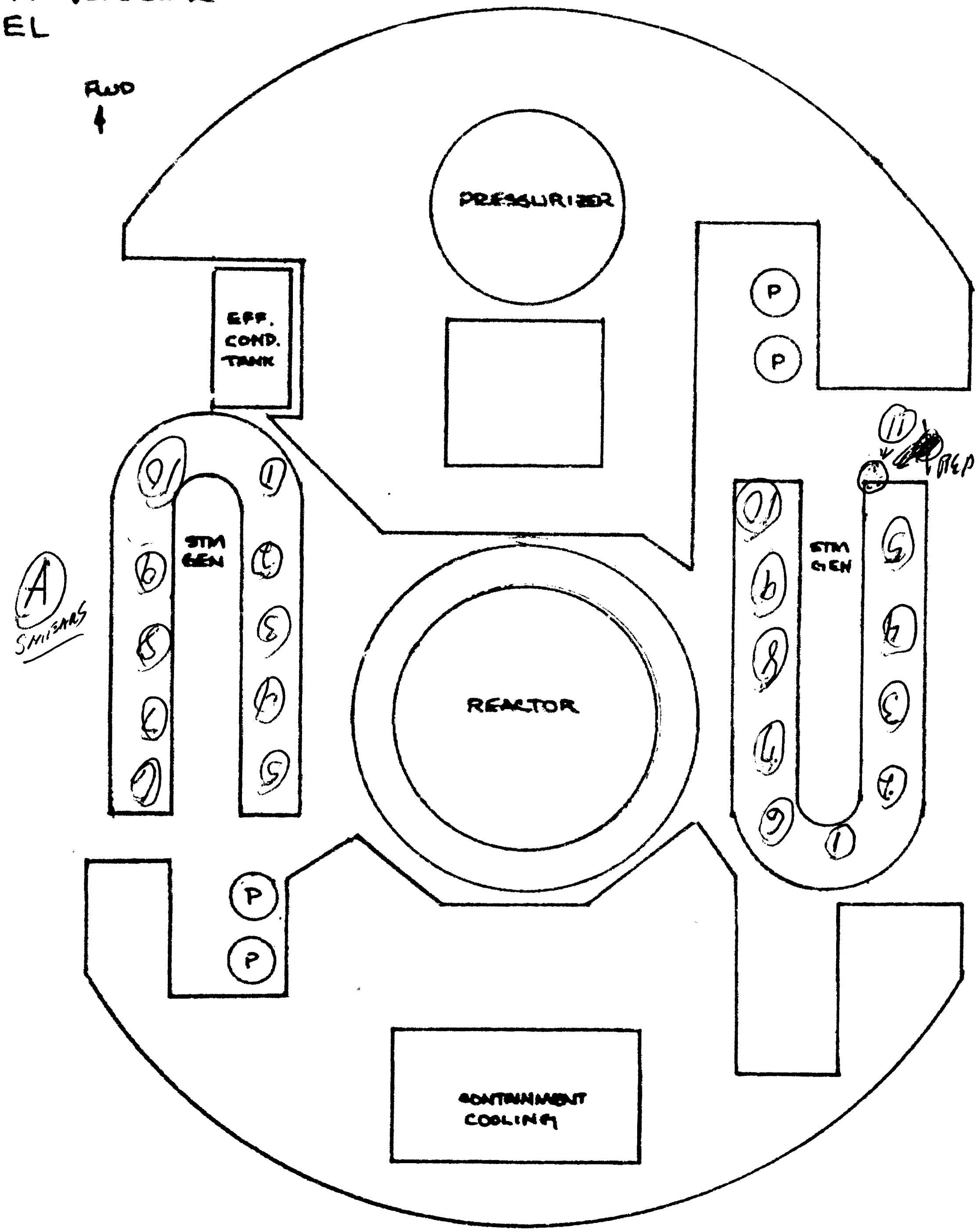
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	52 (2)	9	38 (2)	A 1	<BKG	A9	<BKG		
2	<BKG	10	60 (1)	A 2	<BKG	A10	<BKG		
3	<BKG	~~#~~	~~<BKG~~ [illegible]	A 3	<BKG				
4	<BKG	11	<BKG	A 4	<BKG				
5	<BKG			A 5	<BKG				
6	49 (1)			A6	<BKG				
7	87 (2)			A7	<BKG				
8	64 (1)			A8	<BKG				

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA



INMENT VESSEL
LEVEL



N.S. SAVANNAH
RADIOLOGICAL SURVEY

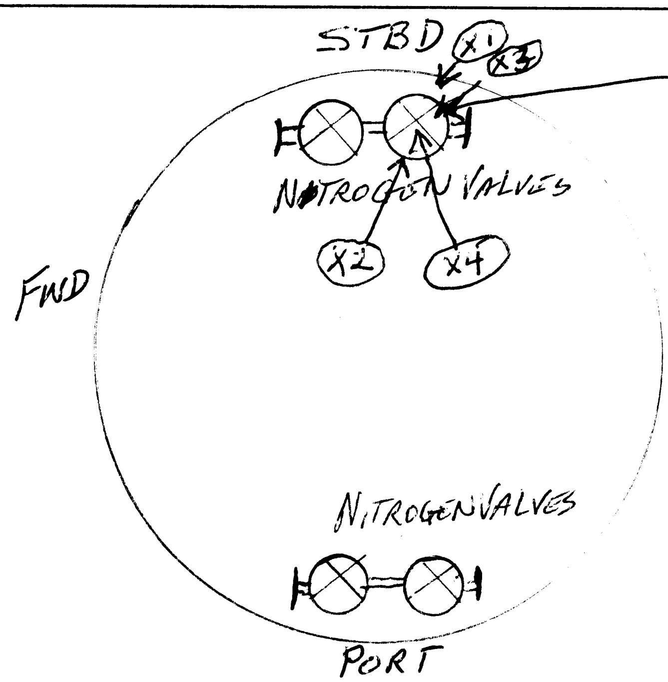
NSS-01

SURVEY NO. NSS-0090

Date 4/19/05 Time 10:30AM	DOSE RATE	CONTAMINATION	
Surveyor JAMES LOVEDAHL	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature James Lovedahl	Serial No.	Inst.Sn N/A	
Reviewed Robt [illegible]	β⁻Factor	Eff.	
		Bkg. cpm	cpm

AREA TOP OF CUPOLA STBD NITROGEN VALVE FLANGE

COMPONENT



5 WIPES
1. OUTBD BETWEEN FLANGE
2. INBOARD BETWEEN FLANGE
3. FLANGE GASKET
4 - INSIDE FLANGE AREA.

"A" DECK

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKGD								
2	< BKGD								
3	< BKGD								
4	< BKGD								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0091

Date 4/19/05 Time 14:00	DOSE RATE	CONTAMINATION	
Surveyor J. Bowen	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. N/A	Inst.Sn N/A	
Reviewed [signature]	β⁻ Factor N/A	Eff.	
		Bkg. cpm	cpm

AREA Smear samples from inside surfaces of Primary Water Shield Tank

COMPONENT Primary Water Shield Tank

All samples were taken inside the Primary Water Shield Tank.

Smear #

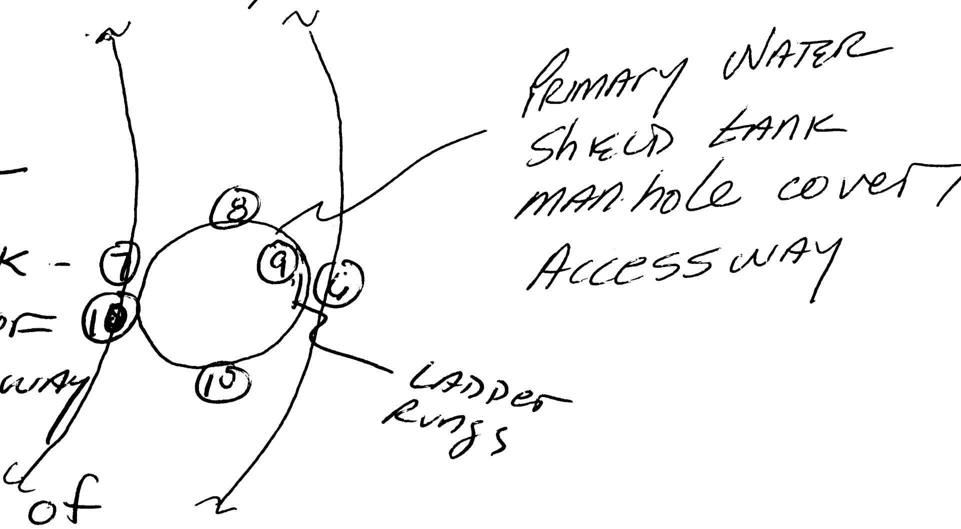
6- Outer Wall

7- Inner WALL

8- Top of tank - Both sides of manhole accessway

9. Top surfaces of 2 Ladder Rungs

10. Top of inner wall.



Survey Personnel did not enter the Primary Water Shield tank.

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
6	< BKG								
7	< BKG								
8	< BKG								
9	< BKG								
10	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

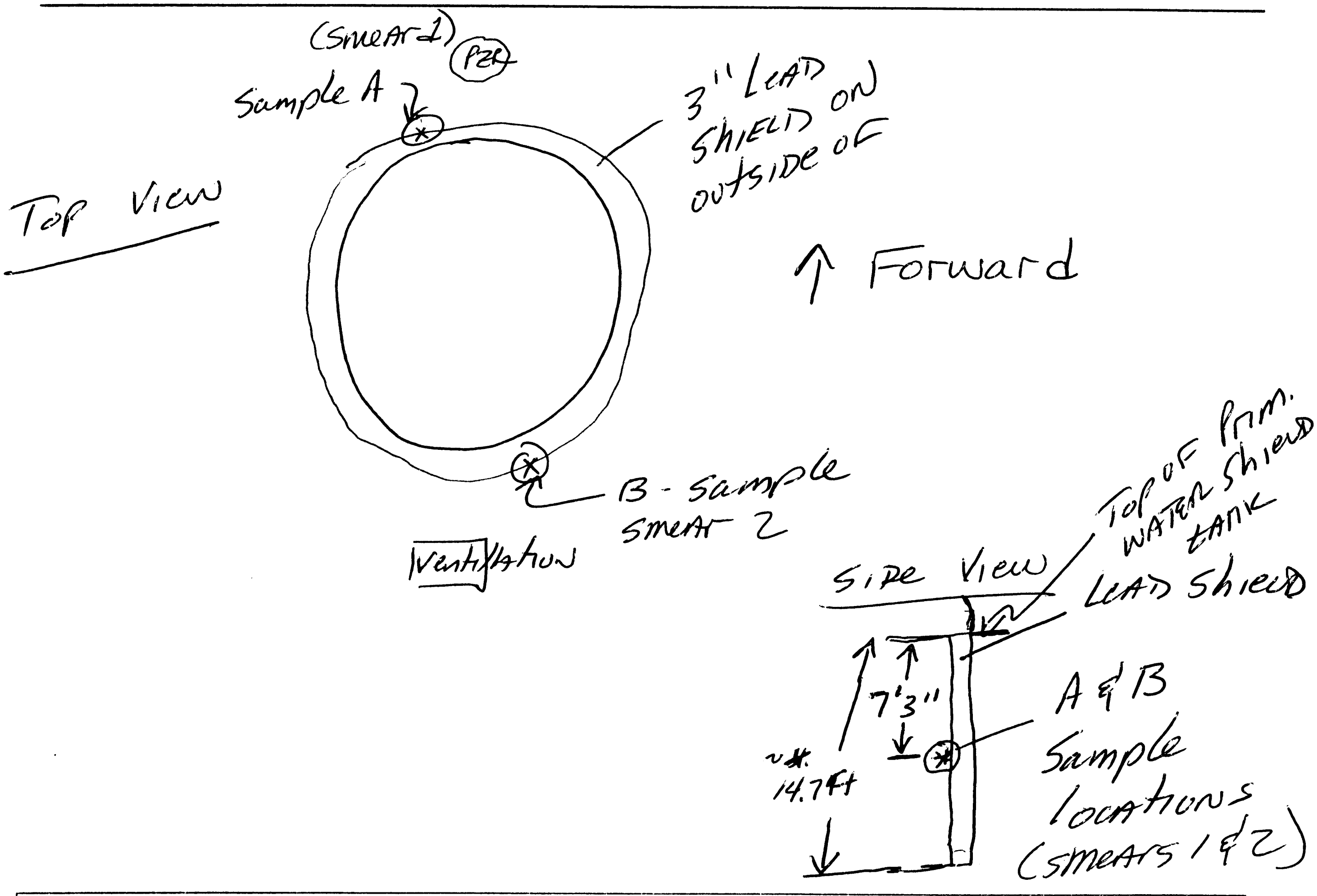
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0092

Date 4/19/05 Time 14:00	DOSE RATE	CONTAMINATION	
Surveyor J. Bowen	Inst. Type NA	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No.	Inst.Sn NA	
Reviewed [signature]	β^- Factor	Eff.	
		Bkg. cpm	cpm

AREA Smear of locations for lead samples

COMPONENT



SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM~~²

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG								
2	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

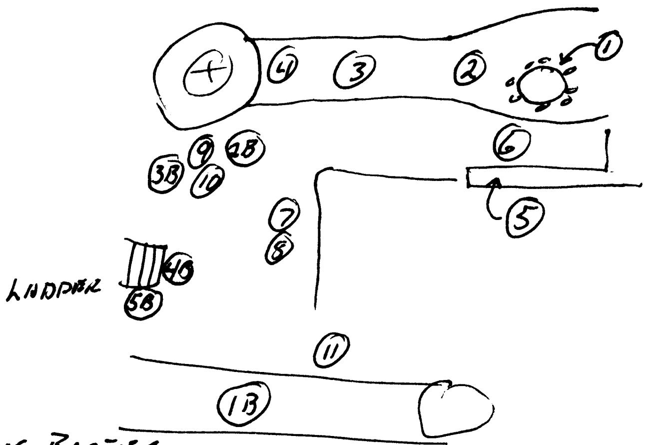
NSS-01 SURVEY NO. NSS-0093

Date 4-21-05 Time	DOSE RATE	CONTAMINATION	
Surveyor ROBT E PENNOCK	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature Robt E Pennock	Serial No.	Inst.Sn N/A	
Reviewed M Manzellone	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA PRIMARY CONTAINMENT FWD - STBD UTUBE STEAM GEN, HOT LEG WORK AREA

COMPONENT

1- SS PLUG & RIM
2- HOT LEG PLENUM
3- " " NEXT TO PLENUM
4- HOT LEG NEXT TO VALVE
5- BRACE BY ACCESS PORT
6- FLOOR BELOW WORK AREA
7- YELLOW FLASHLIGHT
8- BLACK FLASHLIGHT
9- END OF WOODEN ROLLER
10- BOTH SCREW DRIVERS
11- OUTSIDE OF BAG CONTAINING BASTIER
1B- HOT LEG SAMPLE, TOP
2B- YELLOW HAMMER
3B ~~BOTTOM~~ BAG NUTS & BOLTS
4B BOTTOM 2 RUNGS OF LADDER
5B RUNGS 5&6 OF LADDER



ACTIVITY
1 = 166 dpm
2 = 154 dpm
4 = 135 dpm
5 = 471 dpm
7 = 250 dpm
8 = 125 dpm

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B - BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	32 cts	9	BKG	1B	< BKG				
2	37 cts	10	BKG	2B	< BKG				
3	< BKG	11	BKG	3B	< BKG				
4	35 cts			4B	< BKG				
5	70 cts			5B	< BKG				
6	< BKG								
7	47 CTS								
8	34 CTS								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

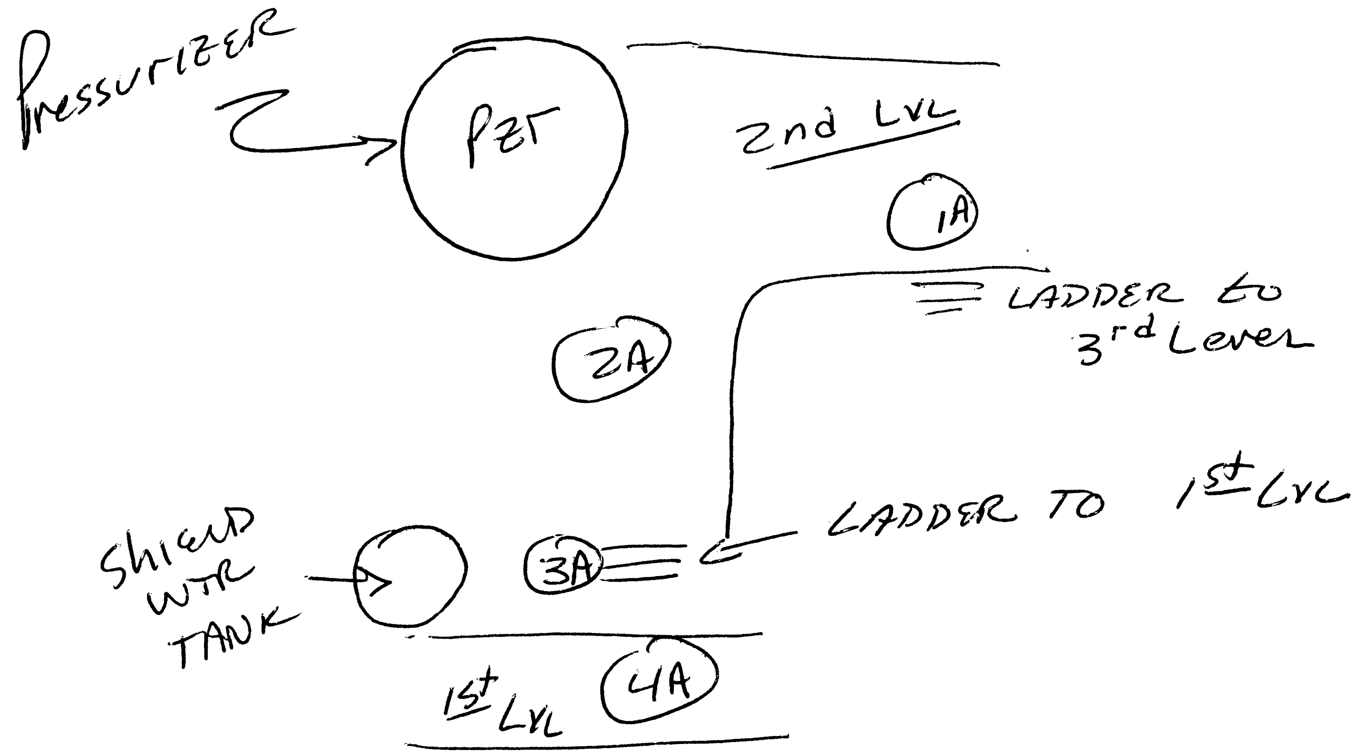
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0094

Date 4/21/05 Time 0900	DOSE RATE	CONTAMINATION	
Surveyor J. Bowen	Inst. Type N/A	Beta N/A Alpha____	Beta____ Alpha____
Signature [signature]	Serial No.	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Forward 1st & 2nd LVL - Primary Containment

COMPONENT



SMEAR RESULTS ~~in DPM/100 CM²~~				~~B = BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1A	< BKG								
2A	< BKG								
3A	< BKG								
4A	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

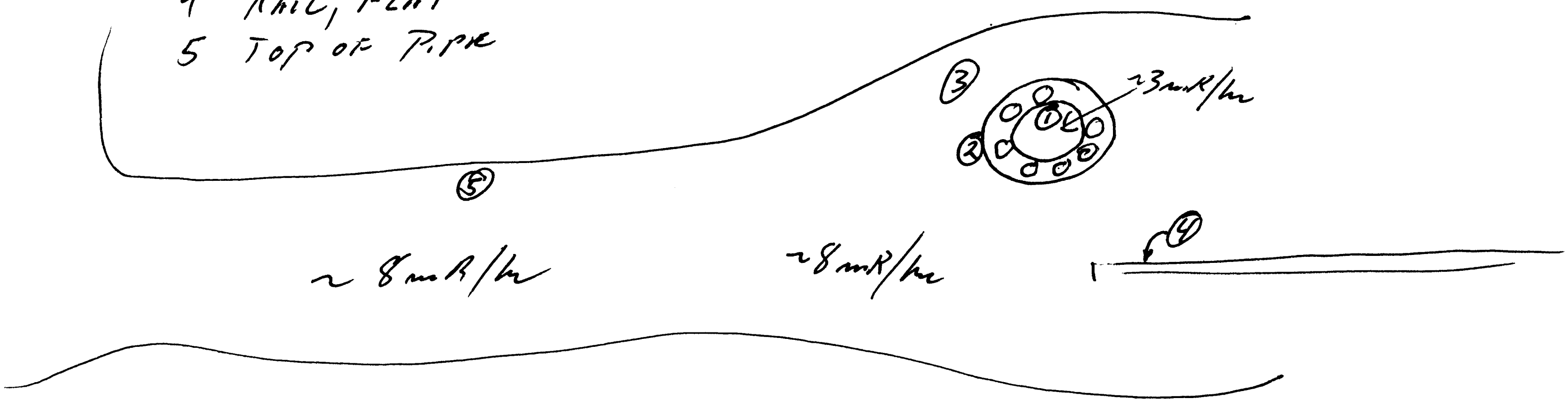
SURVEY NO. NSS-0095

Date 4.21.05 Time 1:00 PM	DOSE RATE	CONTAMINATION	
Surveyor Robt E Pennock	Inst. Type Telentector	Beta____ Alpha____	Beta____ Alpha____
Signature Ralph E Pennock	Serial No. 28991	Inst.Sn	
Reviewed [signature]	β^- Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment Port Under Steam Gen Access Cover

COMPONENT

1 - Cover & Nuts
2 - Cover Gap
3 Plenum outside surface
4 Rail, Flat
5 Top of Pipe



1. 67 dpm/100 cm²
3. 356 dpm/100 cm²

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~									
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	28								
2	<BKG								
3	58								
4	< BKG								
5	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

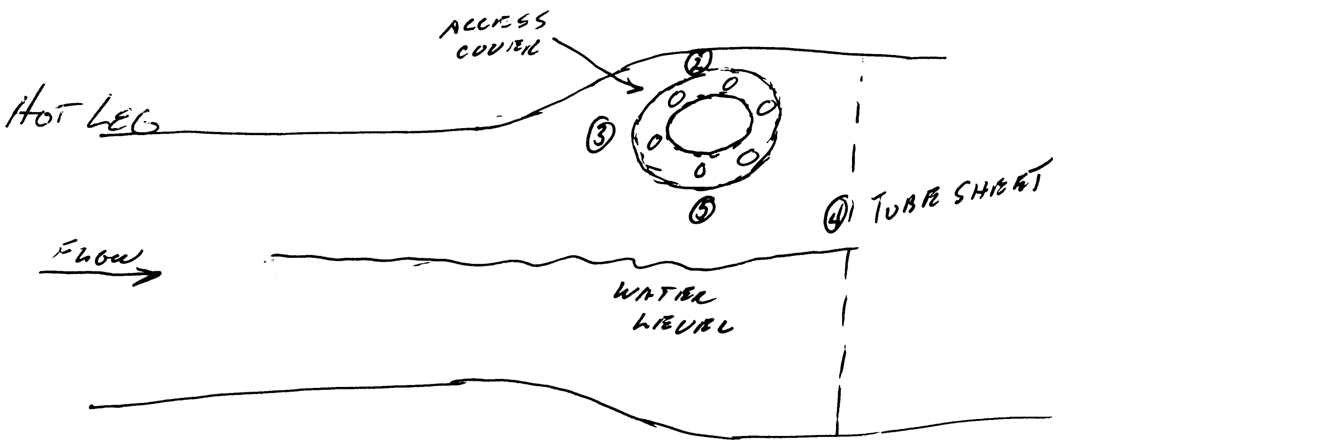
N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0096

Date 4-20-05 Time 1:30	DOSE RATE	CONTAMINATION	
Surveyor John Bowen	Inst. Type Teletector	Beta____ Alpha____	Beta____ Alpha____
Signature	Serial No.	Inst.Sn	
Reviewed	β⁻ Factor	Eff.	
	BKG .3 mR/hr	Bkg. cpm	cpm

AREA Primary Containment - STBD Steam Gen. Primary System Plenum

COMPONENT



32 mR/hr outside inner cover seal
45 mR/hr at opening plane
275 mR/hr ~1 ft inside opening
525 mR/hr at tube sheet

1 Inner lip-inside
2 inside plenum top
3 " " suction side
4 Tube sheet
5 Bottom

Dpm/100cm²

1B - 10,211
2B - 14,798
3B - 13,183
4B - 166,730
5B - 51,682

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B = BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1B	1683								
2B	1560								
3B	1392								
4B	17,361								
5B	5396								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

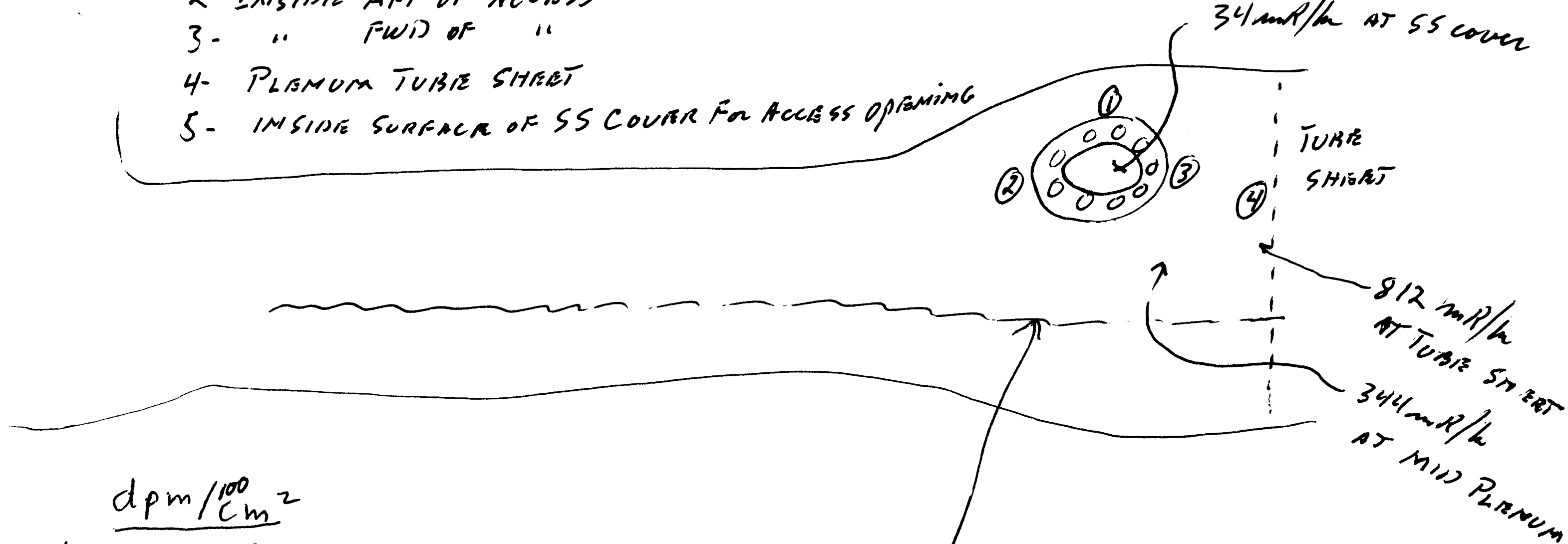
NSS-01 SURVEY NO. NSS-0097

Date 4-21-05 Time 1:45 PM	DOSE RATE	CONTAMINATION	
Surveyor JOHN BOWEN	Inst. Type TELETECTOR	Beta____ Alpha____	Beta____ Alpha____
Signature J.W. B	Serial No. 28991	Inst.Sn N/A	
Reviewed Robt E Pennock	β⁻ Factor	Eff.	
	1-2 mR/hr BKG	Bkg. cpm	cpm

AREA

COMPONENT PORT SIDE MUD DRUM (HEAT EXCHANGER) HOT LEG PRIMARY SIDE

1- INSIDE TOP OF PLENUM
2- INSIDE AFT OF ACCESS
3- " FWD OF "
4- PLENUM TUBE SHEET
5- INSIDE SURFACE OF SS COVER FOR ACCESS OPENING



WATER COVERING Approx. 1/3 OF TUBE Sheet.

dpm/100 cm²

1. 22000
2. 6096
3. 4144
4. 378,673
5. 7654

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B – BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	2309								
2	655								
3	452								
4	39403								
5	817								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

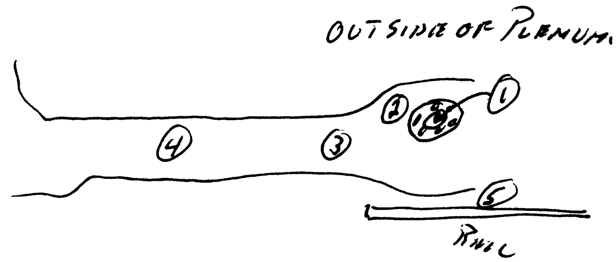
NSS-01 SURVEY NO. NSS-0098

Date 4-22-05 Time 9:00AM	DOSE RATE	CONTAMINATION	
Surveyor ROBERT E PENNOCK	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature Bob E Pennock	Serial No.	Inst.Sn N/A	
Reviewed	β⁻Factor	Eff.	
		Bkg. cpm	cpm

AREA PRIMARY CONTAINMENT PORT U TUBE STEAM GEN ACCESS PORT, POST JOB SURVEY

COMPONENT

1B YELLOW HAMMER
2B SLUG WRENCH 2"
3B SLUG WRENCH 2¼"
4B SOCKET & WRATCHET
5B PIPE WRENCH



dpm/100 cm^2

2. 231

5. 135

* SMEAR COUNTER CONTAMINATED / CLEANED

SMEAR RESULTS ~~IN DPM/100 CM^2~~ ~~B – BETA in mRAD/hr/100 CM^2~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	1B	~~38~~ < BKG						
2	45	2B	~~75~~ < BKG						
3	< BKG	3B	~~35~~ < BKG						
4	< BKG	4B	~~32~~ < BKG						
5	35	5B	~~32~~ < BKG						
			* RW						

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0099

Date 4-25-05 Time 11:15 PM	DOSE RATE	CONTAMINATION	
Surveyor Robt E Pennwell	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature Robt E Pennwell	Serial No.	Inst.Sn N/A	
Reviewed	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Micro R Meters & Friskers

COMPONENT

μR METERS
1 - 95499
2 - 42972
3 95469

FRISKERS
4 - 75809
5 - 91037
12 - 97416
8 - 94954

ALPHA METER
6 - 197766
7 - 127385 Probe

TELETECTOR 28991
9 - Probe
10 Extension
11 Body

2929s
13 - 102001 with Probes
14 - 160019

CN #2

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~B - BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG	9	< BKG						
2	< BKG	10	< BKG						
3	< BKG	11	< BKG						
4	< BKG	12	< BKG						
5	< BKG	13	< BKG						
6	< BKG	14	< BKG						
7	< BKG								
8	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

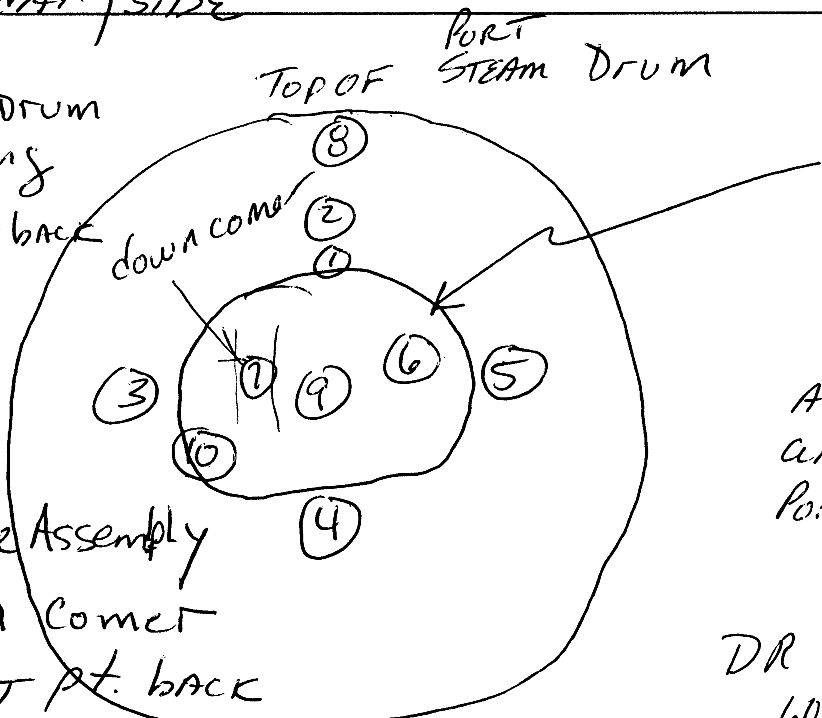
NSS-01 SURVEY NO. NSS-0160

Date 8/25/05 Time	DOSE RATE	CONTAMINATION	
Surveyor J. Bowen	Inst. Type MR Meter	Beta____ Alpha /____	Beta____ Alpha____
Signature [signature]	Serial No. 95469	Inst.Sn N/A	
Reviewed [signature]	β^- Factor	Eff.	
	BKG 3 µR/hr	Bkg. cpm	cpm

AREA Port Steam Drum

COMPONENT Port Steam Generator (Steam Drum) Secondary Side

1. Top of STM Drum near opening
2. Top - Further back
3. Left Side
4. Bottom
5. Right Side
6. Inside - Hinge Assembly
7. Left Down Comer
8. Top - Furthest pt. back
9. Inside surface of Plug
10. Inside - on Plug mating surface.



All smears are from inside Port Steam Drum

DR inside 60-80 µR/hr

DR outside 400-500 µR/hr

SMEAR RESULTS ~~in DPM/100 CM²~~				~~B - BETA in mRAD/hr/100 CM²~~					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	<BKG	9	<BKG						
2	<BKG	10	<BKG						
3	<BKG								
4	<BKG								
5	<BKG								
6	<BKG								
7	<BKG								
8	<BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0101

Date 4-26-05 Time 8 AM	DOSE RATE	CONTAMINATION	
Surveyor Robert E. Raymond	Inst. Type N/A	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No.	Inst.Sn N/A	
Reviewed [signature]	β^{-}Factor	Eff.	
		Bkg. cpm	cpm

AREA Pipe From Nitrogen Line

COMPONENT

SMEAR RESULTS ~~IN DPM/100 CM²~~	B = BETA in mRAD/hr/100 CM²								
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS
1	< BKG								
2	< BKG								

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0111

Date 4-5-05 Time	AIR SAMPLER ~~DOSE RATE~~	CONTAMINATION	
Surveyor Robt R Pennock	Inst. Type Radeco	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 08641	Inst.Sn N/A	
Reviewed Richard Ranellone	β⁻ Factor —	Eff.	
[signature]		Bkg. cpm	cpm

AREA Cold Chem Lab
10 Cu FT Sample

COMPONENT Counted on 2929 smear Counter #2 30 min Count
SN 160019

4-6-05 GROSS COUNTS
10 min Count β 1357 counts 135.7 ~~45~~ cpm ~~<BKG~~ RBW
α 9 counts 0.9 ~~0.3~~ cpm ~~<BKG~~ RBW

4-6-05
30 min Count α 6 (0.2 cpm)
β 1320 (44 cpm)

[initials] 4/6/05

4-12-05 10 min count
α 5 0.5 cpm <LLD (17 gross counts) (2 DAC)
β 398 40 cpm <LLD (506 gross counts) (<25% DAC)

MDA for 10 ft³ sample

$\alpha \quad \frac{1.19 \text{ net cpm}}{0.312} = \frac{3.81 \text{ dpm}}{2.22E6} = 1.72E^{-6} \mu Ci$

$\beta^- \quad \frac{8.45 \text{ net cpm}}{.208} = \frac{40.625 \text{ dpm}}{2.22E6} = 1.83E^{-5} \mu Ci$

$\frac{1.72E^{-6} \mu Ci}{10(28.32)1000} = 6.07E^{-12} \mu Ci/cc$ (~2 DAC)

$\frac{1.83E^{-5} \mu Ci}{10(28.32)1000} = 6.46E^{-11} \mu Ci/cc$ (<25% DAC)

Sample Repeated w/ Larger Volume – See Sample # NSS-0117

SMEAR RESULTS IN DPM/100 CM² B = BETA in mRAD/hr/100 CM²

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0112

Date 4-6-05 Time 10:50	AIR SAMPLE ~~DOSE RATE~~ BGP	CONTAMINATION	
Surveyor Robt E Pennucci	Inst. Type RADECO	Beta____ Alpha____	Beta____ Alpha____
Signature Robt E Pennucci	Serial No. 0864	Inst.Sn NA	
Reviewed Richard Ranellone	β⁻Factor —	Eff.	
R Ranellone		Bkg. cpm	cpm

AREA ACCESS TO SECONDARY CONTAINMENT

COMPONENT RADON EXPECTED, MULTIPLE COUNTS TO BE TAKEN
COUNTED ON LUDLUM 2929 #2 SN 160019

VOLUME 100 FT^3/hr
TIME OF SAMPLE 1:04:27 MINUTES (64 MINUTES)

1st COUNT - 1MIN - β 362 · α 141 30 MIN OR MORE BETWEEN COUNTS
2nd COUNT - 1MIN - β 245 · α 80
3rd COUNT - 1MIN - β 105 α 30
4th count - 1min - β 62 α 11
4/7/05 5th count - 30min - β 1429 (48cpm) α 33 (~1cpm) < MDA (3.97E-13 μCi/cc) α
6th count - 60min - β 2748 (46cpm) α 63 (~1cpm) (.525 net) < MDA α
4/8/05 7th count - 60min - β 2495 (42cpm) α 82 (1.4cpm) (Counter change) #1
β⁻ Activity < MDA (3.4E-12 μCi/cc)
4-11-05 Recount (#2)
30 min β 1311 (44cpm) α 3 (0.1cpm) < MDA (3.6 E-13 μCi/cc) α
10 min β 454 (45.4cpm) α 6 (0.6cpm)

SMEAR RESULTS IN DPM/100 CM²		B = BETA in mRAD/hr/100 CM²							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

Recounts of Air Sample for α activity
Initial entry to Secondary Containment
SAmple Taken 4-6-05 / 1050

$100\ ft^3 = 2.832\ E^6\ cc$

Initial One-Minute Count (α) 141 cpm

6th Count 4-7-05 60 min 63 counts → 0.525 net cpm
Counter #2 < MDA ($3.36E^{-13}$ µCi/ml)

7th Count 4-8-05 60 min 82 counts → 1.04 net cpm
Counter #1

$\frac{1.04}{0.336} = 3.1\ dpm \times \frac{1\ \mu Ci}{2.22E^6} = 1.397\ E^{-6}\ \mu Ci$

$\frac{1.397\ E^{-6}}{2.832\ E^6} = 4.93\ E^{-13}\ \mu Ci/cc$ (<25% DAC)

β^- Activity

7th Count 4-8-05 60 min 2495/60 = 41.58 cpm Gross
BKg = 42.15 cpm

SAmple < MDA ($3.4\ E^{-12}$ µCi/cc)
LLD for 60 min count = 2673 gross counts = $3.4\ E^{-12}$ µCi/cc
(for $100\ ft^3$ Sample)

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0113

Date 4-7-05 Time 12:45	~~DOSE RATE~~ AIR SAMPLE	CONTAMINATION	
Surveyor ROBT E PENNOCK	Inst. Type RADECO Air Sampler	Beta ___ Alpha ___	Beta ___ Alpha ___
Signature [signature]	Serial No. 864	Inst.Sn	
Reviewed [signature]	β^- Factor	Eff.	
		Bkg. cpm	cpm

AREA CHARGE PUMP ROOM STARBOARD

COMPONENT 60 CU FT COUNTER #2 S/N 160019

GROSS COUNTS

1:30 10 MIN COUNT α 905 (905 cpm)
β 2837 (284 cpm)

Sample Repeated with larger AIR volume - See Survey # NSS-0116

8:50 30 MIN COUNT α 81 (2.7 cpm)
β 1496 (49.9 cpm)

4-12-05 (Ctr #1)

8:36 10 min count α 2ct 0.2 cpm < LLD (13 gross counts) 0.26 DAC

β 400 40 cpm < LLD (474 gross counts) < 25% DAC

MDA for 60 ft³ sample

α $\frac{0.997 \text{ net cpm}}{.336} = \frac{2.967 \text{ dpm}}{2.22E^4} = 1.336E^{-4} \mu Ci$

β- $\frac{8.2 \text{ net cpm}}{.252} = \frac{32.54 \text{ dpm}}{2.22E^6} = 1.466E^{-5} \mu Ci$

$\frac{1.336E^{-6} \mu Ci}{60(28.32)1000} = \underline{7.87E^{-13} \mu Ci/cc}$ (26% DAC)

$\frac{1.466E^{-5} \mu Ci}{60(28.32)1000} = 8.63E^{-12} \mu Ci/cc$ (< 25% DAC)

SMEAR RESULTS IN DPM/100 CM² B = BETA in mRAD/hr/100 CM²

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01

SURVEY NO. NSS-0114

Date 4-8-05 Time 8:30 AM	DOSE RATE	CONTAMINATION	
Surveyor ROBERT R PENHOLA	Inst. Type RADECO AIR SAMPLER	Beta___ Alpha___	Beta___ Alpha___
Signature [signature]	Serial No. 865	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Air Lock For Primary Containment

COMPONENT 100 FT³ Sampler

GROSS COUNTS

10:31 1ST COUNT - 30 MIN. α 4667 (156 cpm)
β 13,405 (447 cpm)

11:05 2nd Count - 30 min α 2683 (89)
β 7868 (262)

12:14 3rd count - 30 min α 793 (26)
β 3250 (108)

14:06 4th count - 10 min α 78 (7.8)
β 670 (67)

4-11-05 Counter #1

12:23 30 min Count α 20 (0.34 net cpm) < MDA (< 2.99E-13 μCi/cc) < 0.1 DAC
β 1257 (2.7 net cpm) < MDA (< 3.8 E-12 μCi/cc) < 0.1 DAC

SMEAR RESULTS IN DPM/100 CM² B = BETA in mRAD/hr/100 CM²

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

Initial Entry AIR Sample
Airlock for Primary Containment
α-Decay Analysis
Sample taken 4-8-05 @ 0830

Initial Count (#1)

10:31 30 min count α 4667 — 155.24 cpm net
14:06 10 min count α 78 — 7.48 cpm net

Recount

12:23 4-11-05 (counter #1) α 20 — 0.34 cpm net
30 minute count

< MDA ($2.99E^{-13}$ µCi/cc)

Calculation:

20 count/30 min = 0.667

Bkg = 0.325 cpm .667 - .325 = 0.342 net cpm

$$\frac{0.342}{\text{eff. } 0.336} = 1.017\ \text{dpm} \times \frac{1\ \mu Ci}{2.22E^{6}\ \text{dpm}} = 4.58E^{-7}\ \mu Ci$$

$$100\ \text{cuft Sample} = \frac{28.32\ l}{ft^3} \times 100\ ft^3 \times \frac{1000\ ml}{l} = 2.832E^{6}\ cc$$

$$\frac{4.58E^{-7}\ \mu Ci}{2.832E^{6}\ cc} = 1.62E^{-13}\ \mu Ci/cc\ (< MDA)$$

β^- Calculation

1257/30 = 41.9 - 39.2 = 2.7 net cpm
MDA for 30 min Count = 1357 Gross Counts ($3.8E^{-12}$ µCi/cc)
Count is < MDA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-~~8~~ RW 0115

Date 11-8-05 Time 2:00 pm	~~DOSE RATE~~ AIR SAMPLE	CONTAMINATION	
Surveyor R E PENNOCK	Inst. Type RADECO	Beta_____ Alpha_____	Beta_____ Alpha_____
Signature [signature]	Serial No. ~~[illegible]~~ 865	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA PRIMARY CONTAINMENT 1ST LEVEL

COMPONENT 100 Cu FT COUNTER #2

4/11/05 COUNTER #2
858 AM 10 MIN COUNT α 6 COUNTS (.6 cpm) β 456 cts (46 cpm)

4/12/05 counter #2
8:54 AM 10 min count
α 0 cts 0 cpm < MDA ($6.07E^{-13}$ μCi/cc)
β-γ 436 44 cpm < MDA ($6.53E^{-12}$ μCi/cc)

< 25% DAC

SMEAR RESULTS IN DPM/100 CM² B = BETA in mRAD/hr/100 CM²

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0116

Date 4-8-05 Time	~~DOSE RATE~~ AIR SAMPLER	CONTAMINATION	
Surveyor R E PENNOCK	Inst. Type RADECO	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 864	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA CHARGE PUMP ROOM STARBOARD

COMPONENT 277 Cu FT 2h 59 min

4-8-05
8:46AM 30 MIN COUNT CTR #1 (SN102601)
α 308 (10.3cpm) β 1870 (62.3cpm)

10:13AM 2 hr Count α 1102 (9.2cpm) β 7201 (60cpm)

4-11-05 10 min ct α 1 ct β 436 ct

4-12-05 10 min ct α 3 ct (.3cpm) β 411 (41cpm) [< LLD] α 17 Gross β 506 Gross
counter #2

MDA for 277 CuFt Sample

α $\frac{1.19 \text{ cpm net}}{0.312} = \frac{3.81 \text{ dpm}}{2.22E^6} = 1.72E^{-6} \mu Ci$

β⁻ $\frac{8.45 \text{ net cpm}}{0.208} = \frac{40.625 \text{ dpm}}{2.22E^6} = 1.83E^{-5} \mu Ci$

$\frac{1.72E^{-6}}{277(28.32)1000} = \boxed{2.19E^{-13} \mu Ci/cc \ (<0.1 DAC)}$

$\frac{1.83E^{-5}}{277(28.32)1000} = \boxed{2.33E^{-12} \mu Ci/cc \ (<.10 DAC)}$

SMEAR RESULTS IN DPM/100 CM²		B = BETA in mRAD/hr/100 CM²							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 AIR SAMPLE SURVEY NO. NSS-0117

Date 4/11/05 Time	DOSE RATE RADECO	CONTAMINATION	
Surveyor JAMES LOVEDAHL	Inst. Type AIR SAMPLER	Beta___ Alpha___	Beta___ Alpha___
Signature James Lovedahl	Serial No. 864	Inst.Sn	
Reviewed [signature]	β⁻Factor	Eff.	
	100 FT³ – 1 HR	Bkg. cpm	cpm

AREA "C" DECK – COLD WATER CHEM LAB 1:10PM

COMPONENT

4-12-05 9:10 10 min count #1

α = 21 cts 2.1 cpm

β = 404 40 cpm

9:35 10 min count #1

α = 12 cts 1.2 cpm

β = 412 41 cpm

11:19 ~~30~~ 10 RH min count

α = 9 0.9 cpm < LLD (13 counts) < MDA 4.7E-13 µCi/cc

β = 444 44 cpm < LLD (474 counts) < MDA 5.2E-12 µCi/cc

< 25% DAC

SMEAR RESULTS IN DPM/100 CM²	B = BETA in mRAD/hr/100 CM²								
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN µrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0118

Date 4-11-05 Time 12:00 PM	~~DOSE RATE~~ AIR SAMPLE	CONTAMINATION	
Surveyor ROBT PENNOCK	Inst. Type RADACO	Beta___ Alpha___	Beta___ Alpha___
Signature [signature]	Serial No. 865	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA PRIMARY CONTAINMENT 2nd LEVEL

COMPONENT 100 CU FT

4-11-05
2:11-10 MIN COUNT α 1120 cts (112 cpm) β 2345 (255 cpm)

4-12-05
8:51 10 min count α 13 (1.3 cpm) β 393 (39 cpm)

10:03 30 min count
#2 α 36 (1.2 cpm) β 1192 (40 cpm)

30 MIN LLD α = 39 gross counts Act. < 3.97 E-13 uCi/cc
30 MIN LLD β = 1452 gross counts Act. < 4.79 E-12 uCi/cc
(< 25% DAC)

SMEAR RESULTS IN DPM/100 CM²		B = BETA in mRAD/hr/100 CM²							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr
RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0119

Date 4-11-05 Time 9:30AM	~~DOSE RATE~~ AIR SAMPLER	CONTAMINATION	
Surveyor ROBT PIEMMOCK	Inst. Type RADECO	Beta ___ Alpha ___	Beta ___ Alpha ___
Signature Robt E Pimmock	Serial No. 864	Inst.Sn	
Reviewed	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA SECONDARY CONTAINMENT LOWER LEVEL

COMPONENT 100 OUT

4-11-05 COUNTER #2

12:16 10MIN CT α 309 CTS (31 cpm) β 1153 CTS (115 cpm)

4-12-05

8:41 10MIN CT α 9 CTS (.9 cpm) β 419 CTS (41.9 cpm)

α 10 MIN Count LLD = ~~13~~ 17 counts gross = $6.07E^{-13}$ μCi/cc (< 25% DAC)

β⁻ 10 min Count LLD = 506 gross counts = $6.53E^{-12}$ μCi/cc

SMEAR RESULTS IN DPM/100 CM²		B = BETA in mRAD/hr/100 CM²							
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS-0120

Date 4-12-05 Time 9:10 AM	~~DOSE RATE~~ Air Sample	CONTAMINATION	
Surveyor Robt R Pennock	Inst. Type Radeco	Beta____ Alpha____	Beta____ Alpha____
Signature [signature]	Serial No. 864	Inst.Sn	
Reviewed [signature]	β⁻ Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment 4th Level (Lowest Level)

COMPONENT 100 FT^3

Counter #1 SN 102001

4-12-05

11:03 1st count 10 min CT α 1393 (139 cpm) β 3186 (319 cpm)

2nd count 30 min CT α 70 (2.3 cpm) β 256 (8.5 cpm)

4-13-05

9:13 30 min count α 56 (1.9 cpm) β 1308 (44 cpm)

12:08 60 min count α 83 (1.4 cpm) β 2540 (42 cpm)

4-14-05

9:21 30 min count α 27 (0.9 cpm) β 1212 (40 cpm)

< MDA ($2.99E^{-13}$ μCi/cc) < MDA ($3.8E^{-12}$ μCi/cc)

(< .1 DAC)

SMEAR RESULTS IN DPM/100 CM²				B = BETA in mRAD/hr/100 CM²					
NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

N.S. SAVANNAH
RADIOLOGICAL SURVEY

NSS-01 SURVEY NO. NSS 0121

Air Sampler

Date 4-21-05 Time	~~DOSE RATE~~	CONTAMINATION	
Surveyor Robert E Pennock	Inst. Type Radeco	Beta___ Alpha___	Beta___ Alpha___
Signature Ralph E Pennock	Serial No. 864	Inst.Sn N/A	
Reviewed [signature]	β⁻Factor	Eff.	
		Bkg. cpm	cpm

AREA Primary Containment at Port U Tube Steam Gen. Access Cover During Removal ~~and~~ of Cover and Sampling of System.

COMPONENT 100 CuFT

4-21-05 10 min ct Ctr # 1
(2:21)

α = 3961 β-γ = 9643
(396 cpm) (964 cpm)

4-22-05 10 min ct Ctr # 1
(8:42)
α = 29 (2.9 cpm) β-γ = 495 (49 cpm)

9:23 30 min ct Ctr # 1
α = 108 (3.6 cpm) β-γ = 1372 (46 cpm)

1:51 30 min ct Ctr # 1
α = 72 (2.4 cpm) β-γ = 1286 (42.9 cpm)

4-25-05 30 min ct 8:48 Ctr # 1

α = 9 (0.3 cpm) β-γ = 1270 (42.3 cpm)

SMEAR RESULTS ~~IN DPM/100 CM²~~ ~~β – BETA in mRAD/hr/100 CM²~~

NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS	NO.	RESULTS

RA – RADIATION AREA CA – CONTAMINATION AREA ALL DOSE RATES IN μrem/hr

RCA – RADIATION CONTROL AREA AA – AIRBORNE AREA

GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report
for

WPIA001 WPI

Client SDG: 135938 GEL Work Order: 135938

The Qualifiers in this report are defined as follows:

** Indicates the analyte is a surrogate compound.
< Result is less than amount reported.
> Result is greater than amount reported.
B Target analyte was detected in the sample as well as the associated blank.
BD Results below the MDC or low tracer recovery.
E Concentration of the target analyte exceeds the instrument calibration range.
H Analytical holding time exceeded.
J Indicates an estimated value.
P The response between the confirmation and the primary columns is >40% Different.
R Sample results are rejected.
U Target analyte was analyzed for but not detected above the MDL or LOD.
UI Uncertain identification for gamma spectroscopy.
X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.
Y QC Samples were not spiked with this compound.
Z Paint Filter qualifier: Particulates passed through the filter. No free liquids were observed.
h Sample preparation or preservation holding time exceeded.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.
** Indicates the analyte is a surrogate compound.
This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Jake Crook.

Reviewed by

GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Metal Sample #6	Project:	WPIA00105
Sample ID:	135938001	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21-APR-05 09:10		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	U	-0.11	+/-2.32	3.83	0.800	pCi/g		AKB	05/18/05	1814	423794	1
Americium-241	U	-2.31	+/-2.86	3.80	0.200	pCi/g						
Antimony-124	U	0.424	+/-0.838	1.35	0.100	pCi/g						
Antimony-125	U	1.12	+/-1.60	2.59	0.200	pCi/g						
Barium-133	U	-0.333	+/-0.886	1.16	0.100	pCi/g						
Barium-140	U	2.94	+/-8.46	13.5	0.500	pCi/g						
Beryllium-7	U	1.15	+/-6.97	11.0	0.700	pCi/g						
Bismuth-212	U	0.351	+/-4.91	7.80	0.500	pCi/g						
Bismuth-214	U	1.06	+/-1.35	2.20	0.200	pCi/g						
Cerium-139	U	0.0914	+/-0.541	0.776	0.050	pCi/g						
Cerium-141	U	0.366	+/-1.30	1.87	0.100	pCi/g						
Cerium-144	U	-1.18	+/-3.31	4.63	0.500	pCi/g						
Cesium-134	U	0.524	+/-0.709	1.22	0.100	pCi/g						
Cesium-136	U	1.76	+/-3.15	5.35	0.300	pCi/g						
Cesium-137	U	0.199	+/-0.628	1.01	0.100	pCi/g						
Chromium-51	U	-3.09	+/-8.76	13.3	0.600	pCi/g						
Cobalt-56	U	-0.238	+/-0.744	1.21	0.100	pCi/g						
Cobalt-57	U	-0.0225	+/-0.429	0.605	0.050	pCi/g						
Cobalt-58	U	0.158	+/-0.745	1.25	0.100	pCi/g						
Cobalt-60	U	0.659	+/-1.18	1.41	0.100	pCi/g						
Europium-152	U	1.02	+/-1.61	2.56	0.200	pCi/g						
Europium-154	U	-1.41	+/-1.96	3.05	0.500	pCi/g						
Europium-155	U	-0.24	+/-1.70	2.38	0.500	pCi/g						
Iridium-192	U	0.050	+/-0.681	1.05	0.100	pCi/g						
Iron-59	U	1.54	+/-1.77	3.15	0.300	pCi/g						
Lead-210	U	101	+/-81.0	113	4.00	pCi/g						
Lead-212	UUI	0.00	+/-2.03	1.41	0.100	pCi/g						
Lead-214	U	1.71	+/-1.63	2.05	0.100	pCi/g						
Manganese-54	U	0.308	+/-0.631	1.08	0.100	pCi/g						
Mercury-203	U	0.549	+/-0.858	1.34	0.100	pCi/g						
Neodymium-147	U	5.35	+/-20.7	33.0	1000	pCi/g						
Neptunium-239	U	-2.36	+/-3.16	4.32	2.00	pCi/g						
Niobium-94	U	0.0352	+/-0.600	0.947	1.00	pCi/g						
Niobium-95	U	0.132	+/-0.921	1.54	0.050	pCi/g						
Potassium-40	U	6.62	+/-7.14	13.0	1.00	pCi/g						
Promethium-144	U	-0.236	+/-0.759	0.996	0.080	pCi/g						
Promethium-146	U	-0.0625	+/-0.773	1.20	1.00	pCi/g						
Radium-228	U	-0.11	+/-2.32	3.83	0.500	pCi/g						

GENERAL ENGINEERING LABORATORIES, LLC
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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Metal Sample #6 | Project: WPIA00105
Sample ID: 135938001 | Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	4.16	+/-9.19	9.00	0.800	pCi/g					
Silver-110m	U	-0.0321	+/-0.616	0.968	0.080	pCi/g					
Sodium-22	U	-0.502	+/-0.704	1.10	0.080	pCi/g					
Thallium-208	U	0.453	+/-1.02	1.16	0.080	pCi/g					
Thorium-230	U	1.06	+/-1.35	2.20	1.00	pCi/g					
Thorium-234	U	20.6	+/-36.0	33.3	5.00	pCi/g					
Tin-113	U	-0.452	+/-0.835	1.26	0.100	pCi/g					
Uranium-235	U	1.26	+/-3.34	4.80	0.500	pCi/g					
Uranium-238	U	20.6	+/-36.0	28.3	1.00	pCi/g					
Yttrium-88	U	0.743	+/-0.764	1.50	0.100	pCi/g					
Zinc-65	U	-1.14	+/-1.45	2.25	0.300	pCi/g					
Zirconium-95	U	0.223	+/-1.33	2.23	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	-0.0666	+/-0.961	1.82	4.00	pCi/g		SXE1 05/24/05	2034	423849	2
Beta	U	0.197	+/-1.52	2.63	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

GENERAL ENGINEERING LABORATORIES, LLC

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Certificate of Analysis

Replacement Pages JWB 6/10/2005

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: June 6, 2005

Client Sample ID: Metal Sample #11
Sample ID: 135938002
Matrix: Misc Solid
Collect Date: 22-APR-05 08:32
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	U	ND	+/-2.77	4.92	0.800	pCi/g		AKB	05/18/05	1814	423794	1
Americium-241	U	ND	+/-2.95	4.02	0.200	pCi/g						
Antimony-124	U	ND	+/-1.00	1.59	0.100	pCi/g						
Antimony-125	U	ND	+/-2.06	3.38	0.200	pCi/g						
Barium-133	U	ND	+/-1.07	1.38	0.100	pCi/g						
Barium-140	U	ND	+/-10.6	16.4	0.500	pCi/g						
Beryllium-7	U	ND	+/-8.21	12.6	0.700	pCi/g						
Bismuth-212	U	ND	+/-6.40	10.1	0.500	pCi/g						
Bismuth-214	U	ND	+/-3.06	2.41	0.200	pCi/g						
Cerium-139	U	ND	+/-0.784	0.972	0.050	pCi/g						
Cerium-141	U	ND	+/-1.78	2.50	0.100	pCi/g						
Cerium-144	U	ND	+/-4.55	6.33	0.500	pCi/g						
Cesium-134	U	ND	+/-0.818	1.41	0.100	pCi/g						
Cesium-136	U	ND	+/-3.70	6.16	0.300	pCi/g						
Cesium-137	U	ND	+/-0.754	1.19	0.100	pCi/g						
Chromium-51	U	ND	+/-12.1	16.5	0.600	pCi/g						
Cobalt-56	U	ND	+/-0.946	1.63	0.100	pCi/g						
Cobalt-57	U	ND	+/-0.555	0.782	0.050	pCi/g						
Cobalt-58	U	ND	+/-0.863	1.38	0.100	pCi/g						
Cobalt-60	U	ND	+/-0.788	1.36	0.100	pCi/g						
Europium-152	U	ND	+/-2.11	3.41	0.200	pCi/g						
Europium-154	U	ND	+/-2.19	3.72	0.500	pCi/g						
Europium-155	U	ND	+/-2.22	3.13	0.500	pCi/g						
Iridium-192	U	ND	+/-0.825	1.26	0.100	pCi/g						
Iron-59	U	ND	+/-1.90	3.37	0.300	pCi/g						
Lead-210	U	ND	+/-136	99.3	4.00	pCi/g						
Lead-212	UUI	ND	+/-2.94	2.29	0.100	pCi/g						
Lead-214	UUI	ND	+/-3.39	2.78	0.100	pCi/g						
Manganese-54	U	ND	+/-0.743	1.24	0.100	pCi/g						
Mercury-203	U	ND	+/-1.06	1.63	0.100	pCi/g						
Neodymium-147	U	ND	+/-23.3	38.3	1000	pCi/g						
Neptunium-239	U	ND	+/-3.89	5.50	2.00	pCi/g						
Niobium-94	U	ND	+/-0.723	1.15	1.00	pCi/g						
Niobium-95	U	ND	+/-1.24	2.02	0.050	pCi/g						
Potassium-40	U	ND	+/-16.8	13.4	1.00	pCi/g						
Promethium-144	U	ND	+/-0.766	1.22	0.080	pCi/g						
Promethium-146	U	ND	+/-0.975	1.59	1.00	pCi/g						
Radium-228	U	ND	+/-2.77	4.92	0.500	pCi/g						

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Certificate of Analysis

Replacement Pages JWB 6/10/2005

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: June 6, 2005

Client Sample ID: Metal Sample #11
Sample ID: 135938002
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	ND	+/-7.36	11.8	0.800	pCi/g					
Silver-110m	U	ND	+/-0.765	1.19	0.080	pCi/g					
Sodium-22	U	ND	+/-0.787	1.34	0.080	pCi/g					
Thallium-208	U	ND	+/-1.47	1.47	0.080	pCi/g					
Thorium-230	U	ND	+/-3.06	2.41	1.00	pCi/g					
Thorium-234	U	ND	+/-47.4	41.5	5.00	pCi/g					
Tin-113	U	ND	+/-1.06	1.62	0.100	pCi/g					
Uranium-235	U	ND	+/-4.63	6.65	0.500	pCi/g					
Uranium-238	U	ND	+/-47.4	34.4	1.00	pCi/g					
Yttrium-88	U	ND	+/-0.779	1.44	0.100	pCi/g					
Zinc-65	U	ND	+/-1.75	2.87	0.300	pCi/g					
Zirconium-95	UUI	ND	+/-2.58	2.70	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	ND	+/-1.18	1.90	4.00	pCi/g		SXE1 05/24/05	2034	423849	2
Beta		3.40	+/-1.82	2.90	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description
1	EML HASL 300, 4.5.2.3
2	EPA 900.0 Modified

Analyst Comments

Notes:
The Qualifiers in this report are defined as follows :

** Indicates the analyte is a surrogate compound.
B Target analyte was detected in the sample as well as the associated blank.
BD Results below the MDC or low tracer recovery.
E Concentration of the target analyte exceeds the instrument calibration range.
H Analytical holding time exceeded.
J Indicates an estimated value.
U Target analyte was analyzed for but not detected above the MDL or LOD.
UI Uncertain identification for gamma spectroscopy.
X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.
h Sample preparation or preservation holding time exceeded.

The above sample is reported on a dry weight basis except where prohibited by the analytical procedure.

192 continued on 192A

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Certificate of Analysis

Replacement Pages JWB 6/10/2005

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: June 6, 2005

Client Sample ID: Metal Sample #11
Sample ID: 135938002
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Jake Crook.

Reviewed by

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Metal Sample #13	Project:	WPIA00105
Sample ID:	135938003	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	25-APR-05 11:18		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	UUI	0.00	+/-0.766	0.688	0.800	pCi/g		AKB	05/18/05	1815	423794	1
Americium-241	U	-0.0281	+/-0.294	0.425	0.200	pCi/g						
Antimony-124	U	0.137	+/-0.125	0.207	0.100	pCi/g						
Antimony-125	U	-0.118	+/-0.256	0.384	0.200	pCi/g						
Barium-133	U	-0.0266	+/-0.131	0.174	0.100	pCi/g						
Barium-140	U	1.40	+/-1.10	1.71	0.500	pCi/g						
Beryllium-7	U	0.223	+/-0.942	1.46	0.700	pCi/g						
Bismuth-212	U	0.0178	+/-0.711	1.14	0.500	pCi/g						
Bismuth-214	U	0.230	+/-0.204	0.338	0.200	pCi/g						
Cerium-139	UUI	0.00	+/-0.168	0.123	0.050	pCi/g						
Cerium-141	U	0.0681	+/-0.212	0.308	0.100	pCi/g						
Cerium-144	U	0.0462	+/-0.579	0.839	0.500	pCi/g						
Cesium-134	U	0.023	+/-0.107	0.172	0.100	pCi/g						
Cesium-136	U	0.327	+/-0.930	0.712	0.300	pCi/g						
Cesium-137	U	0.111	+/-0.124	0.133	0.100	pCi/g						
Chromium-51	U	-0.864	+/-1.27	1.91	0.600	pCi/g						
Cobalt-56	U	0.00107	+/-0.117	0.186	0.100	pCi/g						
Cobalt-57	U	0.00287	+/-0.0698	0.101	0.050	pCi/g						
Cobalt-58	U	-0.0358	+/-0.116	0.181	0.100	pCi/g						
Cobalt-60	UUI	0.00	+/-0.175	0.326	0.100	pCi/g						
Europium-152	U	0.0685	+/-0.257	0.398	0.200	pCi/g						
Europium-154	U	0.0749	+/-0.259	0.439	0.500	pCi/g						
Europium-155	U	0.336	+/-0.275	0.412	0.500	pCi/g						
Iridium-192	U	0.0706	+/-0.103	0.162	0.100	pCi/g						
Iron-59	U	0.0663	+/-0.257	0.431	0.300	pCi/g						
Lead-210	U	6.12	+/-11.9	8.19	4.00	pCi/g						
Lead-212	U	0.0252	+/-0.334	0.229	0.100	pCi/g						
Lead-214	U	0.122	+/-0.305	0.322	0.100	pCi/g						
Manganese-54	U	0.0141	+/-0.0958	0.154	0.100	pCi/g						
Mercury-203	U	0.143	+/-0.243	0.189	0.100	pCi/g						
Neodymium-147	U	2.14	+/-2.35	3.91	1000	pCi/g						
Neptunium-239	U	-0.136	+/-0.502	0.721	2.00	pCi/g						
Niobium-94	U	-0.0547	+/-0.109	0.145	1.00	pCi/g						
Niobium-95	U	0.0943	+/-0.143	0.235	0.050	pCi/g						
Potassium-40		2.97	+/-1.22	2.11	1.00	pCi/g						
Promethium-144	U	0.0712	+/-0.109	0.157	0.080	pCi/g						
Promethium-146	U	0.013	+/-0.117	0.180	1.00	pCi/g						
Radium-228	UUI	0.00	+/-0.766	0.688	0.500	pCi/g						

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
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Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Metal Sample #13
Sample ID: 135938003
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium–106	U	–0.773	+/–0.890	1.36	0.800	pCi/g					
Silver–110m	U	–0.0862	+/–0.0887	0.135	0.080	pCi/g					
Sodium–22	U	0.031	+/–0.0929	0.158	0.080	pCi/g					
Thallium–208	U	0.0396	+/–0.198	0.180	0.080	pCi/g					
Thorium–230	U	0.230	+/–0.204	0.338	1.00	pCi/g					
Thorium–234	U	1.23	+/–4.96	3.62	5.00	pCi/g					
Tin–113	U	0.0411	+/–0.123	0.191	0.100	pCi/g					
Uranium–235	U	0.656	+/–0.605	0.887	0.500	pCi/g					
Uranium–238	U	1.23	+/–4.96	3.62	1.00	pCi/g					
Yttrium–88	U	0.0335	+/–0.0965	0.172	0.100	pCi/g					
Zinc–65	U	0.00536	+/–0.213	0.353	0.300	pCi/g					
Zirconium–95	U	–0.0248	+/–0.196	0.311	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	–1.02	+/–1.05	2.76	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta	U	–0.385	+/–1.27	2.68	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Metal Sample #12A	Project:	WPIA00105
Sample ID:	135938004	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	25-APR-05 11:12		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228	U	0.184	+/-0.0996	0.188	0.800	pCi/g		AKB 05/18/05	1815	423794	1
Americium-241	U	0.0141	+/-0.170	0.277	0.200	pCi/g					
Antimony-124	U	0.00315	+/-0.0325	0.0548	0.100	pCi/g					
Antimony-125	U	0.00982	+/-0.0661	0.113	0.200	pCi/g					
Barium-133	U	0.0246	+/-0.035	0.052	0.100	pCi/g					
Barium-140	U	0.178	+/-0.295	0.515	0.500	pCi/g					
Beryllium-7	U	0.0244	+/-0.261	0.444	0.700	pCi/g					
Bismuth-212	U	0.0865	+/-0.197	0.341	0.500	pCi/g					
Bismuth-214	U	0.0445	+/-0.119	0.112	0.200	pCi/g					
Cerium-139	U	-0.0074	+/-0.0217	0.0342	0.050	pCi/g					
Cerium-141	U	-0.0247	+/-0.0513	0.0807	0.100	pCi/g					
Cerium-144	U	0.0415	+/-0.143	0.233	0.500	pCi/g					
Cesium-134	U	0.00758	+/-0.0289	0.0494	0.100	pCi/g					
Cesium-136	U	0.00842	+/-0.108	0.183	0.300	pCi/g					
Cesium-137	UUI	0.00	+/-0.0304	0.0582	0.100	pCi/g					
Chromium-51	U	0.0269	+/-0.366	0.581	0.600	pCi/g					
Cobalt-56	U	-0.00736	+/-0.039	0.0557	0.100	pCi/g					
Cobalt-57	U	-0.00324	+/-0.0178	0.0285	0.050	pCi/g					
Cobalt-58	U	0.00275	+/-0.0291	0.0493	0.100	pCi/g					
Cobalt-60	U	0.0198	+/-0.046	0.0582	0.100	pCi/g					
Europium-152	U	-0.00816	+/-0.0725	0.114	0.200	pCi/g					
Europium-154	U	-0.00194	+/-0.069	0.122	0.500	pCi/g					
Europium-155	U	0.00157	+/-0.0742	0.120	0.500	pCi/g					
Iridium-192	U	-0.0101	+/-0.0299	0.0465	0.100	pCi/g					
Iron-59	U	0.0446	+/-0.0613	0.115	0.300	pCi/g					
Lead-210	U	5.94	+/-8.67	12.3	4.00	pCi/g					
Lead-212	U	0.0258	+/-0.0828	0.0645	0.100	pCi/g					
Lead-214	U	0.0494	+/-0.100	0.101	0.100	pCi/g					
Manganese-54	U	0.0124	+/-0.0269	0.0465	0.100	pCi/g					
Mercury-203	U	0.0192	+/-0.0347	0.0564	0.100	pCi/g					
Neodymium-147	U	-0.0276	+/-0.668	1.13	1000	pCi/g					
Neptunium-239	U	-0.00098	+/-0.136	0.219	2.00	pCi/g					
Niobium-94	U	0.00408	+/-0.0244	0.0413	1.00	pCi/g					
Niobium-95	U	-0.0127	+/-0.0367	0.060	0.050	pCi/g					
Potassium-40	U	0.364	+/-0.523	0.513	1.00	pCi/g					
Promethium-144	U	0.0158	+/-0.0268	0.0464	0.080	pCi/g					
Promethium-146	U	0.00377	+/-0.0321	0.0546	1.00	pCi/g					
Radium-228	U	0.184	+/-0.0996	0.188	0.500	pCi/g					

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Metal Sample #12A
Sample ID: 135938004
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium–106	U	0.0796	+/–0.241	0.413	0.800	pCi/g					
Silver–110m	U	–0.0279	+/–0.0261	0.0406	0.080	pCi/g					
Sodium–22	U	–0.000697	+/–0.0248	0.044	0.080	pCi/g					
Thallium–208	U	0.0194	+/–0.0286	0.0498	0.080	pCi/g					
Thorium–230	U	0.0444	+/–0.119	0.0854	1.00	pCi/g					
Thorium–234	U	1.70	+/–1.31	2.22	5.00	pCi/g					
Tin–113	U	0.000478	+/–0.0371	0.0585	0.100	pCi/g					
Uranium–235	U	0.130	+/–0.146	0.242	0.500	pCi/g					
Uranium–238	U	1.70	+/–1.31	2.22	1.00	pCi/g					
Yttrium–88	U	0.0149	+/–0.0336	0.062	0.100	pCi/g					
Zinc–65	U	–0.0385	+/–0.0541	0.0897	0.300	pCi/g					
Zirconium–95	U	–0.00402	+/–0.0528	0.0883	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	–0.424	+/–1.02	2.42	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta	U	–0.815	+/–1.02	2.27	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #8
Sample ID: 135938005
Matrix: Misc Solid
Collect Date: 22-APR-05 09:16
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	UUI	0.00	+/-1.59	2.86	0.800	pCi/g		AKB	05/18/05	1900	423794	1
Americium-241	U	-0.993	+/-2.25	2.66	0.200	pCi/g						
Antimony-124	U	0.473	+/-0.824	0.901	0.100	pCi/g						
Antimony-125	U	-1.27	+/-1.74	2.49	0.200	pCi/g						
Barium-133	U	-0.0767	+/-0.744	1.09	0.100	pCi/g						
Barium-140	U	-3.03	+/-6.86	10.6	0.500	pCi/g						
Beryllium-7	U	1.77	+/-6.68	10.7	0.700	pCi/g						
Bismuth-212	U	3.68	+/-3.06	5.27	0.500	pCi/g						
Bismuth-214	U	0.706	+/-1.84	1.41	0.200	pCi/g						
Cerium-139	U	-0.285	+/-0.425	0.615	0.050	pCi/g						
Cerium-141	U	0.604	+/-1.15	1.50	0.100	pCi/g						
Cerium-144	U	-0.452	+/-2.70	3.95	0.500	pCi/g						
Cesium-134	U	0.533	+/-0.410	0.720	0.100	pCi/g						
Cesium-136	U	-0.87	+/-1.89	2.93	0.300	pCi/g						
Cesium-137		164	+/-10.6	0.706	0.100	pCi/g						
Chromium-51	U	0.428	+/-8.02	11.9	0.600	pCi/g						
Cobalt-56	U	0.0301	+/-0.478	0.774	0.100	pCi/g						
Cobalt-57	U	-0.0183	+/-0.329	0.482	0.050	pCi/g						
Cobalt-58	U	-0.261	+/-0.455	0.704	0.100	pCi/g						
Cobalt-60		2.61	+/-0.856	0.628	0.100	pCi/g						
Europium-152	U	-0.654	+/-1.60	2.33	0.200	pCi/g						
Europium-154	U	0.215	+/-1.12	1.73	0.500	pCi/g						
Europium-155	U	-0.186	+/-1.28	1.87	0.500	pCi/g						
Iridium-192	U	-0.147	+/-0.622	0.913	0.100	pCi/g						
Iron-59	U	-0.506	+/-1.30	1.85	0.300	pCi/g						
Lead-210	U	58.2	+/-63.2	78.2	4.00	pCi/g						
Lead-212		1.81	+/-1.60	1.27	0.100	pCi/g						
Lead-214	U	1.04	+/-1.19	1.81	0.100	pCi/g						
Manganese-54	U	0.200	+/-0.422	0.595	0.100	pCi/g						
Mercury-203	U	0.806	+/-0.789	1.03	0.100	pCi/g						
Neodymium-147	U	9.65	+/-17.0	27.6	1000	pCi/g						
Neptunium-239	U	1.16	+/-2.35	3.49	2.00	pCi/g						
Niobium-94	U	0.143	+/-0.327	0.544	1.00	pCi/g						
Niobium-95	U	-0.0514	+/-0.593	0.953	0.050	pCi/g						
Potassium-40	UUI	0.00	+/-4.98	9.70	1.00	pCi/g						
Promethium-144	U	0.0638	+/-0.415	0.596	0.080	pCi/g						
Promethium-146	U	0.324	+/-0.951	1.34	1.00	pCi/g						
Radium-228	UUI	0.00	+/-1.59	2.86	0.500	pCi/g						

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #8
Sample ID: 135938005

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Ruthenium-106	U	1.24	+/-4.08	6.63	0.800	pCi/g						
Silver-110m	U	0.267	+/-0.561	0.810	0.080	pCi/g						
Sodium-22	U	0.0757	+/-0.401	0.621	0.080	pCi/g						
Thallium-208	U	0.459	+/-0.507	0.837	0.080	pCi/g						
Thorium-230	U	0.706	+/-1.84	1.69	1.00	pCi/g						
Thorium-234	UUI	0.00	+/-19.2	23.5	5.00	pCi/g						
Tin-113	U	-0.384	+/-0.825	1.20	0.100	pCi/g						
Uranium-235	U	1.58	+/-3.02	4.00	0.500	pCi/g						
Uranium-238	UUI	0.00	+/-19.2	23.5	1.00	pCi/g						
Yttrium-88	U	0.276	+/-0.435	0.821	0.100	pCi/g						
Zinc-65	U	-0.319	+/-0.793	1.32	0.300	pCi/g						
Zirconium-95	U	0.860	+/-0.778	1.35	0.200	pCi/g						
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, solid												
Alpha		4.23	+/-2.43	3.84	4.00	pCi/g		SXE1	05/24/05	1940	423849	2
Beta		160	+/-5.45	1.87	10.0	pCi/g						

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #14
Sample ID: 135938006
Matrix: Misc Solid
Collect Date: 22-APR-05 09:48
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	U	0.197	+/-0.922	1.43	0.800	pCi/g		AKB	05/18/05	1902	423794	1
Americium-241	U	0.130	+/-0.685	0.918	0.200	pCi/g						
Antimony-124	U	-0.0715	+/-0.196	0.306	0.100	pCi/g						
Antimony-125	U	-0.173	+/-0.370	0.580	0.200	pCi/g						
Barium-133	U	-0.0401	+/-0.160	0.252	0.100	pCi/g						
Barium-140	U	1.92	+/-2.19	3.35	0.500	pCi/g						
Beryllium-7	U	-0.727	+/-1.55	2.43	0.700	pCi/g						
Bismuth-212	U	0.154	+/-1.58	2.29	0.500	pCi/g						
Bismuth-214	U	0.269	+/-0.305	0.485	0.200	pCi/g						
Cerium-139	U	0.0405	+/-0.0979	0.147	0.050	pCi/g						
Cerium-141	U	0.270	+/-0.240	0.362	0.100	pCi/g						
Cerium-144	U	0.349	+/-0.750	0.939	0.500	pCi/g						
Cesium-134	U	-0.0179	+/-0.232	0.359	0.100	pCi/g						
Cesium-136	U	0.0843	+/-1.23	2.01	0.300	pCi/g						
Cesium-137		2.58	+/-0.370	0.286	0.100	pCi/g						
Chromium-51	U	0.389	+/-1.96	2.90	0.600	pCi/g						
Cobalt-56	U	0.0497	+/-0.269	0.418	0.100	pCi/g						
Cobalt-57	U	-0.0208	+/-0.0899	0.119	0.050	pCi/g						
Cobalt-58	U	-0.0932	+/-0.260	0.400	0.100	pCi/g						
Cobalt-60		109	+/-6.61	0.195	0.100	pCi/g						
Europium-152	U	0.404	+/-0.546	0.570	0.200	pCi/g						
Europium-154	U	0.011	+/-0.340	0.559	0.500	pCi/g						
Europium-155	U	-0.144	+/-0.354	0.469	0.500	pCi/g						
Iridium-192	U	-0.0602	+/-0.153	0.225	0.100	pCi/g						
Iron-59	U	0.0374	+/-0.692	1.12	0.300	pCi/g						
Lead-210	U	28.5	+/-25.9	34.8	4.00	pCi/g						
Lead-212	U	0.0179	+/-0.284	0.312	0.100	pCi/g						
Lead-214	U	0.188	+/-0.260	0.415	0.100	pCi/g						
Manganese-54	U	0.0674	+/-0.225	0.351	0.100	pCi/g						
Mercury-203	U	0.177	+/-0.180	0.270	0.100	pCi/g						
Neodymium-147	U	2.11	+/-4.98	7.89	1000	pCi/g						
Neptunium-239	U	-0.299	+/-0.649	0.858	2.00	pCi/g						
Niobium-94	U	-0.107	+/-0.164	0.252	1.00	pCi/g						
Niobium-95	U	0.297	+/-0.311	0.491	0.050	pCi/g						
Potassium-40		2.76	+/-1.51	1.44	1.00	pCi/g						
Promethium-144	U	-0.0367	+/-0.171	0.265	0.080	pCi/g						
Promethium-146	U	-0.0595	+/-0.177	0.278	1.00	pCi/g						
Radium-228	U	0.197	+/-0.922	1.43	0.500	pCi/g						

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #14
Sample ID: 135938006

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	1.03	+/-1.52	2.40	0.800	pCi/g					
Silver-110m	U	0.0449	+/-0.197	0.271	0.080	pCi/g					
Sodium-22	U	0.00206	+/-0.122	0.201	0.080	pCi/g					
Thallium-208	U	0.0994	+/-0.161	0.256	0.080	pCi/g					
Thorium-230	U	0.269	+/-0.305	0.485	1.00	pCi/g					
Thorium-234	U	2.12	+/-5.19	6.97	5.00	pCi/g					
Tin-113	U	0.136	+/-0.183	0.293	0.100	pCi/g					
Uranium-235	U	0.270	+/-0.634	0.948	0.500	pCi/g					
Uranium-238	U	2.12	+/-5.19	6.97	1.00	pCi/g					
Yttrium-88	U	0.0483	+/-0.0995	0.179	0.100	pCi/g					
Zinc-65	U	0.400	+/-0.545	0.893	0.300	pCi/g					
Zirconium-95	U	-0.0509	+/-0.428	0.665	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha		11.9	+/-3.17	2.54	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta		135	+/-5.18	2.25	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Company : WPI
Address : 11 S. 12th Street
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Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #19
Sample ID: 135938007
Matrix: Misc Solid
Collect Date: 22-APR-05 10:07
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228	U	1.49	+/-2.01	3.08	0.800	pCi/g		AKB 05/18/05	1903	423794	1
Americium-241	U	-0.203	+/-0.538	0.718	0.200	pCi/g					
Antimony-124	U	-0.421	+/-0.602	0.876	0.100	pCi/g					
Antimony-125	U	0.116	+/-1.30	1.99	0.200	pCi/g					
Barium-133	U	0.854	+/-0.742	0.897	0.100	pCi/g					
Barium-140	U	1.25	+/-6.66	10.3	0.500	pCi/g					
Beryllium-7	U	-1.07	+/-5.69	8.58	0.700	pCi/g					
Bismuth-212	U	-1.14	+/-3.76	6.05	0.500	pCi/g					
Bismuth-214	U	0.584	+/-1.47	1.64	0.200	pCi/g					
Cerium-139	U	0.0314	+/-0.294	0.449	0.050	pCi/g					
Cerium-141	U	0.696	+/-0.844	1.19	0.100	pCi/g					
Cerium-144	U	1.17	+/-2.06	2.89	0.500	pCi/g					
Cesium-134	U	0.0305	+/-0.554	0.910	0.100	pCi/g					
Cesium-136	U	0.0629	+/-2.57	4.22	0.300	pCi/g					
Cesium-137		51.0	+/-1.98	0.807	0.100	pCi/g					
Chromium-51	U	1.85	+/-6.03	9.32	0.600	pCi/g					
Cobalt-56	U	-0.338	+/-0.585	0.923	0.100	pCi/g					
Cobalt-57	U	0.0908	+/-0.252	0.350	0.050	pCi/g					
Cobalt-58	U	0.296	+/-0.558	0.950	0.100	pCi/g					
Cobalt-60		11.6	+/-1.28	0.850	0.100	pCi/g					
Europium-152	U	0.0469	+/-1.34	1.83	0.200	pCi/g					
Europium-154	U	0.180	+/-1.34	2.24	0.500	pCi/g					
Europium-155	U	-0.565	+/-0.964	1.29	0.500	pCi/g					
Iridium-192	U	0.0807	+/-0.474	0.728	0.100	pCi/g					
Iron-59	U	0.497	+/-1.39	2.34	0.300	pCi/g					
Lead-210	U	2.46	+/-11.0	5.79	4.00	pCi/g					
Lead-212	U	0.140	+/-1.02	0.881	0.100	pCi/g					
Lead-214	U	0.870	+/-1.46	1.41	0.100	pCi/g					
Manganese-54	U	-0.0286	+/-0.506	0.825	0.100	pCi/g					
Mercury-203	U	0.618	+/-0.537	0.856	0.100	pCi/g					
Neodymium-147	U	13.4	+/-15.8	25.3	1000	pCi/g					
Neptunium-239	U	0.716	+/-1.83	2.55	2.00	pCi/g					
Niobium-94	U	-0.137	+/-0.429	0.691	1.00	pCi/g					
Niobium-95	U	0.323	+/-0.750	1.26	0.050	pCi/g					
Potassium-40	U	3.47	+/-8.76	6.87	1.00	pCi/g					
Promethium-144	U	0.192	+/-0.453	0.760	0.080	pCi/g					
Promethium-146	U	0.608	+/-0.690	1.09	1.00	pCi/g					
Radium-228	U	1.49	+/-2.01	3.08	0.500	pCi/g					

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #19
Sample ID: 135938007
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	-1.25	+/-4.06	6.57	0.800	pCi/g					
Silver-110m	U	-3.98	+/-0.654	0.763	0.080	pCi/g					
Sodium-22	U	0.0694	+/-0.482	0.807	0.080	pCi/g					
Thallium-208	UUI	0.00	+/-1.04	0.932	0.080	pCi/g					
Thorium-230	U	0.584	+/-1.47	1.41	1.00	pCi/g					
Thorium-234	U	3.80	+/-12.1	11.7	5.00	pCi/g					
Tin-113	U	-0.0137	+/-0.621	0.947	0.100	pCi/g					
Uranium-235	UUI	0.00	+/-2.20	3.18	0.500	pCi/g					
Uranium-238	U	3.80	+/-12.1	7.00	1.00	pCi/g					
Yttrium-88	U	0.0243	+/-0.457	0.831	0.100	pCi/g					
Zinc-65	U	0.681	+/-1.13	1.93	0.300	pCi/g					
Zirconium-95	U	-0.529	+/-1.07	1.70	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha		3.25	+/-2.10	2.71	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta		69.1	+/-3.76	2.37	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #27
Sample ID: 135938008
Matrix: Misc Solid
Collect Date: 22-APR-05 10:28
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228	U	2.16	+/-3.29	5.56	0.800	pCi/g		AKB 05/18/05	1906	423794	1
Americium-241	U	3.21	+/-3.52	4.69	0.200	pCi/g					
Antimony-124	U	0.302	+/-1.19	1.64	0.100	pCi/g					
Antimony-125	U	-2.6	+/-3.04	4.53	0.200	pCi/g					
Barium-133	U	-0.952	+/-1.26	1.88	0.100	pCi/g					
Barium-140	U	9.99	+/-14.5	20.3	0.500	pCi/g					
Beryllium-7	U	2.94	+/-12.8	19.7	0.700	pCi/g					
Bismuth-212	U	2.78	+/-6.27	10.0	0.500	pCi/g					
Bismuth-214	U	2.36	+/-3.52	2.83	0.200	pCi/g					
Cerium-139	U	-0.708	+/-0.787	1.07	0.050	pCi/g					
Cerium-141	U	0.0367	+/-1.87	2.59	0.100	pCi/g					
Cerium-144	U	-4.6	+/-4.90	6.60	0.500	pCi/g					
Cesium-134	U	0.0825	+/-0.928	1.45	0.100	pCi/g					
Cesium-136	U	0.864	+/-4.41	7.37	0.300	pCi/g					
Cesium-137		342	+/-5.67	1.38	0.100	pCi/g					
Chromium-51	U	1.73	+/-13.9	21.2	0.600	pCi/g					
Cobalt-56	U	0.399	+/-1.06	1.68	0.100	pCi/g					
Cobalt-57	U	0.824	+/-0.996	0.846	0.050	pCi/g					
Cobalt-58	U	0.429	+/-1.03	1.65	0.100	pCi/g					
Cobalt-60		84.6	+/-3.74	1.00	0.100	pCi/g					
Europium-152	U	-0.226	+/-2.81	4.26	0.200	pCi/g					
Europium-154	U	0.768	+/-1.78	2.81	0.500	pCi/g					
Europium-155	U	1.12	+/-2.36	3.28	0.500	pCi/g					
Iridium-192	U	0.0901	+/-1.08	1.64	0.100	pCi/g					
Iron-59	U	0.585	+/-2.37	3.97	0.300	pCi/g					
Lead-210	U	-49.9	+/-105	122	4.00	pCi/g					
Lead-212	U	1.54	+/-1.49	2.29	0.100	pCi/g					
Lead-214	U	1.17	+/-2.05	3.16	0.100	pCi/g					
Manganese-54	U	0.285	+/-0.848	1.35	0.100	pCi/g					
Mercury-203	U	1.11	+/-1.26	1.94	0.100	pCi/g					
Neodymium-147	U	-21.6	+/-31.7	47.6	1000	pCi/g					
Neptunium-239	U	0.740	+/-4.51	6.22	2.00	pCi/g					
Niobium-94	U	0.0713	+/-0.710	1.11	1.00	pCi/g					
Niobium-95	U	1.15	+/-1.19	1.97	0.050	pCi/g					
Potassium-40	UUI	0.00	+/-6.91	13.5	1.00	pCi/g					
Promethium-144	U	-0.0423	+/-0.735	1.14	0.080	pCi/g					
Promethium-146	U	-0.61	+/-1.56	2.36	1.00	pCi/g					
Radium-228	U	2.16	+/-3.29	5.56	0.500	pCi/g					

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Certificate of Analysis

Company : WPI
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Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #27
Sample ID: 135938008

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	-3.49	+/-8.16	12.4	0.800	pCi/g					
Silver-110m	UUI	0.00	+/-1.55	2.91	0.080	pCi/g					
Sodium-22	U	0.277	+/-0.641	1.01	0.080	pCi/g					
Thallium-208	U	1.35	+/-1.29	1.40	0.080	pCi/g					
Thorium-230	U	2.36	+/-3.52	2.83	1.00	pCi/g					
Thorium-234	U	22.2	+/-29.8	36.7	5.00	pCi/g					
Tin-113	U	-0.311	+/-1.45	2.20	0.100	pCi/g					
Uranium-235	U	3.27	+/-5.48	6.88	0.500	pCi/g					
Uranium-238	U	22.2	+/-29.8	36.7	1.00	pCi/g					
Yttrium-88	U	0.211	+/-0.658	1.20	0.100	pCi/g					
Zinc-65	U	-0.929	+/-1.93	3.10	0.300	pCi/g					
Zirconium-95	U	0.425	+/-1.74	2.76	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha		3.71	+/-2.87	2.38	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta		480	+/-9.44	2.02	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Company : WPI
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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Paint Sample #2	Project:	WPIA00105
Sample ID:	135938009	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	20-APR-05 08:27		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228	U	5.02	+/-5.42	7.72	0.800	pCi/g		AKB 05/19/05	1224	423794	1
Americium-241	U	-5.89	+/-8.21	9.74	0.200	pCi/g					
Antimony-124	U	0.789	+/-1.31	2.29	0.100	pCi/g					
Antimony-125	U	-0.685	+/-2.58	3.94	0.200	pCi/g					
Barium-133	U	-0.776	+/-1.72	2.20	0.100	pCi/g					
Barium-140	U	6.18	+/-16.4	26.6	0.500	pCi/g					
Beryllium-7	U	-6.13	+/-11.4	17.0	0.700	pCi/g					
Bismuth-212	U	3.43	+/-6.88	12.4	0.500	pCi/g					
Bismuth-214	U	0.556	+/-3.00	3.92	0.200	pCi/g					
Cerium-139	U	0.193	+/-0.936	1.41	0.050	pCi/g					
Cerium-141	U	-0.062	+/-2.50	3.69	0.100	pCi/g					
Cerium-144	U	2.23	+/-6.73	8.93	0.500	pCi/g					
Cesium-134	U	0.0677	+/-1.03	1.78	0.100	pCi/g					
Cesium-136	U	0.0964	+/-5.53	9.68	0.300	pCi/g					
Cesium-137	U	1.16	+/-1.59	1.80	0.100	pCi/g					
Chromium-51	U	-5.59	+/-15.7	23.4	0.600	pCi/g					
Cobalt-56	U	-0.185	+/-1.22	2.05	0.100	pCi/g					
Cobalt-57	U	0.300	+/-0.773	1.16	0.050	pCi/g					
Cobalt-58	U	1.38	+/-1.00	1.93	0.100	pCi/g					
Cobalt-60		8.62	+/-2.13	1.71	0.100	pCi/g					
Europium-152	U	0.754	+/-3.40	4.68	0.200	pCi/g					
Europium-154	U	0.167	+/-2.50	4.55	0.500	pCi/g					
Europium-155	U	-1.66	+/-3.22	4.56	0.500	pCi/g					
Iridium-192	U	-0.0439	+/-1.16	1.78	0.100	pCi/g					
Iron-59	U	0.820	+/-2.69	4.90	0.300	pCi/g					
Lead-210	U	234	+/-308	400	4.00	pCi/g					
Lead-212	U	1.06	+/-1.89	2.92	0.100	pCi/g					
Lead-214	U	2.74	+/-2.44	3.99	0.100	pCi/g					
Manganese-54	U	0.161	+/-0.939	1.65	0.100	pCi/g					
Mercury-203	U	-0.52	+/-1.55	2.30	0.100	pCi/g					
Neodymium-147	U	-5.18	+/-44.4	68.9	1000	pCi/g					
Neptunium-239	U	-0.324	+/-5.89	8.59	2.00	pCi/g					
Niobium-94	U	-0.248	+/-0.960	1.57	1.00	pCi/g					
Niobium-95	U	0.322	+/-1.59	2.76	0.050	pCi/g					
Potassium-40	U	0.764	+/-16.8	17.5	1.00	pCi/g					
Promethium-144	U	-0.0639	+/-1.15	1.66	0.080	pCi/g					
Promethium-146	U	0.956	+/-1.25	2.10	1.00	pCi/g					
Radium-228	U	5.02	+/-5.42	7.72	0.500	pCi/g					

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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #2 Project: WPIA00105
Sample ID: 135938009 Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	-0.617	+/-8.55	14.3	0.800	pCi/g					
Silver-110m	U	-0.0199	+/-1.09	1.60	0.080	pCi/g					
Sodium-22	U	0.0567	+/-0.901	1.64	0.080	pCi/g					
Thallium-208	U	1.49	+/-1.18	2.13	0.080	pCi/g					
Thorium-230	U	0.556	+/-3.00	3.92	1.00	pCi/g					
Thorium-234	U	56.5	+/-60.3	78.9	5.00	pCi/g					
Tin-113	U	-0.88	+/-1.43	2.10	0.100	pCi/g					
Uranium-235	U	4.13	+/-6.28	9.49	0.500	pCi/g					
Uranium-238	U	56.5	+/-60.3	78.9	1.00	pCi/g					
Yttrium-88	U	0.377	+/-0.979	2.08	0.100	pCi/g					
Zinc-65	U	0.0904	+/-2.17	3.80	0.300	pCi/g					
Zirconium-95	U	0.575	+/-2.14	3.75	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	0.293	+/-1.31	2.66	4.00	pCi/g		SXE1 05/24/05	1940	423849	2
Beta		11.0	+/-1.81	2.32	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #1
Sample ID: 135938010
Matrix: Misc Solid
Collect Date: 20-APR-05 10:00
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	UUI	0.00	+/-2.31	2.47	0.800	pCi/g		AKB	05/19/05	1226	423794	1
Americium-241	U	-0.184	+/-1.15	1.11	0.200	pCi/g						
Antimony-124	U	0.177	+/-0.501	0.835	0.100	pCi/g						
Antimony-125	U	-0.451	+/-0.961	1.48	0.200	pCi/g						
Barium-133	U	0.108	+/-0.554	0.782	0.100	pCi/g						
Barium-140	U	-0.90	+/-6.55	10.4	0.500	pCi/g						
Beryllium-7	U	-0.856	+/-3.78	5.99	0.700	pCi/g						
Bismuth-212	U	3.32	+/-4.02	4.60	0.500	pCi/g						
Bismuth-214	U	1.36	+/-0.895	1.58	0.200	pCi/g						
Cerium-139	U	-0.12	+/-0.358	0.444	0.050	pCi/g						
Cerium-141	U	0.818	+/-0.861	1.29	0.100	pCi/g						
Cerium-144	U	-1.13	+/-2.15	2.96	0.500	pCi/g						
Cesium-134	U	0.113	+/-0.442	0.780	0.100	pCi/g						
Cesium-136	U	-2.03	+/-2.14	3.26	0.300	pCi/g						
Cesium-137	U	0.0559	+/-0.783	0.664	0.100	pCi/g						
Chromium-51	U	1.18	+/-5.70	9.10	0.600	pCi/g						
Cobalt-56	U	-0.0373	+/-0.474	0.813	0.100	pCi/g						
Cobalt-57	U	-0.184	+/-0.267	0.365	0.050	pCi/g						
Cobalt-58	U	0.225	+/-0.429	0.792	0.100	pCi/g						
Cobalt-60	U	0.108	+/-0.384	0.717	0.100	pCi/g						
Europium-152	U	0.461	+/-1.03	1.67	0.200	pCi/g						
Europium-154	U	0.495	+/-1.10	2.08	0.500	pCi/g						
Europium-155	U	0.199	+/-0.978	1.40	0.500	pCi/g						
Iridium-192	U	-0.168	+/-0.437	0.670	0.100	pCi/g						
Iron-59	U	-0.152	+/-1.04	1.79	0.300	pCi/g						
Lead-210	U	13.7	+/-10.6	14.1	4.00	pCi/g						
Lead-212	UUI	0.00	+/-1.38	0.874	0.100	pCi/g						
Lead-214	U	0.251	+/-1.32	1.37	0.100	pCi/g						
Manganese-54	U	-0.138	+/-0.361	0.602	0.100	pCi/g						
Mercury-203	U	0.530	+/-1.21	0.762	0.100	pCi/g						
Neodymium-147	U	-1.4	+/-15.2	24.3	1000	pCi/g						
Neptunium-239	U	-0.951	+/-1.82	2.52	2.00	pCi/g						
Niobium-94	U	0.143	+/-0.394	0.658	1.00	pCi/g						
Niobium-95	U	0.655	+/-1.34	1.13	0.050	pCi/g						
Potassium-40	U	8.18	+/-4.14	9.21	1.00	pCi/g						
Promethium-144	U	0.496	+/-0.418	0.747	0.080	pCi/g						
Promethium-146	U	-0.0315	+/-0.456	0.728	1.00	pCi/g						
Radium-228	UUI	0.00	+/-2.31	2.47	0.500	pCi/g						

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Certificate of Analysis

Company : WPI
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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Paint Sample #1
Sample ID: 135938010

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	0.0973	+/-3.61	5.87	0.800	pCi/g					
Silver-110m	U	0.235	+/-0.436	0.668	0.080	pCi/g					
Sodium-22	U	0.177	+/-0.395	0.748	0.080	pCi/g					
Thallium-208	U	0.069	+/-0.593	0.697	0.080	pCi/g					
Thorium-230	U	1.36	+/-0.895	1.58	1.00	pCi/g					
Thorium-234	U	1.84	+/-13.9	9.25	5.00	pCi/g					
Tin-113	U	0.063	+/-0.491	0.791	0.100	pCi/g					
Uranium-235	U	0.323	+/-2.19	3.14	0.500	pCi/g					
Uranium-238	U	1.84	+/-13.9	9.25	1.00	pCi/g					
Yttrium-88	U	0.159	+/-0.469	0.954	0.100	pCi/g					
Zinc-65	U	-0.093	+/-0.913	1.37	0.300	pCi/g					
Zirconium-95	U	-0.166	+/-0.785	1.33	0.200	pCi/g					
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, solid											
Alpha	U	0.588	+/-1.37	2.56	4.00	pCi/g		SXE1 05/24/05	1941	423849	2
Beta	U	2.86	+/-1.58	2.90	10.0	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	
2	EPA 900.0 Modified	

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Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Core bore Sample #5	Project:	WPIA00105
Sample ID:	135938011	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21–APR–05 11:00		
Receive Date:	05–MAY–05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Tritium Dist, Solid											
Tritium	U	–2.06	+/–2.84	5.12	6.00	pCi/g		ATH1 05/18/05	0700	425676	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 906.0 Modified	

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Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Core bore Sample #6	Project:	WPIA00105
Sample ID:	135938012	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21-APR-05 11:48		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Solid												
Tritium	U	0.683	+/-2.90	4.99	6.00	pCi/g		ATH1	05/18/05	0732	425676	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 906.0 Modified	

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Report Date: May 25, 2005
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Client Sample ID:	Core bore Sample #5 Outside	Project:	WPIA00105
Sample ID:	135938013	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21–APR–05 11:00		
Receive Date:	05–MAY–05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Tritium Dist, Solid											
Tritium	U	0.628	+/–2.92	5.05	6.00	pCi/g		ATH1 05/18/05	0803	425676	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 906.0 Modified	

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Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Core bore Sample #6 Outside	Project:	WPIA00105
Sample ID:	135938014	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21–APR–05 11:48		
Receive Date:	05–MAY–05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Tritium Dist, Solid											
Tritium	U	–0.738	+/–2.97	5.23	6.00	pCi/g		ATH1 05/18/05	0835	425676	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 906.0 Modified	

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Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Core bore Sample #5 Middle	Project:	WPIA00105
Sample ID:	135938015	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21-APR-05 11:00		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228		0.497	+/-0.143	0.131	0.800	pCi/g		AKB 05/11/05	1730	424563	1
Americium-241	U	0.0697	+/-0.0894	0.151	0.200	pCi/g					
Antimony-124	U	-0.0252	+/-0.024	0.0391	0.100	pCi/g					
Antimony-125	U	0.00409	+/-0.0464	0.084	0.200	pCi/g					
Barium-133	U	0.00492	+/-0.0235	0.0377	0.100	pCi/g					
Barium-140	U	-0.0876	+/-0.182	0.309	0.500	pCi/g					
Beryllium-7	U	0.222	+/-0.199	0.375	0.700	pCi/g					
Bismuth-212	U	0.143	+/-0.271	0.292	0.500	pCi/g					
Bismuth-214		0.266	+/-0.0816	0.062	0.200	pCi/g					
Cerium-139	U	0.0013	+/-0.015	0.0266	0.050	pCi/g					
Cerium-141	U	0.0244	+/-0.0449	0.0604	0.100	pCi/g					
Cerium-144	U	-0.0594	+/-0.105	0.181	0.500	pCi/g					
Cesium-134	U	0.0322	+/-0.0305	0.0414	0.100	pCi/g					
Cesium-136	U	0.0459	+/-0.0828	0.155	0.300	pCi/g					
Cesium-137	U	-0.0109	+/-0.0198	0.0333	0.100	pCi/g					
Chromium-51	U	0.0668	+/-0.210	0.388	0.600	pCi/g					
Cobalt-56	U	-0.000919	+/-0.0257	0.0402	0.100	pCi/g					
Cobalt-57	U	-0.012	+/-0.0126	0.0217	0.050	pCi/g					
Cobalt-58	U	-0.0235	+/-0.0208	0.0343	0.100	pCi/g					
Cobalt-60	U	-0.00629	+/-0.0212	0.0369	0.100	pCi/g					
Europium-152	U	-0.0343	+/-0.0504	0.0878	0.200	pCi/g					
Europium-154	U	-0.0529	+/-0.0703	0.116	0.500	pCi/g					
Europium-155	U	0.0254	+/-0.0542	0.0993	0.500	pCi/g					
Iridium-192	U	-0.00335	+/-0.0178	0.0321	0.100	pCi/g					
Iron-59	U	-0.0577	+/-0.0574	0.0933	0.300	pCi/g					
Lead-210	U	1.33	+/-2.59	4.09	4.00	pCi/g					
Lead-212		0.429	+/-0.069	0.0496	0.100	pCi/g					
Lead-214		0.331	+/-0.0729	0.0671	0.100	pCi/g					
Manganese-54	U	-0.00191	+/-0.0387	0.0375	0.100	pCi/g					
Mercury-203	U	-0.00951	+/-0.0252	0.0389	0.100	pCi/g					
Neodymium-147	U	0.271	+/-0.441	0.812	1000	pCi/g					
Neptunium-239	U	0.0326	+/-0.0917	0.167	2.00	pCi/g					
Niobium-94	U	0.0141	+/-0.0181	0.0336	1.00	pCi/g					
Niobium-95	U	0.0244	+/-0.0284	0.0546	0.050	pCi/g					
Potassium-40		13.8	+/-1.33	0.225	1.00	pCi/g					
Promethium-144	U	-0.00153	+/-0.0186	0.0324	0.080	pCi/g					
Promethium-146	U	0.00226	+/-0.0236	0.0425	1.00	pCi/g					
Radium-228		0.497	+/-0.143	0.131	0.500	pCi/g					

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Certificate of Analysis

Company : WPI
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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Core bore Sample #5 Middle
Sample ID: 135938015
Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	0.0363	+/-0.180	0.321	0.800	pCi/g					
Silver-110m	U	0.00555	+/-0.0178	0.0323	0.080	pCi/g					
Sodium-22	U	-0.0187	+/-0.0252	0.0416	0.080	pCi/g					
Thallium-208		0.0996	+/-0.0463	0.0349	0.080	pCi/g					
Thorium-230		0.266	+/-0.0816	0.062	1.00	pCi/g					
Thorium-234	U	0.247	+/-0.860	1.16	5.00	pCi/g					
Tin-113	U	-0.014	+/-0.025	0.0436	0.100	pCi/g					
Uranium-235	U	0.0729	+/-0.134	0.174	0.500	pCi/g					
Uranium-238	U	0.247	+/-0.860	1.16	1.00	pCi/g					
Yttrium-88	U	0.0217	+/-0.0189	0.0418	0.100	pCi/g					
Zinc-65	U	-0.0121	+/-0.0599	0.0893	0.300	pCi/g					
Zirconium-95	U	0.029	+/-0.0395	0.0759	0.200	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	TC1	05/10/05	1412	423806

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Core bore Sample #6 Middle	Project:	WPIA00105
Sample ID:	135938016	Client ID:	WPIA001
Matrix:	Misc Solid		
Collect Date:	21-APR-05 11:48		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228		0.451	+/-0.0835	0.056	0.800	pCi/g		AKB	05/11/05	1928	424563	1
Americium-241	U	0.0262	+/-0.036	0.0648	0.200	pCi/g						
Antimony-124	U	-0.00521	+/-0.0104	0.0185	0.100	pCi/g						
Antimony-125	U	0.00475	+/-0.0228	0.041	0.200	pCi/g						
Barium-133	U	-0.00066	+/-0.0117	0.0186	0.100	pCi/g						
Barium-140	U	-0.00973	+/-0.0887	0.154	0.500	pCi/g						
Beryllium-7	U	-0.0833	+/-0.0849	0.143	0.700	pCi/g						
Bismuth-212		0.261	+/-0.116	0.122	0.500	pCi/g						
Bismuth-214		0.139	+/-0.0419	0.0313	0.200	pCi/g						
Cerium-139	U	0.000945	+/-0.00737	0.0133	0.050	pCi/g						
Cerium-141	U	-0.00436	+/-0.0162	0.0293	0.100	pCi/g						
Cerium-144	U	0.00552	+/-0.0526	0.0867	0.500	pCi/g						
Cesium-134	U	0.0158	+/-0.0158	0.0215	0.100	pCi/g						
Cesium-136	U	0.0245	+/-0.0398	0.0712	0.300	pCi/g						
Cesium-137	U	-0.00994	+/-0.00979	0.0168	0.100	pCi/g						
Chromium-51	U	0.0752	+/-0.103	0.193	0.600	pCi/g						
Cobalt-56	U	-0.0106	+/-0.0109	0.0182	0.100	pCi/g						
Cobalt-57	U	-0.00274	+/-0.00575	0.0105	0.050	pCi/g						
Cobalt-58	U	-0.00904	+/-0.0108	0.0182	0.100	pCi/g						
Cobalt-60	U	-0.0107	+/-0.0108	0.0177	0.100	pCi/g						
Europium-152	U	-0.0163	+/-0.0237	0.042	0.200	pCi/g						
Europium-154	U	0.00324	+/-0.0349	0.0619	0.500	pCi/g						
Europium-155	U	0.0269	+/-0.0238	0.0458	0.500	pCi/g						
Iridium-192	U	-0.00895	+/-0.00872	0.0154	0.100	pCi/g						
Iron-59	U	-0.00726	+/-0.0281	0.0496	0.300	pCi/g						
Lead-210	U	0.667	+/-1.04	1.75	4.00	pCi/g						
Lead-212		0.447	+/-0.0459	0.024	0.100	pCi/g						
Lead-214		0.172	+/-0.0409	0.0303	0.100	pCi/g						
Manganese-54	U	0.0101	+/-0.0167	0.0174	0.100	pCi/g						
Mercury-203	U	0.0194	+/-0.0119	0.0206	0.100	pCi/g						
Neodymium-147	U	-0.154	+/-0.206	0.345	1000	pCi/g						
Neptunium-239	U	0.0381	+/-0.0437	0.0828	2.00	pCi/g						
Niobium-94	U	0.00053	+/-0.00883	0.0159	1.00	pCi/g						
Niobium-95	U	-0.00657	+/-0.0156	0.0233	0.050	pCi/g						
Potassium-40		12.1	+/-0.902	0.148	1.00	pCi/g						
Promethium-144	U	-0.00143	+/-0.00938	0.0167	0.080	pCi/g						
Promethium-146	U	-0.00955	+/-0.011	0.0186	1.00	pCi/g						
Radium-228		0.451	+/-0.0835	0.056	0.500	pCi/g						

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Report Date: May 25, 2005

Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Client Sample ID: Core bore Sample #6 Middle
Sample ID: 135938016

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	0.0727	+/-0.0826	0.155	0.800	pCi/g					
Silver-110m	U	0.00342	+/-0.0103	0.0166	0.080	pCi/g					
Sodium-22	U	0.00122	+/-0.0125	0.0222	0.080	pCi/g					
Thallium-208		0.157	+/-0.0251	0.0152	0.080	pCi/g					
Thorium-230		0.139	+/-0.0419	0.0313	1.00	pCi/g					
Thorium-234	U	0.163	+/-0.513	0.529	5.00	pCi/g					
Tin-113	U	-0.00775	+/-0.0112	0.0197	0.100	pCi/g					
Uranium-235	U	-0.0072	+/-0.0486	0.0882	0.500	pCi/g					
Uranium-238	U	0.163	+/-0.513	0.529	1.00	pCi/g					
Yttrium-88	U	0.0011	+/-0.00967	0.0179	0.100	pCi/g					
Zinc-65	U	-0.0128	+/-0.0278	0.0414	0.300	pCi/g					
Zirconium-95	U	0.00678	+/-0.0206	0.0372	0.200	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	TC1	05/10/05	1412	423806

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

GENERAL ENGINEERING LABORATORIES, LLC

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Steel Disk #5		Project:	WPIA00105
Sample ID:	135938017		Client ID:	WPIA001
Matrix:	Misc Solid			
Collect Date:	21-APR-05 11:00			
Receive Date:	05-MAY-05			
Collector:	Client			

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Actinium-228	U	0.033	+/-0.0502	0.0438	0.800	pCi/g		AKB 05/19/05	1544	423794	1
Americium-241	U	-0.00563	+/-0.0156	0.0257	0.200	pCi/g					
Antimony-124	U	0.00355	+/-0.00761	0.0129	0.100	pCi/g					
Antimony-125	U	-0.00388	+/-0.0139	0.0223	0.200	pCi/g					
Barium-133	U	0.000399	+/-0.00704	0.0101	0.100	pCi/g					
Barium-140	U	0.0502	+/-0.0765	0.129	0.500	pCi/g					
Beryllium-7	U	-0.0209	+/-0.0577	0.0913	0.700	pCi/g					
Bismuth-212	U	0.0255	+/-0.0443	0.075	0.500	pCi/g					
Bismuth-214	UUI	0.00	+/-0.0129	0.022	0.200	pCi/g					
Cerium-139	U	-0.00291	+/-0.00457	0.00708	0.050	pCi/g					
Cerium-141	U	0.00369	+/-0.012	0.0193	0.100	pCi/g					
Cerium-144	U	0.0132	+/-0.0284	0.0459	0.500	pCi/g					
Cesium-134	U	0.00112	+/-0.00615	0.0102	0.100	pCi/g					
Cesium-136	U	0.0164	+/-0.0359	0.062	0.300	pCi/g					
Cesium-137	U	0.00294	+/-0.00551	0.00937	0.100	pCi/g					
Chromium-51	U	-0.00265	+/-0.0746	0.122	0.600	pCi/g					
Cobalt-56	U	-0.000924	+/-0.00772	0.0126	0.100	pCi/g					
Cobalt-57	U	0.000374	+/-0.0037	0.00595	0.050	pCi/g					
Cobalt-58	U	-0.00456	+/-0.00721	0.0114	0.100	pCi/g					
Cobalt-60	U	0.0054	+/-0.00677	0.0119	0.100	pCi/g					
Europium-152	U	-0.00592	+/-0.0138	0.0222	0.200	pCi/g					
Europium-154	U	0.0179	+/-0.0251	0.0293	0.500	pCi/g					
Europium-155	U	-0.000213	+/-0.014	0.0227	0.500	pCi/g					
Iridium-192	U	0.00165	+/-0.0057	0.00945	0.100	pCi/g					
Iron-59	U	-0.00282	+/-0.0165	0.0277	0.300	pCi/g					
Lead-210	U	0.247	+/-0.634	0.590	4.00	pCi/g					
Lead-212	UUI	0.00	+/-0.00939	0.0162	0.100	pCi/g					
Lead-214	U	0.00159	+/-0.0181	0.0184	0.100	pCi/g					
Manganese-54	U	-0.000482	+/-0.00608	0.00993	0.100	pCi/g					
Mercury-203	U	0.00168	+/-0.00686	0.0114	0.100	pCi/g					
Neodymium-147	U	-0.0813	+/-0.180	0.298	1000	pCi/g					
Neptunium-239	U	0.00148	+/-0.0263	0.0425	2.00	pCi/g					
Niobium-94	U	0.00133	+/-0.00552	0.00921	1.00	pCi/g					
Niobium-95	U	-0.00214	+/-0.00946	0.0154	0.050	pCi/g					
Potassium-40	U	0.0834	+/-0.159	0.111	1.00	pCi/g					
Promethium-144	U	-0.000817	+/-0.00593	0.00975	0.080	pCi/g					
Promethium-146	U	0.00395	+/-0.00638	0.0105	1.00	pCi/g					
Radium-228	U	0.033	+/-0.0502	0.0438	0.500	pCi/g					

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Steel Disk #5
Sample ID: 135938017

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	0.00139	+/-0.0518	0.0866	0.800	pCi/g					
Silver-110m	U	-0.00136	+/-0.00508	0.00838	0.080	pCi/g					
Sodium-22	U	0.00644	+/-0.00902	0.0103	0.080	pCi/g					
Thallium-208	UUI	0.00	+/-0.016	0.0117	0.080	pCi/g					
Thorium-230	UUI	0.00	+/-0.0129	0.022	1.00	pCi/g					
Thorium-234	UUI	0.00	+/-0.244	0.297	5.00	pCi/g					
Tin-113	U	-0.0026	+/-0.00705	0.0113	0.100	pCi/g					
Uranium-235	UUI	0.00	+/-0.032	0.0511	0.500	pCi/g					
Uranium-238	UUI	0.00	+/-0.244	0.297	1.00	pCi/g					
Yttrium-88	U	-0.00398	+/-0.00735	0.0121	0.100	pCi/g					
Zinc-65	U	-0.00397	+/-0.0141	0.0234	0.300	pCi/g					
Zirconium-95	U	-0.00297	+/-0.0122	0.0199	0.200	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Steel Disk #6
Sample ID: 135938018
Matrix: Misc Solid
Collect Date: 21-APR-05 11:48
Receive Date: 05-MAY-05
Collector: Client

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid (Long List)												
Actinium-228	U	0.0303	+/-0.0176	0.0325	0.800	pCi/g		AKB	05/19/05	1703	423794	1
Americium-241	U	0.0136	+/-0.0195	0.0353	0.200	pCi/g						
Antimony-124	U	-0.00315	+/-0.00565	0.00937	0.100	pCi/g						
Antimony-125	U	0.00716	+/-0.0103	0.0186	0.200	pCi/g						
Barium-133	U	-0.00118	+/-0.00486	0.00745	0.100	pCi/g						
Barium-140	U	0.0314	+/-0.0574	0.102	0.500	pCi/g						
Beryllium-7	U	0.0042	+/-0.0396	0.0696	0.700	pCi/g						
Bismuth-212	U	0.0211	+/-0.0351	0.062	0.500	pCi/g						
Bismuth-214	UUI	0.00	+/-0.020	0.0151	0.200	pCi/g						
Cerium-139	U	-0.00157	+/-0.0029	0.00481	0.050	pCi/g						
Cerium-141	U	0.00194	+/-0.0125	0.0122	0.100	pCi/g						
Cerium-144	U	-0.00227	+/-0.0182	0.031	0.500	pCi/g						
Cesium-134	U	0.000293	+/-0.00475	0.00814	0.100	pCi/g						
Cesium-136	U	-0.0159	+/-0.0248	0.0419	0.300	pCi/g						
Cesium-137	U	0.00315	+/-0.00463	0.00711	0.100	pCi/g						
Chromium-51	U	-0.00631	+/-0.0549	0.0899	0.600	pCi/g						
Cobalt-56	U	0.00501	+/-0.00529	0.00959	0.100	pCi/g						
Cobalt-57	U	0.00165	+/-0.0023	0.00407	0.050	pCi/g						
Cobalt-58	U	-0.0026	+/-0.0053	0.00867	0.100	pCi/g						
Cobalt-60	U	0.00638	+/-0.00547	0.0105	0.100	pCi/g						
Europium-152	U	0.00178	+/-0.0101	0.0179	0.200	pCi/g						
Europium-154	U	0.00978	+/-0.0107	0.0213	0.500	pCi/g						
Europium-155	U	-0.00528	+/-0.00919	0.0156	0.500	pCi/g						
Iridium-192	U	0.0022	+/-0.00413	0.00699	0.100	pCi/g						
Iron-59	U	-0.00936	+/-0.0128	0.018	0.300	pCi/g						
Lead-210	U	0.112	+/-1.37	1.27	4.00	pCi/g						
Lead-212	U	0.00717	+/-0.0108	0.00939	0.100	pCi/g						
Lead-214	U	0.00742	+/-0.0185	0.0122	0.100	pCi/g						
Manganese-54	U	0.00231	+/-0.00439	0.00775	0.100	pCi/g						
Mercury-203	U	-0.000779	+/-0.00502	0.00826	0.100	pCi/g						
Neodymium-147	U	-0.0415	+/-0.135	0.231	1000	pCi/g						
Neptunium-239	U	0.00758	+/-0.0171	0.030	2.00	pCi/g						
Niobium-94	U	-0.00136	+/-0.00416	0.00694	1.00	pCi/g						
Niobium-95	U	0.00463	+/-0.00687	0.0123	0.050	pCi/g						
Potassium-40	U	0.0105	+/-0.105	0.0647	1.00	pCi/g						
Promethium-144	U	-2.010E-06	+/-0.00448	0.00764	0.080	pCi/g						
Promethium-146	U	0.00399	+/-0.00505	0.00842	1.00	pCi/g						
Radium-228	U	0.0303	+/-0.0176	0.0325	0.500	pCi/g						

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Steel Disk #6
Sample ID: 135938018

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Solid (Long List)											
Ruthenium-106	U	0.0257	+/-0.0565	0.0638	0.800	pCi/g					
Silver-110m	U	0.00138	+/-0.0039	0.00687	0.080	pCi/g					
Sodium-22	U	0.00349	+/-0.00386	0.00766	0.080	pCi/g					
Thallium-208	U	0.00215	+/-0.00967	0.00869	0.080	pCi/g					
Thorium-230	UUI	0.00	+/-0.020	0.0151	1.00	pCi/g					
Thorium-234	U	0.159	+/-0.286	0.260	5.00	pCi/g					
Tin-113	U	0.000649	+/-0.00499	0.00882	0.100	pCi/g					
Uranium-235	U	0.00547	+/-0.0332	0.0341	0.500	pCi/g					
Uranium-238	U	0.159	+/-0.286	0.260	1.00	pCi/g					
Yttrium-88	U	0.00183	+/-0.00619	0.0104	0.100	pCi/g					
Zinc-65	U	-0.000652	+/-0.00973	0.0172	0.300	pCi/g					
Zirconium-95	U	-0.000399	+/-0.00966	0.0164	0.200	pCi/g					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID:	Water Sample #1	Project:	WPIA00105
Sample ID:	135938019	Client ID:	WPIA001
Matrix:	Waste Water		
Collect Date:	20-APR-05 14:06		
Receive Date:	05-MAY-05		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid (Long List)											
Actinium-228	U	103	+/-182	238	20.0	pCi/L		AKB 05/20/05	0734	424558	1
Americium-241	U	56.4	+/-101	185	25.0	pCi/L					
Antimony-124	U	-51	+/-90.1	153	5.00	pCi/L					
Antimony-125	U	41.8	+/-92.9	163	10.0	pCi/L					
Barium-133	U	25.3	+/-44.6	71.0	5.00	pCi/L					
Barium-140	U	272	+/-533	969	30.0	pCi/L					
Beryllium-7	U	-128	+/-374	619	50.0	pCi/L					
Bismuth-212	U	173	+/-273	499	50.0	pCi/L					
Bismuth-214	U	60.6	+/-306	115	10.0	pCi/L					
Cerium-139	U	5.88	+/-31.8	53.9	5.00	pCi/L					
Cerium-141	U	1.17	+/-137	140	10.0	pCi/L					
Cerium-144	U	-72.1	+/-203	339	50.0	pCi/L					
Cesium-134	U	5.90	+/-35.4	62.8	5.00	pCi/L					
Cesium-136	U	97.5	+/-196	367	15.0	pCi/L					
Cesium-137	UUI	0.00	+/-53.2	54.5	5.00	pCi/L					
Chromium-51	U	735	+/-869	920	50.0	pCi/L					
Cobalt-56	U	8.08	+/-43.8	76.8	5.00	pCi/L					
Cobalt-57	U	-22	+/-25.7	42.0	5.00	pCi/L					
Cobalt-58	U	21.2	+/-41.0	74.6	10.0	pCi/L					
Cobalt-60	U	50.1	+/-37.2	74.5	5.00	pCi/L					
Europium-152	U	-81.4	+/-88.8	145	20.0	pCi/L					
Europium-154	U	17.5	+/-74.6	141	20.0	pCi/L					
Europium-155	U	31.8	+/-97.0	170	20.0	pCi/L					
Iridium-192	U	-5.69	+/-45.0	67.9	10.0	pCi/L					
Iron-59	U	64.7	+/-92.6	177	10.0	pCi/L					
Lead-210	U	3030	+/-4150	3510	750	pCi/L					
Lead-212	U	44.5	+/-101	118	15.0	pCi/L					
Lead-214	U	33.9	+/-91.9	127	10.0	pCi/L					
Manganese-54	U	-0.555	+/-33.5	58.0	5.00	pCi/L					
Mercury-203	U	9.27	+/-49.2	86.8	5.00	pCi/L					
Neodymium-147	U	-5.38	+/-1270	2270	100	pCi/L					
Neptunium-239	U	-138	+/-182	300	25.0	pCi/L					
Niobium-94	U	30.7	+/-30.4	57.0	5.00	pCi/L					
Niobium-95	U	55.9	+/-116	89.8	5.00	pCi/L					
Potassium-40	UUI	0.00	+/-779	547	100	pCi/L					
Promethium-144	U	-6.78	+/-34.2	58.8	5.00	pCi/L					
Promethium-146	U	-38.4	+/-41.1	64.9	5.00	pCi/L					
Radium-228	U	103	+/-182	238	20.0	pCi/L					

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Certificate of Analysis

Company : WPI
Address : 11 S. 12th Street
Suite 210
Richmond, Virginia 23219
Contact: Mr. John Bowen
Project: **Radiochemistry Analytical**

Report Date: May 25, 2005

Client Sample ID: Water Sample #1
Sample ID: 135938019

Project: WPIA00105
Client ID: WPIA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid (Long List)											
Ruthenium–106	U	6.09	+/–294	521	50.0	pCi/L					
Silver–110m	U	–20.7	+/–35.4	50.5	5.00	pCi/L					
Sodium–22	U	0.0791	+/–27.8	50.7	5.00	pCi/L					
Thallium–208	U	13.5	+/–58.8	70.0	10.0	pCi/L					
Thorium–230	U	60.6	+/–306	115	20.0	pCi/L					
Thorium–234	UUI	0.00	+/–1250	2120	250	pCi/L					
Tin–113	U	–34.4	+/–45.4	73.9	10.0	pCi/L					
Uranium–235	U	2.86	+/–335	349	50.0	pCi/L					
Uranium–238	UUI	0.00	+/–1250	2120	250	pCi/L					
Yttrium–88	U	2.98	+/–39.3	70.3	10.0	pCi/L					
Zinc–65	U	–21.2	+/–80.3	119	10.0	pCi/L					
Zirconium–95	U	74.4	+/–63.2	134	10.0	pCi/L					

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 901.1	

Appendix D
Gas-Free Certificates (CV and Secondary Containment)

MARINE CHEMIST SERVICE, INC.
11850 Tug Boat Lane
Newport News, VA 23606
(757) 873-0933 Norfolk (757) 640-1122

MARINE CHEMIST CERTIFICATE

SERIAL NO. M 15268

Page 1 of 1

JRRF WPI, ERM — Survey Requested by
MARAD / NRC — Vessel Owner or Agent
11 April 2005 — Date
NS Savannah — Vessel
Passenger / Dry Cargo — Type of Vessel
JRRF nuke Row — Specific Location of Vessel
N/A — Last Three (3) Loadings
O_2 LEL Visual — Tests Performed
1430 — Time Survey Completed

Primary Containment — Enter with Restrictions -

maintain forced air mechanical ventilation

Restrictions:
① first level only - until such time that readings by the SCP indicate greater than 19.5% Oxygen as progression is made
② Radiological survey indicates safe radiation levels exist

Upper Secondary Containment
Middle Secondary Containment
Lower Secondary Containment — Atmosphere Safe for Workers -

maintain ventilation

tested 21% O_2
0% LEL

Continued
Entry is contingent upon Radiological testing continues to indicate safe levels.

Inst Calib Check 4-11-05

In the event of physical or atmospheric changes affecting the STANDARD SAFETY DESIGNATIONS assigned to any of the above spaces, this certificate is voided; spaces not listed on the Certificate are not to be entered unless authorized on another Certificate and/or maintained in accordance with OSHA 29 CFR 1915; or if in any doubt, immediately stop all work and contact the undersigned Marine Chemist. Unless otherwise stated on the Certificate, all spaces and affected adjacent spaces are to be reinspected daily or more often as necessary by the competent person or the authority having jurisdiction as applicable in support of work prior to entry or recommencement of work.

QUALIFICATIONS: Transfer of ballast, cargo, fuel, or manipulation of valves or closure equipment tending to alter conditions in pipelines, tanks, or compartments subject to gas accumulation, unless specifically approved on this Certificate, requires inspection and a new Certificate for spaces so affected. All lines, vents, heating coils, valves, and similar enclosed appurtenances shall be considered "not safe" unless otherwise specifically designated. Movement of the vessel from its specific location voids the Certificate unless shifting of the vessel within the facility has been specifically authorized on this Certificate.

STANDARD SAFETY DESIGNATIONS: (partial list, paraphrased from NFPA 306, Subsections 4.3.1 through 4.3.6).

ATMOSPHERE SAFE FOR WORKERS: In the compartment or space so designated (a) the oxygen content of the atmosphere is at least 19.5 percent and not greater than 22 percent by volume; (b) the concentration of flammable materials is below 10 percent of the lower explosive limit; (c) any toxic materials in the atmosphere associated with cargo, fuel, tank coatings, inerting mediums, or fumigants are within permissible concentrations at the time of the inspection.

NOT SAFE FOR WORKERS: In the compartment or space so designated, entry is not permitted.

ENTER WITH RESTRICTIONS: In the compartment or space so designated, entry for work is permitted only if conditions of proper protective equipment, or clothing, or time, or all of the aforementioned, as appropriate, are as specified.

SAFE FOR HOT WORK: In the compartment or space so designated (a) the oxygen content of the atmosphere is not greater than 22 percent by volume; (b) the concentration of flammable materials in the atmosphere is less than 10 percent of the lower explosive limit; (c) the residues, scale, or preservative coatings are cleaned sufficiently to prevent the spread of fire and are not capable of producing a higher concentration than permitted by (a) or (b); (d) all adjacent spaces, containing or having contained flammable or combustible materials shall be sufficiently cleaned of residues, scale, or preservative coatings to prevent the spread of fire, or they are inerted. Ship's fuel tanks, lube tanks, or engine room or fire room bilges, or other machinery spaces, are treated in accordance with the Marine Chemist's requirements.

SAFE FOR LIMITED HOT WORK: In the compartment or space so designated (a) portions of the space meet the requirements for Safe for Hot Work and Partial Cleaning, as applicable, or (b) the space is inerted, adjacent spaces meet the requirements for Safe for Hot Work, and hot work is restricted to specific locations; (c) portions of the space shall meet the requirements for Safe for Hot Work, as applicable, and the nature or type of hot work is limited or restricted.

NOT SAFE FOR HOT WORK: In the compartment or space so designated, hot work is not permitted.

CHEMISTS ENDORSEMENT. This is to certify that I have personally determined that all spaces in the foregoing list are in accordance with NFPA 306 Control of Gas Hazards on Vessels and have found the condition of each to be in accordance with its assigned designation.

"The undersigned acknowledges receipt of this Certificate under NFPA 306 and understands conditions and limitations under which it was issued, and the requirements for maintaining its validity."

This Certificate is based on conditions existing at the time the inpection herein set forth was completed and is issued subject to compliance with all qualifications and instructions.

Signed [signature] (Name) WPI (Company) 04/11/05 (Date)

Signed James P. Duff (Marine Chemist) 671 (Certificate No.)

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20M-9-97

Appendix E
Project Exposure

The NSS Characterization Project required personnel monitoring for those individuals involved in the project. MARAD provided the RADOS DBR-1 System reader (Serial number 230011) and a supply of DIS-1 dosimeters.

The manufacturer provided a device called a Calibration Plug (Serial number 204024) to permit calibration of the reader, thereby ensuring accuracy of dosimeter readings.

Initial calibration was performed using the Calibration Plug, and results were entered in the project log book. Thereafter, the Calibration Plug was used each morning to verify correct operation of the reader.

Individual members of the project wore a dosimeter when entering an area controlled by an RWP. Individuals would select a dosimeter, log on to a Daily Personnel Exposure Record, zero the dosimeter using the RADOS DBR-1 reader, and fasten the dosimeter to the front of the body between the waist and neck with the dosimeter facing out. At the end of the work period, individuals would insert their dosimeter into the RADOS DBR-1 reader and record the reading on the Daily Personnel Exposure Record.

Summary of individual exposures for the project:

Name	μ sievert	milliRem
Thomas E. Craddock	139	13.9
Benjamin J. Scott	182	18.2
Loman H. Scott	162	16.2
James H. Lovedahl	44	4.4
Robert E. Pennock	84	8.4
Jon Stouky	54	5.4
John Bowen	217	21.7
Richard Ranellone	0	0
Keith Welch	73	7.3
Matt Baxter	46	4.6
Brent Williams	43	4.3
Rob Schoennagel	0	0
Pat Madden	1	0.1
Alexander Adams Jr.	0	0
Erhard Koehler	1	0.1
John C. Wiegand	0	0
James P. Bruff	0	0

Appendix F
Radiation Work Permits

Radiation Work Permits (RWPs) are used to control radiological work by specifying dress requirements for a job, respiratory protection requirements, dosimetry requirements, and work restrictions. Special work instructions may be added to protect members of the project.

RWPs were written for a specific function, such as entering primary containment when radiological conditions were unknown. Other RWPs were written more generally once the radiological conditions were determined.

RWPs were closed when they no longer applied or an area was cleared of any radiological restrictions. Several RWPs were modified to reflect changing radiological conditions.

All active RWPs were posted near the instrument storage area to permit easy access for project members. A briefing was conducted whenever a RWP was created or modified. Project members signed onto the RWP after they were briefed.

The thirteen RWPs written to control the various phases of radiological work during this project include the following:

- Stateroom B-1, Rad Waste Storage
- Health Physics Lab at Hospital
- Port and Starboard Stabilizer Rooms
- Fan Room, B Deck, across from Stateroom B-1
- Port and Starboard Charge Pump Rooms, lower level of engine room
- Hot Chemistry Lab next to Control Room
- Cold Chemistry Lab, Port side “C” Deck
- Entry into Secondary Containment from Hatch on “B” Deck
- Lower level of Secondary Containment
- Entry into Primary Containment from Secondary Containment
- Lower levels of Primary Containment
- Primary and Secondary Containment, all levels
- Opening of steam generators, primary side

Form F-1	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Work Authorization Request	Date: 4-12-05

REQUEST FOR WORK AUTHORIZATION AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jonstonky
A. Compartment or space to be entered: LOWER LEVELS OF PRIMARY CONTAINMENT (BELOW 1ST LEVEL)	B. Date(s) to be entered:

B. Reason for entry (type work or inspection to be performed, etc):
TAKE PAINT + METAL SAMPLES

D. Material, equipment, machinery, parts, components, etc. to be removed:
SAMPLES

E. Number of personnel required to perform work or inspection: 3

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
R Jonstonky, PM, 804 938-1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: AS INDICATED ON Form F-2 ENTRY INSTRUCTIONS

Signature: Robert Pennock	Date: 4-12-05

4-15-05 RWP CLOSED
Robert Pennock

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-12-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: LOWER LEVELS OF PRIMARY CONTAINMENT (BELOW 1ST LEVEL)

B. Date and time entered: 4-13-05 8:30 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls).......... ✓
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ____
5. Hoods (head cover) .... ✓
6. . ... ____

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ______________ Removed By: __________________________
Number on seal installed: ______________ Installed By: __________________________

G. Other Information: FRISK HANDS & FEET AT SOP UPON EXIT.

PERSONNEL SIGN ON:
[signatures]

RWP REPLACED 4-12-05 AND 4-15-05
[signature]

Form F-2	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Entry Instructions and Requirements	Date: 4-19-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered:	B. Date and time entered:
OPENING OF STEAM GEN.	4-20-05 4-21-05 4-22-05 - ~~[illegible]~~

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls)........... ✓
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ✓
5. Hoods (head cover) ....
6. . ...

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO_____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO_____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: N/A Removed By: __________
Number on seal installed: __________ Installed By: __________

G. Other Information: HANDLE SAMPLES CAREFULLY & WITH GOOD CONTAMINATION CONTROL PRACTICES. SURVEY WORK AREA AFTER COMPLETION OF JOB.

PERSONNEL SIGN ON
[signature]
[signature]

4-25-05 WORK DONE SYSTEM CLOSED.
RWP CLOSED
[signature]

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-19-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: John W. Bowen
A. Compartment or space to be entered: OPENING OF STEAM GENERATOR	B. Date(s) to be entered: 4-20-05 4-21-05 4-22-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, SMEAR SURVEY DOSE RATE SURVEY

D. Material, equipment, machinery, parts, components, etc. to be removed:

NONE

E. Number of personnel required to perform work or inspection: 3

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):

John Bowen
Chief Engineer
804.615.1118
804.789.1576

John W. Bowen 4/19/05
john-bowen@wpi.biz

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: FULL DRESS AS SPECIFIED ON F-2 ENTRY INSTRUCTIONS

Signature: [signature]	Date: 4-19-05

Form F-2	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Entry Instructions and Requirements	Date: 4-4-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered:
STATEROOM B-1 B DECK
RAD WASTE STORAGE AREA

B. Date and time entered:
4-4-05 9:30 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls) .... ____
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ____
5. Hoods (head cover) .... ____
6. . ... ____

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO ____

E. Record of Personnel Exposure Shall be maintained : YES ✓ NO ____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: N/A Removed By: ____
Number on seal installed: Installed By:

G. Other Information:
FRISK HANDS & FEET UPON EXIT NO STEP OFF PAD REQUIRED.

PERSONNEL SIGN ON

[signatures] 4/4/05

4-15-05 AREA CLEARED
NOTHING REQUIRED FOR
ENTRY [signature]

4-25-05 PROJECT Complete, RWP
CLOSED [signature]

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-4-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: John W. Bowen
A. Compartment or space to be entered: B DECK STATEROOM B-1 RADIOACTIVE WASTE STORAGE AREA	B. Date(s) to be entered: 4-4-05

B. Reason for entry (type work or inspection to be performed, etc):
TO PERFORM INSPECTION, SMEAR SURVEY, DOSE RATE SURVEY AND FRISK OF RAD WASTE STORAGE AREA

D. Material, equipment, machinery, parts, components, etc. to be removed:
NONE

E. Number of personnel required to perform work or inspection: 3

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
John W. Bowen
Proj. Engineer
Ph 804.615.1118
F 804 789 1476
email: john_bowen@wpi.biz

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: AS LISTED ON "ENTRY INSTRUCTIONS AND REQUIREMENTS" FORM F-2

Signature: [signature]	Date: 4-4-05

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-8-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: ~~SURGE~~ Pump Rooms Port & STAR CHARGE

B. Date and time entered: 4-8-05

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls).......... ✓
2. Shoe Covers ....✓...............
3. Gloves .... ✓
4. Respirators .... ____
5. Hoods (head cover) .... ____
6. . ... ____

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ____________ Removed By: ____________________
Number on seal installed: ____________ Installed By: ____________________

G. Other Information: FRISK WHOLE BODY UPON EXIT AT SOP. NO ENTRY UNTIL CLEARED WITH AIR SAMPLE FOR AIRBORNE RADIOACTIVITY

PERSONNEL SIGN ON:
Benjamin J. [signature]
[signature]
[signature]

4-14-05 CHARGE PUMP Rooms CLEARED - DOSIMETRY ONLY FOR ENTRY. [signature]
4-25-05 PROJECT Complete RWP CLOSED [signature]

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-8-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stouky
A. Compartment or space to be entered: ~~Surge~~ RCP Pump Room Port & STBD. Charge	B. Date(s) to be entered: 4-8-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, SMEAR SURVEY, FRISK SURVEY, AND DOSE RATE SURVEY

D. Material, equipment, machinery, parts, components, etc. to be removed:

None

E. Number of personnel required to perform work or inspection: 2

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):

R. Jon Stouky, Project Manager, 804 938 1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: SEE FORM F-2 ENTRY REQUIREMENTS FOR DRESS OUT

Signature: [signature]	Date: 4-8-05

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-11-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered:	B. Date and time entered:
HOT CHEM LAB - NEXT TO CONTROL ROOM D DECK PORT SIDE	4-11-05 11:10 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls)........... ✓
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ✓
5. Hoods (head cover) ....
6. ....

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ____________ Removed By: ____________________
Number on seal installed: ____________ Installed By: ____________________

G. Other Information: FRISK UPON EXIT, HANDS & FEET.
RESPIRATORY PROTECTION.

Scott

PERSONNEL SIGN ON:
James H. Fairchild

4-11-05 AREA CLEARED
No REQUIREMENTS FOR ENTRY EXCEPT DOSIMETRY
Robt Pennoli

4-25-05 PROJECT COMP LETE; RWP CLOSED.
Robt Pennoli

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-11-05

REQUEST FOR WORK AUTHORIZATION AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stouky
A. Compartment or space to be entered: HOT CHEM LAB - NEXT TO CONTROL ROOM	B. Date(s) to be entered: 4-11-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION OF AREA, SMEAR SURVEY, FRISK SURVEY, DOSE RATE SURVEY

D. Material, equipment, machinery, parts, components, etc. to be removed:
None

E. Number of personnel required to perform work or inspection: 1

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
R. Jon Stouky, Project Manager, 804 938 1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: RESPIRATORY PROTECTION

Signature: [signature]	Date: 4-11-05

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-5-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: COLD CHEM LAB C DECK, PORT

B. Date and time entered:
4-5-05 10:35 AM
4-7-05 1:35 PM
4-11-05 1:10 PM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls).......... ______
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ______
5. Hoods (head cover) .... ______
6. . ... ______

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: 7700 Removed By: ____________
Number on seal installed: ________ Installed By: ____________

G. Other Information: SHOE COVERS & GLOVES FRISK UPON EXIT AT SOP

PERSONNEL SIGN ON:
[signatures]
4-11-05

[signatures]
4-12-05

AREA CLEARED - DOSIMETRY ONLY FOR ENTRY. [signature]

4-25-05 PROJECT Complete, RWP CLOSED [signature]

Form F-1	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Work Authorization Request	Date: 4-5-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stouky
A. Compartment or space to be entered: COLD CHEM LAB C DECK, PORT	B. Date(s) to be entered:

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, FRISK SURVEY, SMEAR SURVEY, AND DOSE RATE SURVEY

D. Material, equipment, machinery, parts, components, etc. to be removed:
NONE

E. Number of personnel required to perform work or inspection: 3

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
Project Manager (804) 938-1261 / jstouky@aol.com

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: SHOE COVER & GLOVES SOP FOR EXIT
FRISK HANDS & FEET UPON EXIT

Signature: Robert Pinnock	Date: 4-5-05

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-15-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: PRIMARY & SECONDARY CONTAINMENT ALL LEVELS

B. Date and time entered: 4-15-05 TO CLOSE

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls).......... NA
2. Shoe Covers .... N/A
3. Gloves .... NA
4. Respirators .... NA
5. Hoods (head cover) .... NA
6. . ...

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: N/A Removed By: ____________
Number on seal installed: ____________ Installed By: ____________

G. Other Information:
AVOID RADIATION AREAS & POSTED CONTAMINATION AREA!
PERSONNEL SIGN ON:
[illegible signatures]
Brent D. Williams
James H. [illegible]
Robert E Pinnock

4-25-05 PROJECT Complete
RWP CLOSED
Robert E Pinnock

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-15-05

REQUEST FOR WORK AUTHORIZATION AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stoulcy
A. Compartment or space to be entered: PRIMARY & SECONDARY CONTAINMENT ALL LEVELS	B. Date(s) to be entered: 4-15-05 TO CLOSE OF CONTAINMENT

B. Reason for entry (type work or inspection to be performed, etc):
CORE BORE SAMPLING, INSPECTION AND POSTING

D. Material, equipment, machinery, parts, components, etc. to be removed:
MATERIALS TAKEN INTO CONTAINMENT:

E. Number of personnel required to perform work or inspection: 8

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
Jon Stoulcy PM (804) 938-1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: DOSIMETRY REQUIRED

Signature: [signature]	Date: 4-15-05

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-4-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: John W. Bowen
A. Compartment or space to be entered: FAN ROOM B DECK ACROSS FROM STRM B-1 STARBOARD SIDE	B. Date(s) to be entered: 4-4-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, SMEARS SURVEY, D.R. SURVEY, FRISKING.

D. Material, equipment, machinery, parts, components, etc. to be removed:

NONE

E. Number of personnel required to perform work or inspection: 2

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
John Bowen, Proj. Engineer
804. 615. 1118 (Ph)
804. 789. 1576 (F)
john_bowen@wpi.biz

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: GLOVES & SHOE COVERS AS DETAILED ON "ENTRY INSTRUCTIONS AND REQUIREMENTS" FORM F-2

Signature: [signature]	Date: 4-4-05

4-15-05 RWP CLOSED
[signature]

Form F-2	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Entry Instructions and Requirements	Date: 4-4-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: FAN ROOM B DECK ACROSS FROM STRM B-1 STARBOARD SIDE

B. Date and time entered: 4-5-05 8:50 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls) .... ______
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ______
5. Hoods (head cover) .... ______
6. . ... ______

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ______________ Removed By: ______________
Number on seal installed: ______________ Installed By: ______________

G. Other Information: FRISK HANDS & FEET UPON EXITING AT STEP off PHA

ROOM CLEARED NOTHING REQUIRED FOR ENTRY.
4-15-05 R E Penn

PERSONNEL SIGN ON:
Robt E Pennock
[signature] E [signature]
[signature] ACM / [signature] 4/11/05

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-4-65

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: HP LAB A DECK AT HOSPITAL

B. Date and time entered: 4-6-05

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls) ....
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators ....
5. Hoods (head cover) ....
6. . ...

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: N/A Removed By: ____________
Number on seal installed: ____________ Installed By: ____________

G. Other Information: FRISK UPON EXITING - HANDS & FEET AT S.O.P.
4-7-05 LAB CLEARED FOR ENTRY WITHOUT DRESS OUT OR DOSIMETRY - CONTAMINATED SINK ONLY ~~DO NOT OPEN COVER~~
PERSONNEL SIGN ON

4/11/05

4-12-05 RWP CLOSED - ROOM CLEARED EXCEPT FOR SINK

Form F-1	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Work Authorization Request	Date: 4-4-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: John Bowen
A. Compartment or space to be entered: HP LAB A DECK AT HOSPITAL	B. Date(s) to be entered: 4-4-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, FRISKING, SMEAR SURVEY, AND DOSE RATE SURVEY

D. Material, equipment, machinery, parts, components, etc. to be removed:
None

E. Number of personnel required to perform work or inspection: 2

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
John Bowen, Proj. Engineer
(Ph) 804. ~~789~~ JWB 4/4/05 615. 1118
(F) 804. 789-1576
john-bowen @ wpi.biz

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: AS DETAILED ON "ENTRY INSTRUCTION AND REQUIREMENTS" FORM F-2

Signature: [signature] | Date: 4-4-05

Form F-1	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Work Authorization Request	Date: 4-4-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: John W. Bowen
A. Compartment or space to be entered: PORT & STARBOARD STABILIZER ROOM OFF OF 14 FLAT DECK	B. Date(s) to be entered: 4-4-05

B. Reason for entry (type work or inspection to be performed, etc):
TO PERFORM INSPECTION, SMEAR SURVEY, DOSE RATE SURVEY & FRISK OF COMPARTMENT

D. Material, equipment, machinery, parts, components, etc. to be removed:
NONE

E. Number of personnel required to perform work or inspection: 3

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
John Bowen
Project Engineer
804.615.1118 (Ph.)
804.789.1576 (F)
john_bowen@wpi.biz

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: AS LISTED ON "ENTRY INSTRUCTIONS & REQUIREMENTS" FORM F-2.

Signature: Ralph E. Pennock　　Date: 4-4-05

4-15-05 RWP CLOSED

DOSE RATE ON CONTACT with PIPES ~250 μR - NOT A RADIATION AREA

Ralph E. Pennock

Form F-2	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Entry Instructions and Requirements	Date: 4-4-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: PORT & STARBOARD STABLIZER Rm 14 FLAT DECK

B. Date and time entered: 4-4-05 9:55 AM / 4-5-05 12:15 RGP

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls) .... ______
2. Shoe Covers .... ✓ 1 PR
3. Gloves .... ✓ 2 PR
4. Respirators .... ______
5. Hoods (head cover)............... ______
6. . ... ______

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO_____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO_____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: 7602/7604 Removed By: ______________
Number on seal installed: ______________ Installed By: ______________

G. Other Information:

SET UP STEP OFF PAD & FRISKER TO PERMIT CONTROLLED EXIT OF ROOM, FRISK FEET & HANDS UPON EXIT

PERSONNEL SIGN ON

ROOMS FRISKED & SMEARED CLEAN. SHOE COVERS & GLOVES NO LONGER REQUIRED 4-4-05 1:07PM RGP.

[signatures]

4-5-05 ROOMS CLEARED FOR ENTRY WITHOUT DRESS OUT. DOSIMETRY REQUIRED FOR LOWER LEVEL OF PORT STABILIZER. RG Pennock

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-6-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered:
SECONDARY CONTAINMENT FROM HATCH ON "B" DECK

B. Date and time entered:
4-6-05 10:05 AM
4-7-05 8:50 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls).......... ✓
2. Shoe Covers .... ✓
3. Gloves .... ✓
4. Respirators .... ✓ PER H.P.
5. Hoods (head cover) .... ____
6. . ... ____

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: 7838 Removed By: ROBT PENNOCK c̄ PERMISSION FROM BOB SURFER
Number on seal installed: ________ Installed By: ________

G. Other Information: FRISK HANDS & FEET UPON EXITING THEN PERFORM WHOLE BODY FRISK ONCE OUT

4-7-05 BASED ON SMEAR & FRISK SURVEY SHOE COVER & GLOVE FOR UPPER SECONDARY ENTRY WITH HAND & FOOT FRISK UPON EXIT WORK STILL REQUIRES FULL DRESS WITH HAND & FOOT FRISK ONLY FOR EXIT. RLP

PERSONNEL SIGN ON:

Robert E Pennock
[signature] 4/11
[signatures]
James P Bruff

4-12-05 RWP CLOSED - AREA CLEARED FOR ENTRY WITHOUT DRESSOUT - LOWER LEVEL HAS HIGH RAD AREA AND IS CONTROLLED BY DIFFERENT RWP.
RL Pennock

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-6-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Joss Stouky
A. Compartment or space to be entered: SECONDARY CONTAINMENT FROM HATCH ON "B" DECK	B. Date(s) to be entered: 4-6-05 4-7-05

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, FRISK SURVEY, SMEAR SURVEY, DOSE RATE SURVEY PLUG REMOVAL AND HATCH OPENING. NO ENTRY

D. Material, equipment, machinery, parts, components, etc. to be removed:
NONE

E. Number of personnel required to perform work or inspection: 5

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
R. Joss Stouky, Project Manager 336 316 0707

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: SEE REQUIREMENTS ON FORM F-2 - ENTRY INSTRUCTIONS
NO ENTRY UNTIL AIR SAMPLE IS TAKEN AND AREA CLEARED FOR AIRBORNE

Signature: [signature]	Date: 4-6-05

Form F-1	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Work Authorization Request	Date: 4-12-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stouky
A. Compartment or space to be entered: Lower Level of Secondary Containment	B. Date(s) to be entered:

B. Reason for entry (type work or inspection to be performed, etc):

Core Bore Samples

D. Material, equipment, machinery, parts, components, etc. to be removed:

Samples

E. Number of personnel required to perform work or inspection: 4

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):

Roy Jon Stouky, PM, 804-938-1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: Dosimetry Required

μR meter Required.

Signature: Robert E Pennock	Date: 4-12-05

4-15-05 RWP Closed

Robert E Pennock

Form F-2	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Entry Instructions and Requirements	Date: 4-12-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: LOWER LEVEL OF SECONDARY CONTAINMENT

~~B.~~ Date and time entered: 4-13-05 9:00 AM

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls) .... —
2. Shoe Covers .... —
3. Gloves .... —
4. Respirators .... —
5. Hoods (head cover) .... —
6. . ... —

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ______________ Removed By: ______________
Number on seal installed: ______________ Installed By: ______________

G. Other Information: DOSIMETRY AND MR meter Required for ENTRY.

PERSONNEL SIGN ON:

[signatures]

Form F-1	**U.S. MARITIME ADMINISTRATION** **N/S SAVANNAH** Work Authorization Request	Date: 4-6-05

REQUEST FOR WORK AUTHORIZATION
AND ENTRY INTO RADIATION CONTROL AREA

To: RADIATION SAFETY OFFICER	From: R. Jon Stouky
A. Compartment or space to be entered: PRIMARY CONTAINMENT FROM SECONDARY CONTAINMENT	B. Date(s) to be entered:

B. Reason for entry (type work or inspection to be performed, etc):
INSPECTION, FRISK SURVEY (IF ABLE), DOSE RATE SURVEY, SMEAR SURVEY AND WORK PLANNING.

D. Material, equipment, machinery, parts, components, etc. to be removed:
NONE EXCEPT WHAT IS TAKEN IN.

E. Number of personnel required to perform work or inspection: 6

F. Identification of Person submitting request (name, title, phone, fax, email, etc.):
R. Jon Stouky, Project Manager, 804 938 1261

Permission for Work Authorization and Entry is approved based on information submitted above, subject to the following conditions: NO ENTRY UNTIL AIR SAMPLE CLEARS CONTAINMENT AS NON AIRBORNE OR RESPIRATORY PROTECTION REQUIRED. SEE REQUIREMENTS ON FORM F-2 - ENTRY INSTRUCTIONS. PRIMARY CONTAINMENT TO BE VENTILATED PRIOR TO AND ~~WHILE~~ DURING ENTRY

Signature: [signature]	Date: 4-6-05

4-15-05 RWP CLOSED - REPLACED

[signature]

Form F-2	U.S. MARITIME ADMINISTRATION N/S SAVANNAH Entry Instructions and Requirements	Date: 4-6-05

INSTRUCTIONS AND REQUIRMENTS FOR ENTRY INTO RADIATION CONTROL AREAS AND COMPARTMENTS

A Work Authorization Request (Form F-1) must be submitted and approved prior to entry into any Radiation Control Areas aboard the N/S SAVANNAH. Control Areas are defined as any space, compartment, or area designated as a Radiation Area due to the presence of radioactivity, radiation sources, residual radioactivity, or radioactive contamination in the space or on equipment, in systems, etc. These areas are posted with the appropriate radiation caution signs. Entry into Control Areas should be made with the minimum number of persons required to perform the work or inspection. Time required to perform work or inspections should be as short as possible to prevent unnecessary radiation exposure to personnel.

A. Compartment or space to be entered: PRIMARY CONTAINMENT FROM SECONDARY CONTAINMENT

B. Date and time entered: 4-11-05 CONTINUAL

C. Protective Clothing Shall be worn as follows:

1. Anti-C Suits (coveralls)........... ✓
2. Shoe Covers .... ✓ 2 PR
3. Gloves .... ✓ 2 PR
4. Respirators .... ✓ AS NECESSARY
5. Hoods (head cover) .... ✓
6. . ... ____

D. Personnel Dosimeters Shall be worn by each worker: YES ✓ NO____

E, Record of Personnel Exposure Shall be maintained : YES ✓ NO____
(Maintain Personnel Exposure Record on form C-1)

F. Record of Numbered Security Seals:
Number on seal removed: ______________ Removed By: ____________________________
Number on seal installed: ______________ Installed By: ____________________________

G. Other Information: PRIMARY CONTAINMENT TO BE VENTILATED PRIOR TO AND DURING ENTRY. DRESS REQUIREMENTS AS ABOVE. FRISK HANDS & FEET AT EXIT TO PRIMARY CONTAINMENT, WHOLE BODY FRISK AFTER EXITING AREA.

PERSONNEL SIGN ON:

[signatures]

4-13-05
PRIMARY 1ST LEVEL ONLY OPEN TO ACCESS WITH DOSIMETRY ONLY.

Appendix G
SUMMARY OF OPERATING PROCEDURES

The characterization effort was implemented in accordance with a preestablished conduct of operations that included nine project-specific procedures encompassing all radiological aspects of the project. These procedures included the following:

1. RADIATION WORKER TRAINING—established the process for training individuals to work safely in radiological areas. This procedure applied to WPI employees and subcontractors who performed or supported work in radiological areas.

2. DOSIMETRY ISSUE—described the processes used for issuing dosimetry to WPI and others aboard the N/S SAVANNAH as deemed appropriate by the RSO.

3. CONTAMINATION CONTROL—provided instructions for using protective clothing (PC) to control personnel contamination, monitoring personnel, and materials for contamination, and determining follow-up actions.

4. RADIATION SURVEYS AND SAMPLING—provided guidance for the performance of radiation surveys using portable survey instruments, surveys for removable surface contamination, and obtaining physical samples of materials.

5. RADIOACTIVE AIRBORNE SAMPLING—established the method for collecting various types of airborne radioactivity samples, and for documenting the Derived Air Concentration (DAC) associated with samples collected for purposes of respiratory protection.

6. MANAGING RESPIRATORS—described the processes used for the protection of employees from occupational respiratory hazards, both radiological and non-radiological.

7. SHIPBOARD RADWASTE MANAGEMENT—provided instructions and established processes for handling radioactive waste aboard N/S SAVANNAH.

8. DATA AND RECORD MANAGEMENT—provided instructions for collection, analysis, documentation, and archiving of radiological data and records obtained during characterization.

9. N/S SAVANNAH SPECIAL INITIAL CONTAINMENT ENTRY PROCEDURE—provided instructions for the initial entry into primary containment for purposes of sampling, performing radiological surveys, and other characterization efforts.

Appendix H
Respiratory Protection

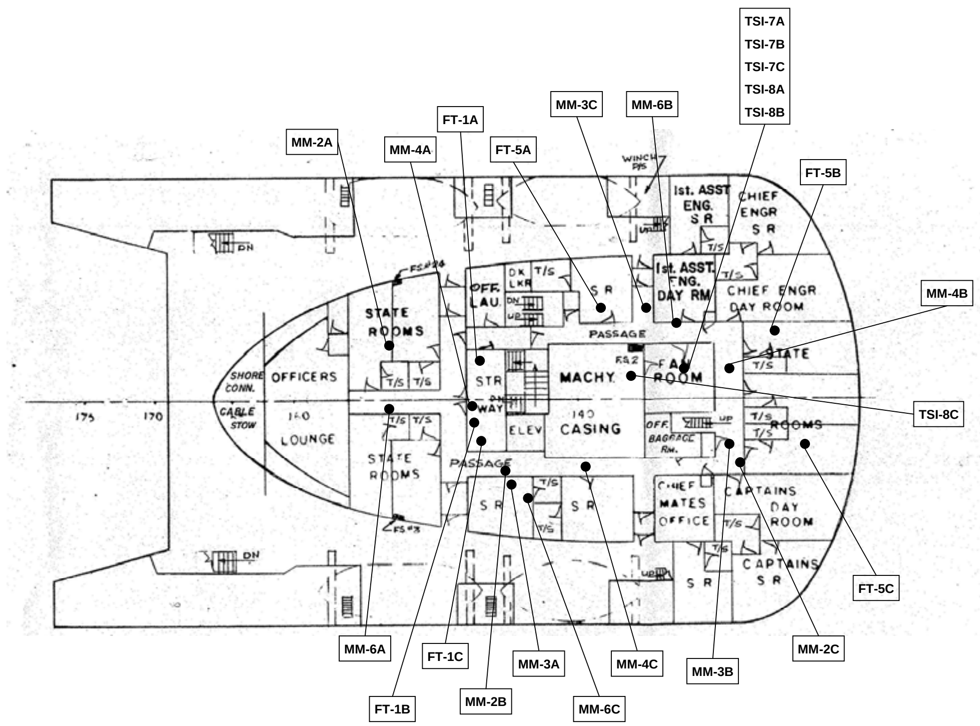
To fully assess radiological characteristics of the N/S SAVANNAH, entry into areas with unknown radiological conditions was necessary. Respiratory protection was needed to make these entries.

Qualifying an individual for a respirator involved training, passing a medical, and a fit test. Members of the project, that were likely to perform tasks requiring respirator protection, were trained in wearing respirators and received medical examinations for wearing respirators. These medicals were performed at Bon Secours OccuMed by Roxanne Dietzer, DO. A qualitative respirator fit test was also performed on these individuals. The respirator selected for this project is the MSA Ultra Twin, dual-canister respirator. The combo canister (Number GMA-P100) with both HEPA and charcoal filters was used for this project. These respirators were MARAD (SERAT) equipment.

Those individuals that qualified to wear a respirator included the following:

- James H. Lovedahl
- John W. Bowen
- R. Jon Stouky
- Thomas Craddock
- Loman H. Scott

Appendix I
Revised Deck-specific Sampling Plan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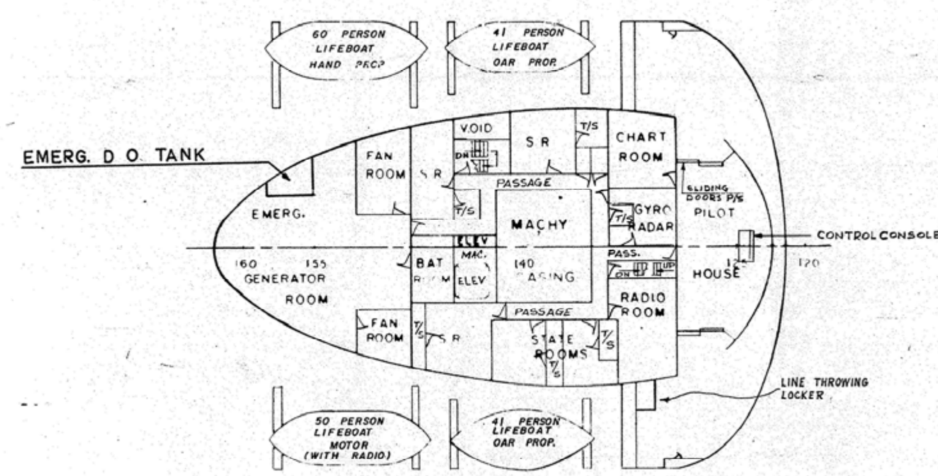
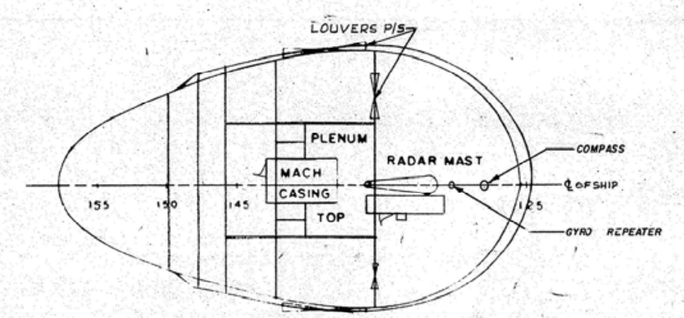
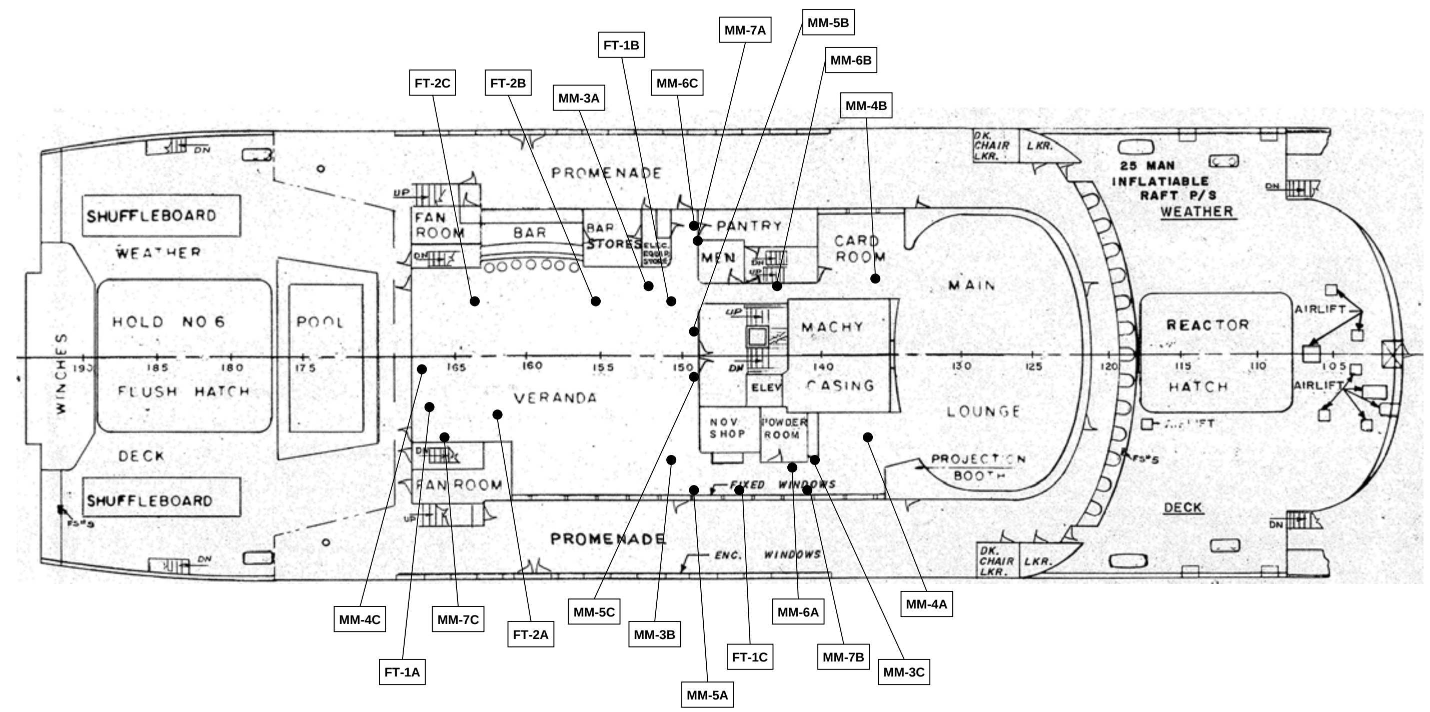
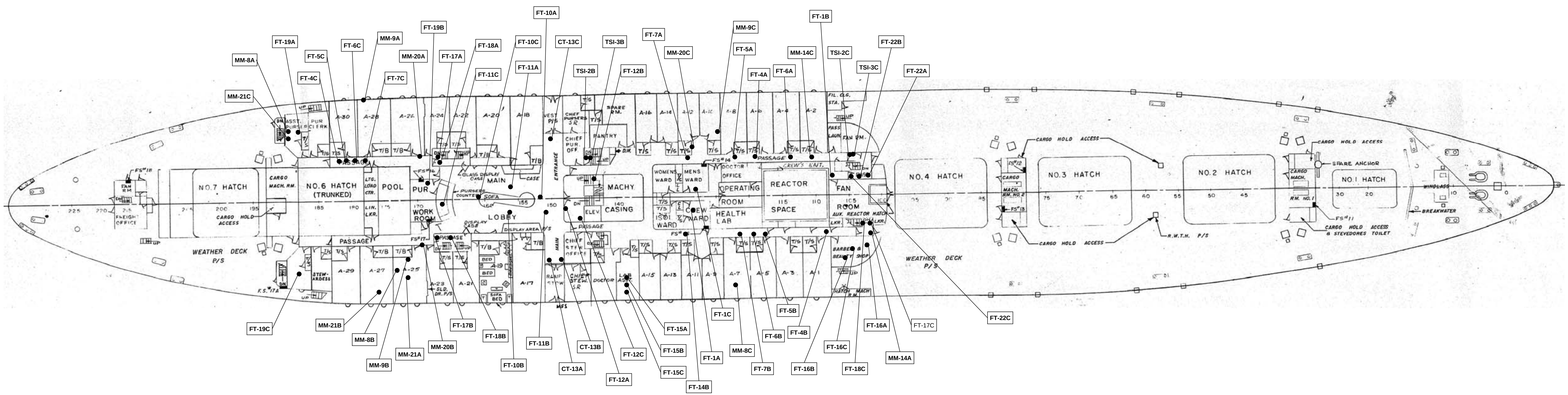
TSI-7C
TSI-8A
TSI-8B
MM-3C
MM-6B
FT-1A
MM-2A
MM-4A
FT-5A
FT-5B
MM-4B
TSI-8C
FT-5C
MM-2C
MM-3B
MM-4C
MM-3A
MM-6C
MM-2B
FT-1C
FT-1B
MM-6A
1st. ASST ENG. S R
CHIEF ENGR S R
1st. ASST. ENG. DAY RM
CHIEF ENGR DAY ROOM
STATE ROOMS
OFFICERS LOUNGE
SHORE CONN. CABLE STOW
OFF. LAU.
STR
ELEV
PASSAGE
MACHY. 140 CASING
FAN ROOM
OFF. BAGFACE RM.
CHIEF MATES OFFICE
CAPTAINS DAY ROOM
CAPTAINS S R
S R
T/S
175
170


EMERG. D.O. TANK
60 PERSON LIFEBOAT HAND PROP.
41 PERSON LIFEBOAT OAR PROP.
50 PERSON LIFEBOAT MOTOR (WITH RADIO)
41 PERSON LIFEBOAT OAR PROP.
EMERG.
160 155 GENERATOR ROOM
FAN ROOM
VOID
S R
CHART ROOM
PASSAGE
MACHY 140 CASING
GYRO RADAR
PILOT HOUSE
SLIDING DOORS P/S
CONTROL CONSOLE
BAT ROOM
ELEV
PASS.
RADIO ROOM
STATE ROOMS
LINE THROWING LOCKER
120


LOUVERS P/S
PLENUM
RADAR MAST
MACH CASING
TOP
COMPASS
℄ OF SHIP
GYRO REPEATER
155
150
145
125



FT-2C
FT-2B
MM-3A
FT-1B
MM-6C
MM-7A
MM-5B
MM-6B
MM-4B
PROMENADE
FAN ROOM
BAR
BAR STORES
PANTRY
MEN
CARD ROOM
MAIN
LOUNGE
MACHY CASING
ELEV
NOV. SHOP
POWDER ROOM
PROJECTION BOOTH
VERANDA
SHUFFLEBOARD
WEATHER
HOLD NO 6
FLUSH HATCH
POOL
DECK
WINCHES
25 MAN INFLATIABLE RAFT P/S
WEATHER
REACTOR HATCH
AIRLIFT
DECK
DK. CHAIR LKR.
LKR.
FIXED WINDOWS
ENC. WINDOWS
UP
DN
190
185
180
175
165
160
155
150
140
130
125
120
115
110
105
MM-4C
MM-7C
FT-1A
FT-2A
MM-5C
MM-3B
MM-5A
FT-1C
MM-6A
MM-7B
MM-3C
MM-4A



FT-10A
FT-19B
MM-9C
FT-1B
FT-19A
FT-6C
MM-9A
FT-18A
FT-10C
CT-13C
TSI-3B
FT-7A
FT-5A
TSI-2C
FT-22B
MM-8A
FT-5C
MM-20A
FT-17A
MM-20C
MM-14C
FT-4C
FT-7C
FT-11C
FT-11A
TSI-2B
FT-12B
FT-4A
FT-6A
TSI-3C
FT-22A
MM-21C
NO.7 HATCH
CARGO MACH. RM.
NO.6 HATCH (TRUNKED)
POOL
PUR
WORK ROOM
MAIN
LOBBY
ENTRANCE
MACHY CASING
ELEV
WOMENS WARD
MENS WARD
DOCTOR OFFICE
OPERATING ROOM
HEALTH LAB
CREW WARD
ISOL WARD
REACTOR SPACE
CREW'S ENT.
PASSAGE
FAN ROOM
AUX. REACTOR HATCH
NO.4 HATCH
NO.3 HATCH
NO.2 HATCH
NO.1 HATCH
CARGO HOLD ACCESS
SPARE ANCHOR
WINDLASS
BREAKWATER
CARGO HOLD ACCESS & STEVEDORES TOILET
R.W.T.H. P/S
WEATHER DECK P/S
FREIGHT OFFICE
FAN RM
PANTRY
SPARE RM.
CHIEF PURSERS SR
CHIEF PUR. OFF
CHIEF STEW. OFFICE
DOCTOR
LAB ASST.
BARBER & BEAUTY SHOP
HATCH MACH RM.
STEWARDESS
ASST. PURSER
PUR CLERK
FT-19C
MM-21B
MM-8B
MM-9B
MM-21A
MM-20B
FT-17B
FT-18B
FT-10B
FT-11B
CT-13A
CT-13B
FT-12A
FT-12C
FT-15A
FT-15B
FT-15C
FT-14B
FT-1A
FT-1C
MM-8C
FT-7B
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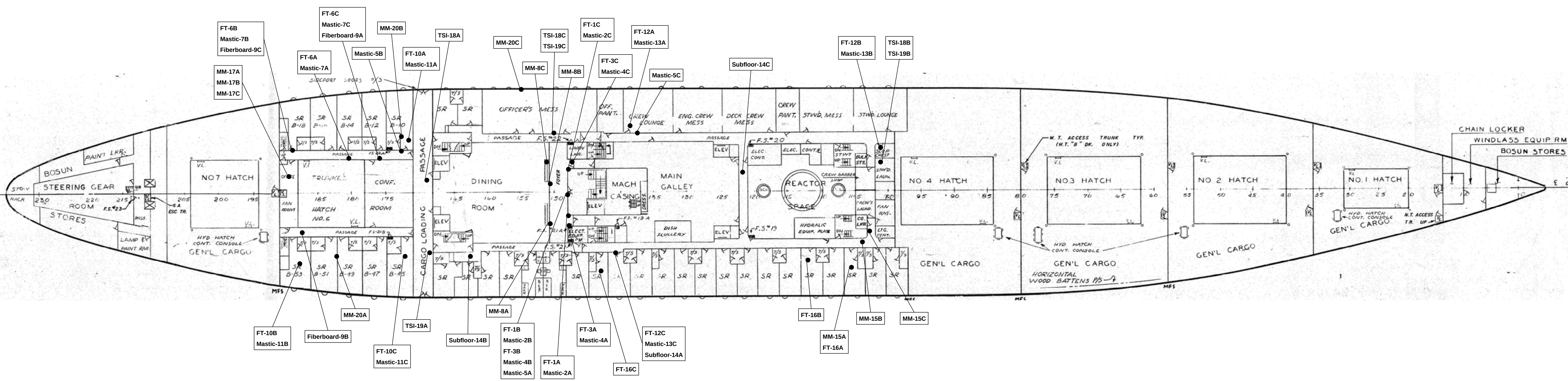
FT-22C



FT-6B
Mastic-7B
Fiberboard-9C
MM-17A
MM-17B
MM-17C
FT-6A
Mastic-7A
FT-6C
Mastic-7C
Fiberboard-9A
Mastic-5B
MM-20B
FT-10A
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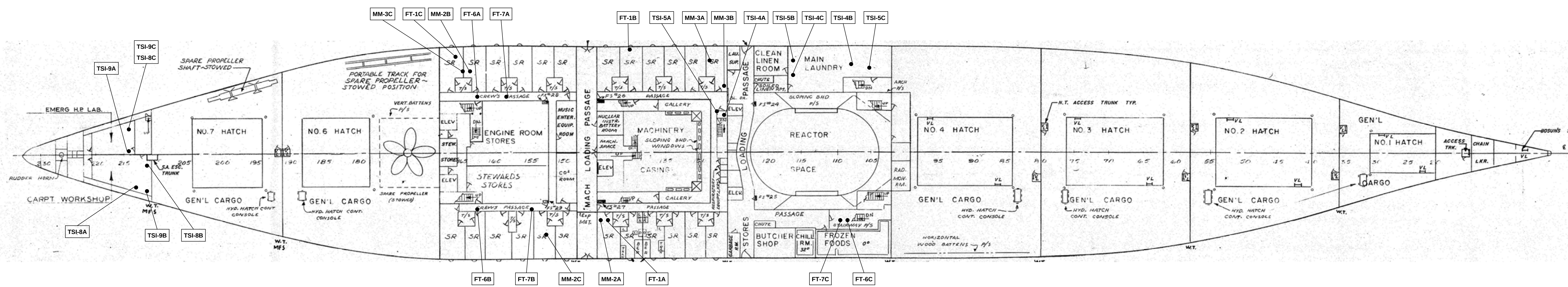
MM-20C
MM-8C
TSI-18C
TSI-19C
MM-8B
FT-1C
Mastic-2C
FT-3C
Mastic-4C
FT-12A
Mastic-13A
Mastic-5C
Subfloor-14C
FT-12B
Mastic-13B
TSI-18B
TSI-19B
MM-20A
FT-10B
Mastic-11B
Fiberboard-9B
TSI-19A
FT-10C
Mastic-11C
Subfloor-14B
MM-8A
FT-1B
Mastic-2B
FT-3B
Mastic-4B
Mastic-5A
FT-1A
Mastic-2A
FT-3A
Mastic-4A
FT-16C
FT-12C
Mastic-13C
Subfloor-14A
FT-16B
MM-15A
FT-16A
MM-15B
MM-15C
BOSUN
PAINT LKR.
STEERING GEAR
ROOM
STORES
NO7 HATCH
TRUNK
HATCH
NO. 6
CONF.
ROOM
GEN'L CARGO
HYD HATCH
CONT. CONSOLE
SIDEPORT DOORS P/S
CARGO LOADING
PASSAGE
OFFICER'S MESS
DINING
ROOM
OFF.
PANT.
CREW
LOUNGE
ENG. CREW
MESS
DECK CREW
MESS
CREW
PANT.
STWD. MESS
STWD. LOUNGE
MACH
CASING
MAIN
GALLEY
DISH
SCULLERY
REACTOR
SPACE
HYDRALIC
EQUIP. PLAT.
NO 4 HATCH
NO.3 HATCH
NO 2 HATCH
NO.1 HATCH
W.T. ACCESS TRUNK TYP.
(W.T. "B" DK. ONLY)
HORIZONTAL
WOOD BATTENS P/S
CHAIN LOCKER
WINDLASS EQUIP RM
BOSUN STORES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FT-1C
MM-2B
FT-6A
FT-7A
FT-1B
TSI-5A
MM-3A
MM-3B
TSI-4A
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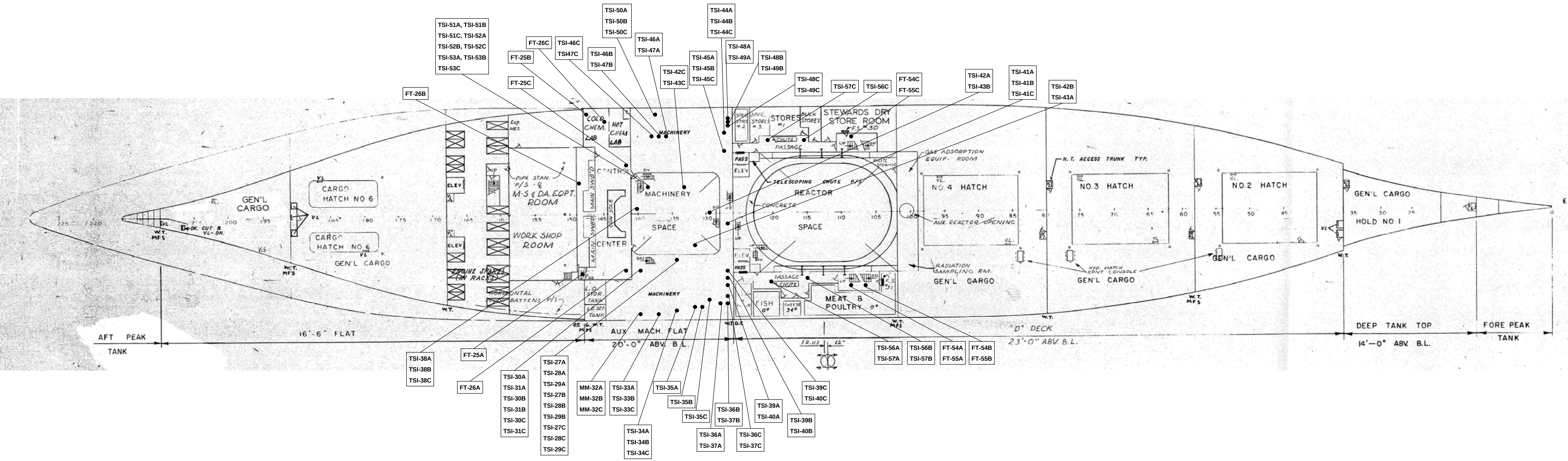
TSI-4C
TSI-4B
TSI-5C
TSI-9C
TSI-8C
TSI-9A
TSI-8A
TSI-9B
TSI-8B
FT-6B
FT-7B
MM-2C
MM-2A
FT-1A
FT-7C
FT-6C
SPARE PROPELLER SHAFT-STOWED
PORTABLE TRACK FOR SPARE PROPELLER~ STOWED POSITION
EMERG H.P. LAB.
NO.7 HATCH
NO.6 HATCH
RUDDER HORN
CARPT WORKSHOP
S.A. ESC. TRUNK
GEN'L CARGO
HYD. HATCH CONT. CONSOLE
SPARE PROPELLER (STOWED)
ENGINE ROOM STORES
STEWARDS STORES
CREW'S PASSAGE
MUSIC ENTER. EQUIP. ROOM
CO² ROOM
MACH LOADING PASSAGE
NUCLEAR INSTR. BATTERY ROOM
MACH. SPACE
MACHINERY CASING
SLOPING BHD. WINDOWS
GALLERY
PASSAGE
ELEV
LOADING PASSAGE
STORES
CLEAN LINEN ROOM
MAIN LAUNDRY
SLOPING BHD
REACTOR SPACE
BUTCHER SHOP
CHILL RM. 32°
FROZEN FOODS 0°
RAD. MON. RM.
STAIRWAY P/S
HORIZONTAL WOOD BATTENS P/S
NO. 4 HATCH
NO. 3 HATCH
NO. 2 HATCH
NO. 1 HATCH
N.T. ACCESS TRUNK TYP.
GEN'L
CARGO
ACCESS TRK.
CHAIN LKR.
BOSUN'S
W.T.
SR
T/S
VL


TSI-51A, TSI-51B
TSI-51C, TSI-52A
TSI-52B, TSI-52C
TSI-53A, TSI-53B
TSI-53C
TSI-50A
TSI-50B
TSI-50C
TSI-44A
TSI-44B
TSI-44C
FT-26C
TSI-46C
TSI47C
TSI-46A
TSI-47A
TSI-48A
TSI-49A
TSI-48B
TSI-49B
FT-25B
TSI-46B
TSI-47B
TSI-45A
TSI-45B
TSI-45C
TSI-42C
TSI-43C
TSI-48C
TSI-49C
FT-25C
TSI-57C
TSI-56C
FT-54C
FT-55C
TSI-42A
TSI-43B
TSI-41A
TSI-41B
TSI-41C
TSI-42B
TSI-43A
FT-26B
GEN'L CARGO
CARGO HATCH NO 6
CARGO HATCH NO 6
GEN'L CARGO
ENGINE SPARES (IN RACKS)
HORIZONTAL BATTENS P/S
ELEV
ELEV
M-S & DA. EQPT. ROOM
PIPE STAN. P/S - ℄
WORK SHOP ROOM
MAIN SWB'D
CONTROL CENTER
COLD CHEM. LAB
HOT CHEM LAB
MACHINERY
MACHINERY SPACE
MACHINERY
L.O. STOR TANK
L.O. SET. TANK
STORES
SPEC. STORES
BULK STORES
STEWARDS DRY STORE ROOM
CHUTE
PASSAGE
PASS
ELEV
TELESCOPING CHUTE P/S
CONCRETE
REACTOR SPACE
GAS ADSORPTION EQUIP. ROOM
AUX. REACTOR OPENING
RADIATION SAMPLING RM.
GEN'L CARGO
PASSAGE
CHUTE
FISH 0°
CHEESE 34°
MEAT & POULTRY 0°
NO. 4 HATCH
N.T. ACCESS TRUNK TYP.
NO.3 HATCH
NO.2 HATCH
HYD. HATCH CONT. CONSOLE
GEN'L CARGO
GEN'L CARGO
GEN'L CARGO
HOLD NO 1
W.T.
AFT PEAK TANK
16'-6" FLAT
AUX. MACH. FLAT
20'-0" ABV. B.L.
"D" DECK
23'-0" ABV. B.L.
DEEP TANK TOP
14'-0" ABV. B.L.
FORE PEAK TANK
FR. 113
TSI-38A
TSI-38B
TSI-38C
FT-25A
FT-26A
TSI-30A
TSI-31A
TSI-30B
TSI-31B
TSI-30C
TSI-31C
TSI-27A
TSI-28A
TSI-29A
TSI-27B
TSI-28B
TSI-29B
TSI-27C
TSI-28C
TSI-29C
MM-32A
MM-32B
MM-32C
TSI-33A
TSI-33B
TSI-33C
TSI-34A
TSI-34B
TSI-34C
TSI-35A
TSI-35B
TSI-35C
TSI-36A
TSI-37A
TSI-36B
TSI-37B
TSI-36C
TSI-37C
TSI-39A
TSI-40A
TSI-39B
TSI-40B
TSI-39C
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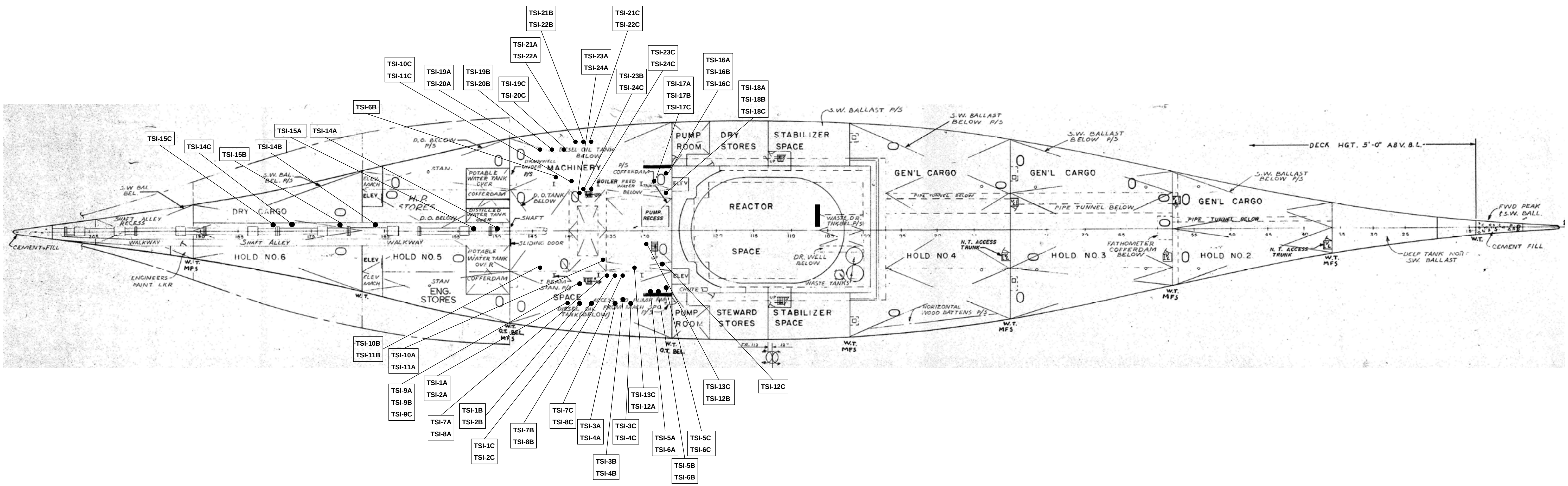
FT-54B
FT-55B



TSI-21B
TSI-22B
TSI-21C
TSI-22C
TSI-21A
TSI-22A
TSI-23A
TSI-24A
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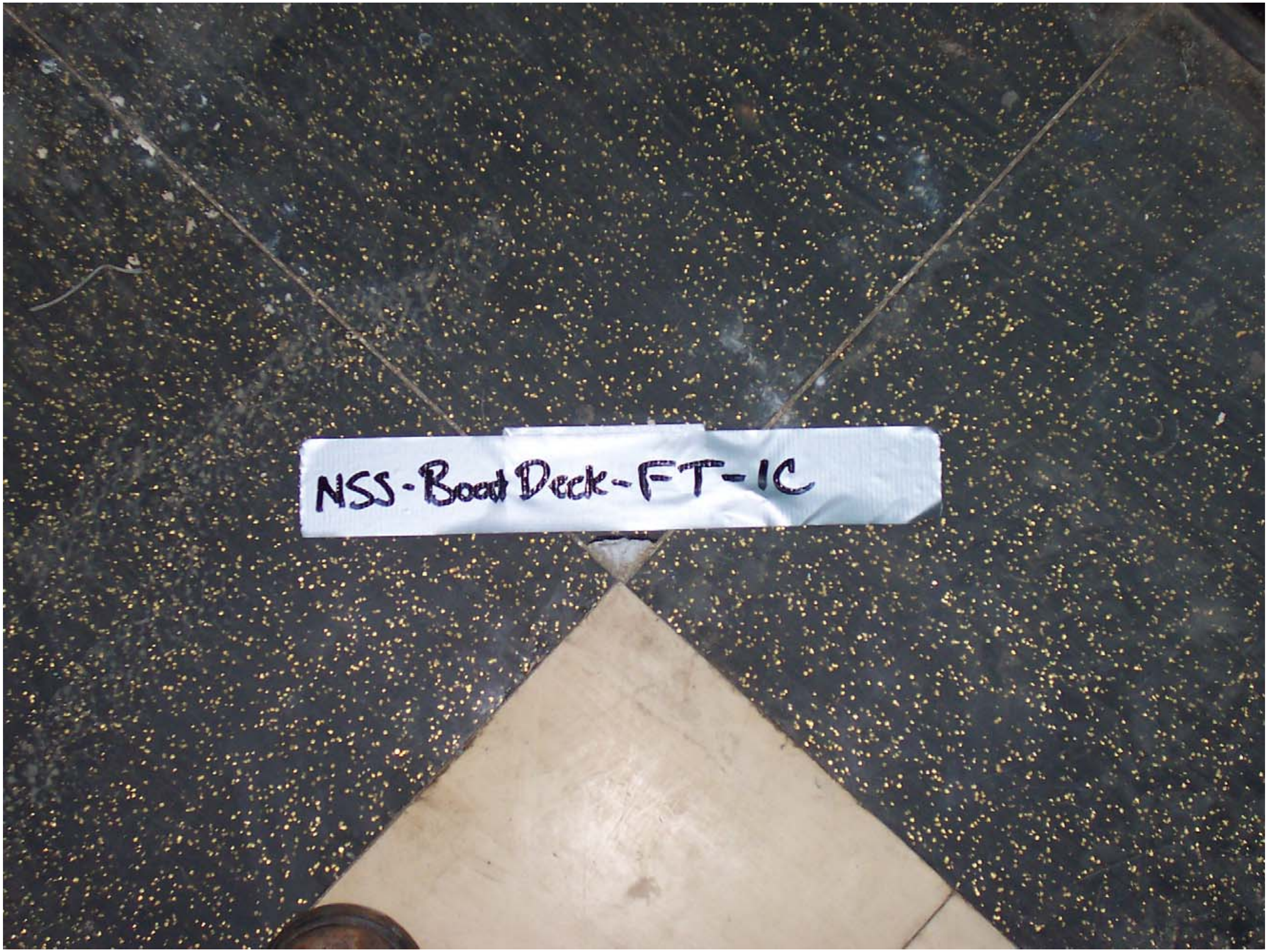
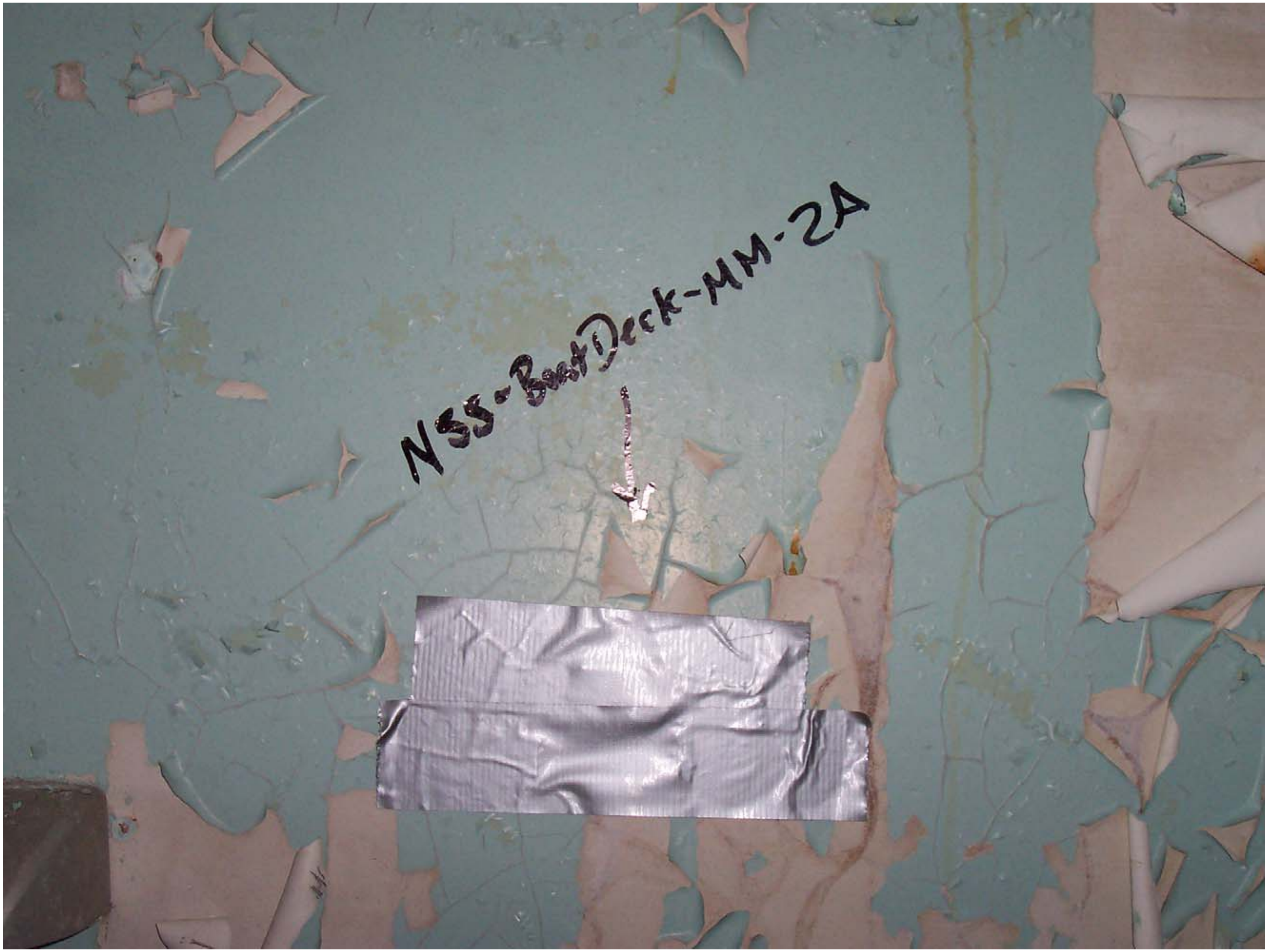
TSI-24C
TSI-10C
TSI-11C
TSI-19A
TSI-20A
TSI-19B
TSI-20B
TSI-19C
TSI-20C
TSI-23B
TSI-24C
TSI-16A
TSI-16B
TSI-16C
TSI-17A
TSI-17B
TSI-17C
TSI-18A
TSI-18B
TSI-18C
TSI-6B
TSI-15A
TSI-14A
TSI-15C
TSI-14C
TSI-15B
TSI-14B
PUMP ROOM
DRY STORES
STABILIZER SPACE
S.W. BALLAST P/S
S.W. BALLAST BELOW P/S
DECK HGT. 5'-0" ABV. B.L.
MACHINERY
DRY CARGO
H.P. STORES
SHAFT ALLEY
WALKWAY
CEMENT FILL
HOLD NO.6
HOLD NO.5
POTABLE WATER TANK OVER
COFFERDAM
DISTILLED WATER TANK OVER
SLIDING DOOR
REACTOR SPACE
GEN'L CARGO
PIPE TUNNEL BELOW
HOLD NO.4
HOLD NO.3
HOLD NO.2
N.T. ACCESS TRUNK
FATHOMETER COFFERDAM BELOW
FWD PEAK F.S.W. BALL.
DEEP TANK NOT S.W. BALLAST
ENGINEERS PAINT LKR
ENG. STORES
STEWARD STORES
WASTE TANKS
HORIZONTAL WOOD BATTENS P/S
W.T. MFS
TSI-10B
TSI-11B
TSI-10A
TSI-11A
TSI-9A
TSI-9B
TSI-9C
TSI-1A
TSI-2A
TSI-7A
TSI-8A
TSI-1B
TSI-2B
TSI-1C
TSI-2C
TSI-7B
TSI-8B
TSI-7C
TSI-8C
TSI-3A
TSI-4A
TSI-3B
TSI-4B
TSI-3C
TSI-4C
TSI-13C
TSI-12A
TSI-5A
TSI-6A
TSI-5B
TSI-6B
TSI-5C
TSI-6C
TSI-13C
TSI-12B
TSI-12C

Appendix J
Ship Photo Log

NSS-Boatdeck-FT-1A


NSS-BoardDeck-FT-1B
FT-1B

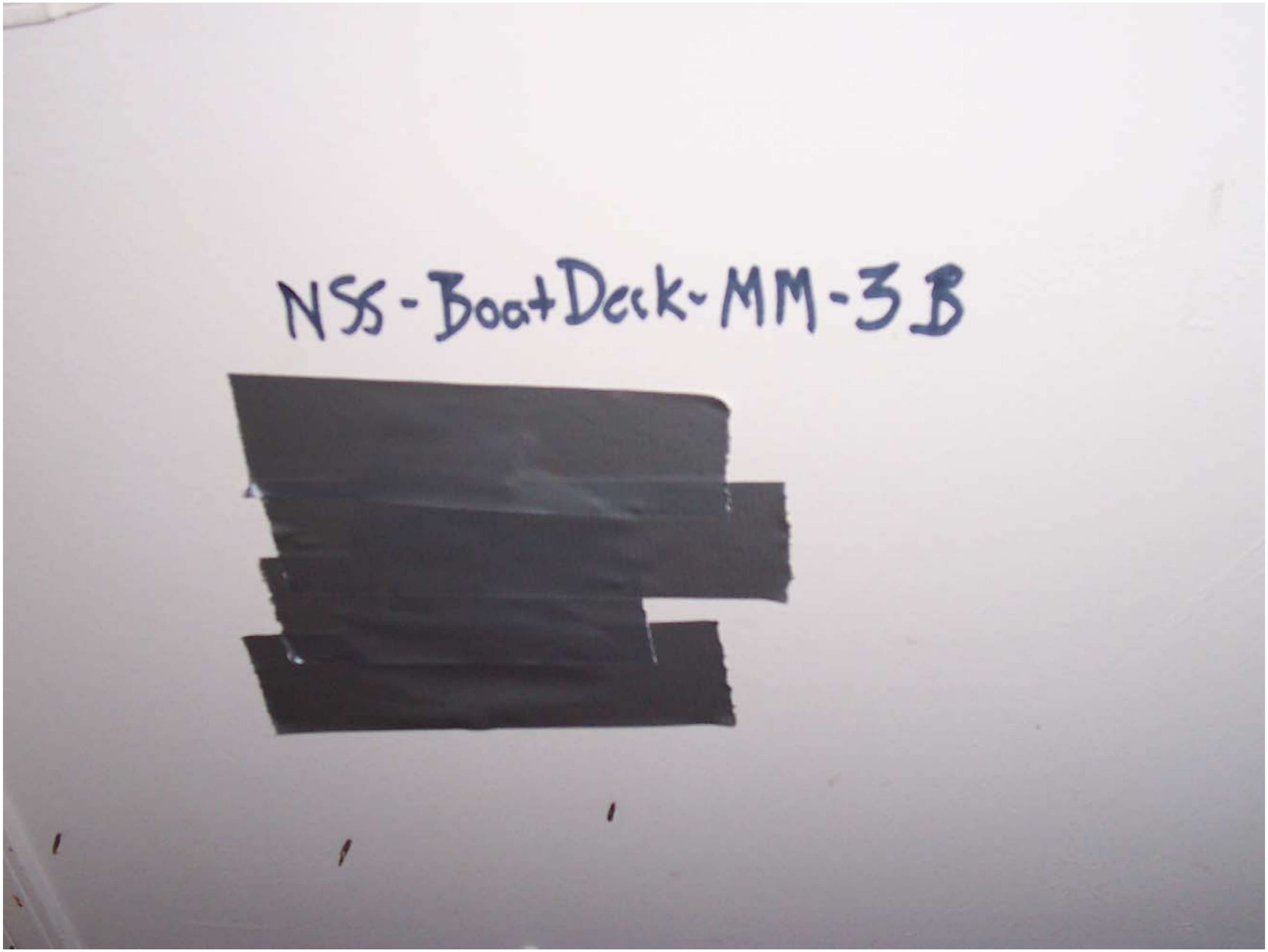

NSS-Boat Deck-FT-1C


NSS-BoatDeck-MM-2A


NSS · Boat Deck-MM-2B

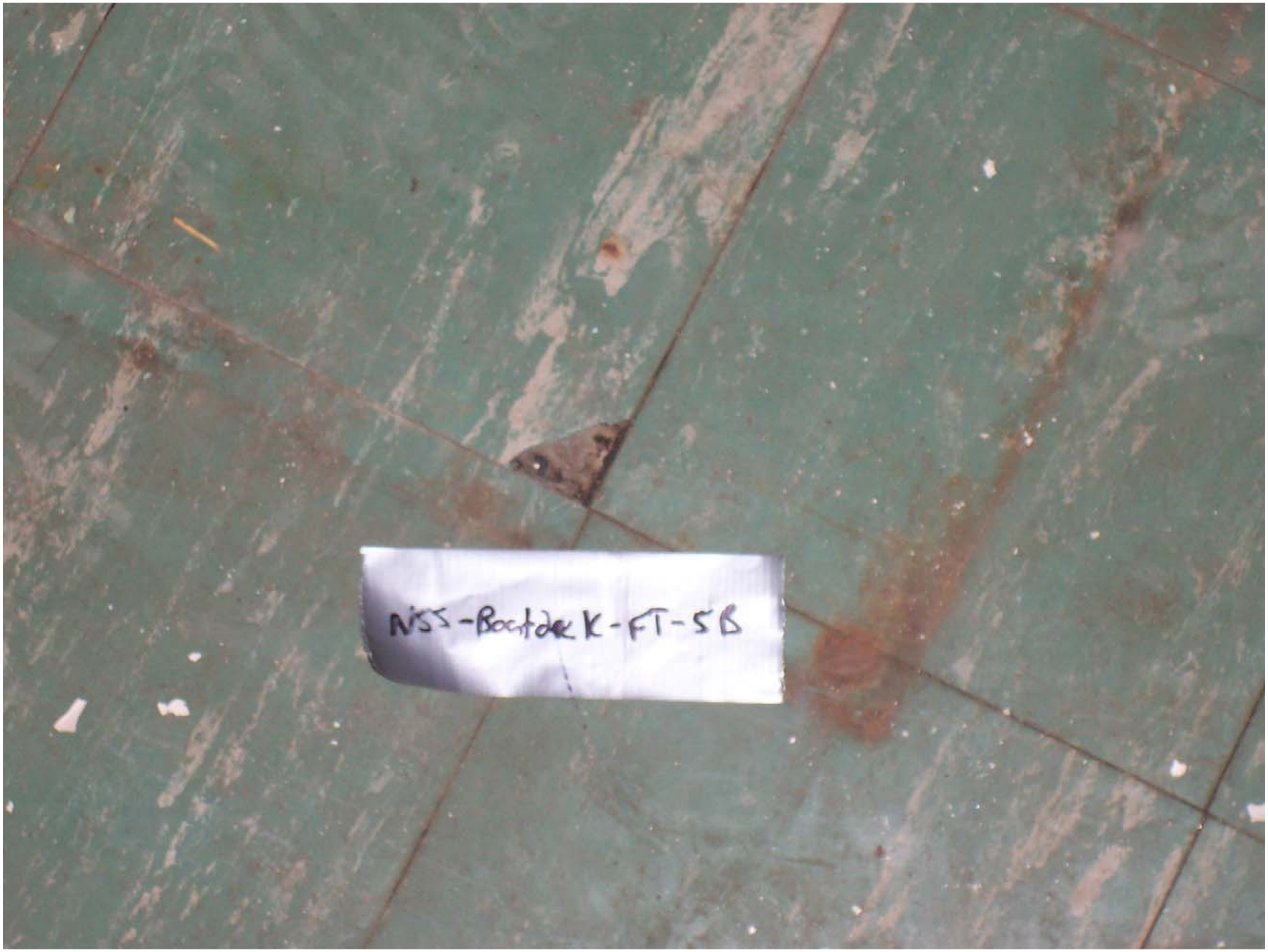

NSS-BoatDeck-MM-ZC

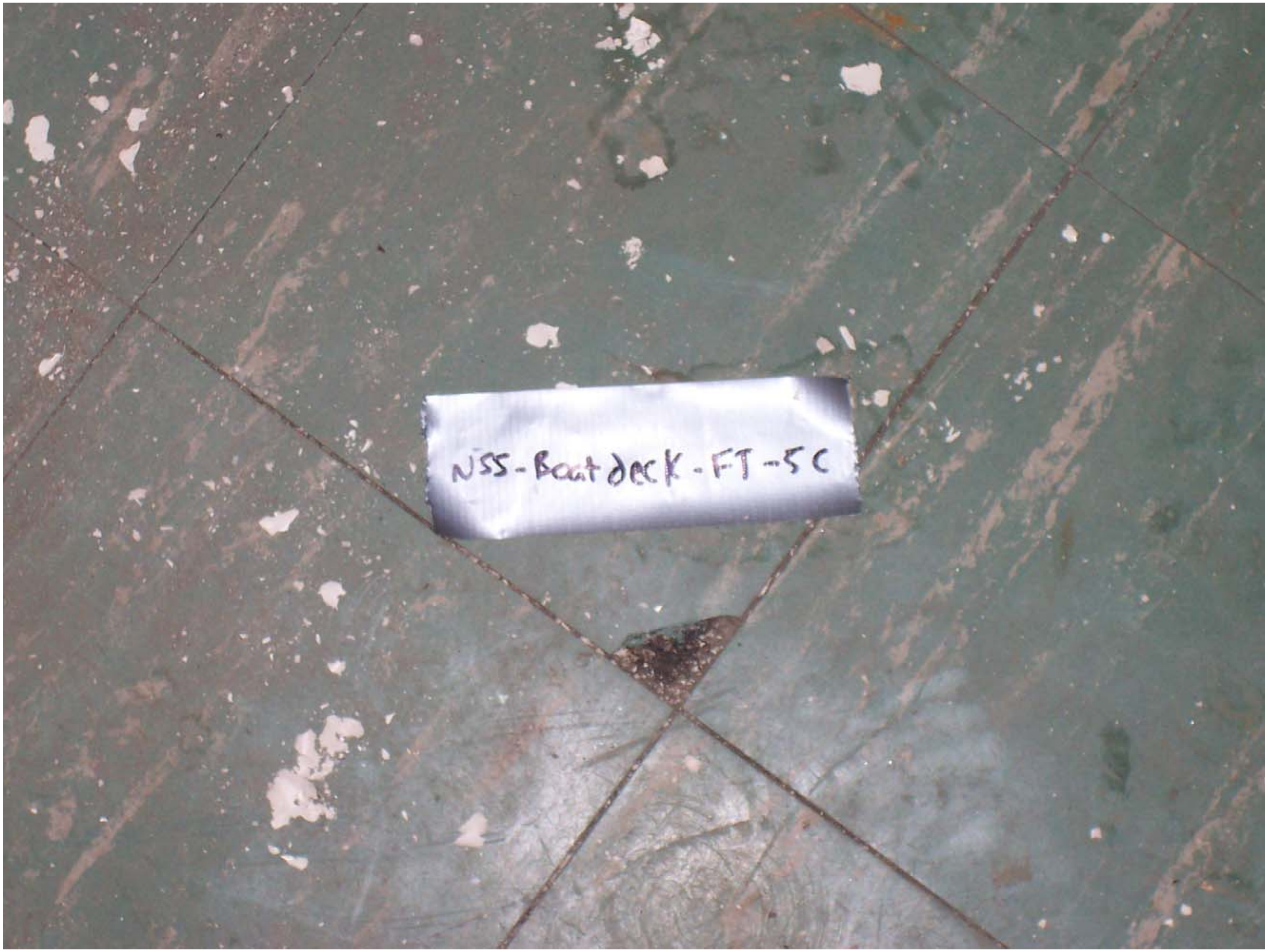

NSS-Boat Deck-MM-3A


NSS - Boat Deck - MM - 3 B


NSS-Boat Deck-MM-3C

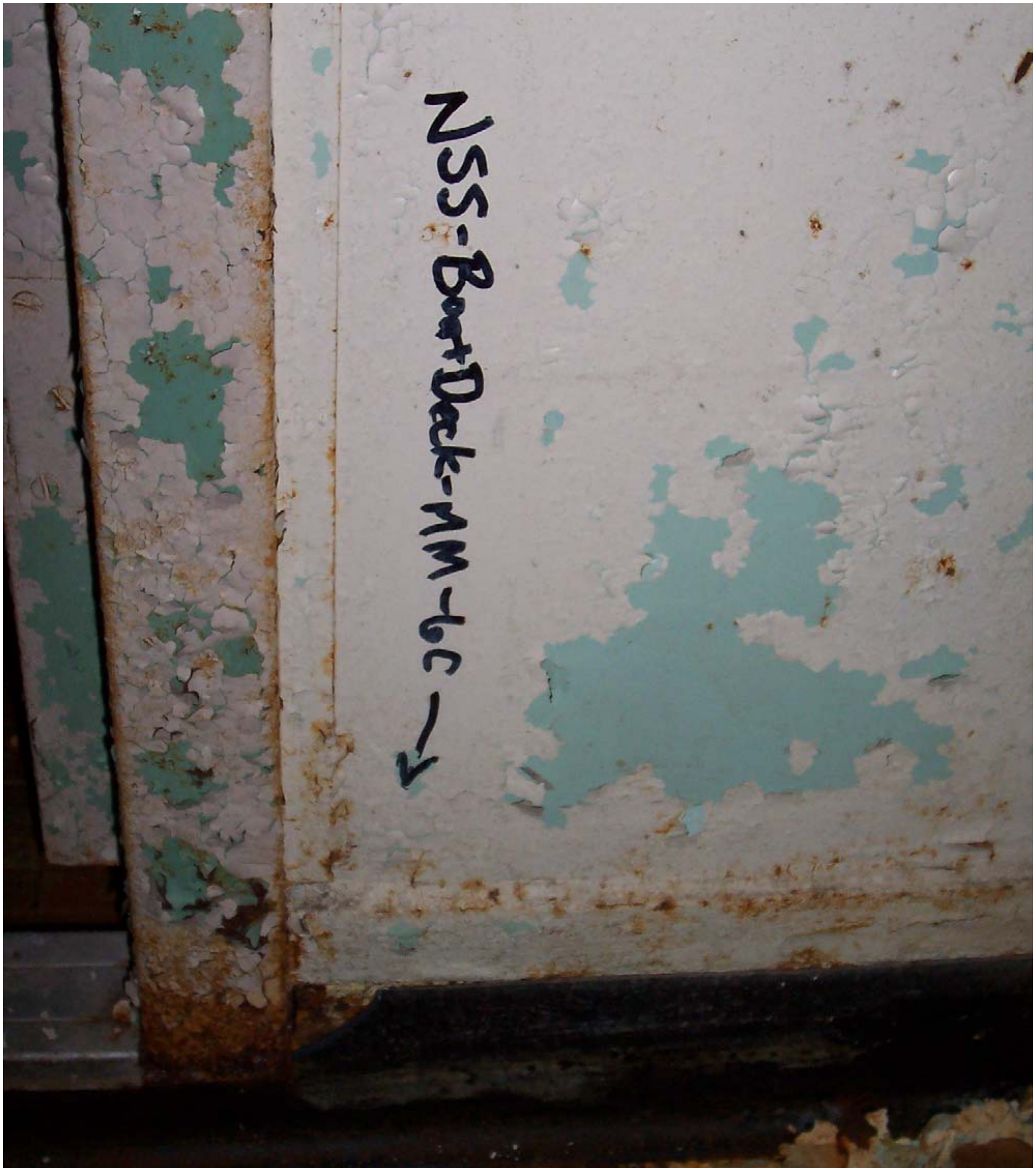

NSS-Boatdeck-FT-5A


NSS-Boatdeck-FT-5B


NSS-Boat deck-FT-5C

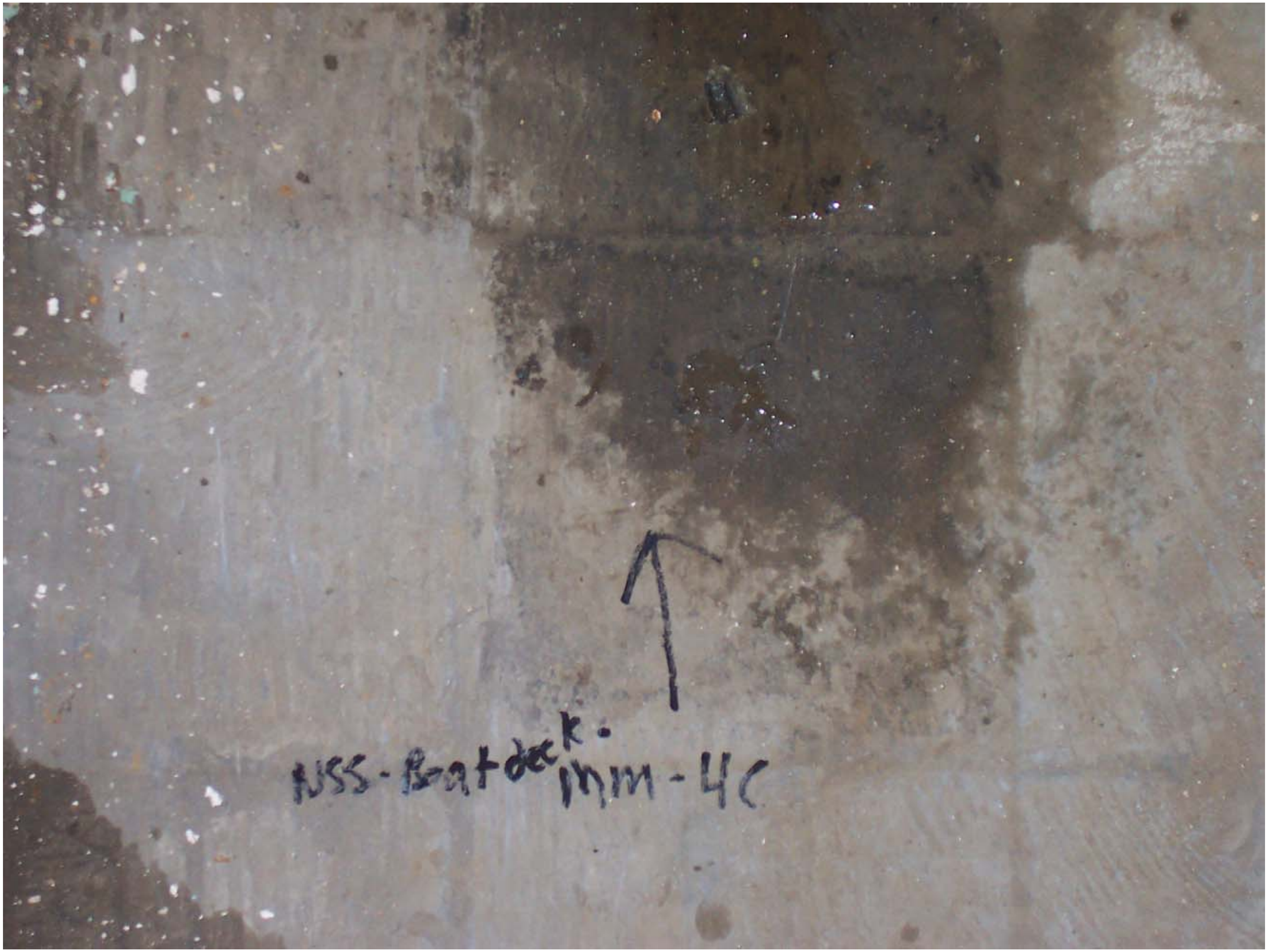

NSS-BoatDeck-MM-6A


NSS·Boat Deck·MM-6B

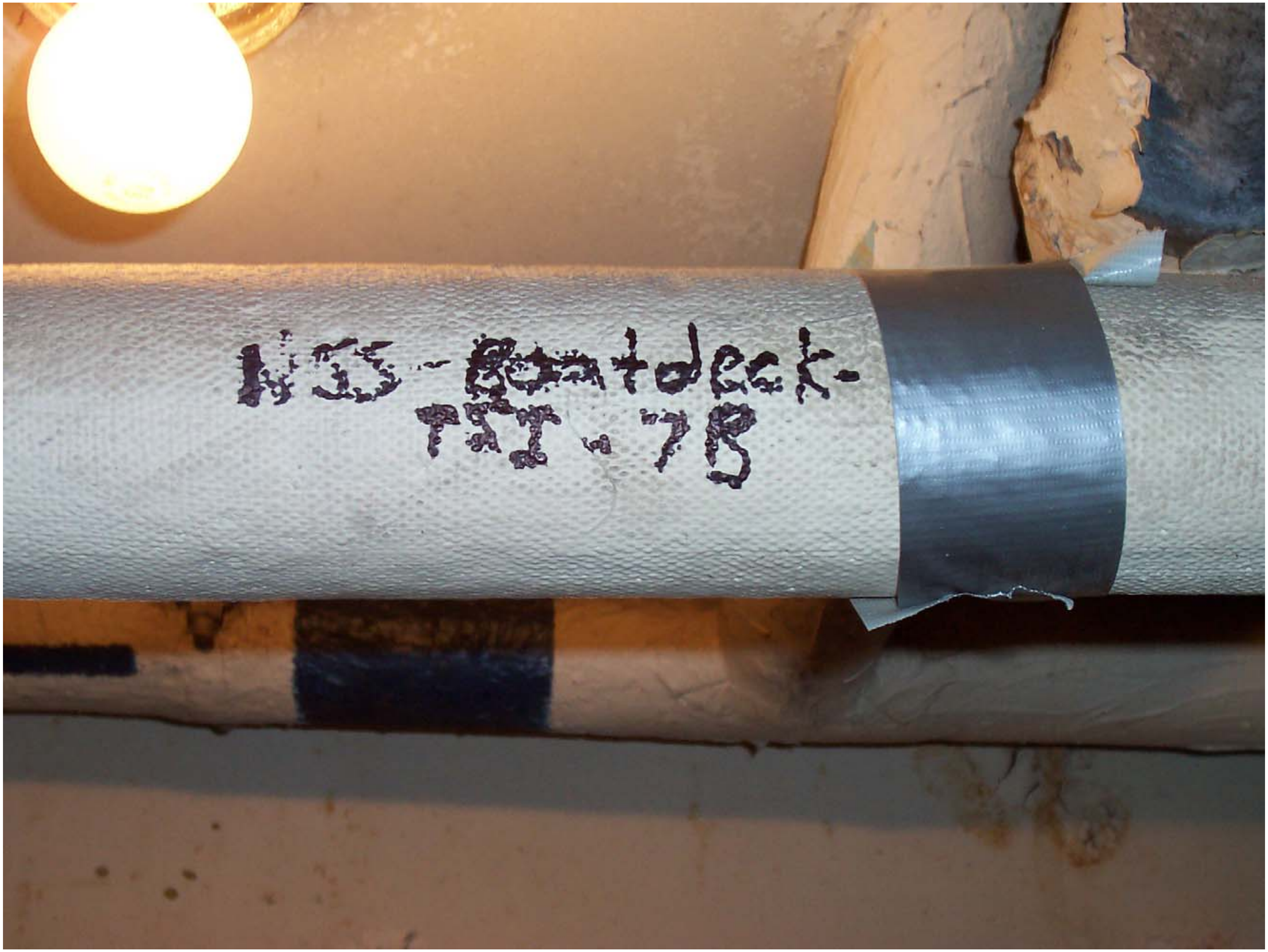

NSS-BoatDeck-MM-6C


NSS - Boat Deck - FT - 1B
NSS - Boat Deck - MM - 4A


NSS - Boatdeck - MM - 4B


NSS-Boat deck. mm-4C

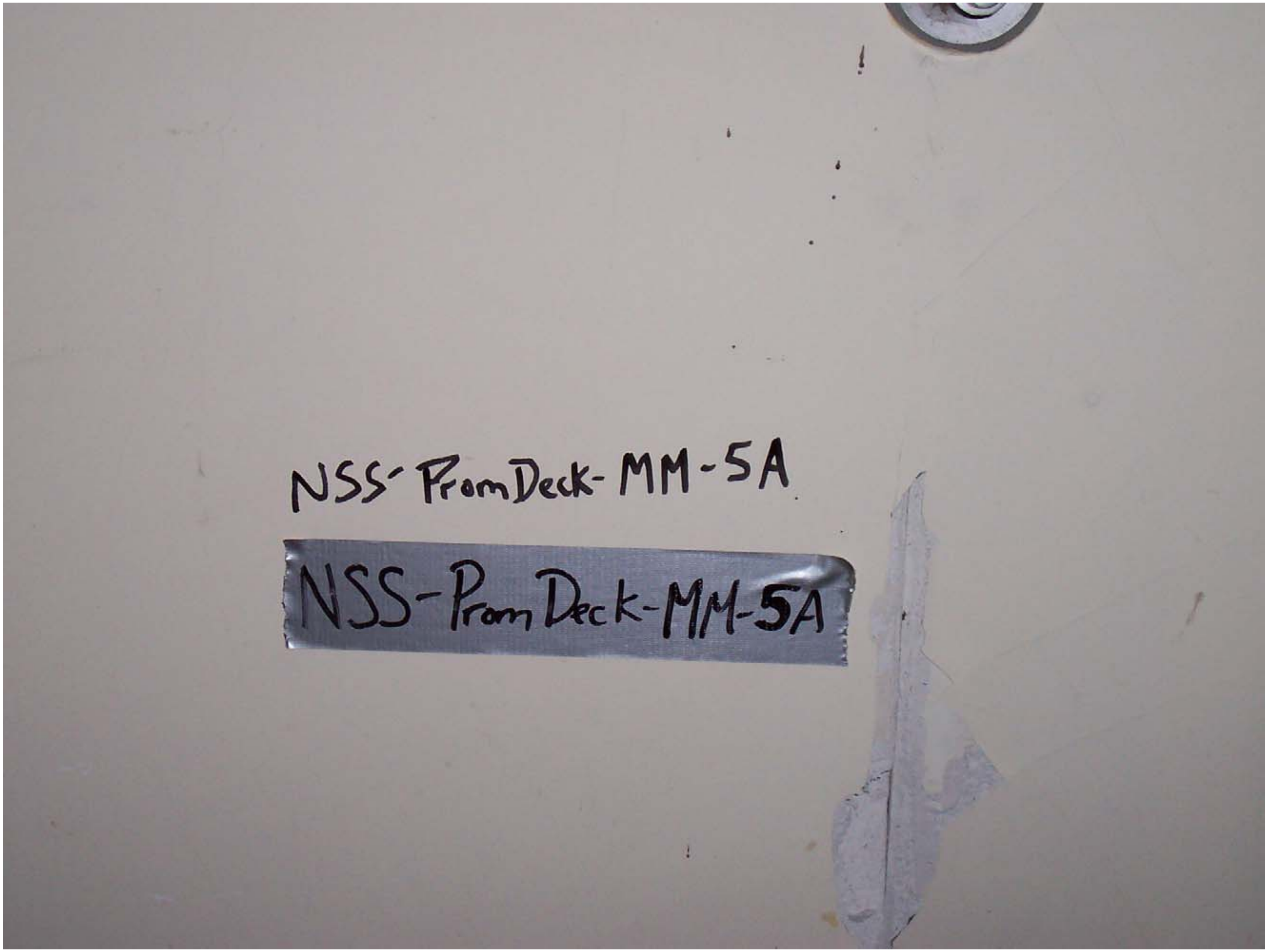

NSS-Boatdeck-TSI-7A
NSS-BoatDeck-TSI-8A


NS5-Boatdeck-
TSI-7B


NSS - Boat dec
TSI 7C


NSS-BoatDeck-TSI-8B


NSS-BoatDeck-751-8C

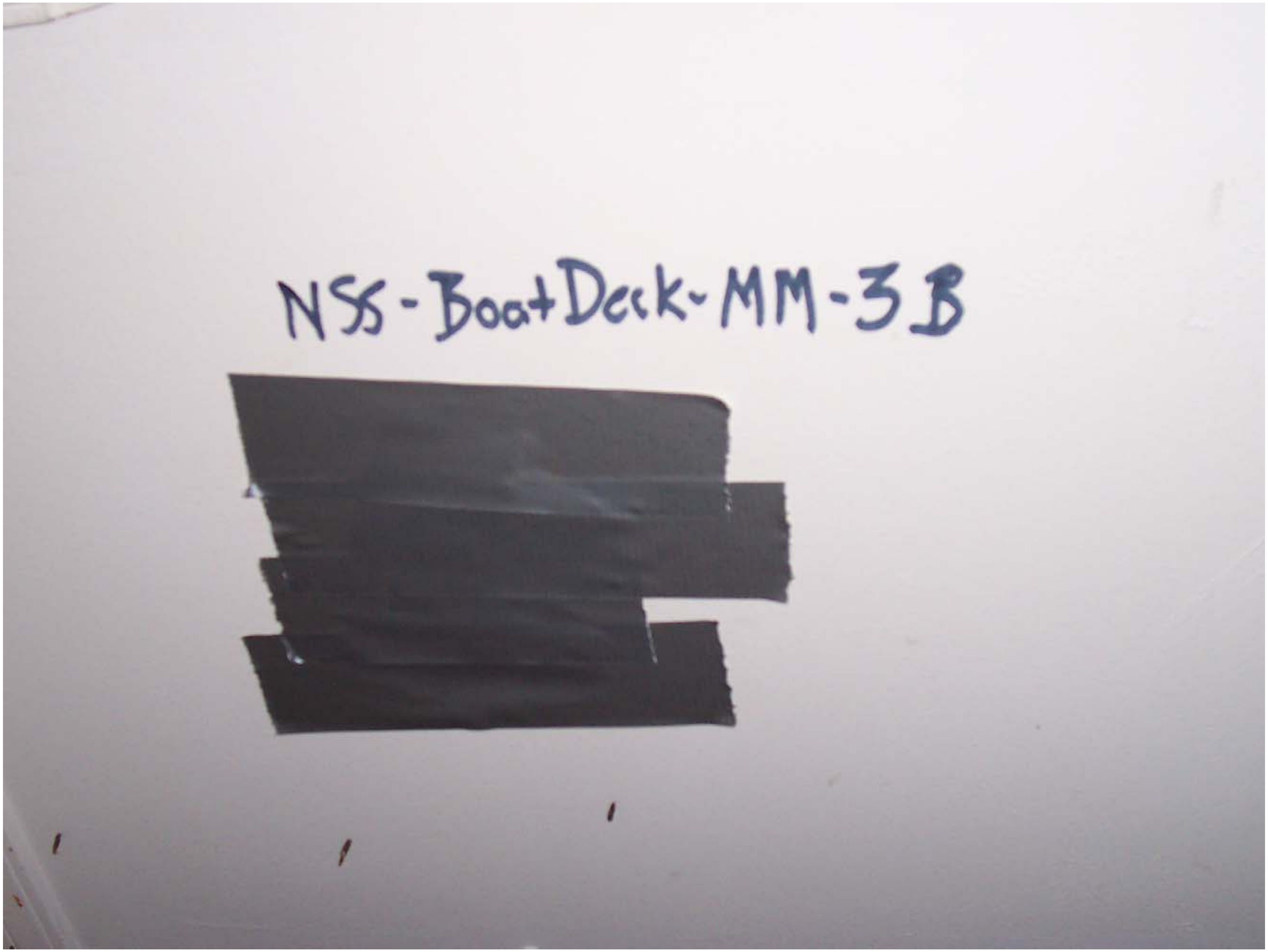

NSS-PromDeck-MM-5A
NSS-PromDeck-MM-5A


NSS-Prom Deck-MM-5B
NSS-Prom Deck-MM-5B

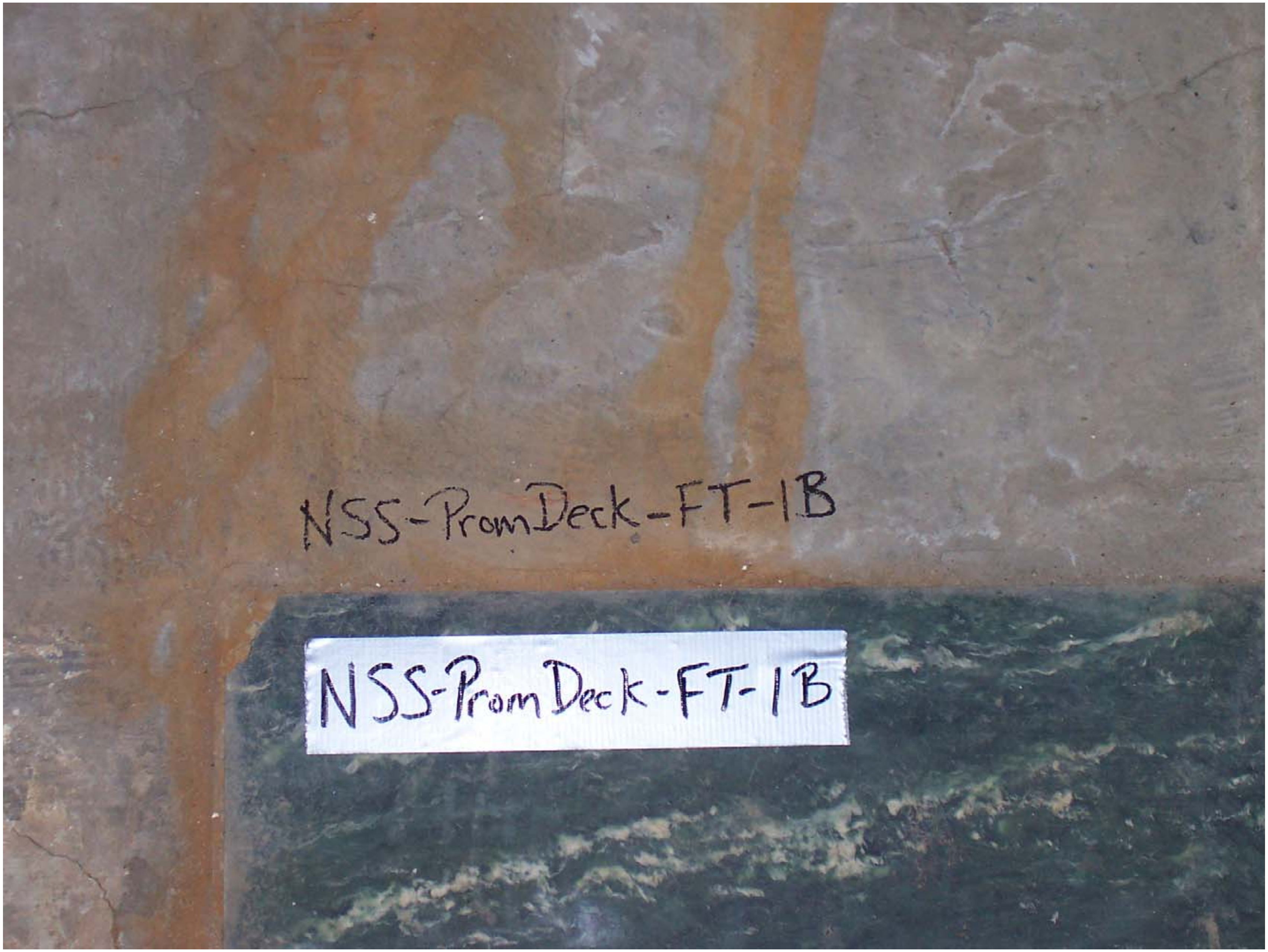

NSS-Prom Deck-MM-5C
NSS-Prom Deck-MM-5C


NSS-PromDeck-MM-6C
NSS-PromDeck-MM-6C


NSS-PromDeck-MM-6B
NSS-Prom Deck-MM-6B

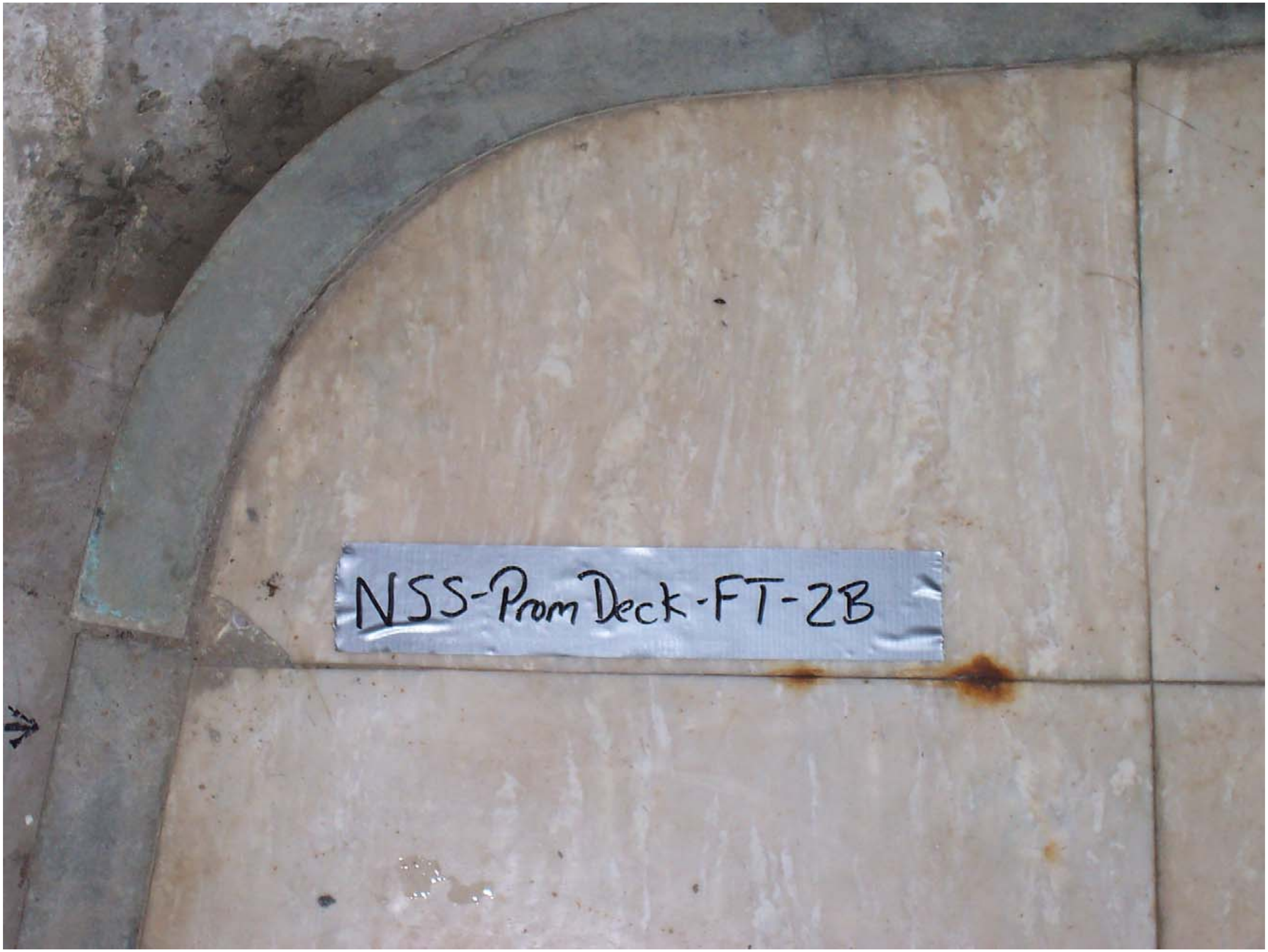

NSS-Boat Deck-MM-3B

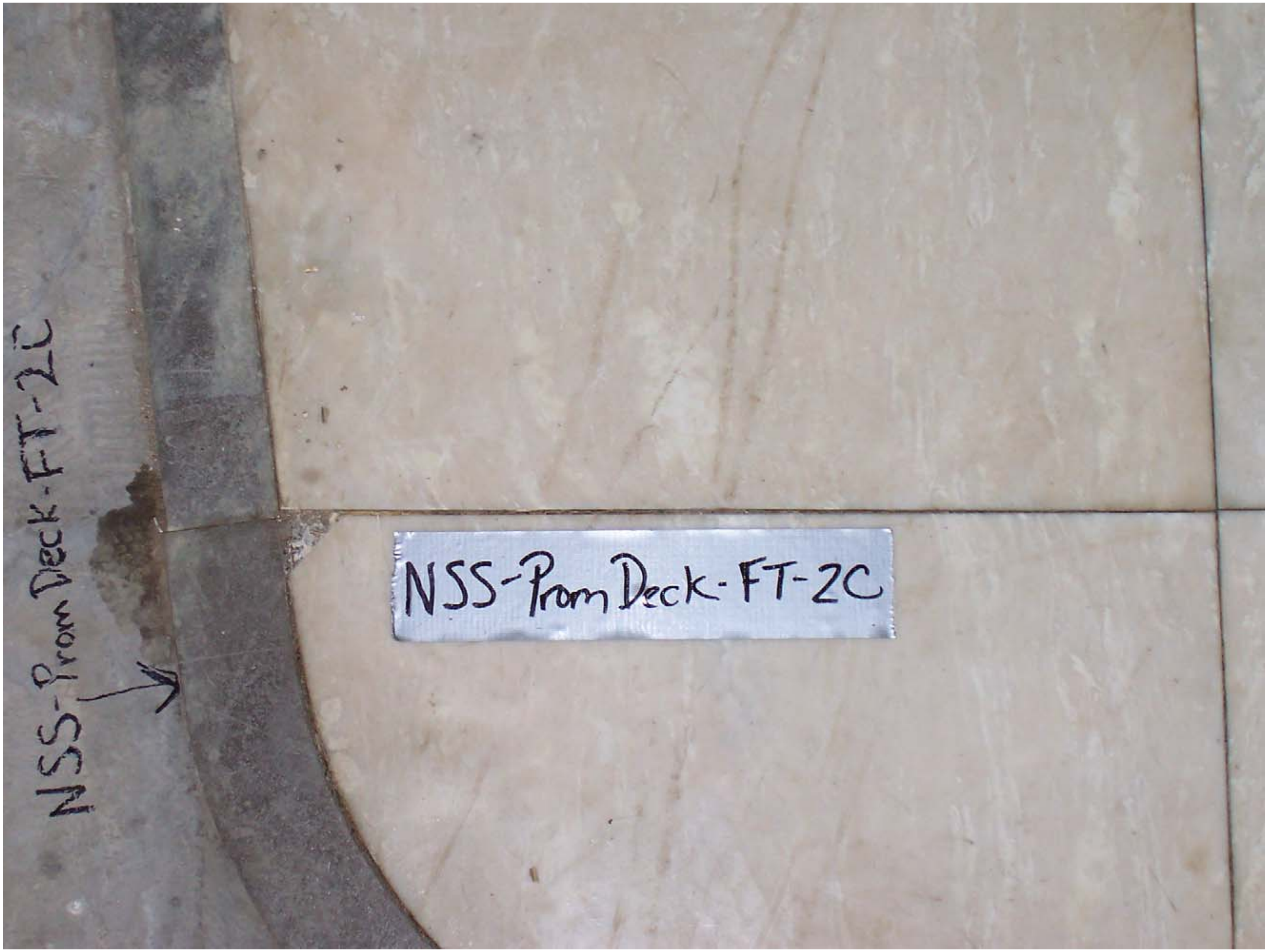

NSS-Prom Deck-FT-1A

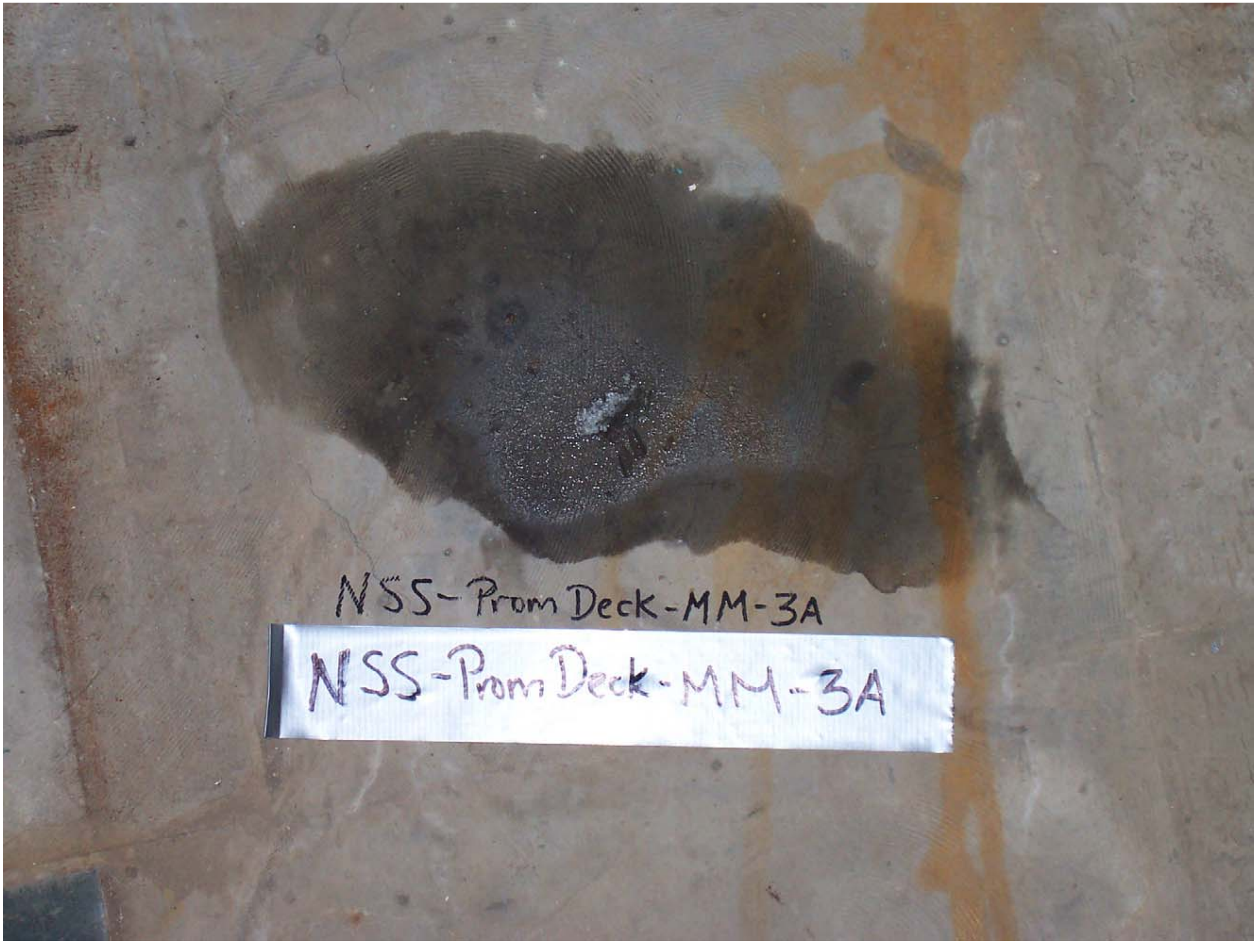

NSS-PromDeck-FT-1B
NSS-PromDeck-FT-1B


NSS-PromDeck-FT-1C


NSS-Prom Deck-FT-2A
NSS-Prom Deck-FT-2A


NSS-Prom Deck-FT-2B


NSS-Prom Deck-FT-2C
NSS-Prom Deck-FT-2C

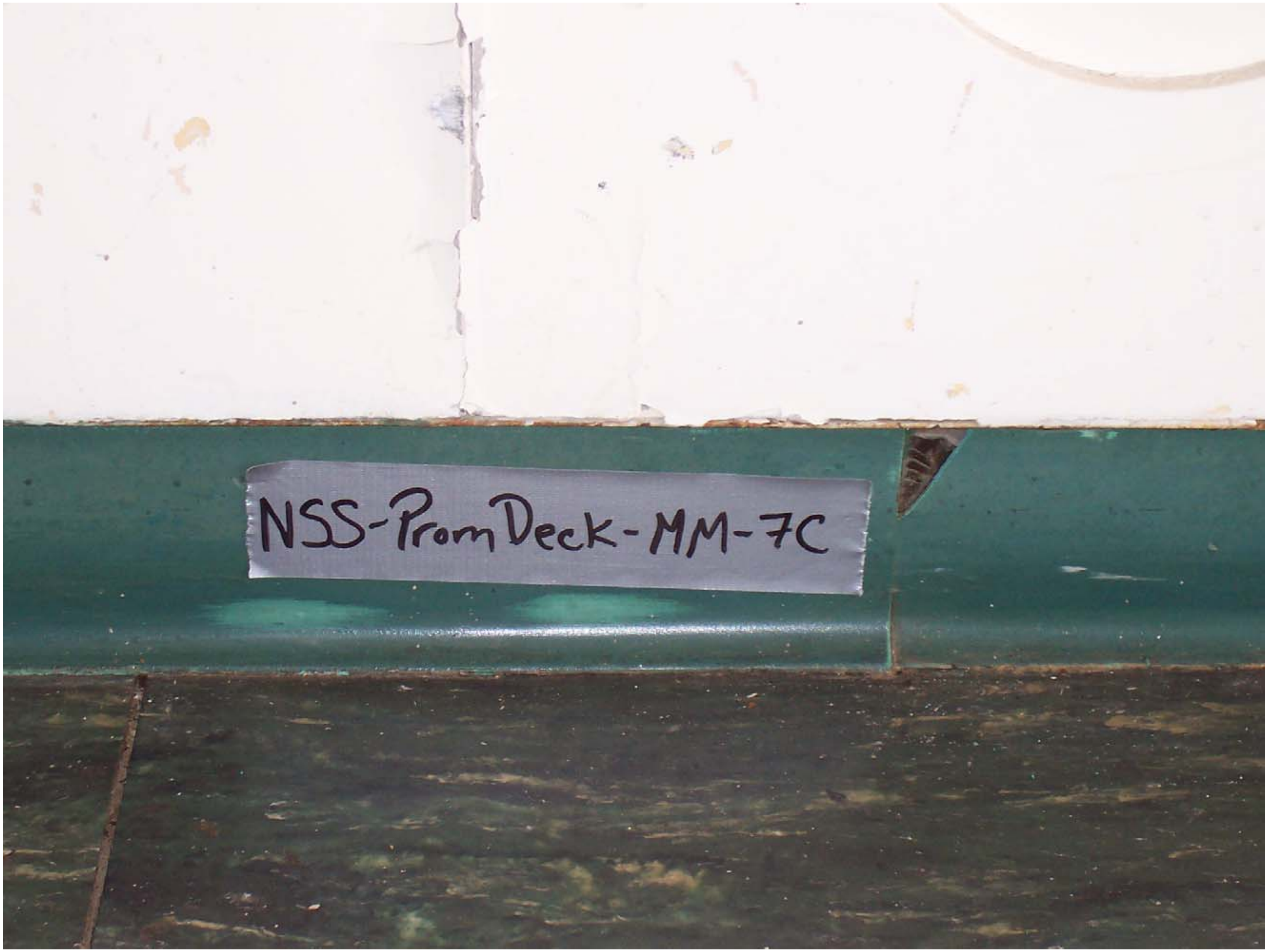

NSS-Prom Deck-MM-3A
NSS-Prom Deck-MM-3A

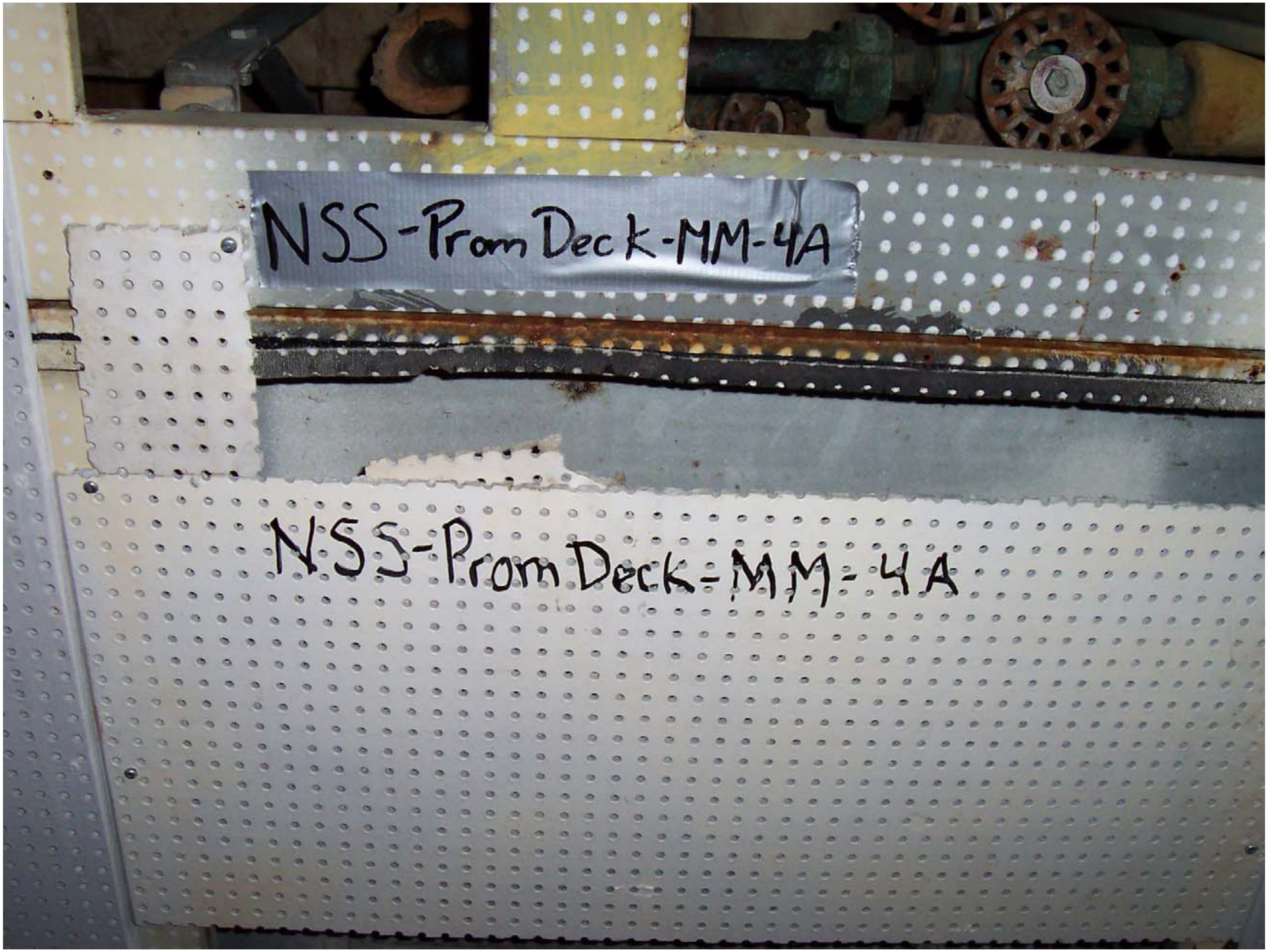

NSS-PromDeck-MM-3B
NSS-PromDeck-MM-3B


NSS-Prom Deck-MM-3C
Prom Deck-MM-3C


NSS-Prom
NSS-Prom Deck-MM-7A

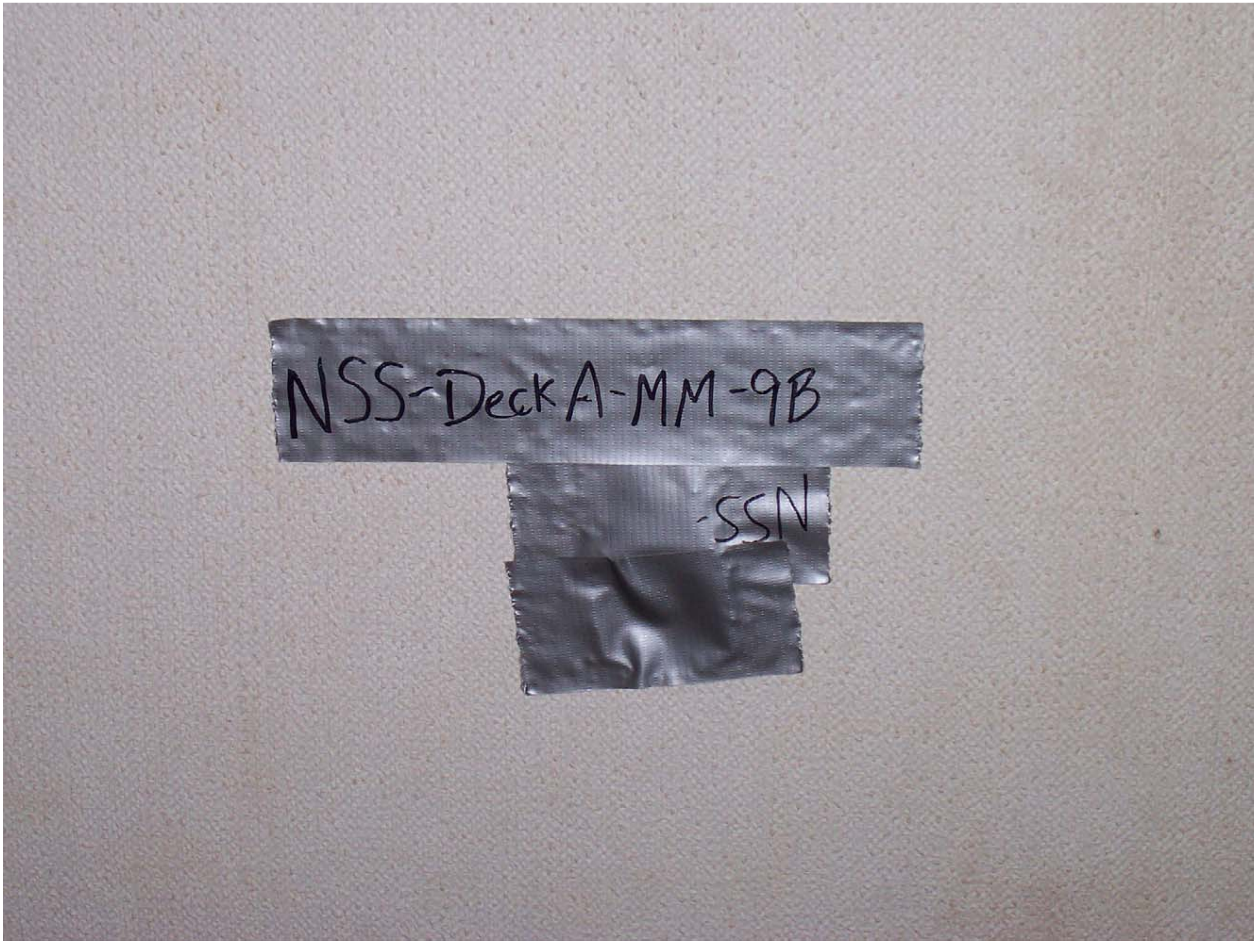

NSS-Prom De
NSS-Prom Deck-MM-7B

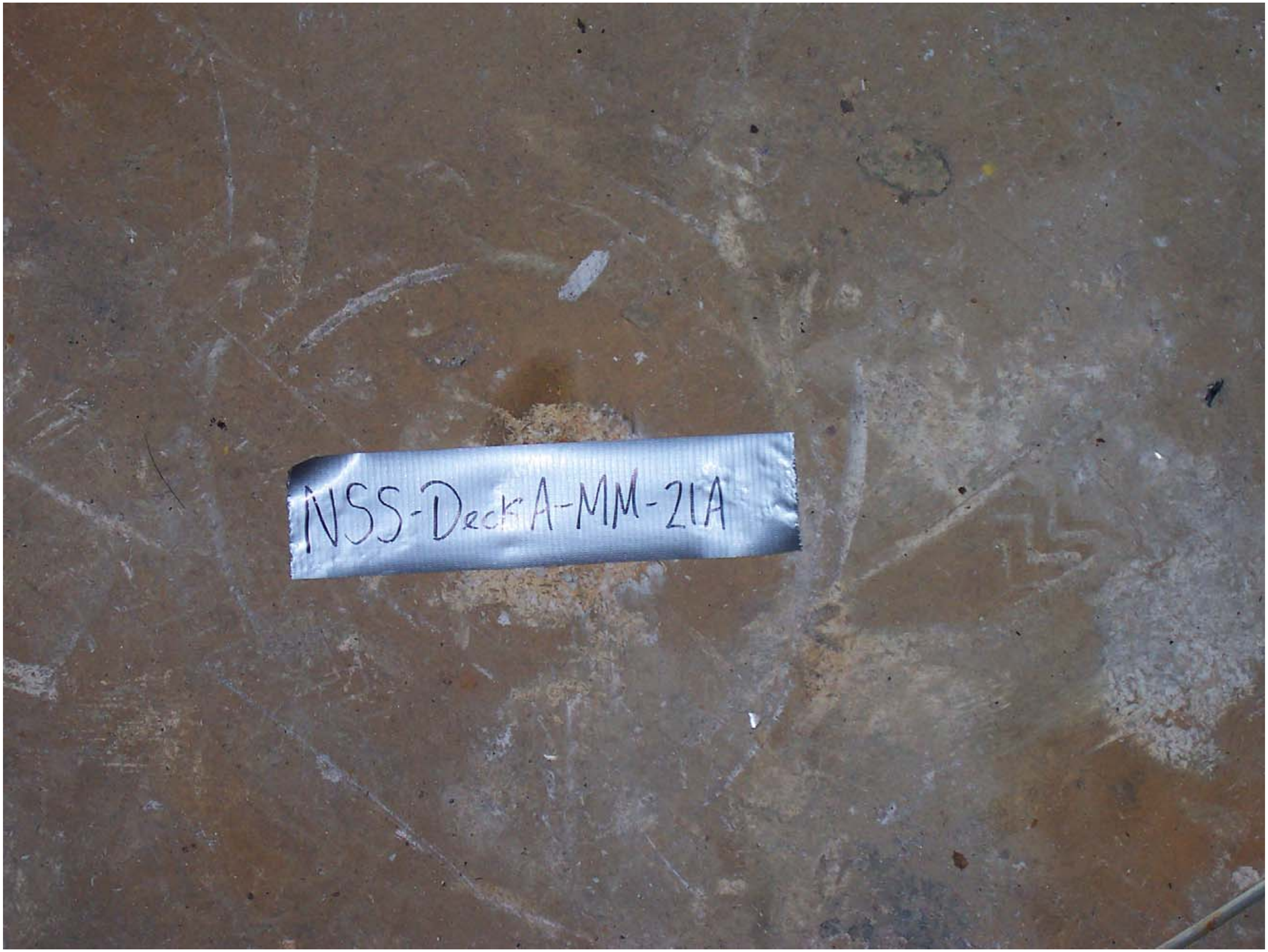

NSS-PromDeck-MM-7C


NSS-Prom Deck-MM-4A
NSS-Prom Deck-MM-4A


NSS-Prom Deck-MM-4B
NSS-Prom Deck-MM-4B

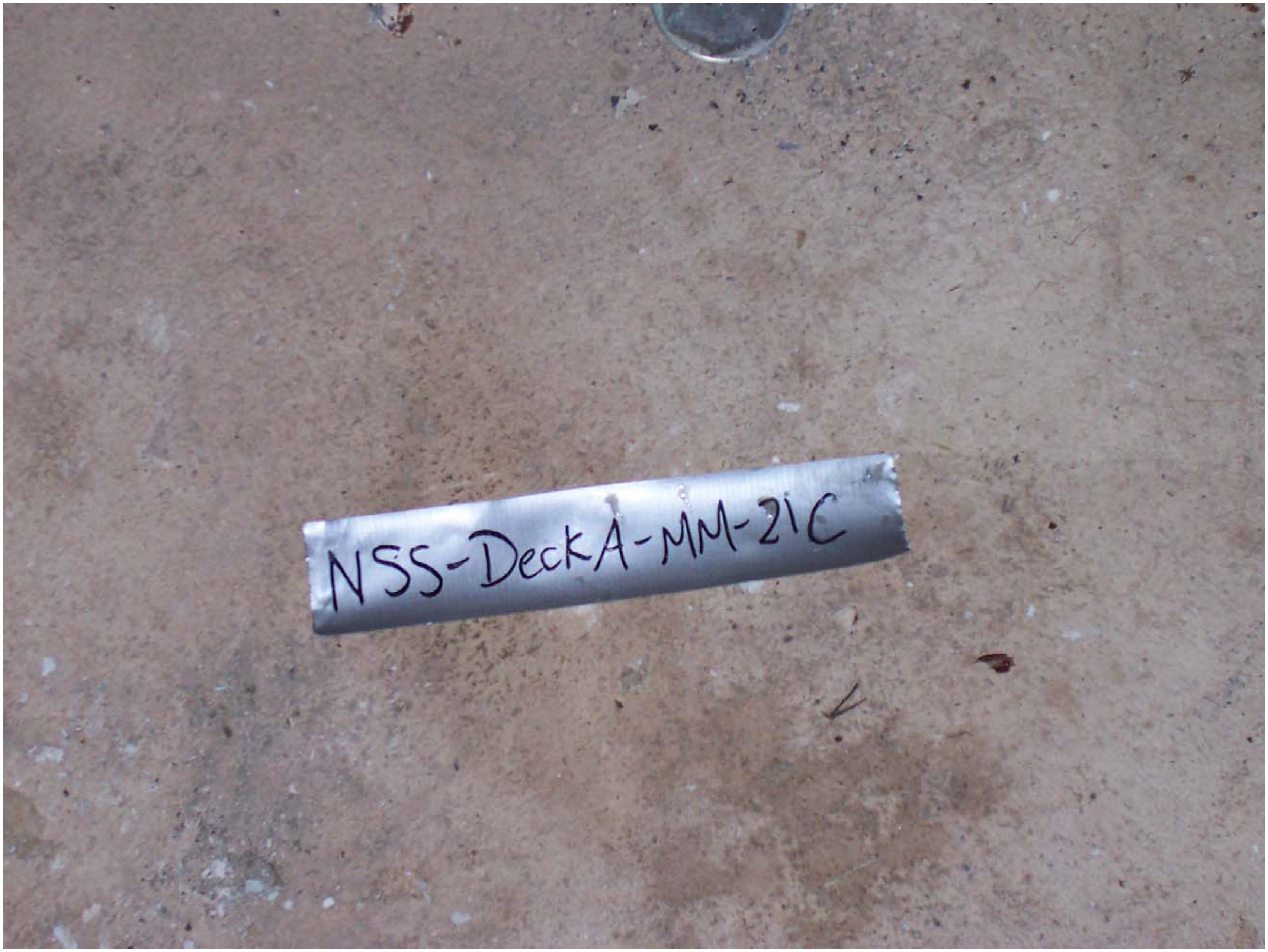

NSS-ADeck-MM-20A

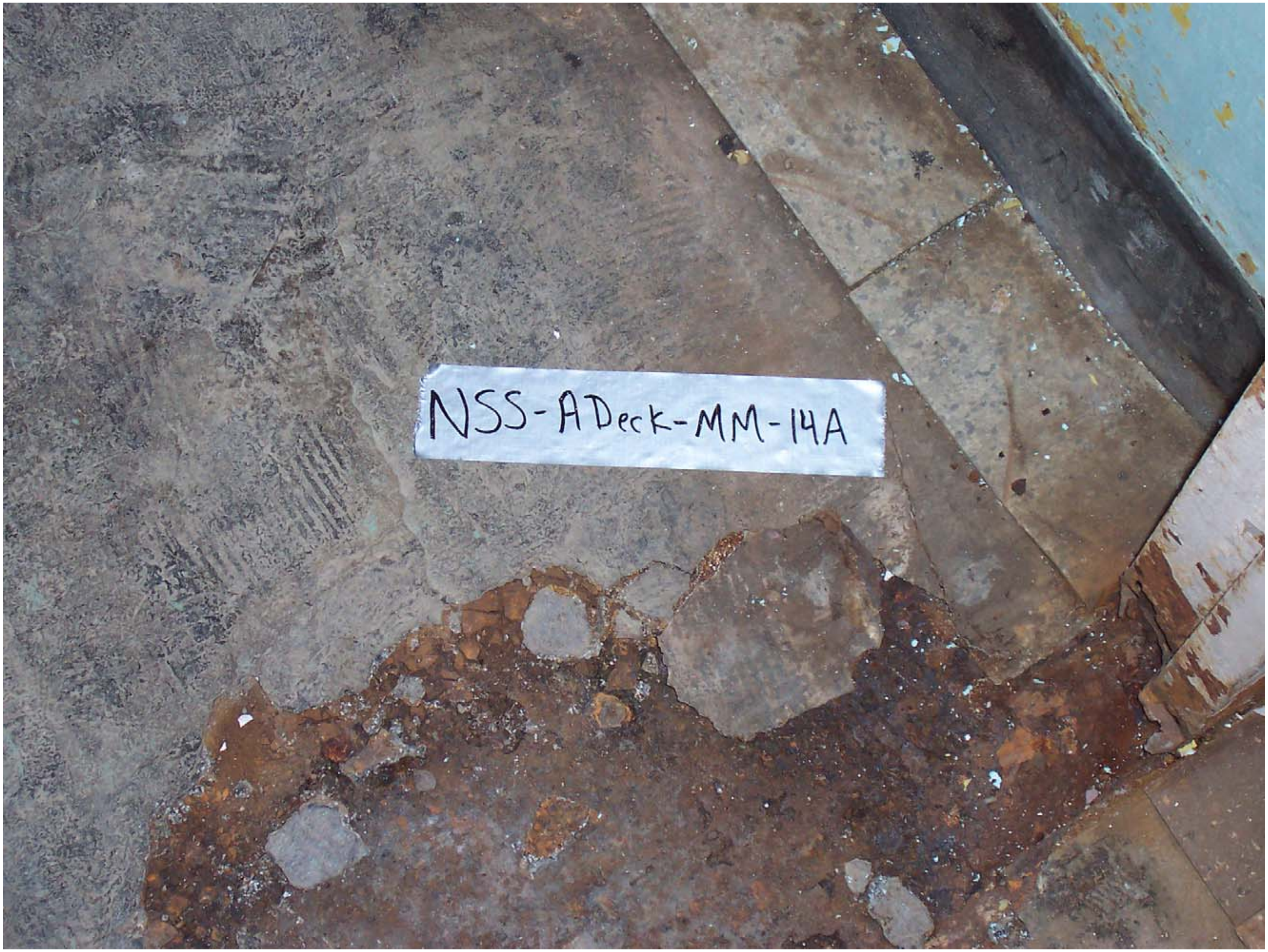

NSS-Deck A-MM-9B
-SSN


NSS-Deck A-MM-21A


NSS-Deck A-MM-21B


SHEET NO. 10 OF 12
NSS-Deck A-MM-9C


NSS-DeckA-MM-21C


NSS-ADeck-MM-14A


NSS-Deck A-MM-14C


NSS-Deck A-MM-14C


NSS DeckA - mm - 14B


NSS-DeckA-CT-13A


NSS-Deck A-CT-13B


NSS-Deck A-CT-13C


NSS-Deck A-MM-8A


NSS-Deck A-MM-8B


NSS-DeckA-MM-8C

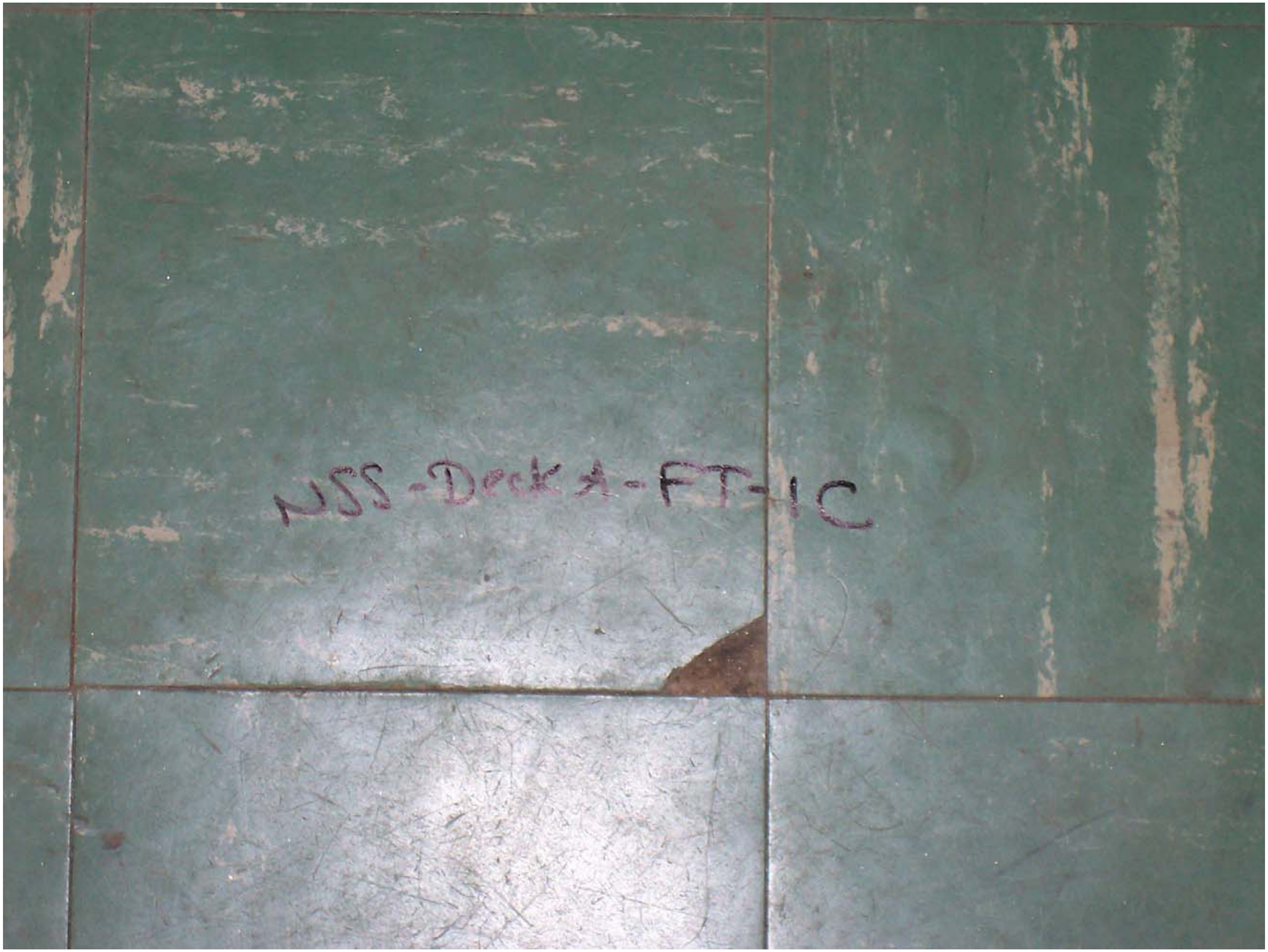

NSS-Deck A-TS1-2B


TS1-3B

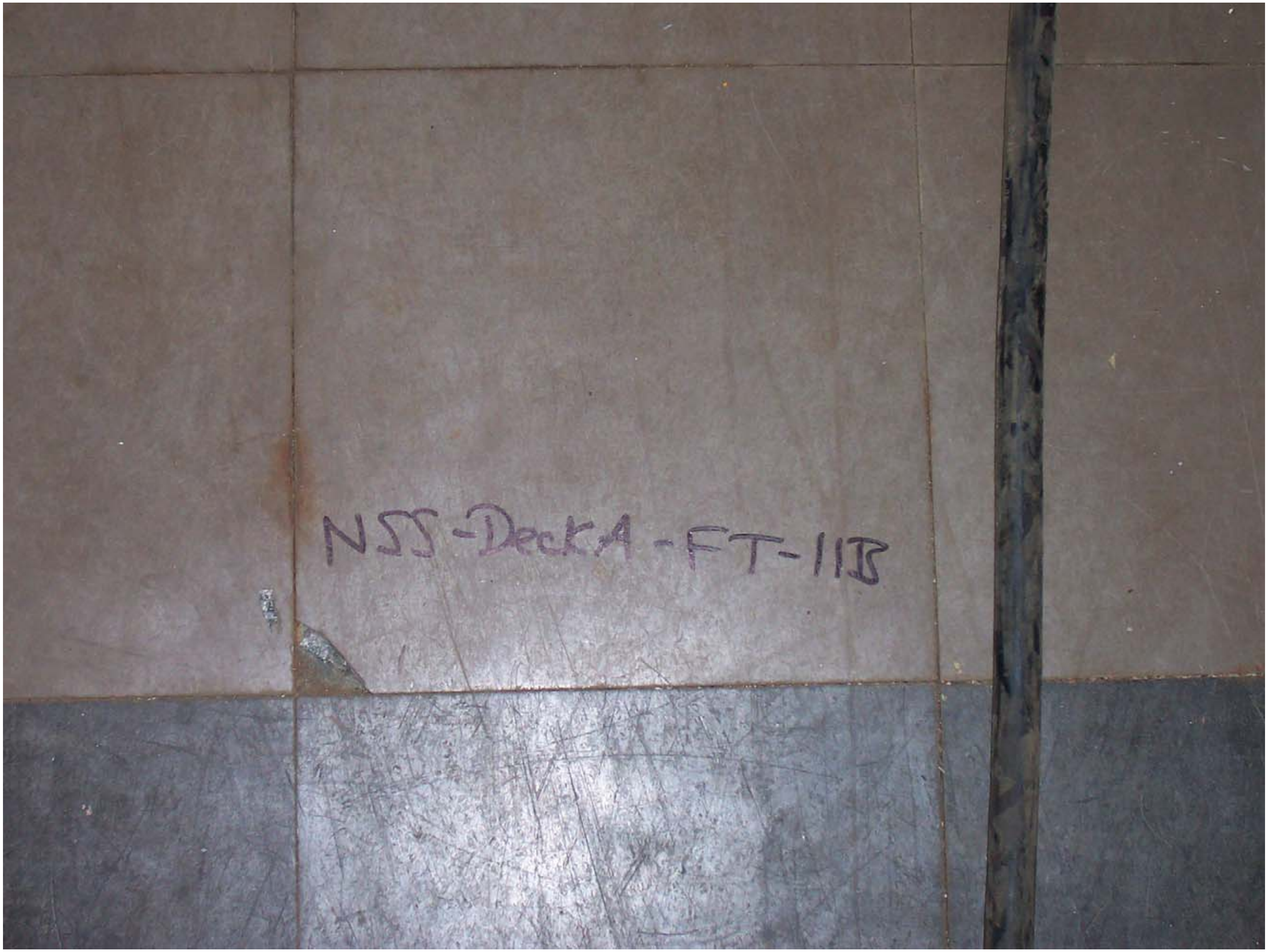

ckA-T51-3

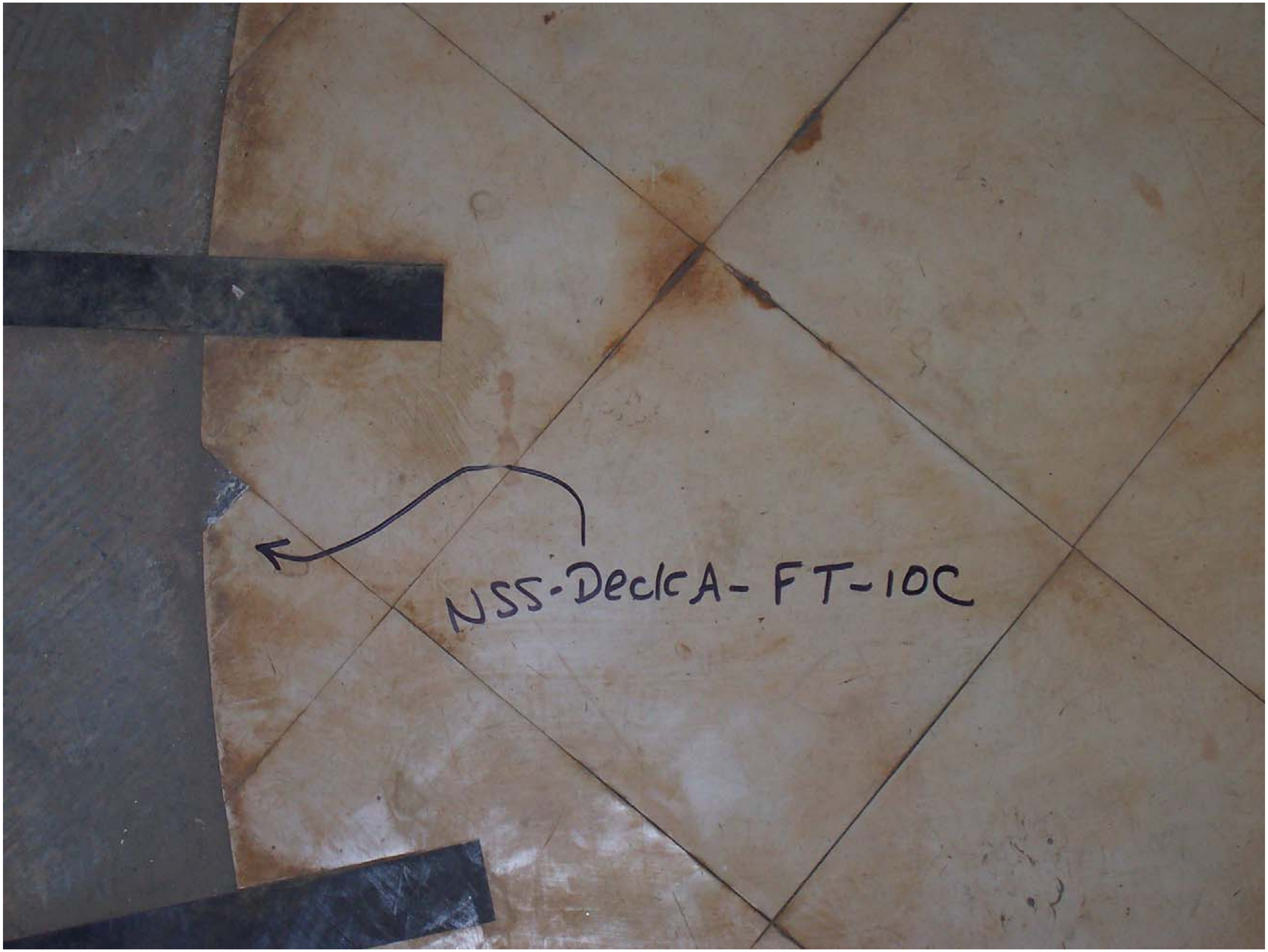

NS5-DeckA-T51-2C

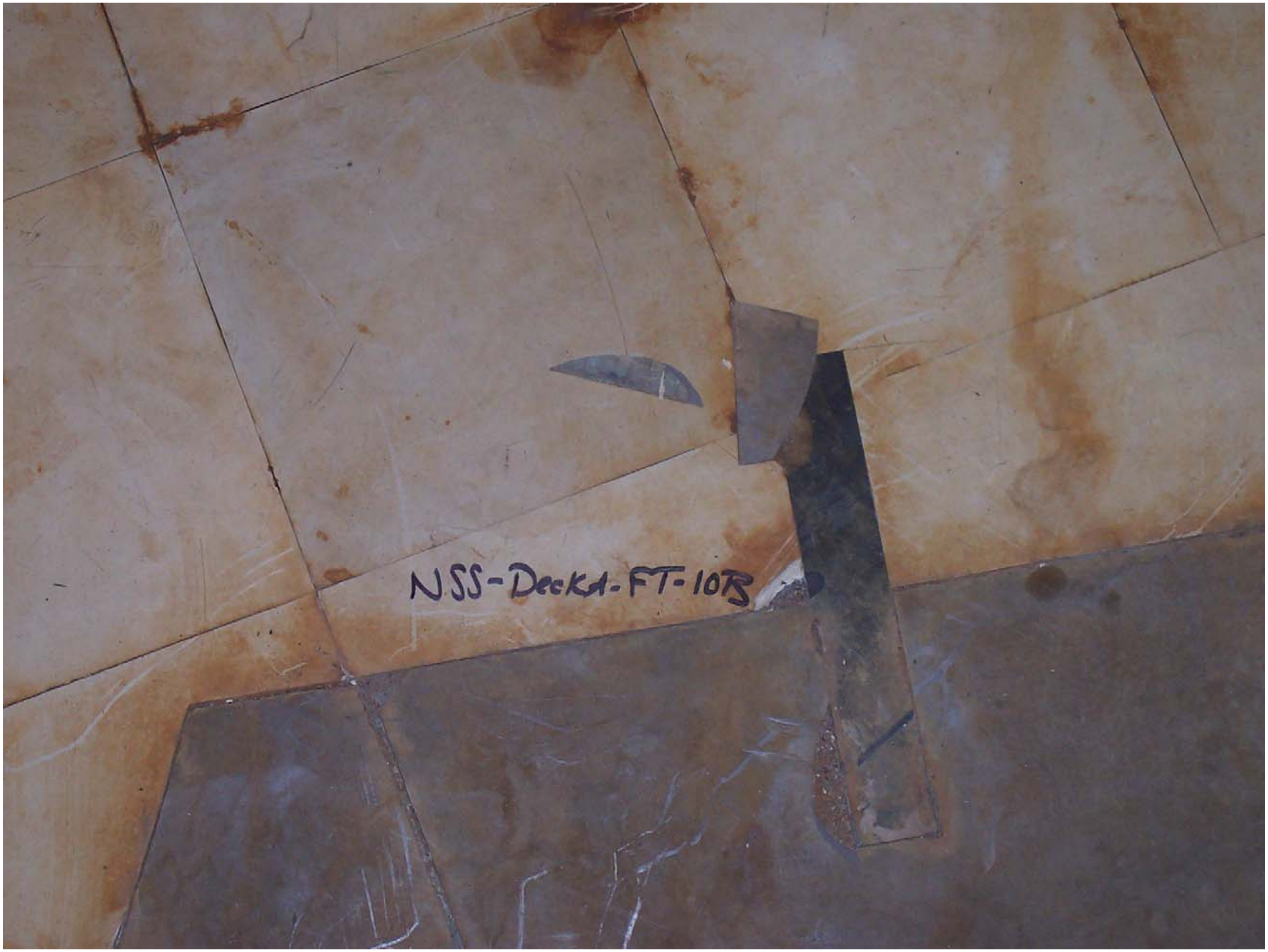

NSS-Deck A-731-3C


NSS-Deck A-FT-1C

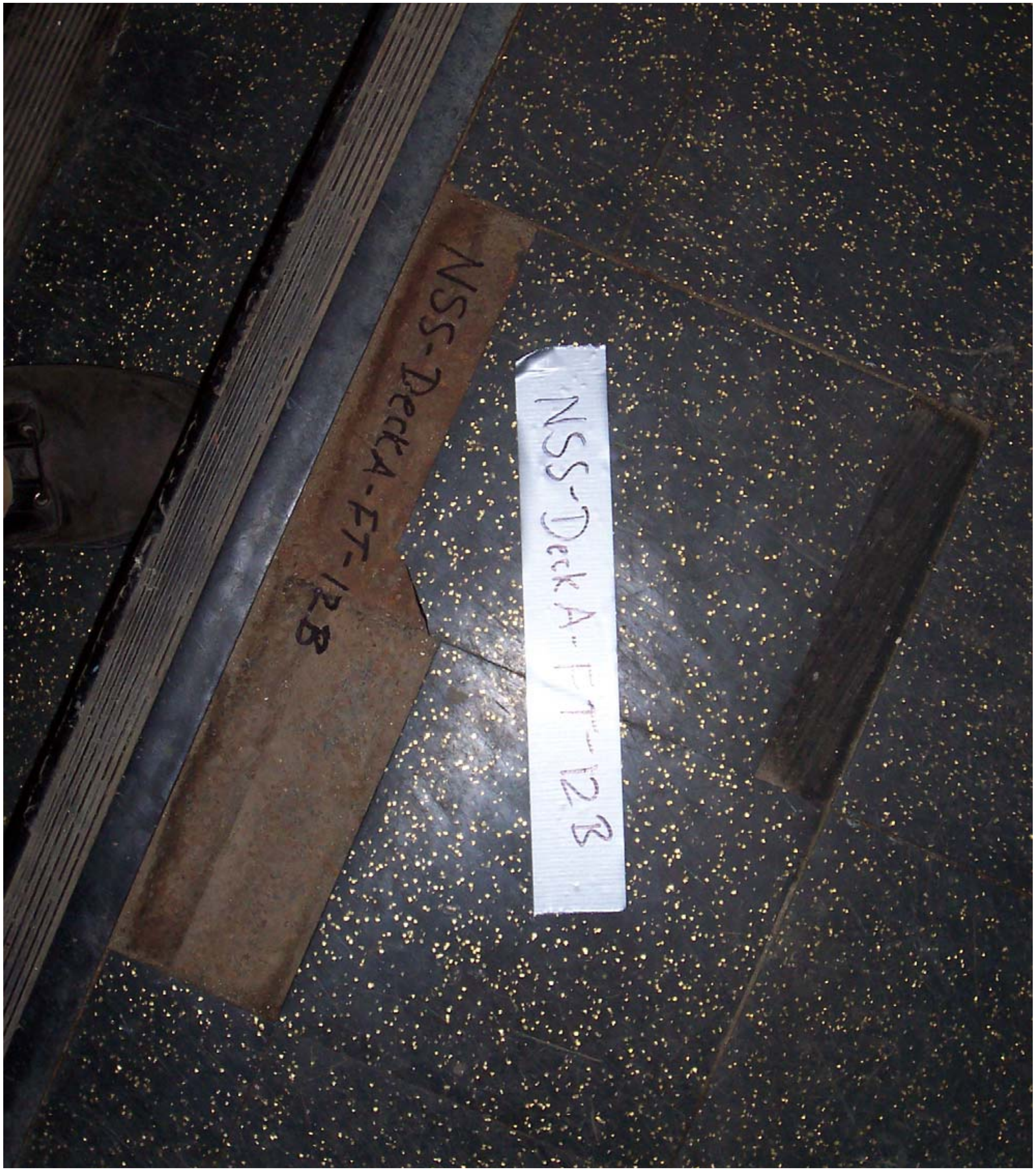

NSS DECKA
FT 1B


NSS-DeckA-FT-11B


NSS-DeckA- FT-10C


NSS-Deck1-FT-10B

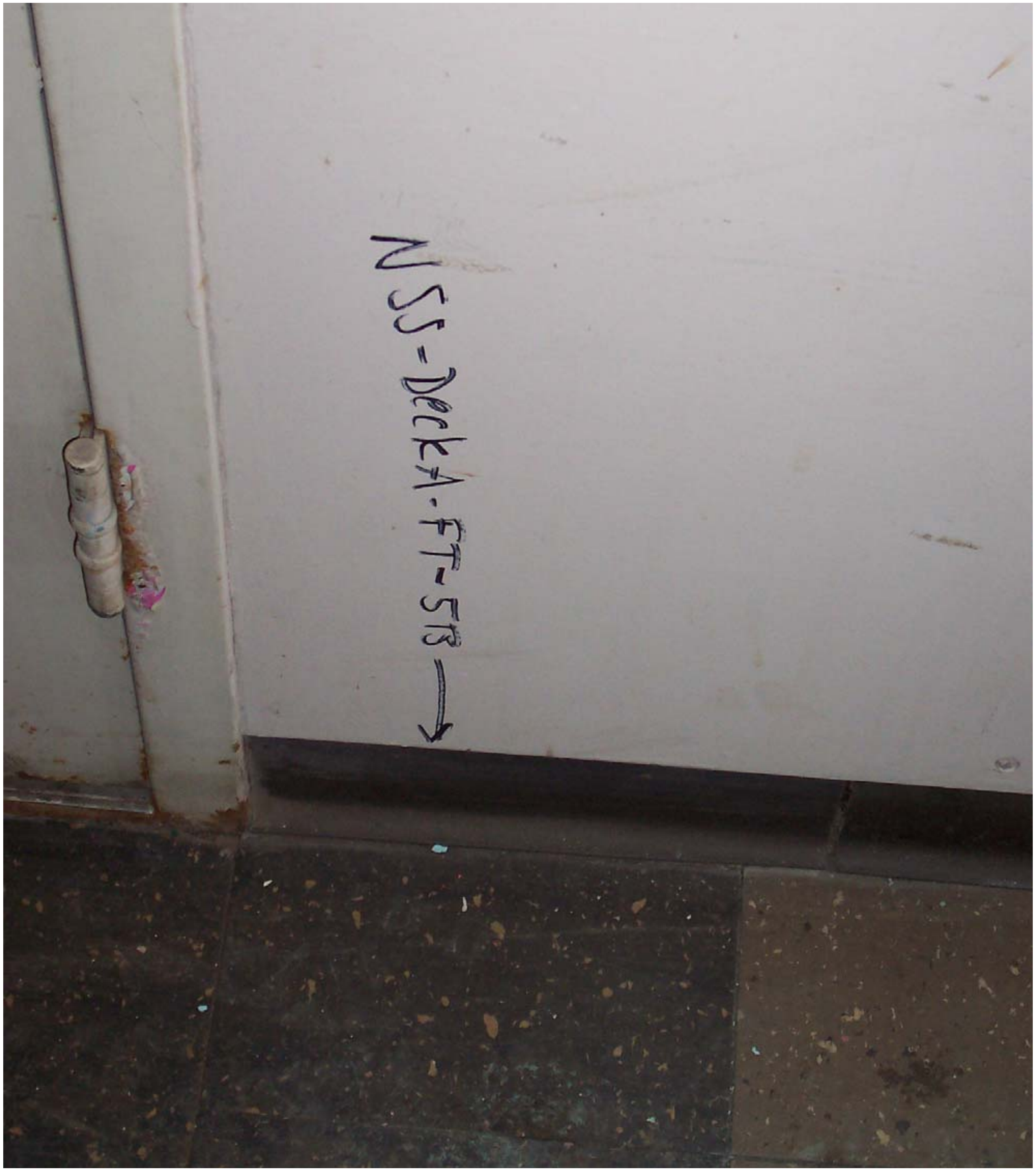

DeckA-FT-11C

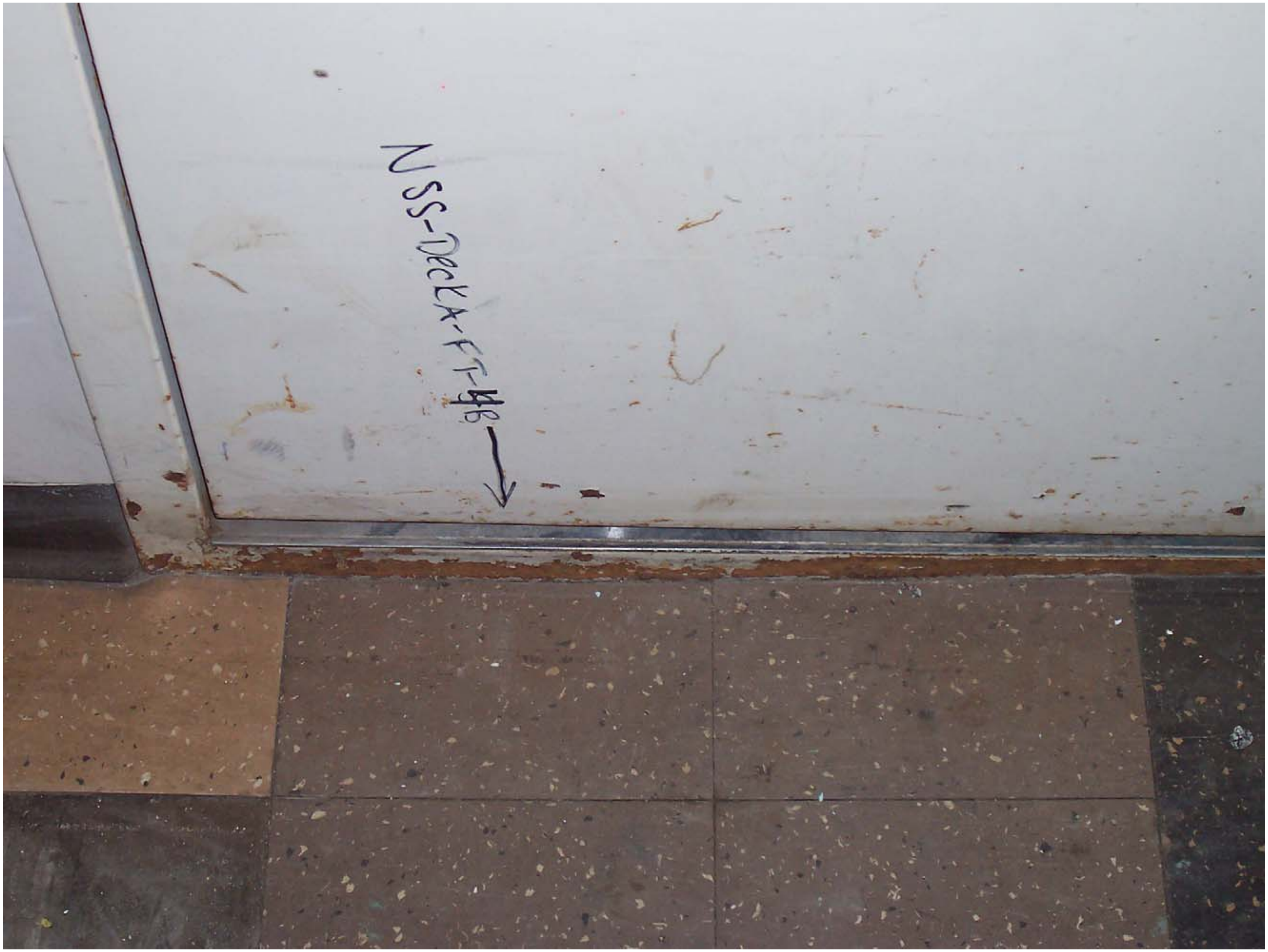

NSS-DeckA-FT-12B
NSS-DeckA-FT-12B


NSS-Deck A-FT-12C


NSS-DeckA-FT-15B


NSSDeckA-FT-15C


NSS-DeckA-FT-5TB


NSS-DeckA-FT-4B

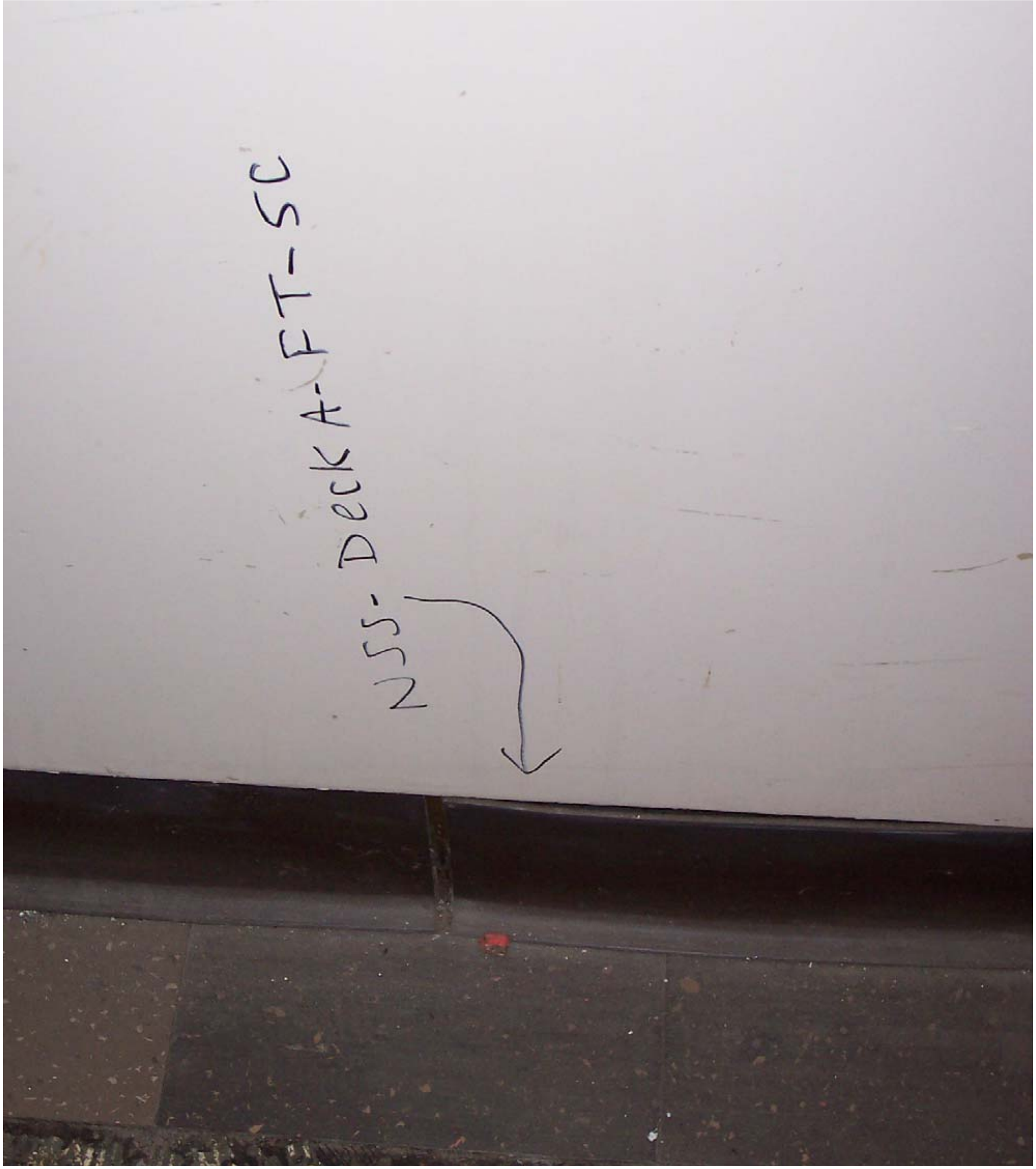

NSS-DECKA-FT-LAB

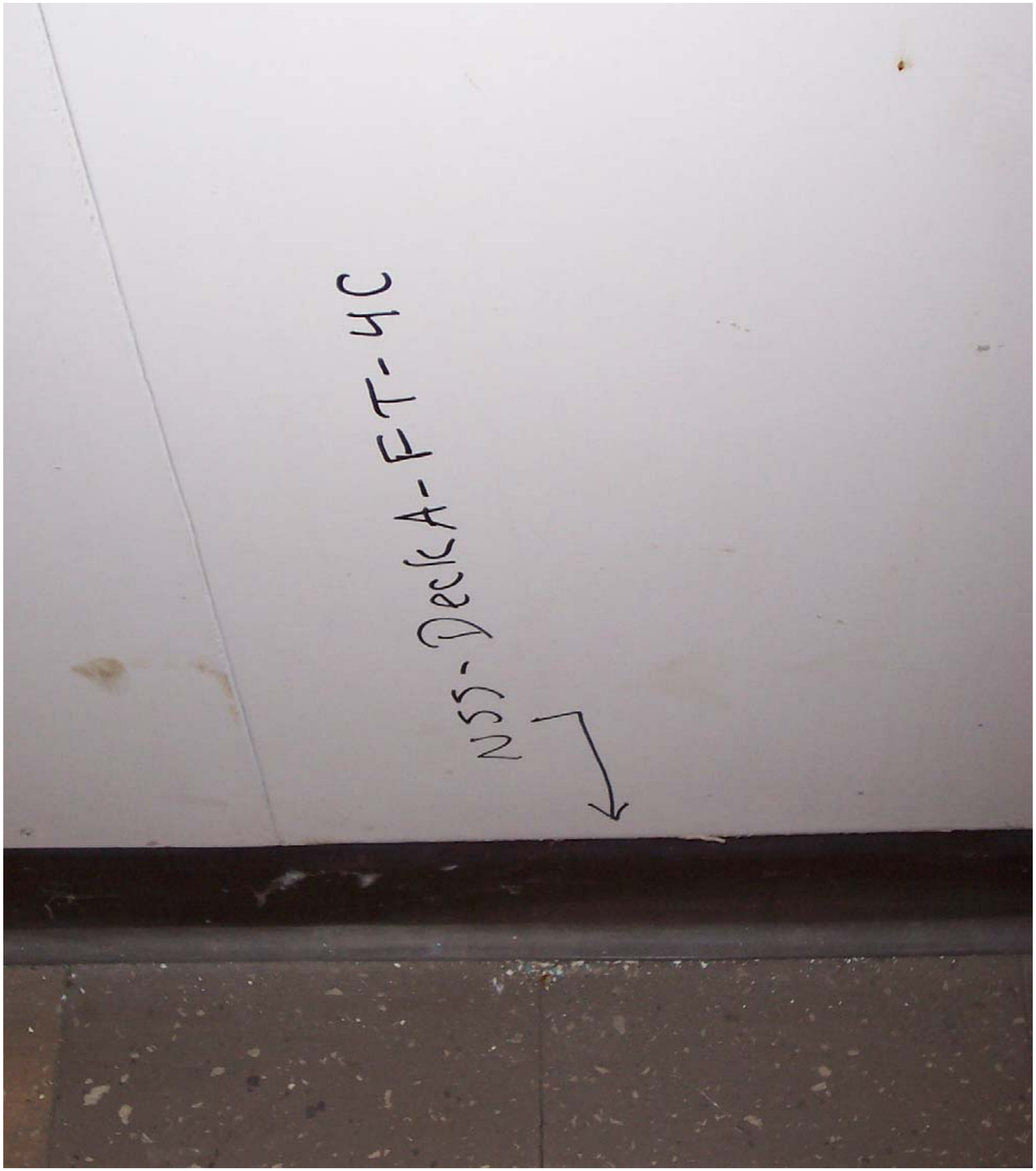

←NSS-DecK A-FT-7B


NSS-DeckA-FT-16C

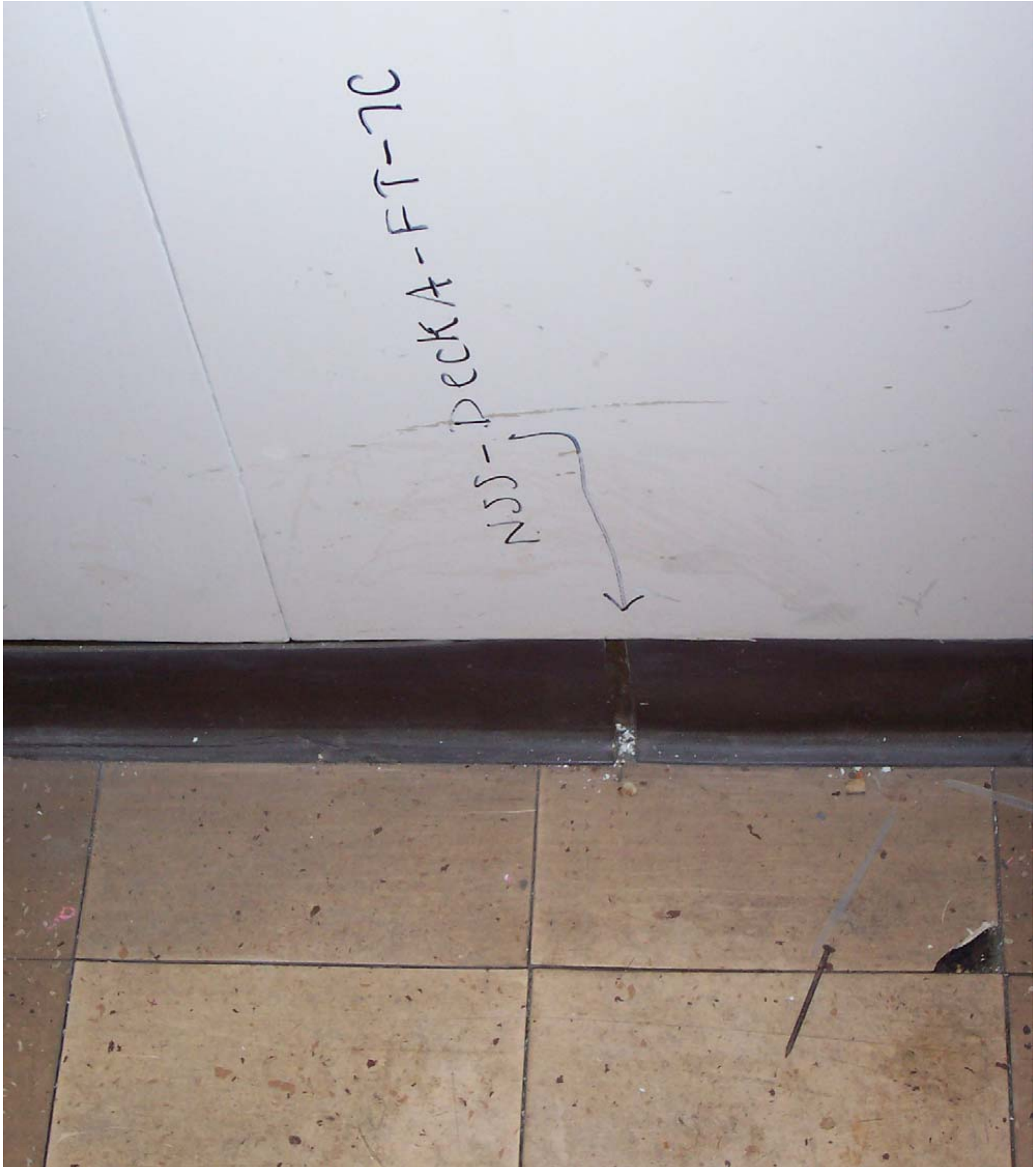

NSS-DeckA-FT-16C


NSS-Deck A-FT-16D
PROPER USE AND CARE OF ROPE
UTILISATION ET ENTRETIEN DES CORDES
INSTRUCCIONES PARA EL USO Y CONSERVACIÓN DE LAS CUERDAS
Lehigh


NSS-DECK A-FT-SC

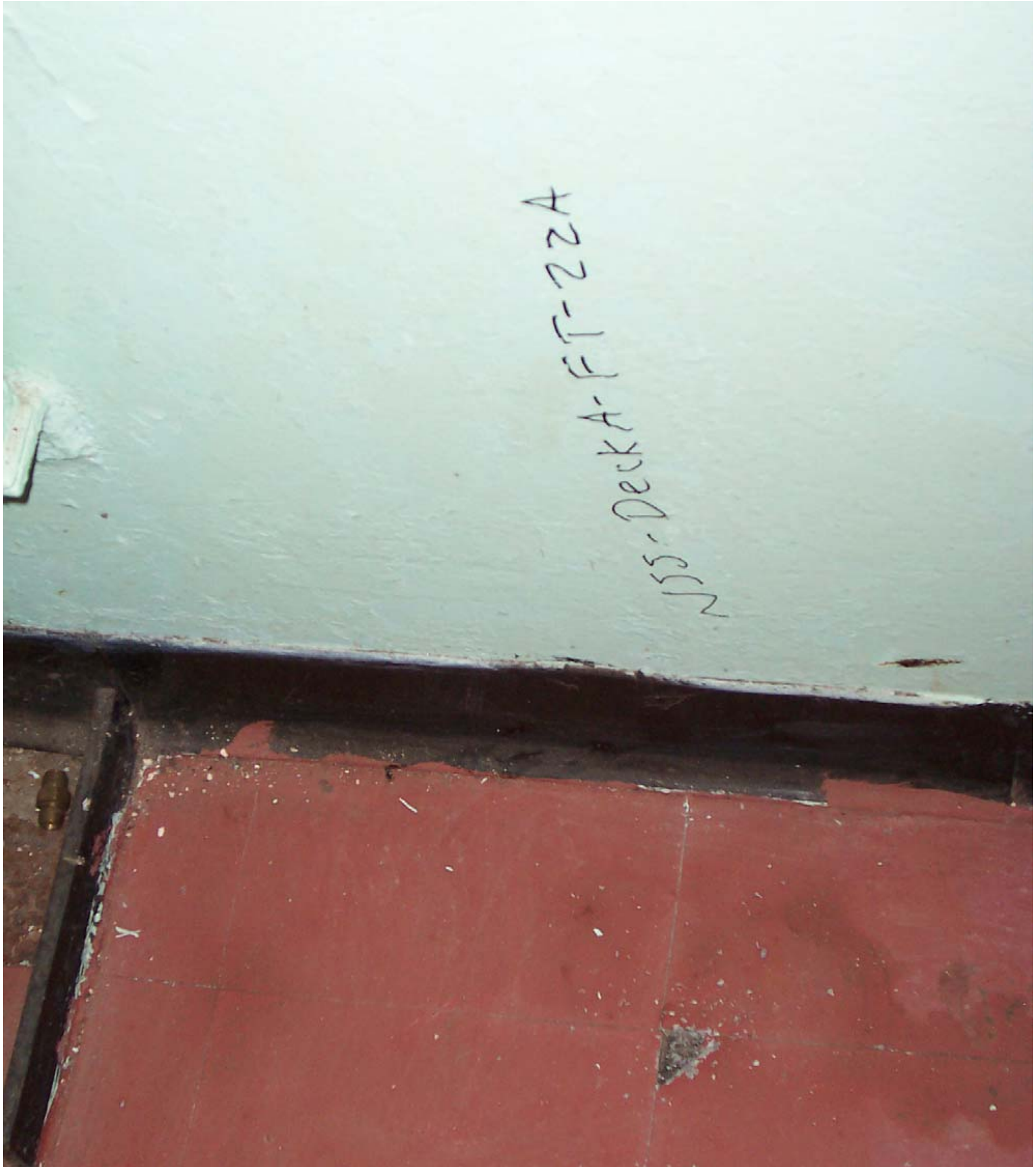

N55-DeckA-FT-4C

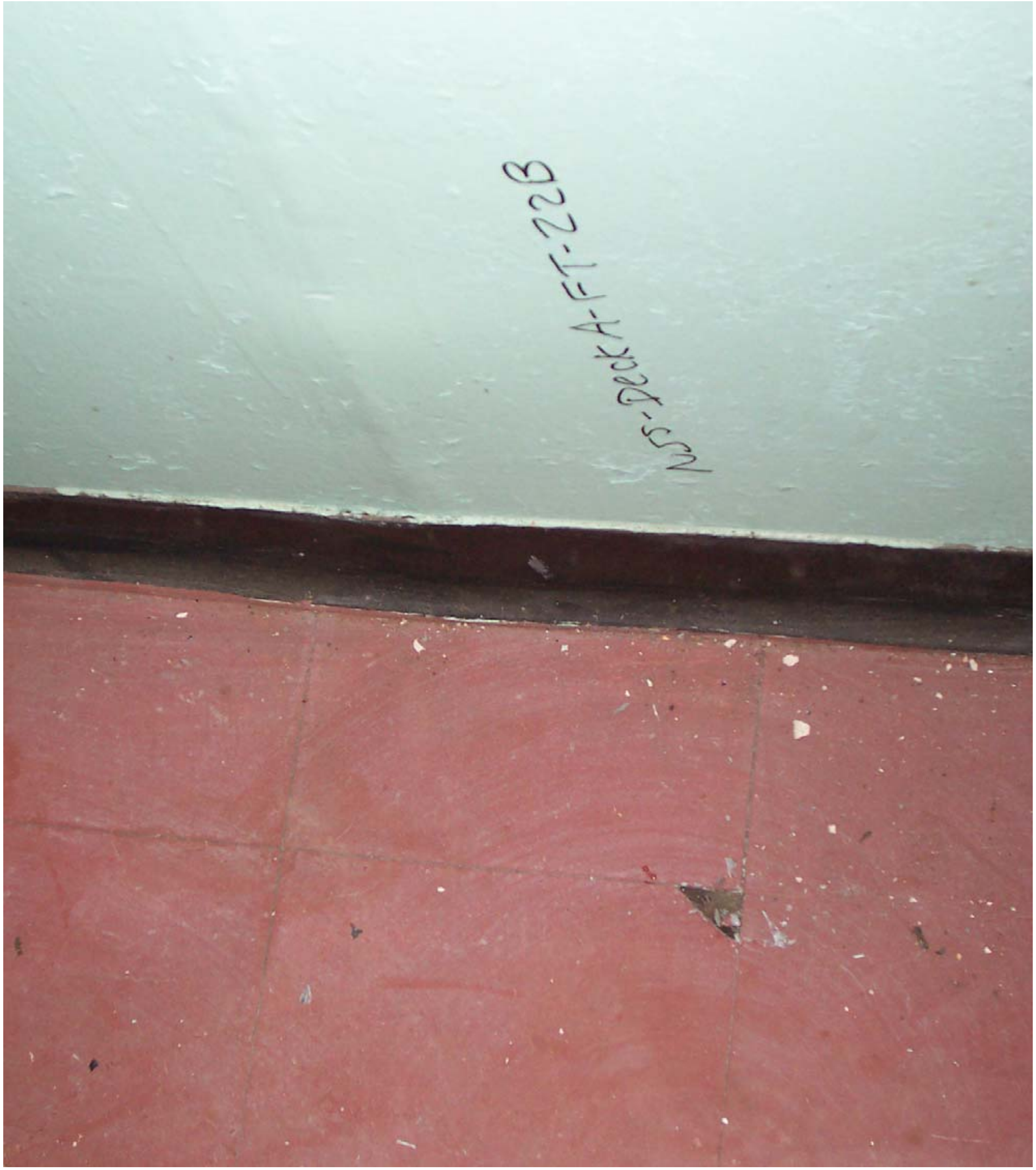

NSS-DECKA-FT-6C


NJJ-DeckA-FT-7C


NSS-DecKA-FT-12B

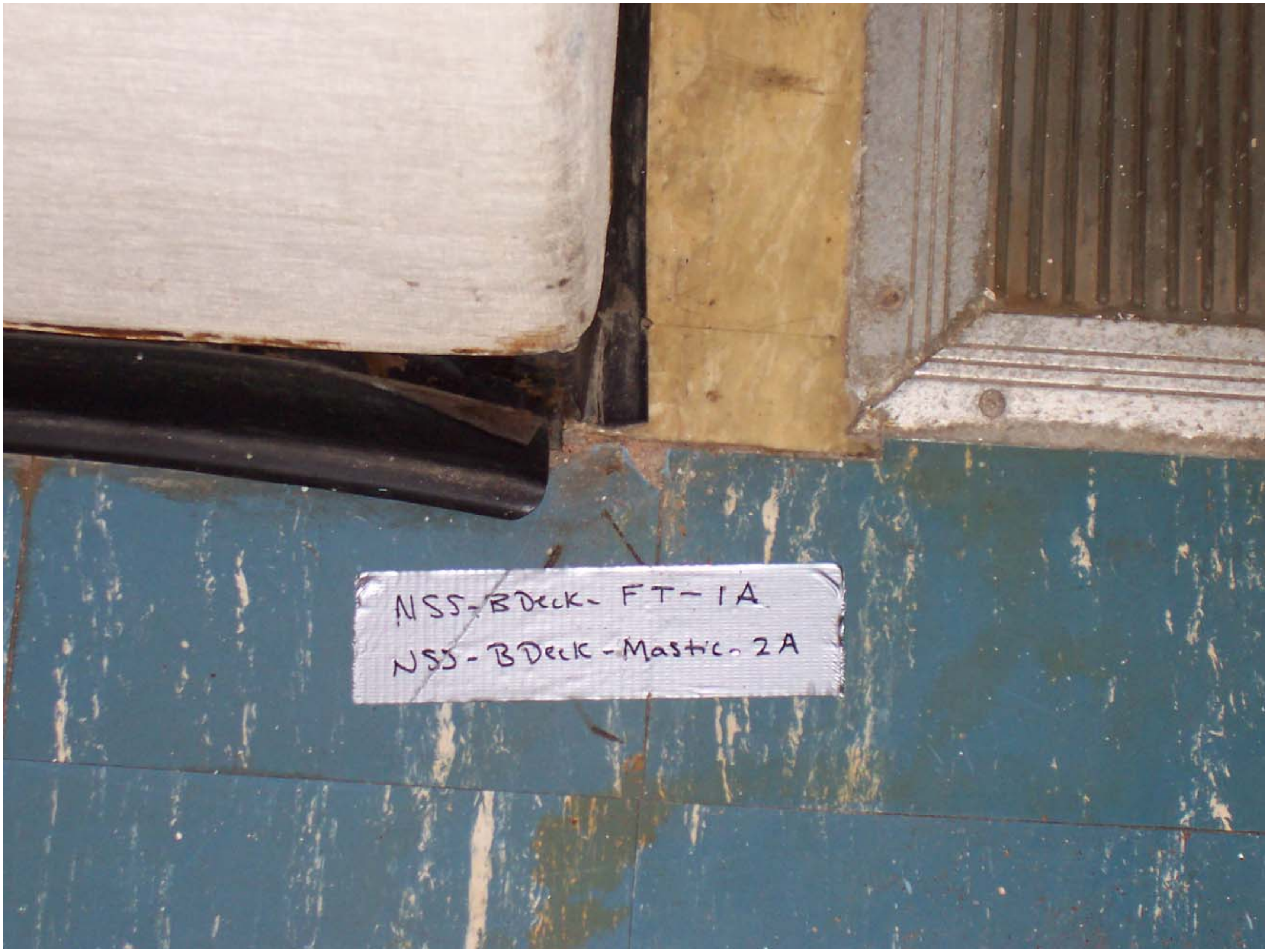

NSS-Deck A-FT-18B

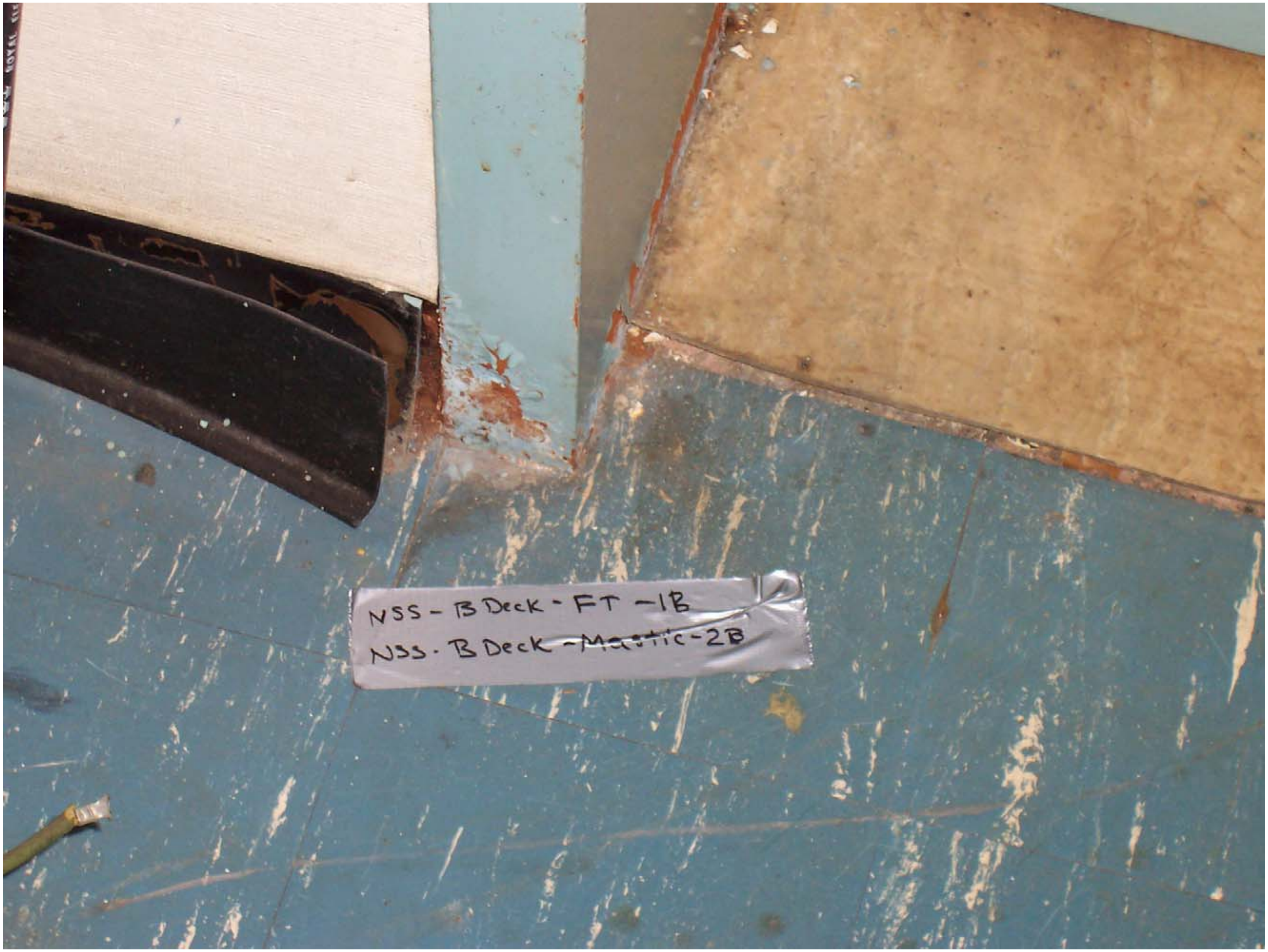

J55-DeckA-FT-22A

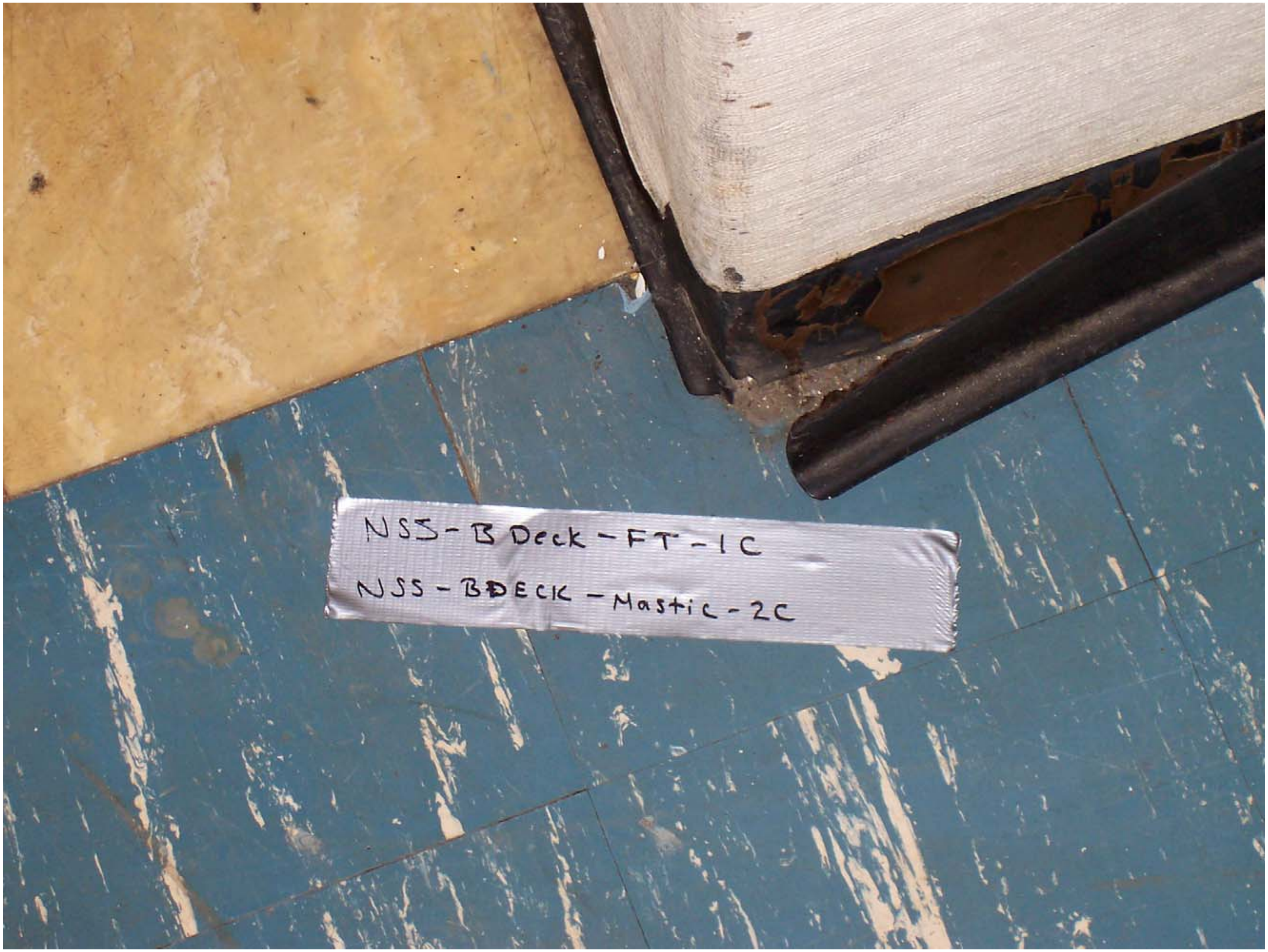

NS-Deck A-FT-22B


NJS-Deck A-FT-22C

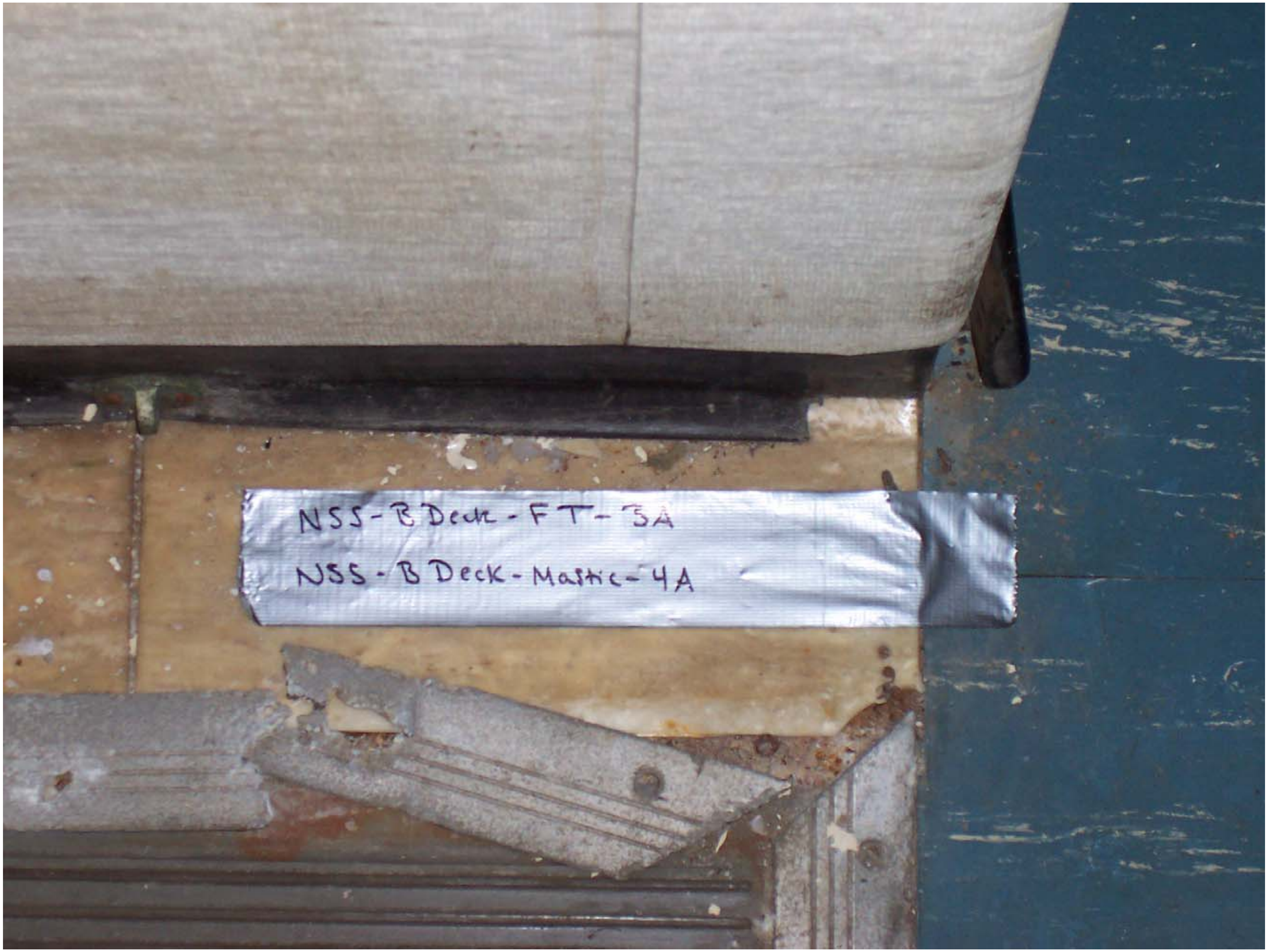

NSS-DeckA-FT-17C
NSS-DeckA-FT-18C

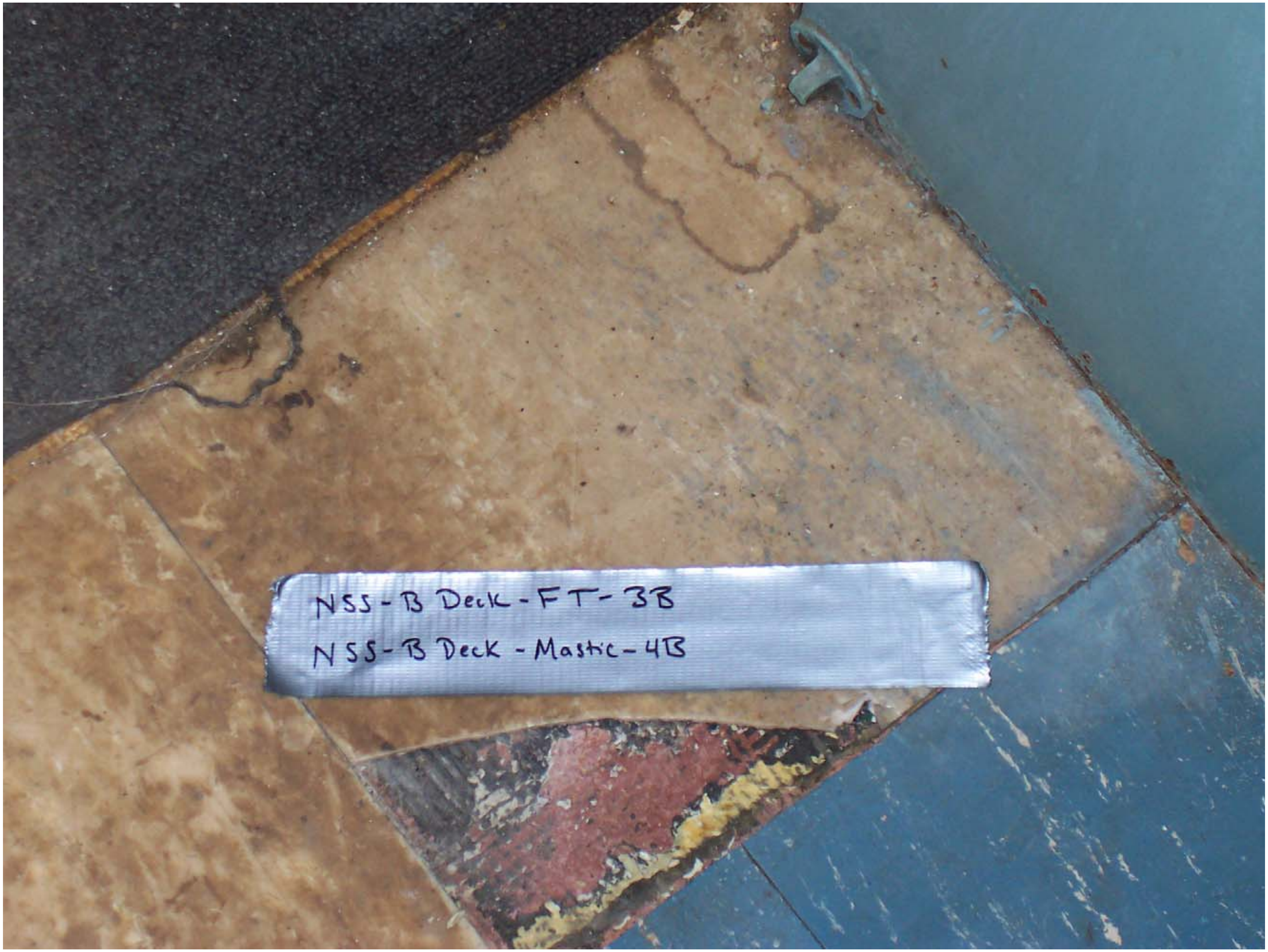

NSS-BDeck-FT-1A
NSS-BDeck-Mastic-2A

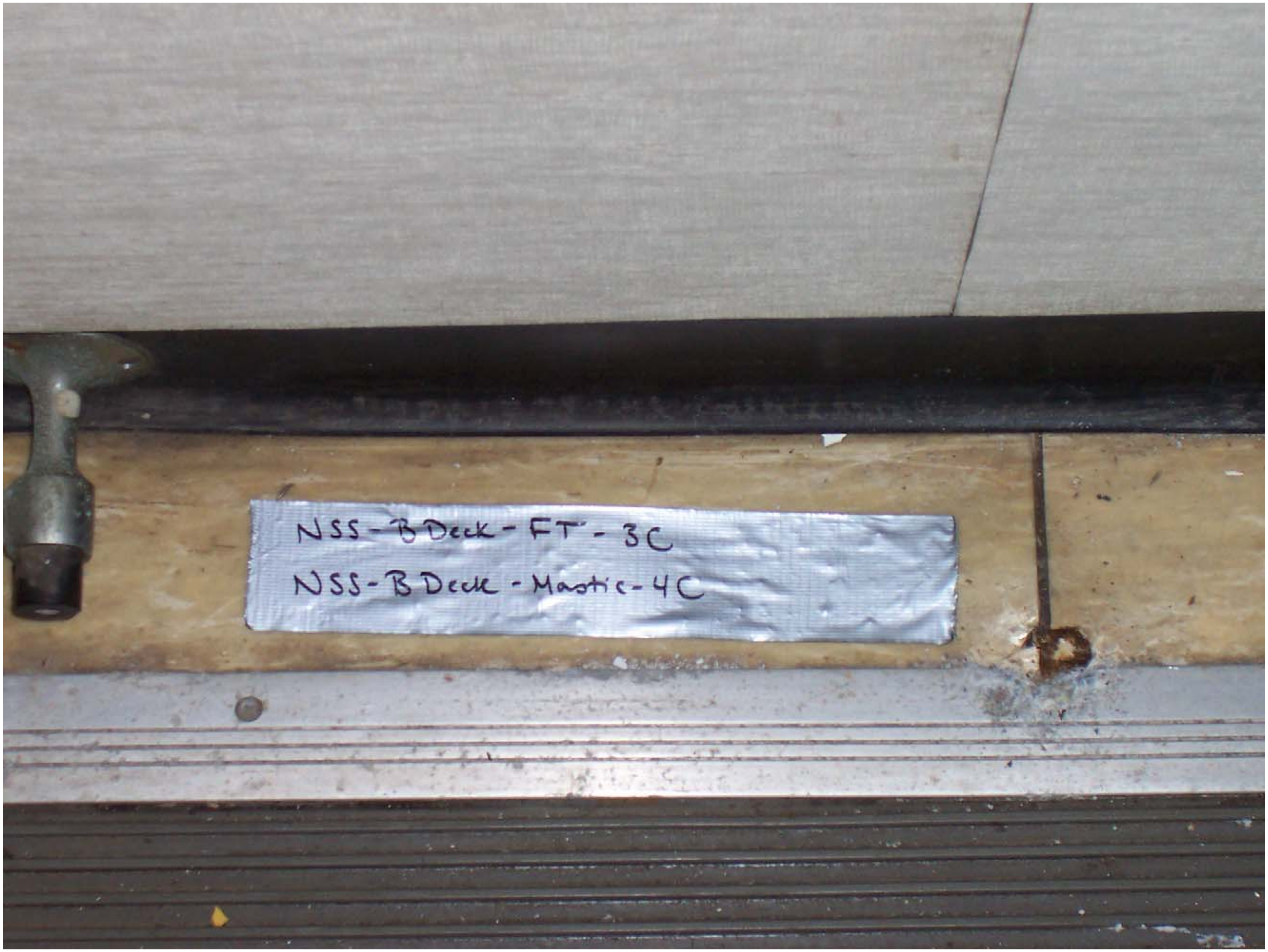

NSS - B Deck - FT - 1B
NSS - B Deck - ~~Mastic~~ - 2B



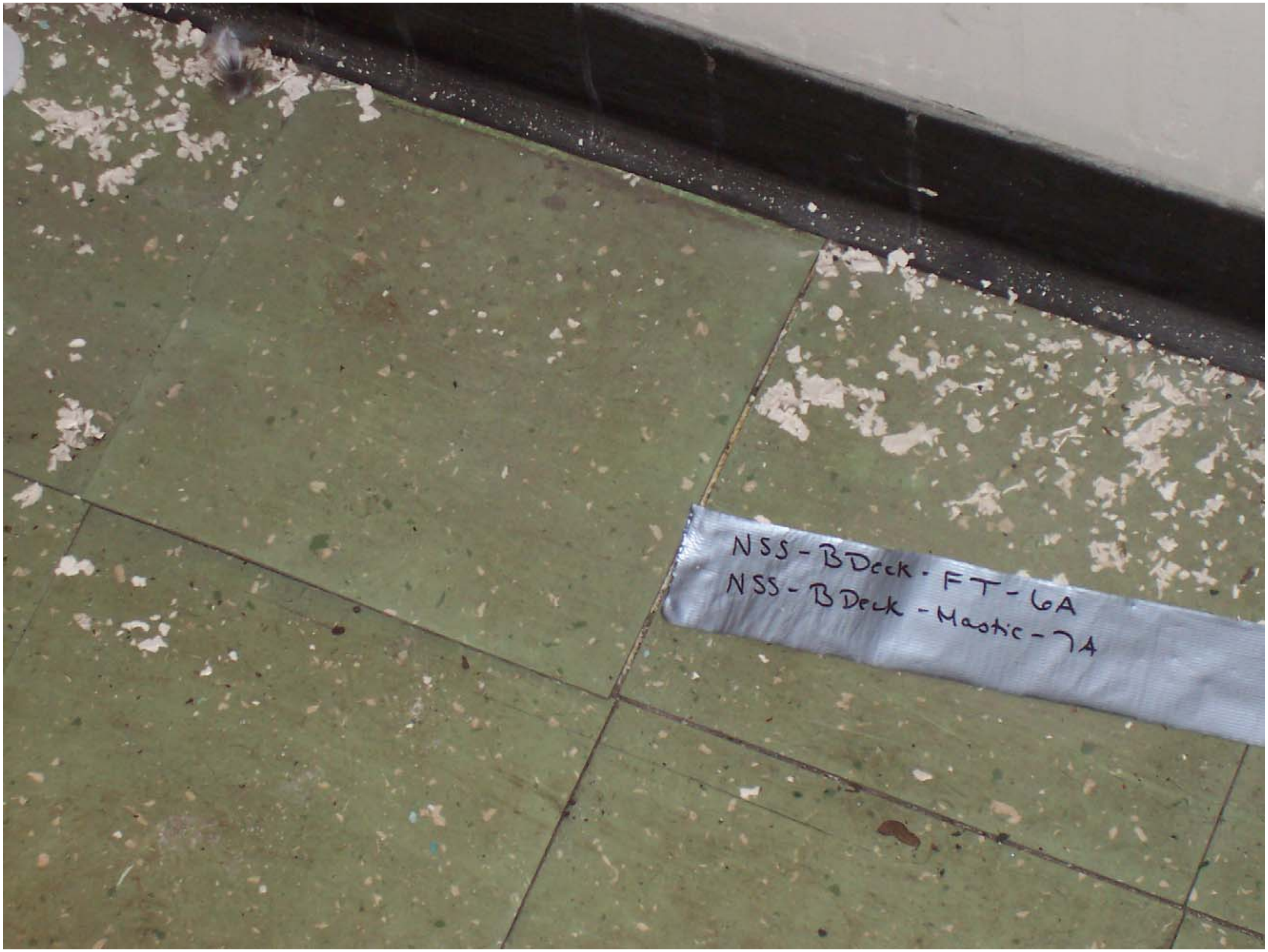
NSJ-B Deck-FT-1C
NSS-BDECK-Mastic-2C


NSS - B Deck - FT - 3A
NSS - B Deck - Mastic - 4A

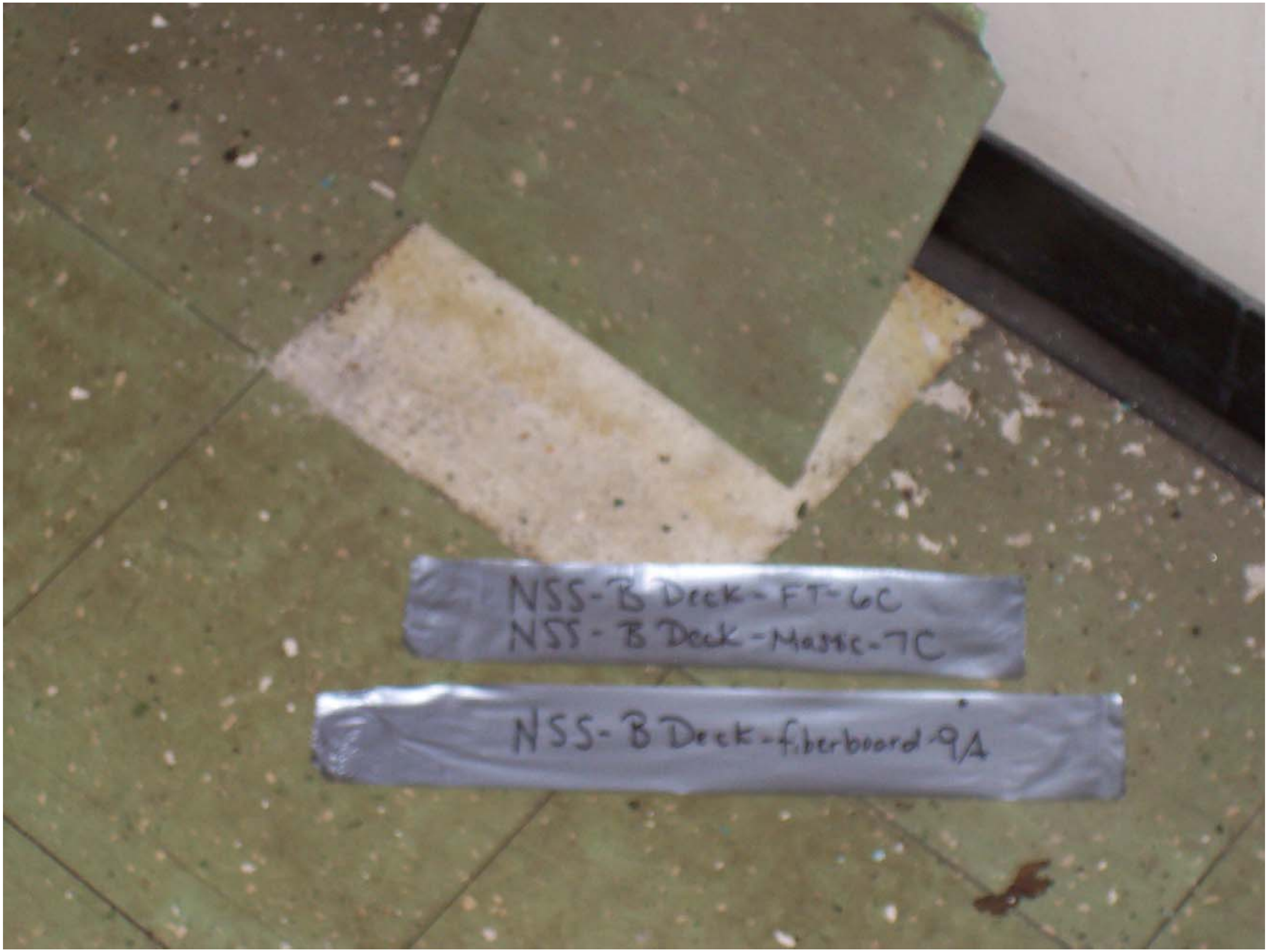

NSS - B Deck - FT - 3B
NSS - B Deck - Mastic - 4B


NSS-B Deck-FT-3C
NSS-B Deck-Mastic-4C


NSS-B Deck-Mastic-5A

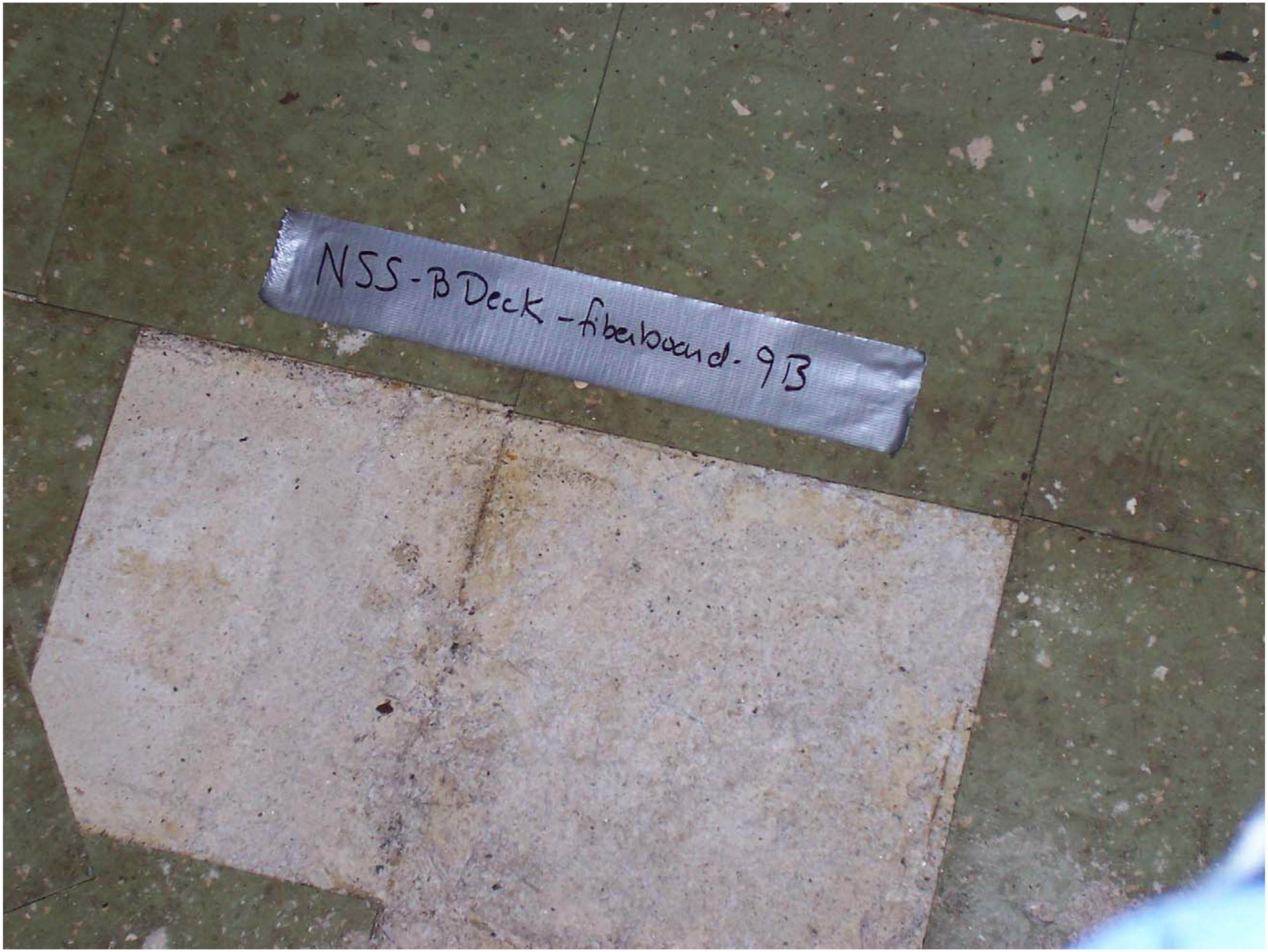

NSS - BDeck - FT - 6A
NSS - BDeck - Mastic - 7A


NSS-B Deck-FT-6B
NSS-B Deck-~~FT~~ Mastic-7B


NSS-B Deck-FT-6C
NSS-B Deck-Mastic-7C
NSS-B Deck-fiberboard-9A

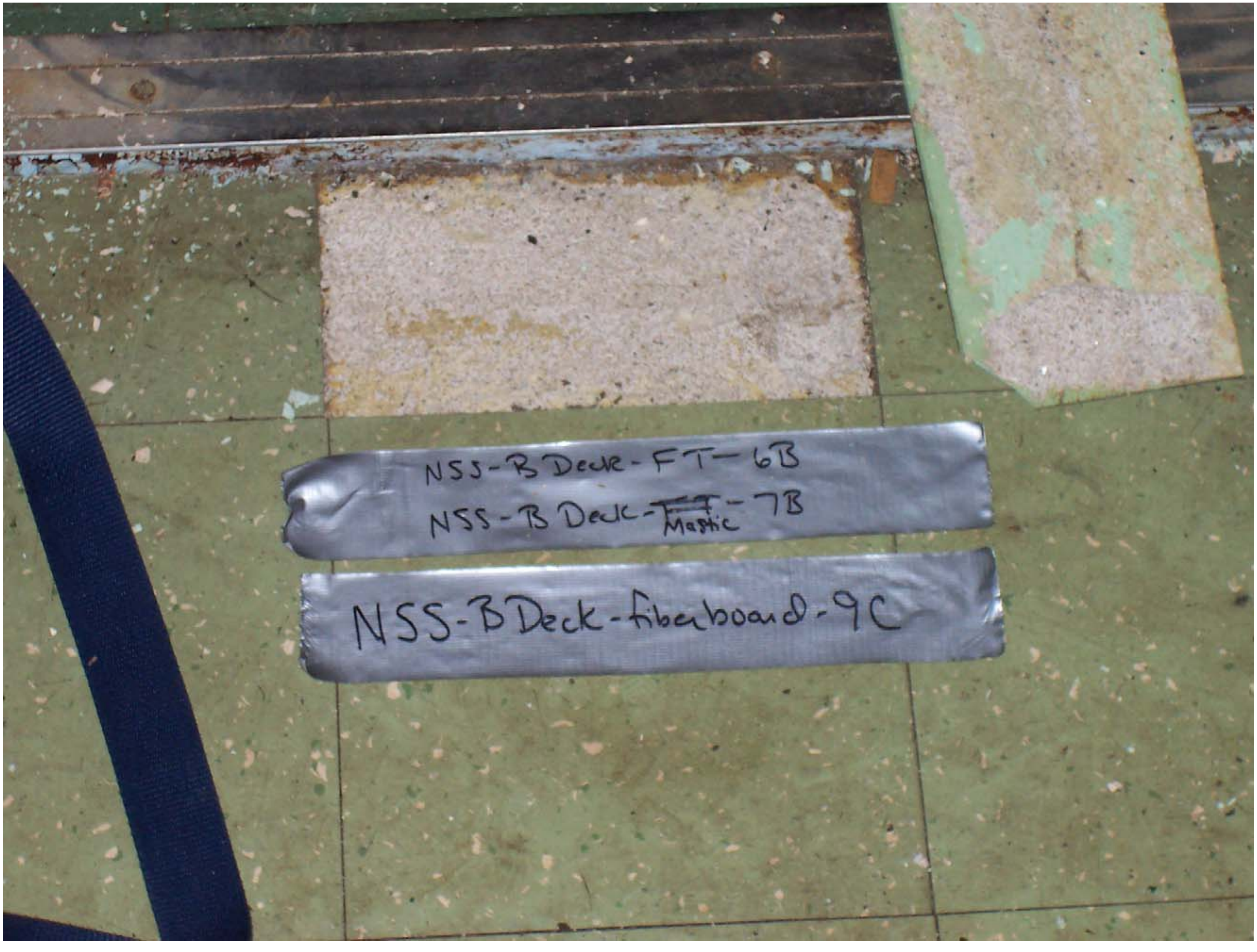

NSS - B Deck - Mastic - 8A


NSS-B Deck-FT-10A
NSS-B Deck-Mastic-11A


NSS-B Deck-fiberboard-9B


NSS-BDeck-FT-10B
NSS-BDeck-Mastic-11B


NS - "B" Deck - FT - 10C
NS - "B" Deck - Mastic - 11C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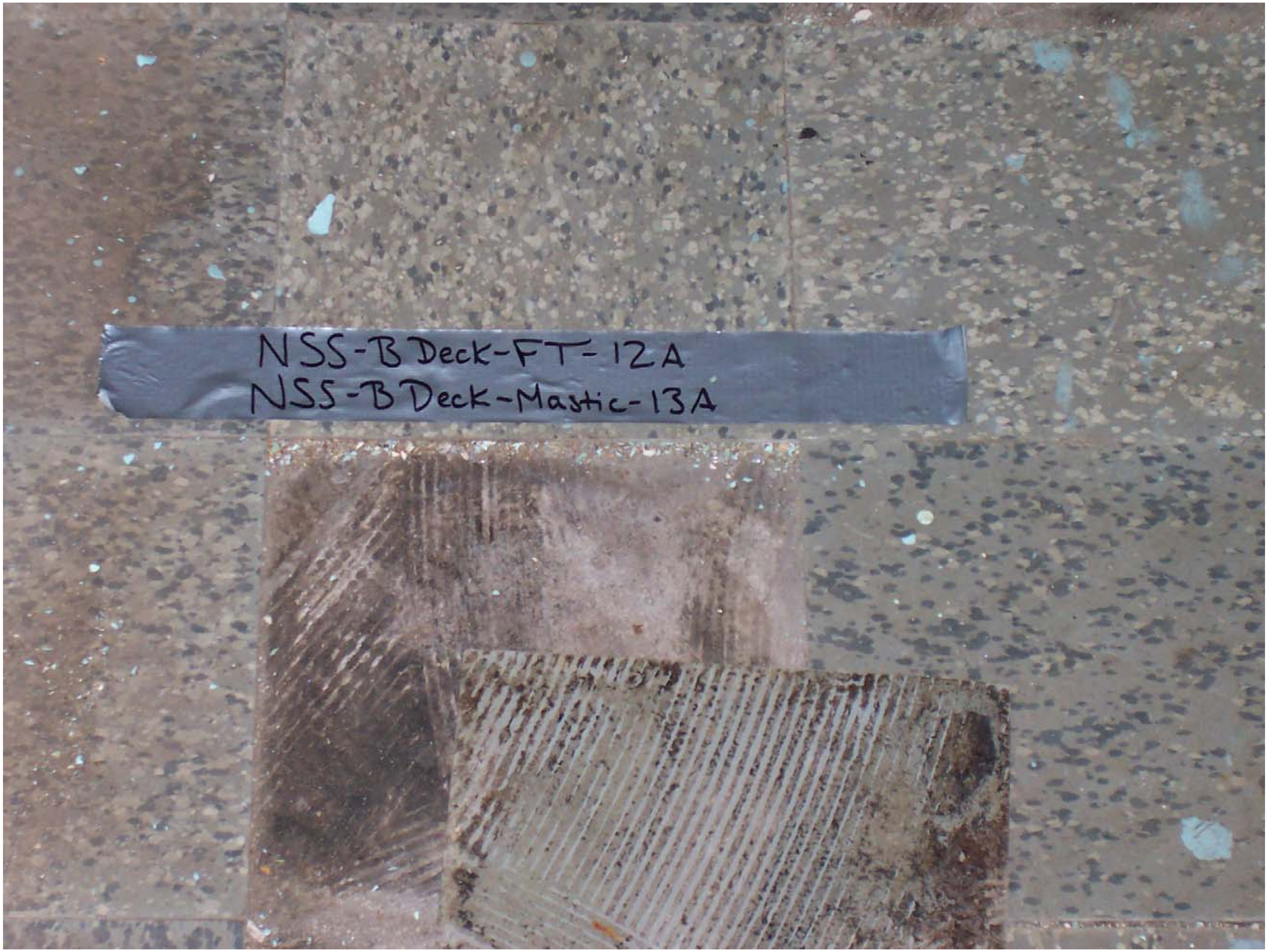
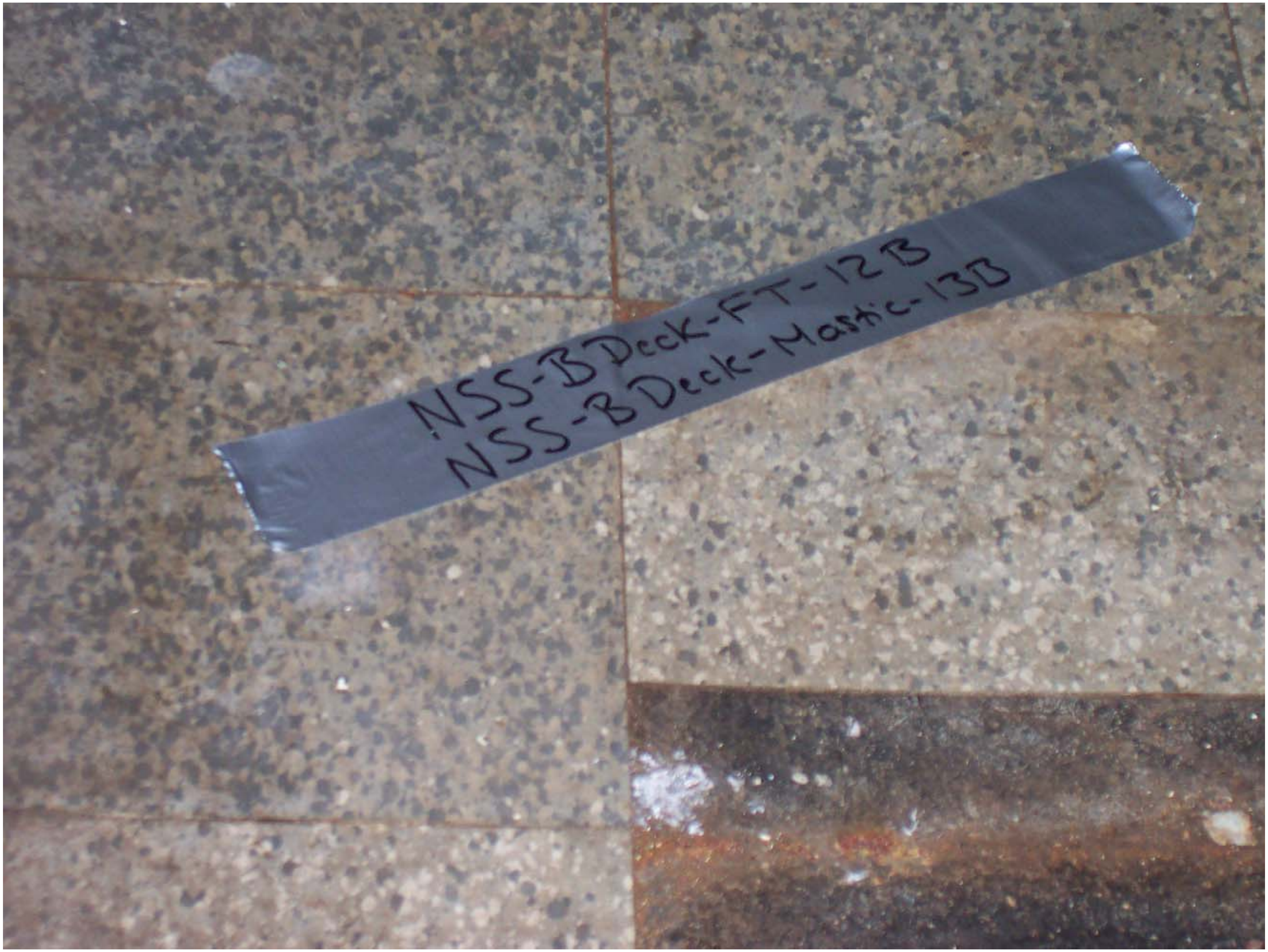
NSS-B Deck-~~FT~~ Mastic-7B
NSS-B Deck-fiberboard-9C


NSS-B Deck-FT-12A
NSS-B Deck-Mastic-13A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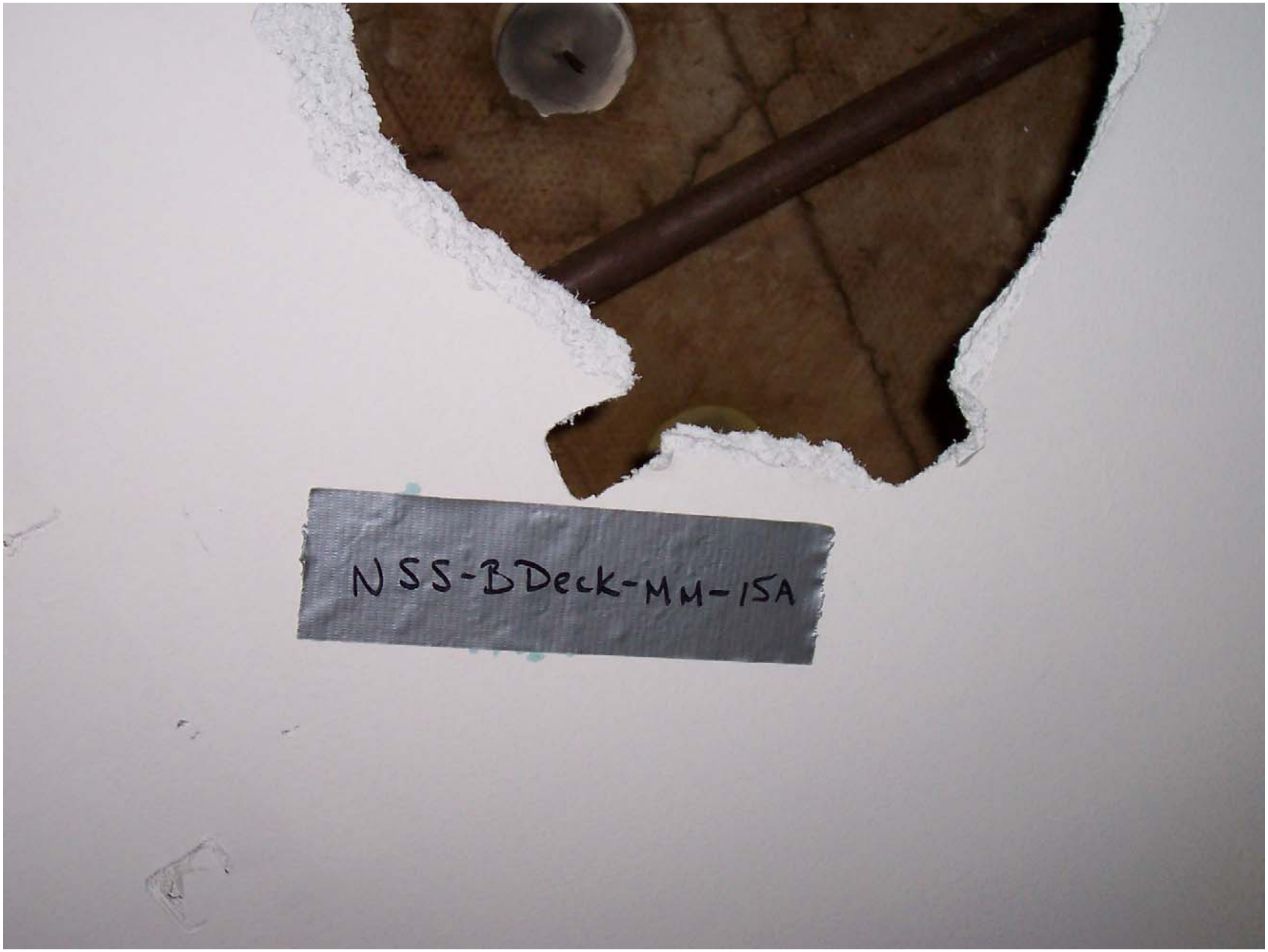
NSS-B Deck-Mastic-13B


NSS-B Deck-FT-12C
NSS-B Deck-Mastic-13C


NSS-B Deck-Subfloor-14A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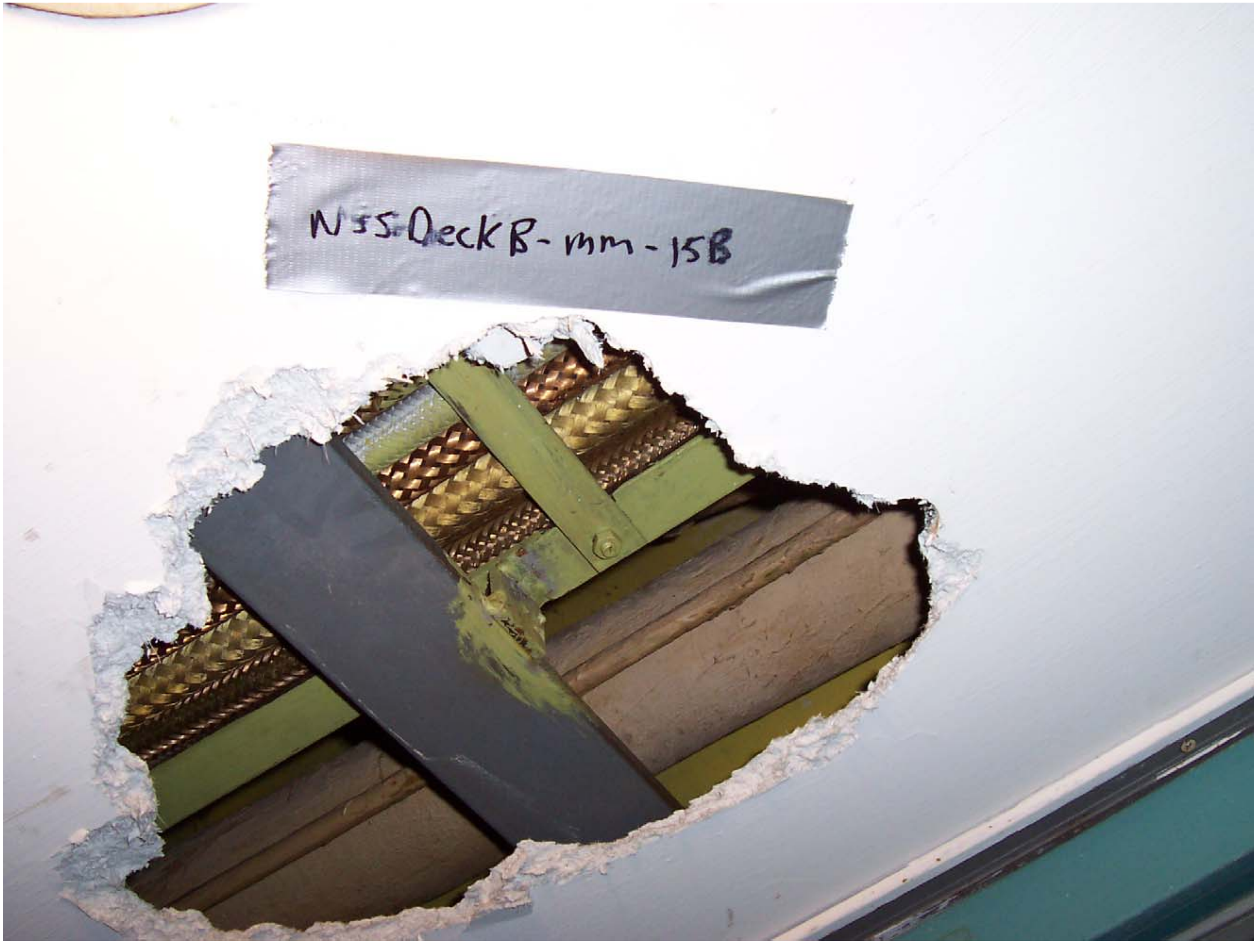
NSS Deck 8 - FT - 16A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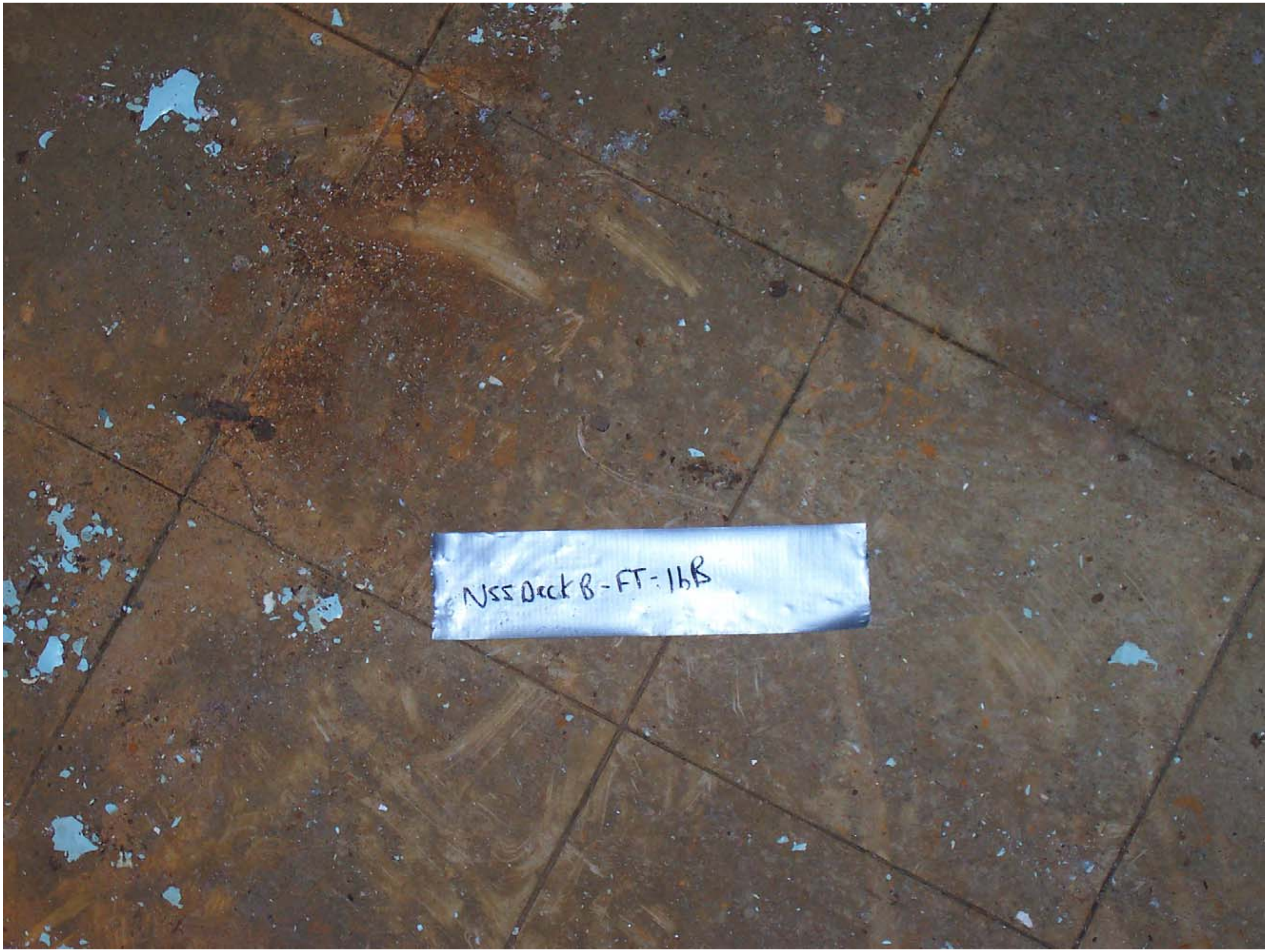
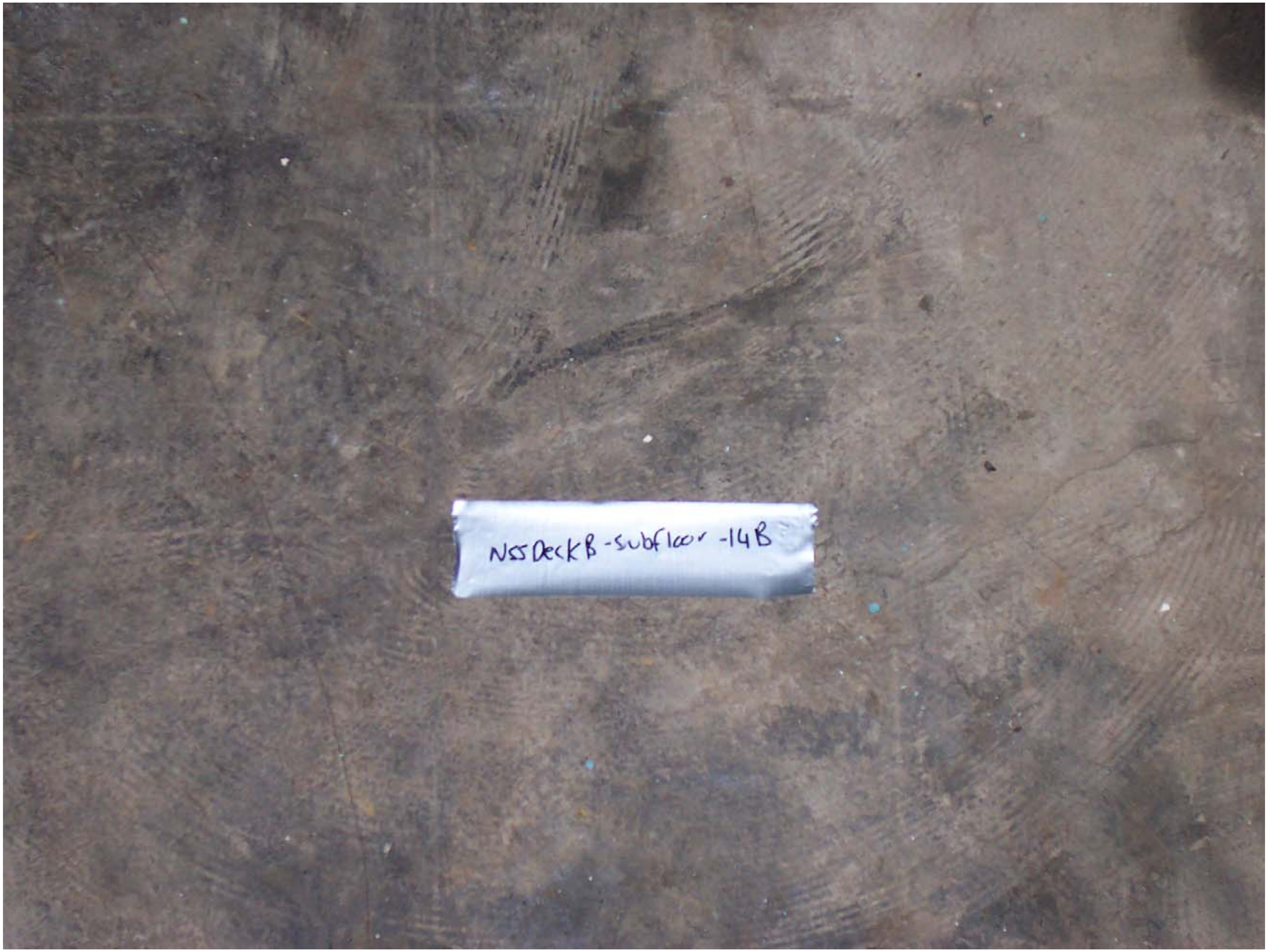
NS5 Deck B-MM-15C


N55 Deck B - FT - 16B


NSS Deck B - FT - 16C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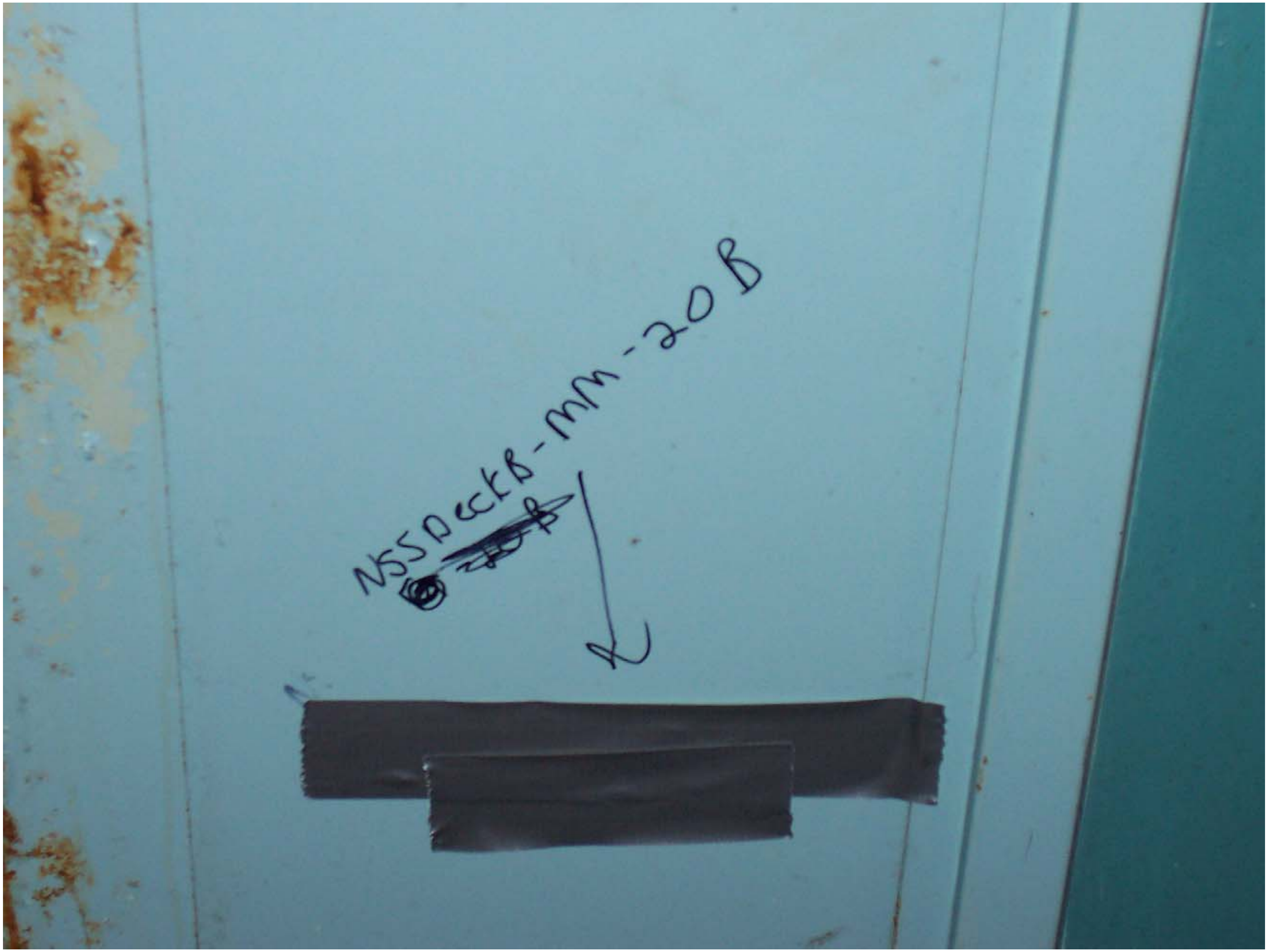
TSI-19A


NSJ Dock B -
TSI - 18A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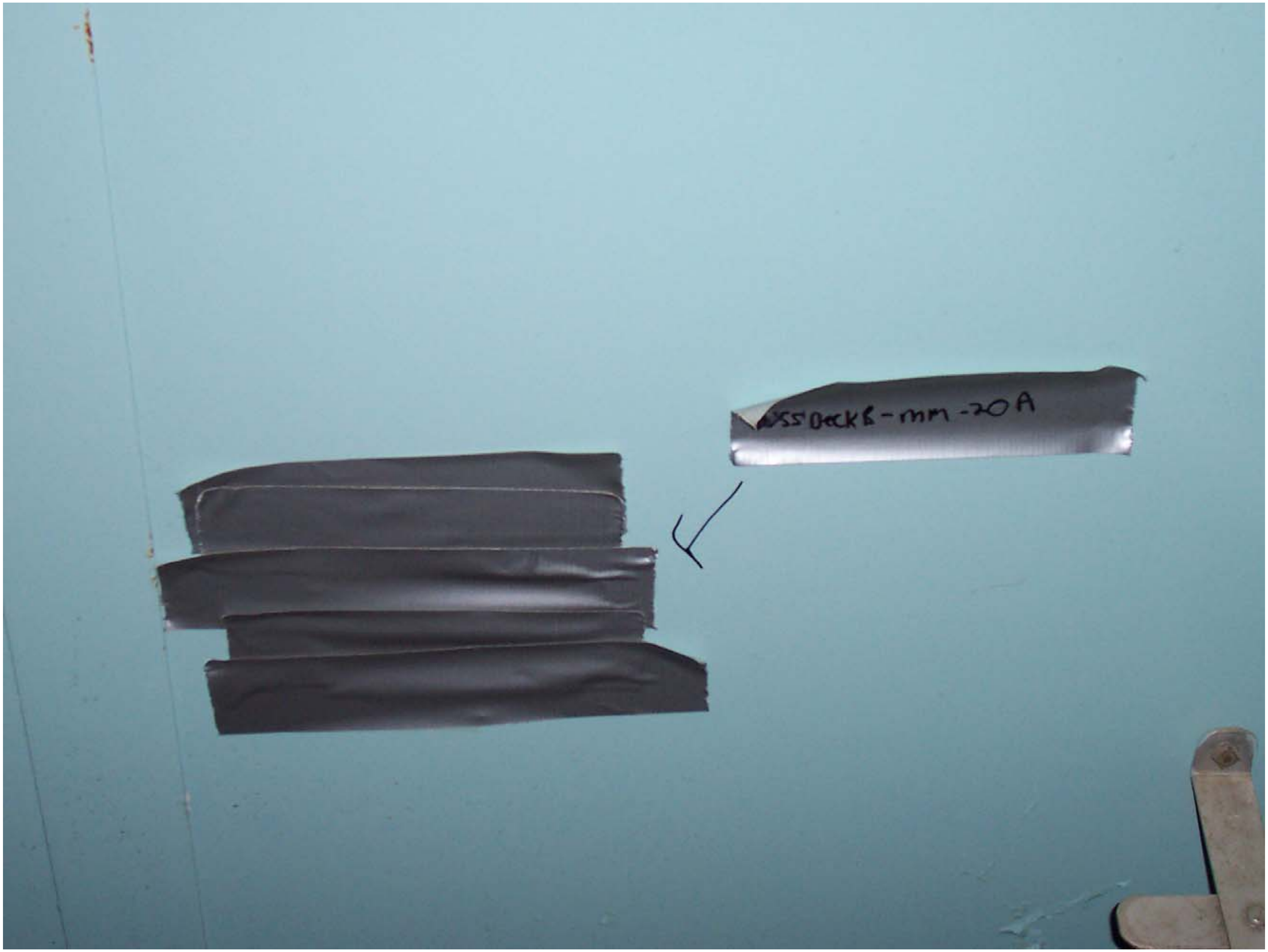
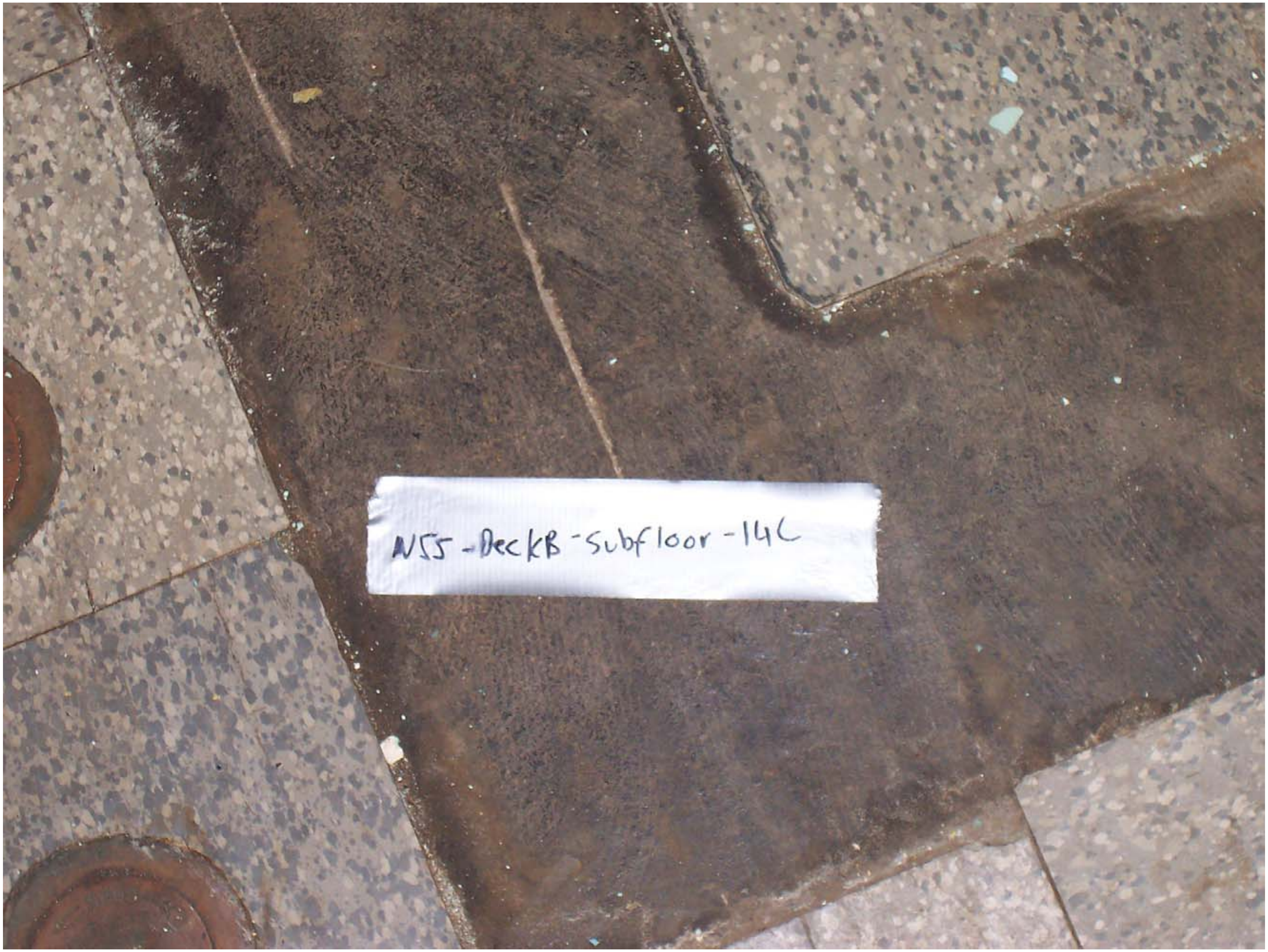

SS Beck B-MM-20A


NSSDeckB-mm-20C


NSS-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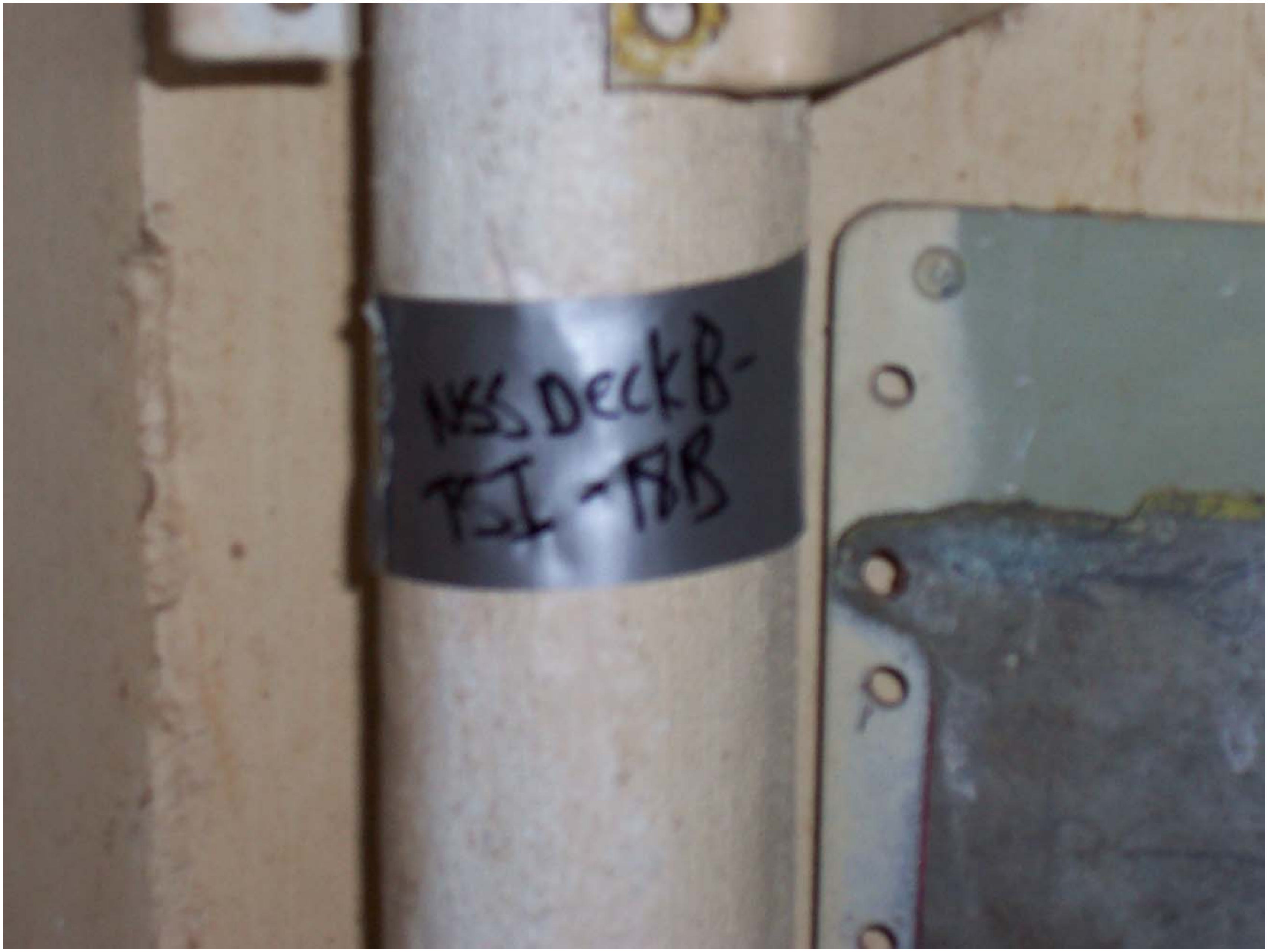
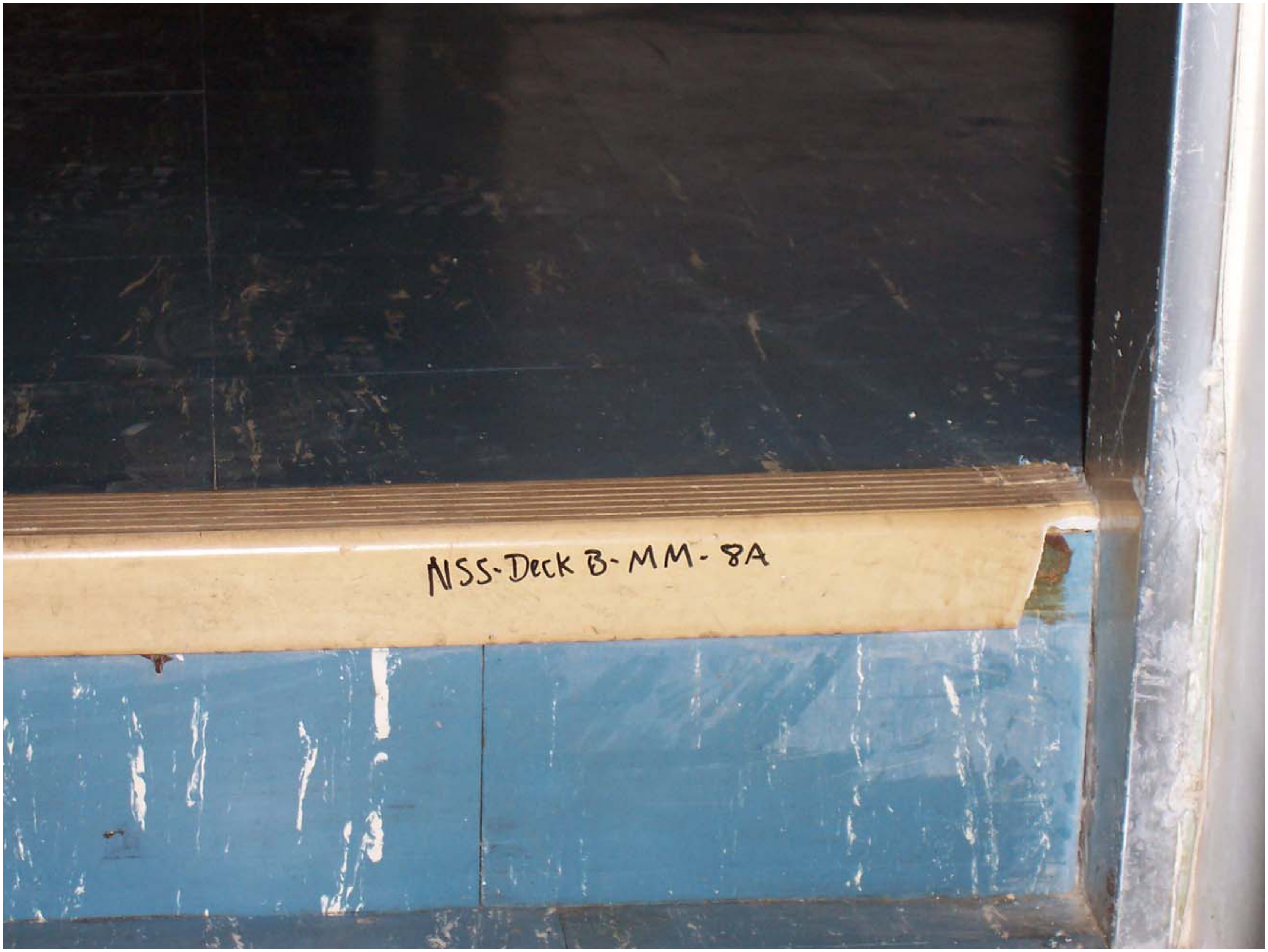

NSS Deck B-


TSI - 19C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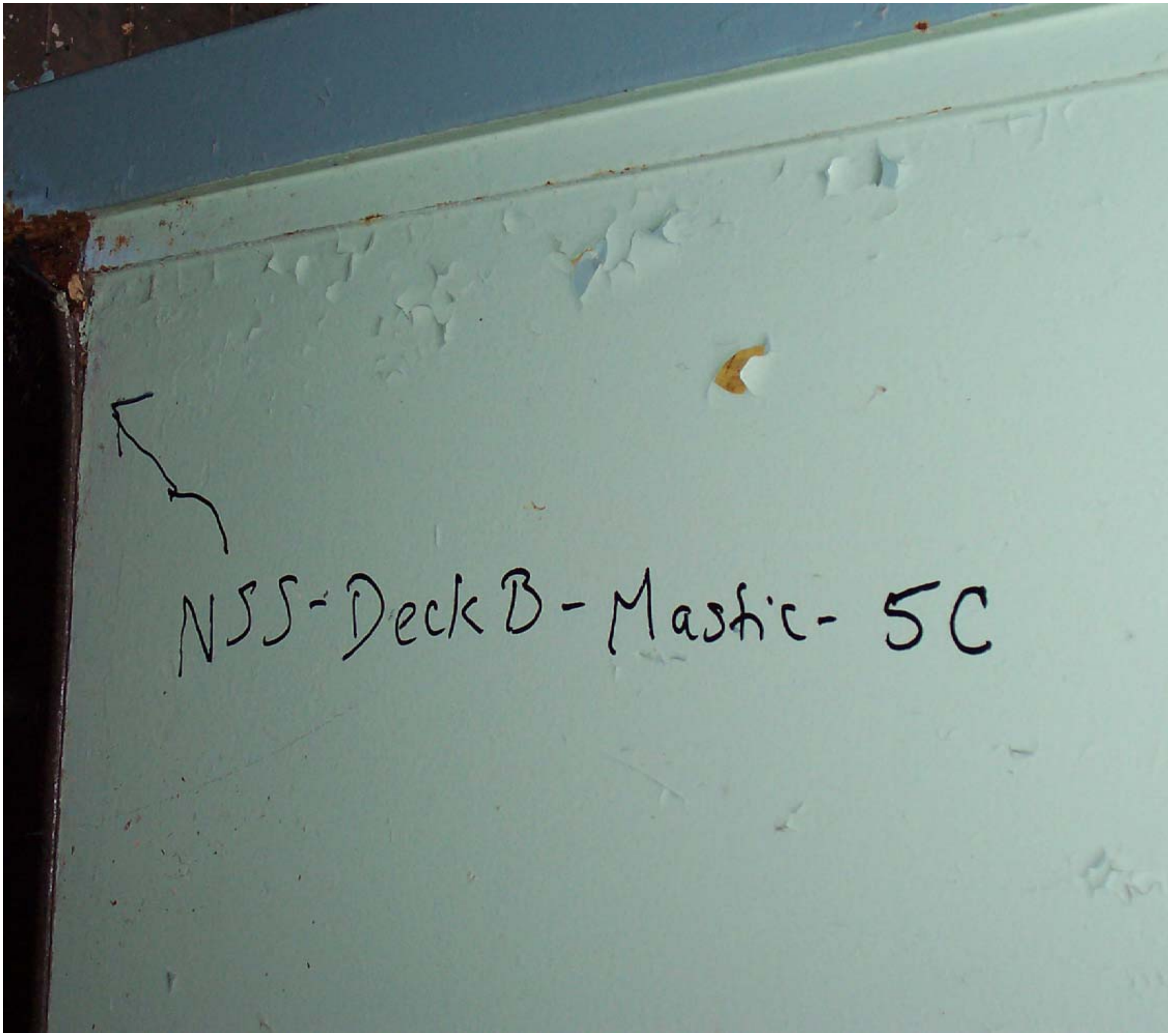
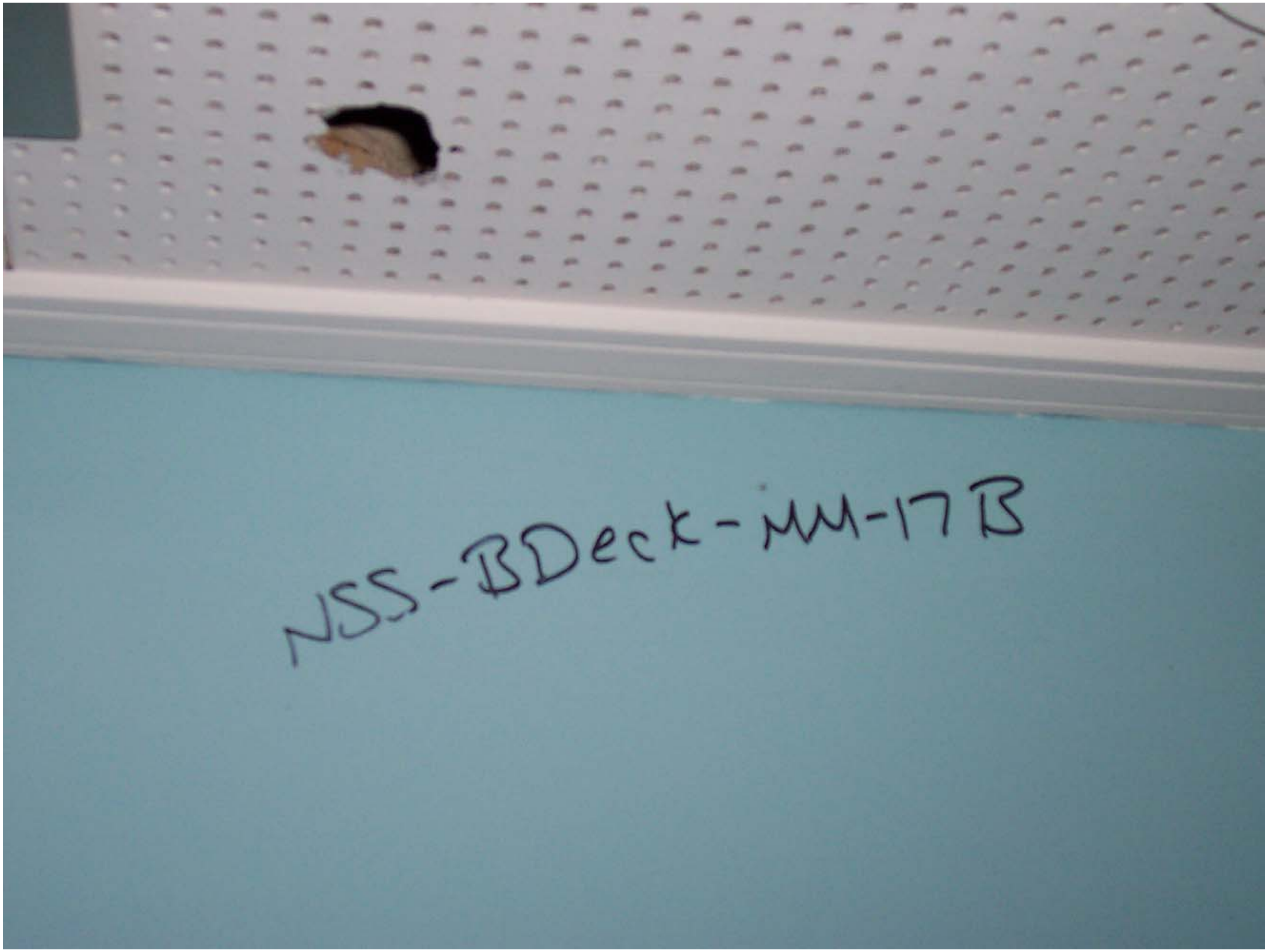
NSS-Deck B-MM-8B


NSS-Deck B-MM-8C


NSS-Deck B-Mastic- 5C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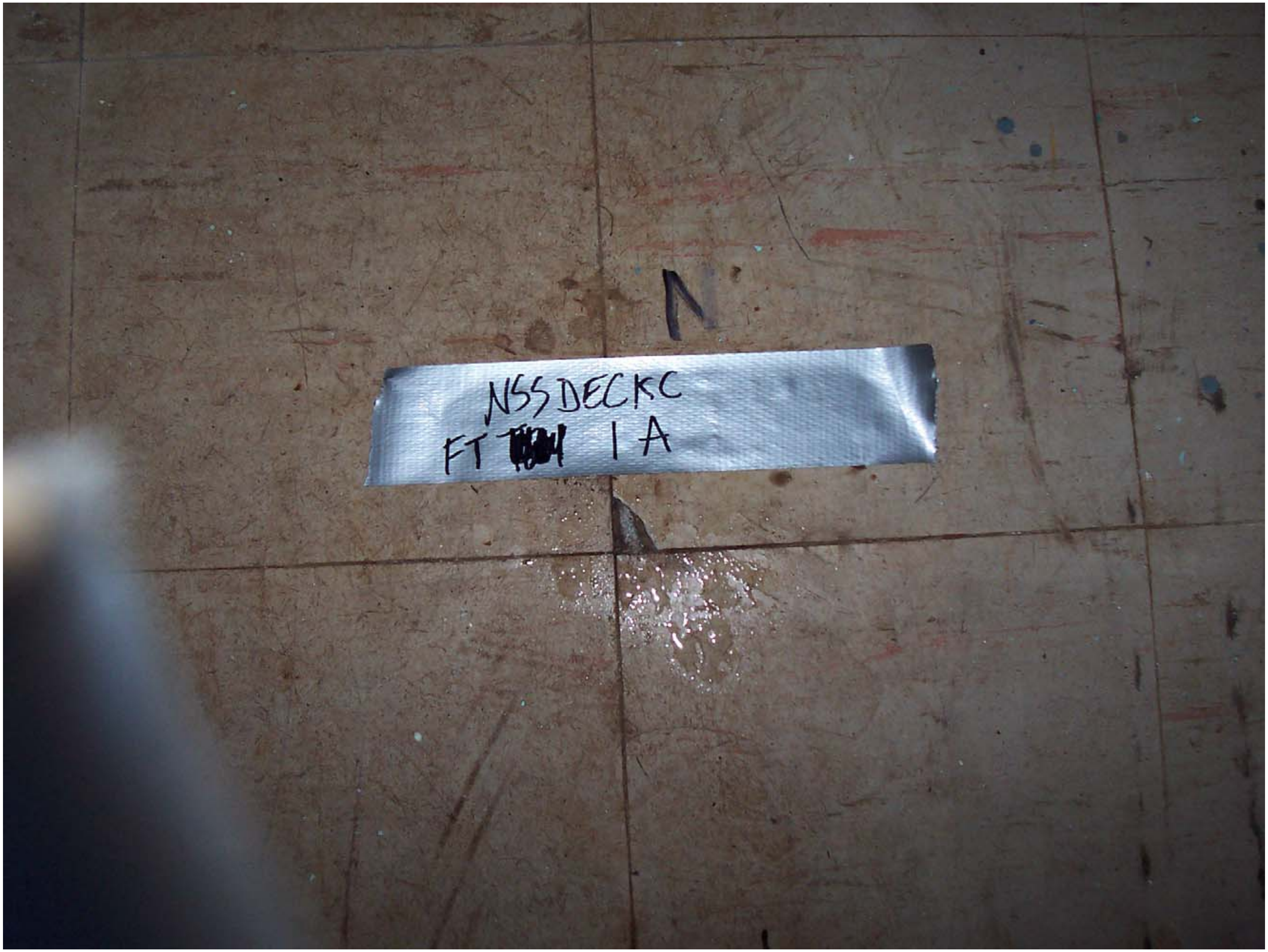
NBS- B Deck- MM- 17C

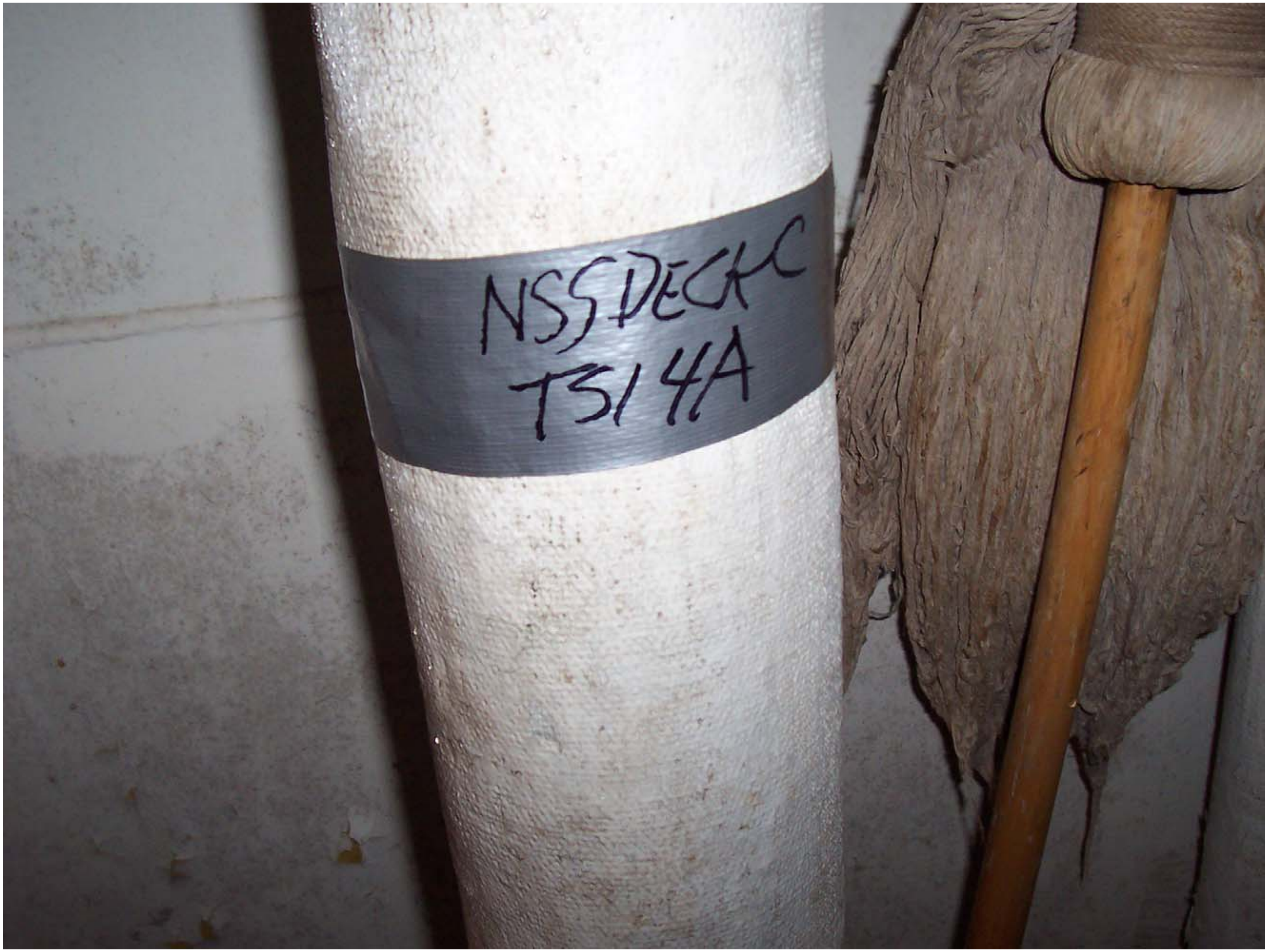

NSS-B Deck-MM-17A


NSS-B Deck - Mastic - 5B


N
NSSDECKC
FT [redacted] 1A


NSSDECKC
MM 2A


NSS DECKC
MM3A


NSS DECK C
TSI 4A


NSS DECK C
TS1 5A


NSS DECKC
FT 6A


NSS DECK C
TS1 8A

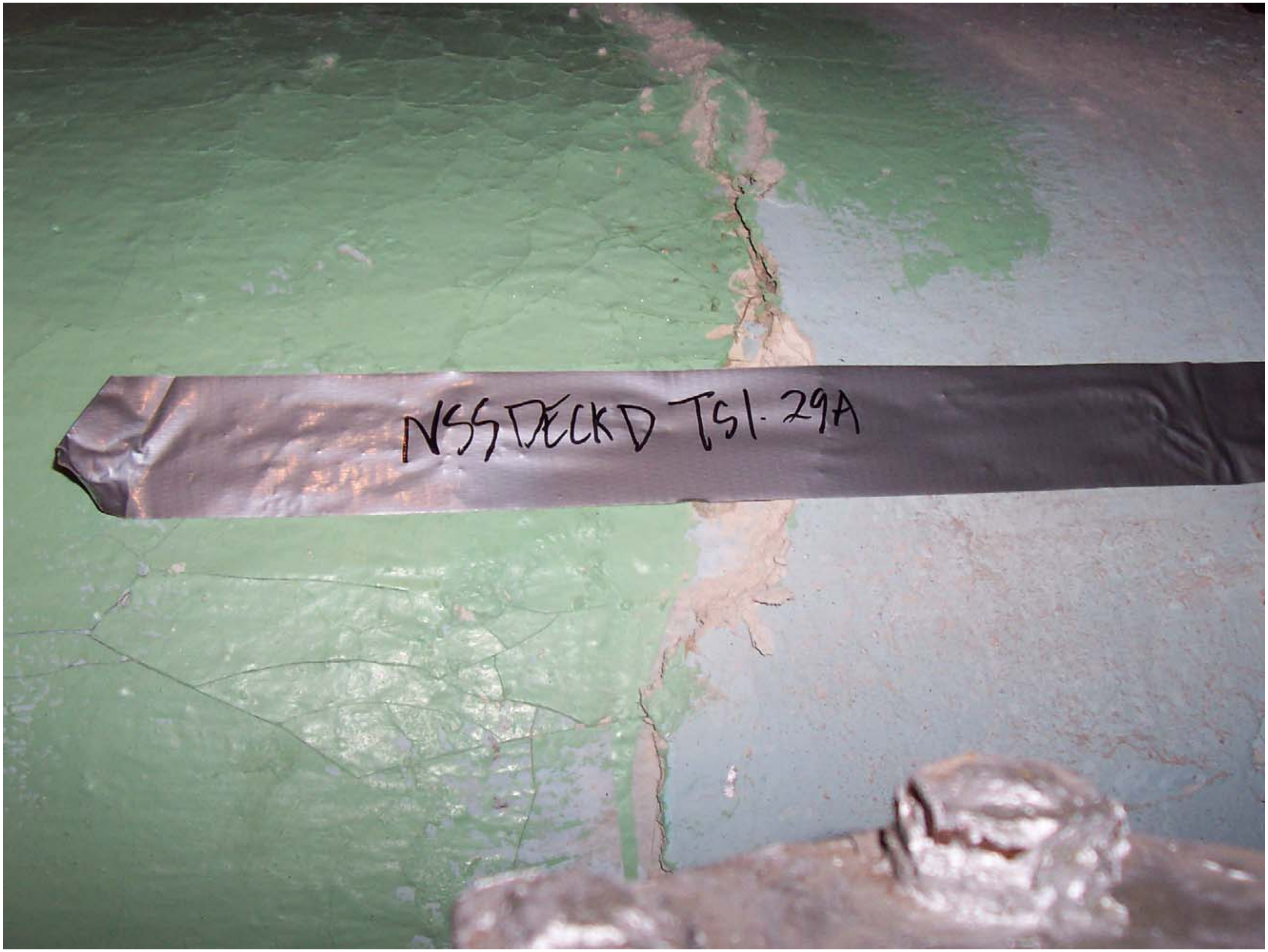

NSS
9A

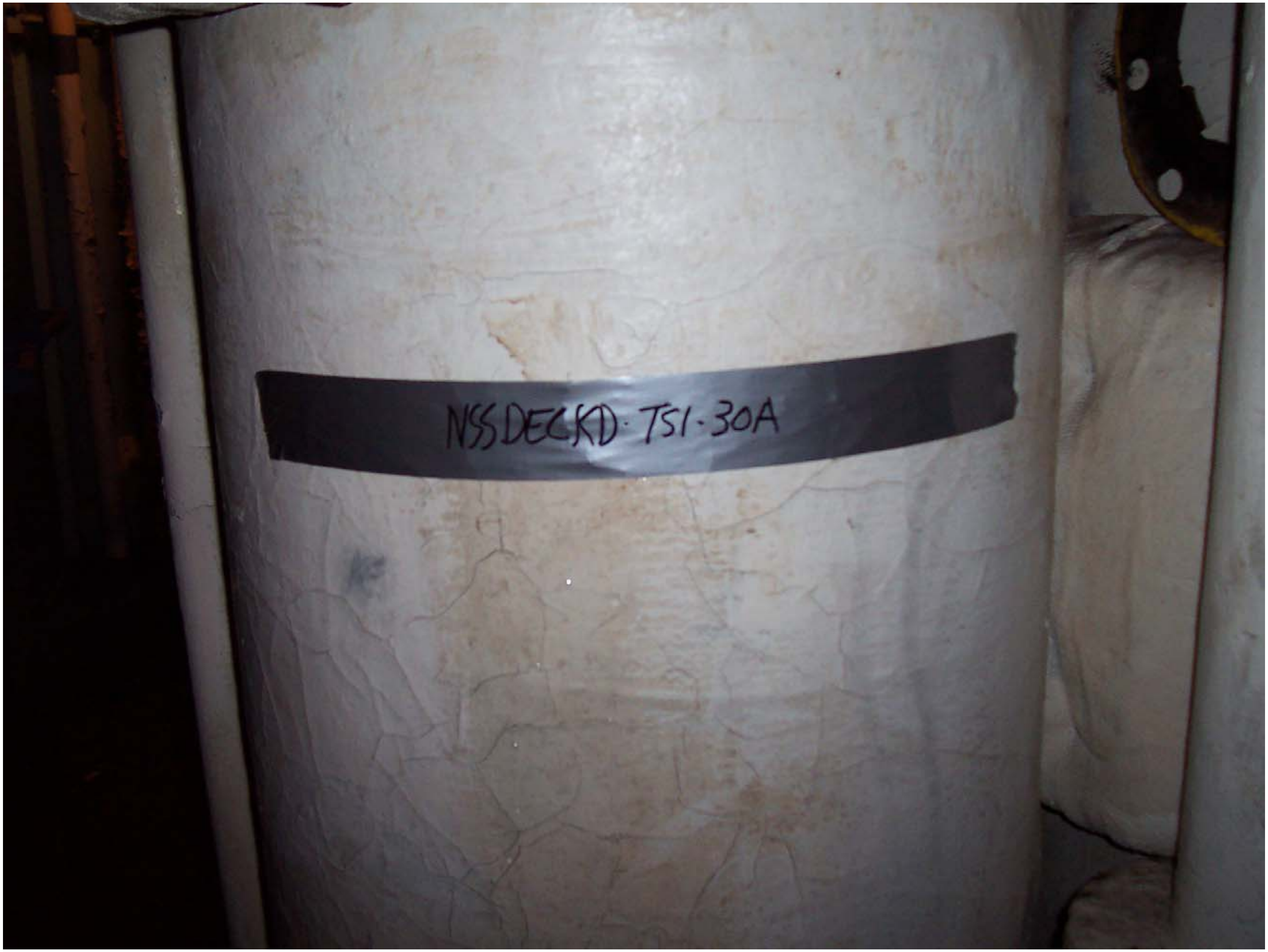

NSSDECK D
FT 25A


NSS DECKD
FT-26A


NSSDECK D
TSI-27A


NSS
DECK D
TS128A


NSS DECK D TSI-29A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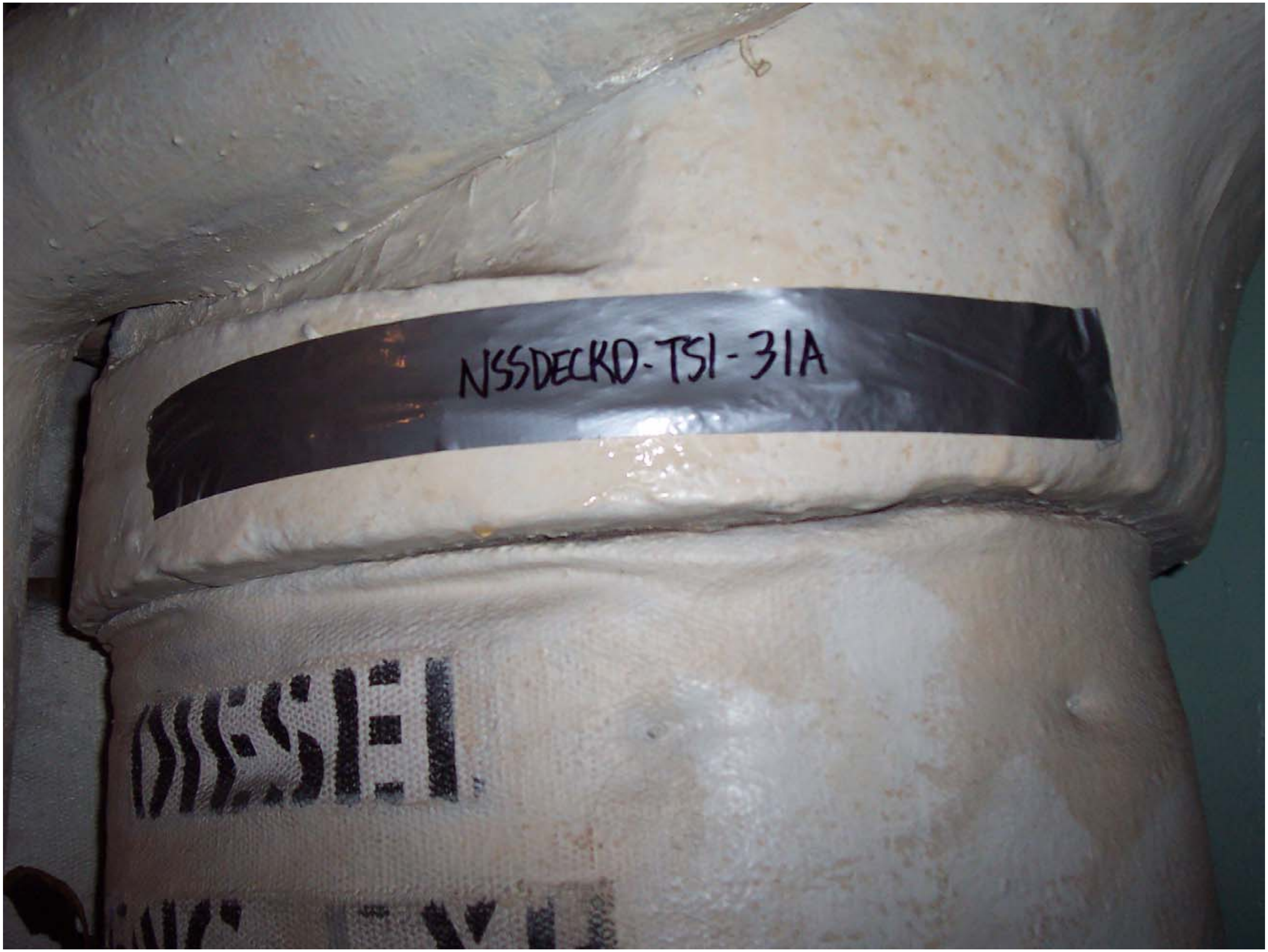
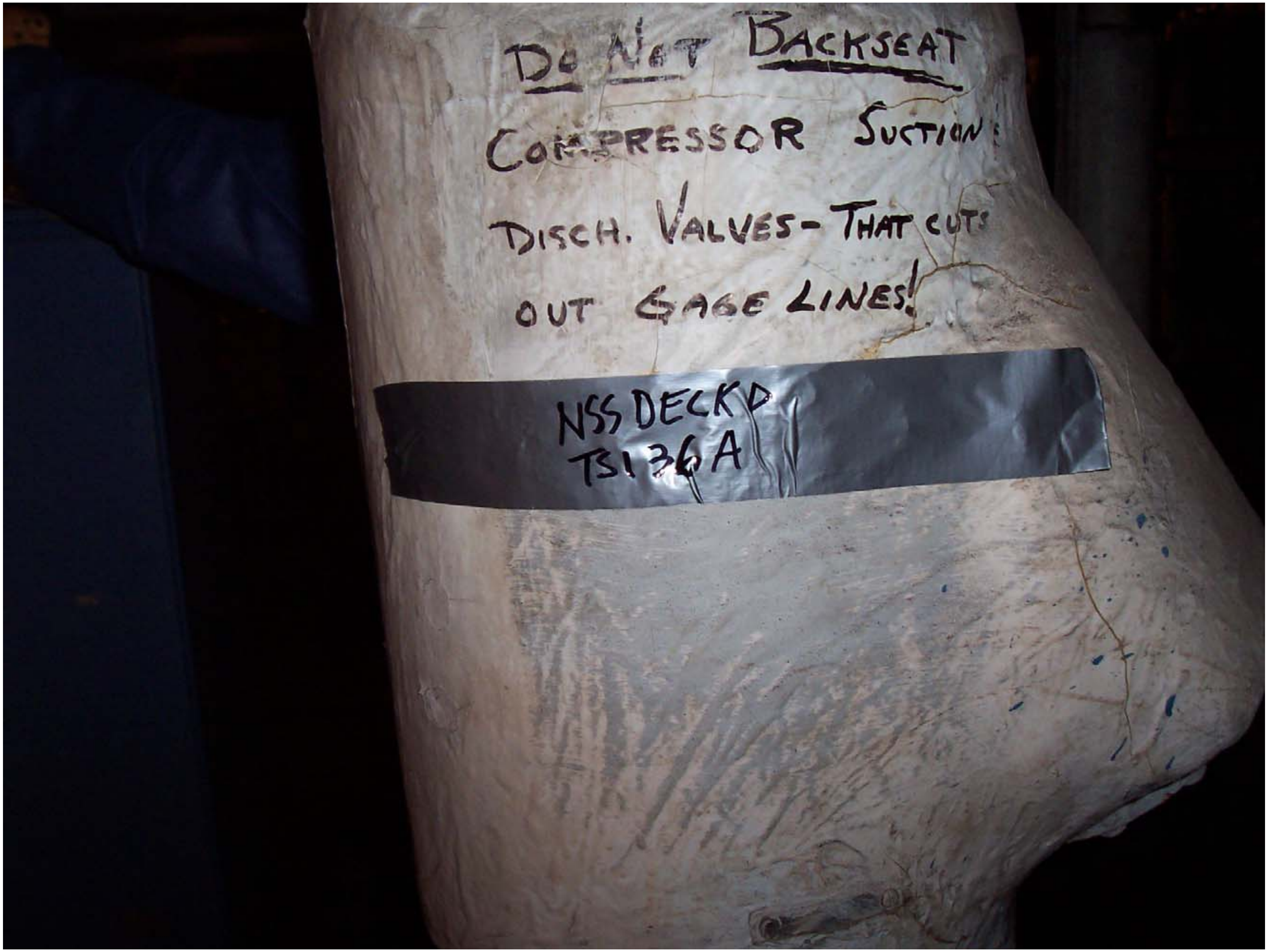

NSSDECKD-TSI-31A
DIESEL


NSS DECK D
MM 32A


NSSDECKD
TSI 33A


NSS DECK D
TSI 34A

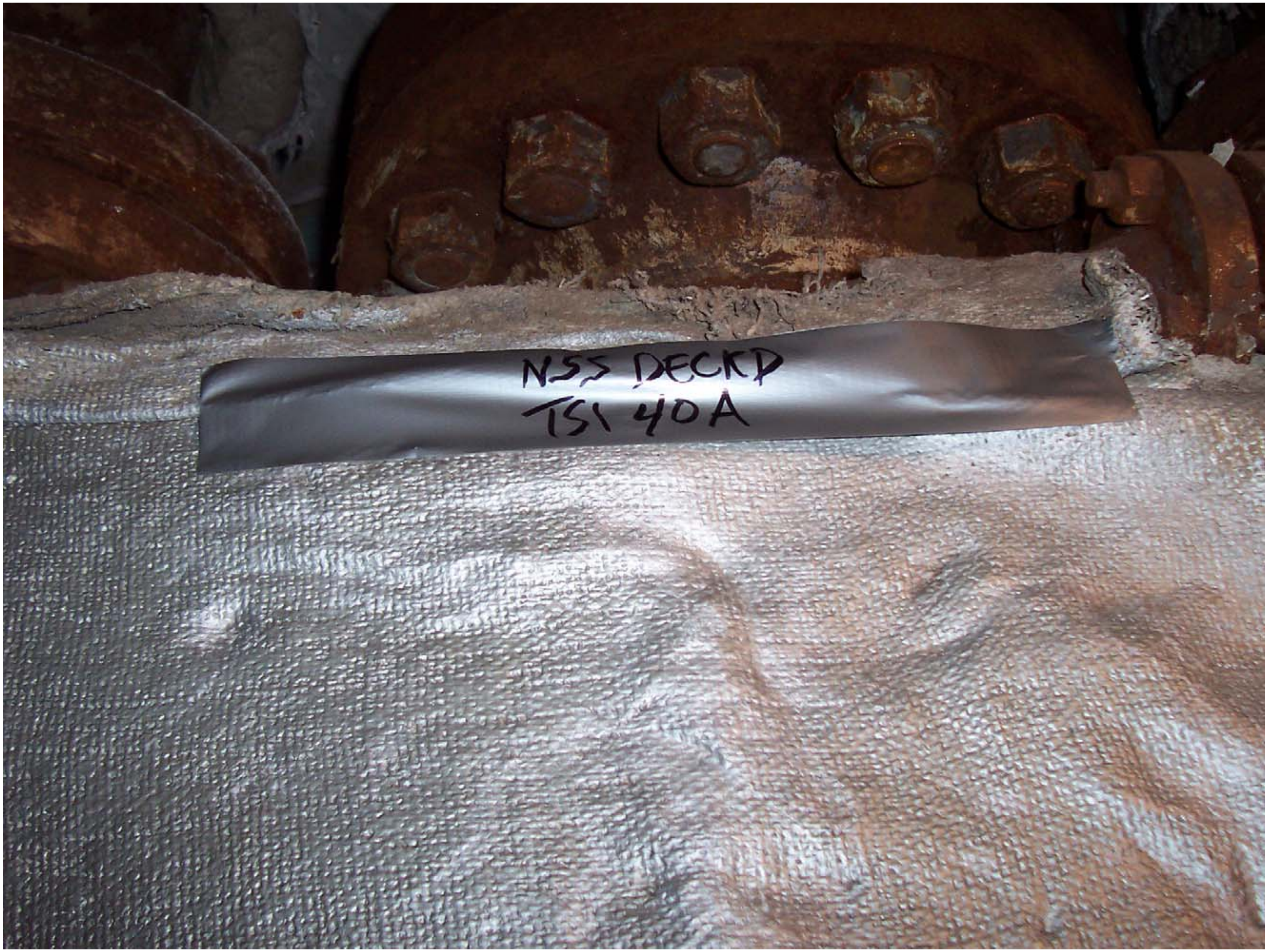

NSS DECK D
TSI-35A


DO NOT BACKSEAT
COMPRESSOR SUCTION
DISCH. VALVES - THAT CUTS
OUT GAGE LINES!
NSS DECK D
TS136A


NSS DECKD
TB1 37A


NSS DECK D
TSI 38A


NS DECKD
TS139A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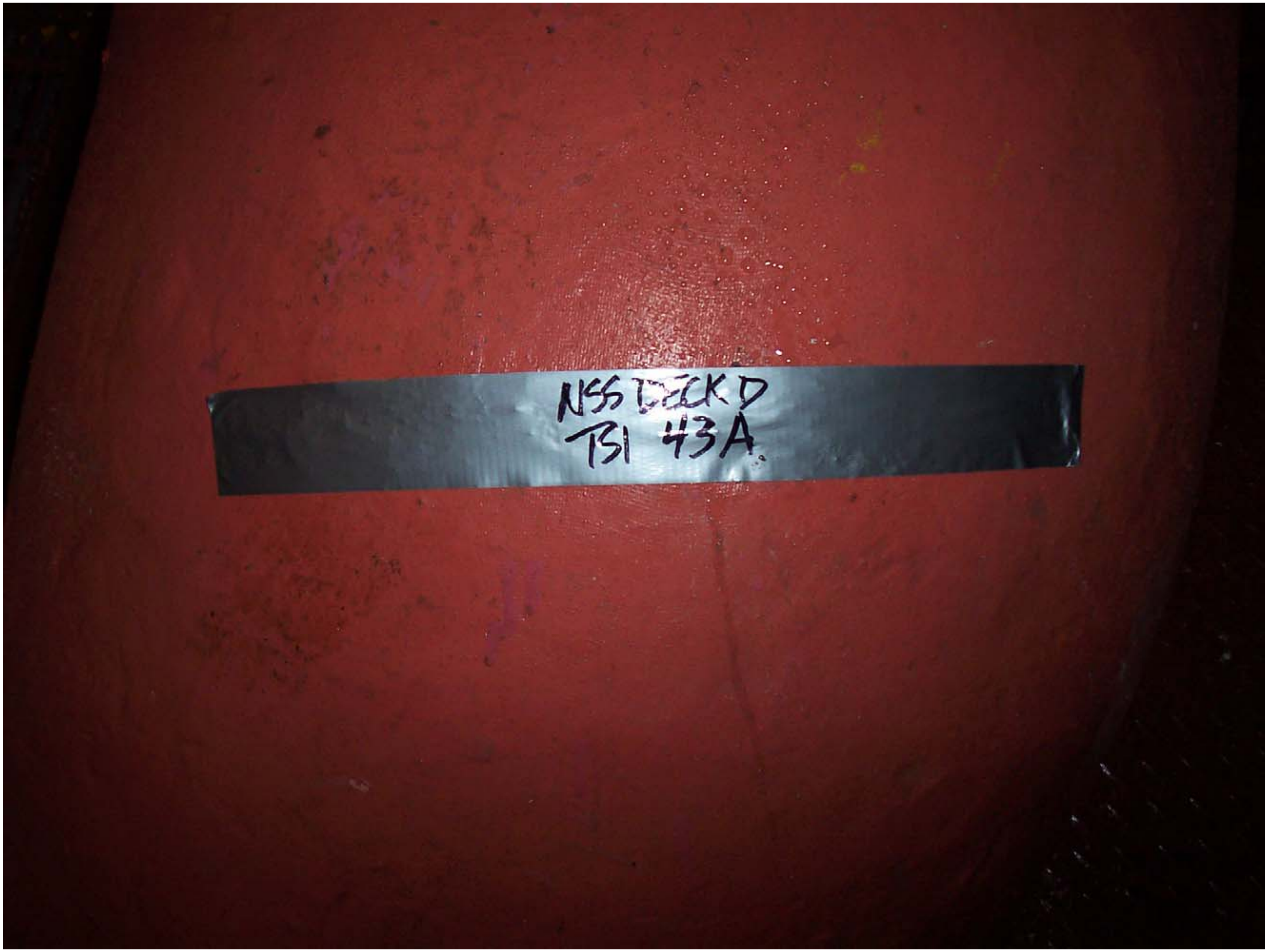
TSI 40A


NSS DECKD
TSI 41A


NSS DECKD
TS1 42A


NSS DECK D
TSI 43A


-Deck 0-
TSI-4A


NSS DECK D
TSI - 45A


NSS DECKD
TSI 46A


USS DECK
TSI 47A

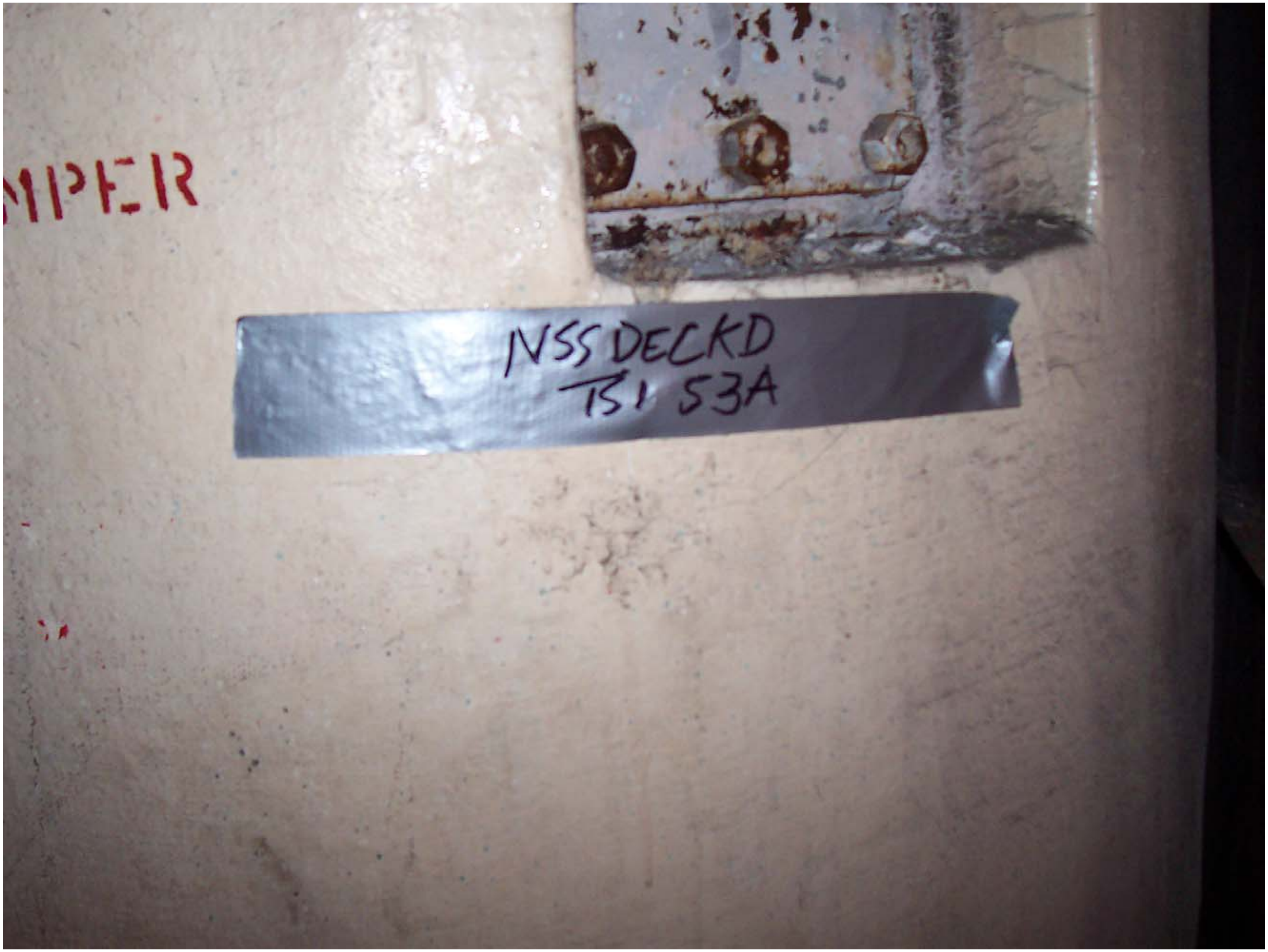

NSS DECKD
TSI 48A


NSSDECKD
TSI 49A


VAPOR
NSS DECK D


NSSDECKD
TSI 51A


NSSDECKD
TSI 52A


MPER
NSS DECKD
TSI 53A


FT 54A


NSS DECK D
FT 55A


NSS
DECKD
T3156A


NSS
DECKD
TSI 57A


←NSS-DDeck-FT-55C
NSS-DDeck-FT-54C


TS15TC


NSS
TSI 566


←NSS-D Deck-FT-54B
←NSS-D Deck-FT-55B


DECKD
TSI


NSS
DECK D
T3136A


NSS


14FLAT
TSI
1A


NSS
14 FLAT
TSI
2A


NSS
14 FLAT
TSI
4A


NSS
HFLAT
TSI
5A


NSS
14 FLAT
TSI
6A


NSS
14 FLAT
TSI
7A

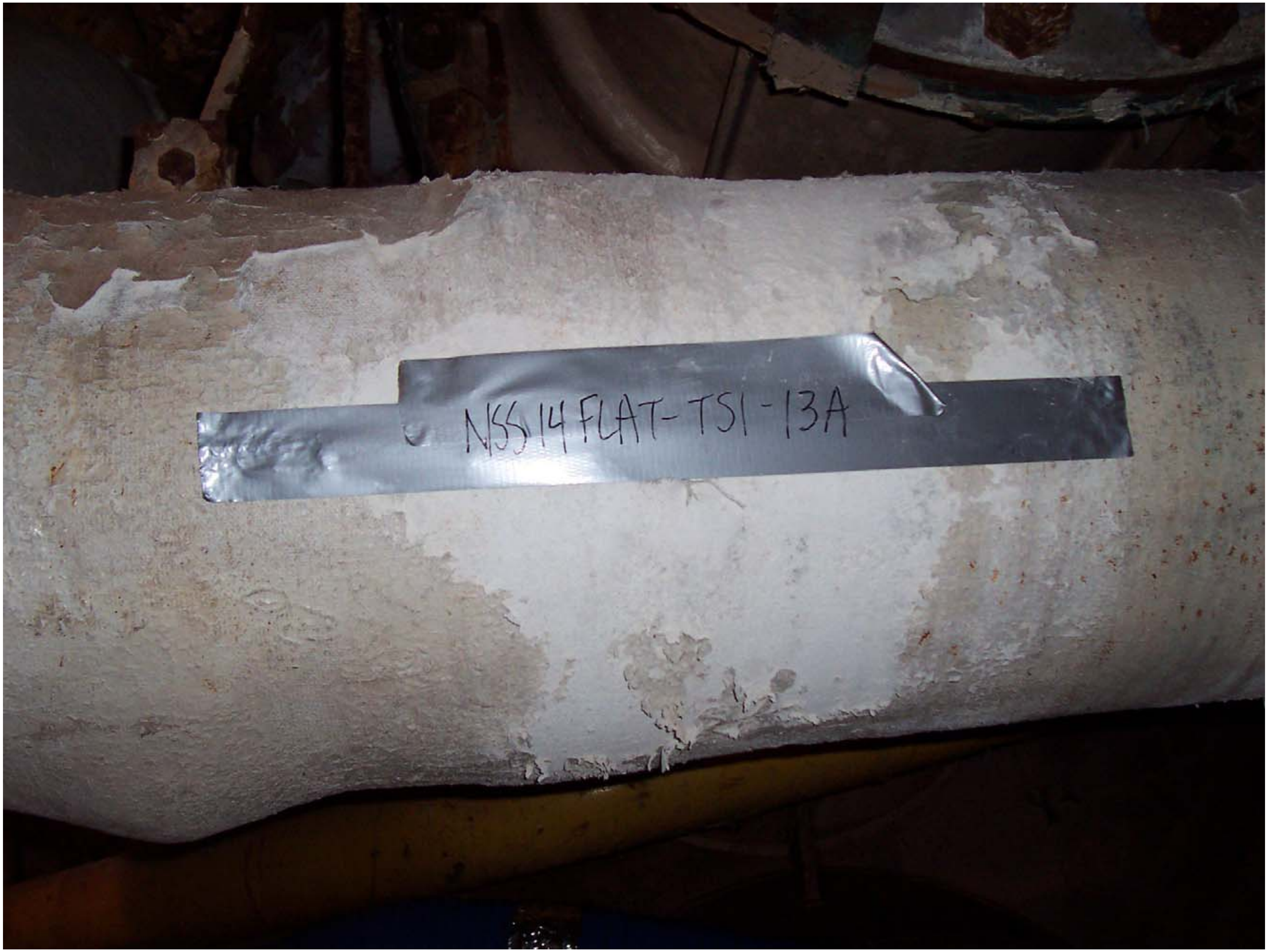

NSS
14FLAT
TSI
8A


NSS 14FLAT · TSI - 9A


L.P.
OVER
AT-TSI-10A


N55 14 FLAT TSI 11A


N5514FLAT-TSI-12A

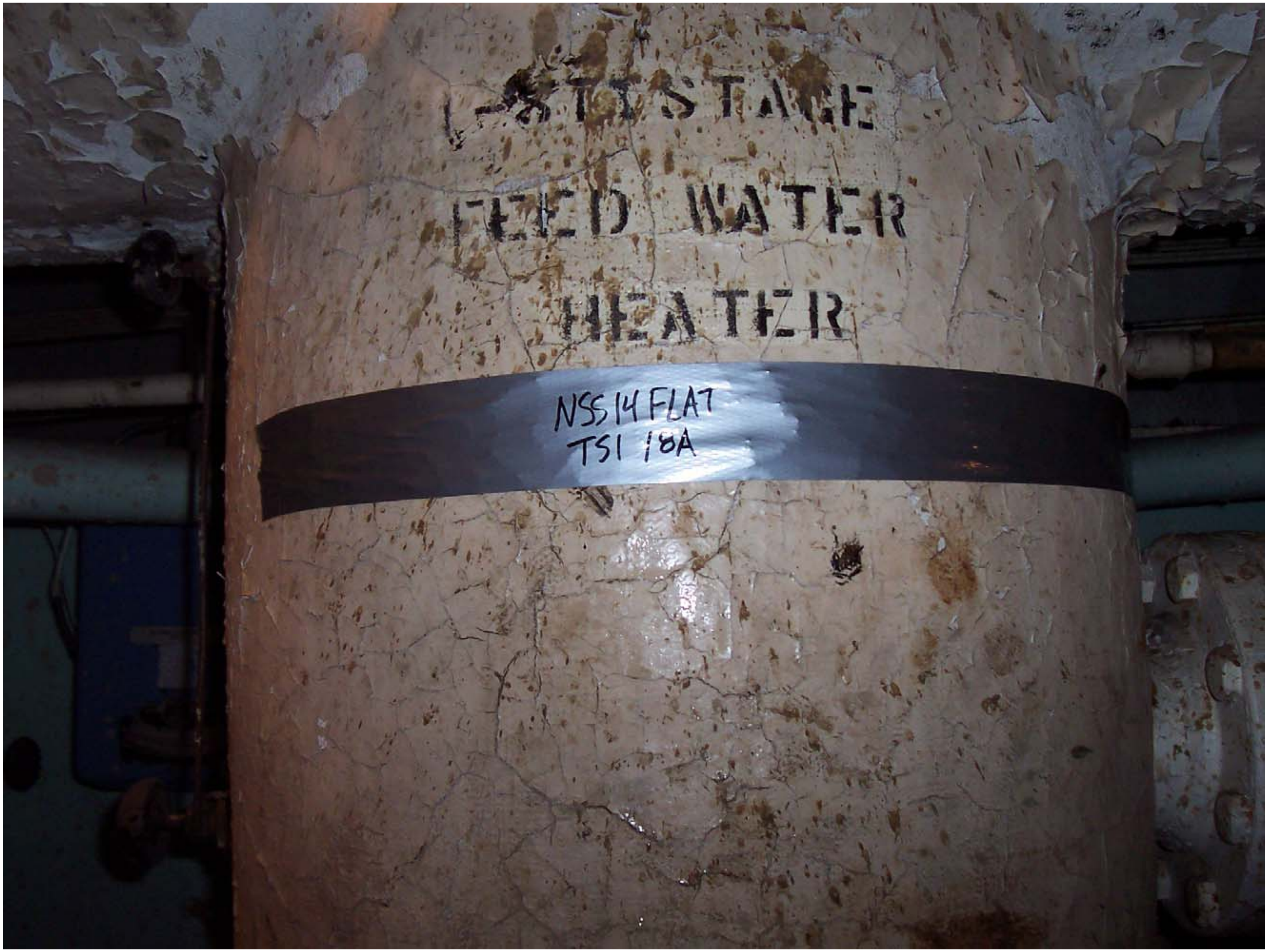

NSS14 FLAT-TSI-13A


FLAT


NSS
14FLAT
TS115A


NSS14FLAT-TSI
16A


NSS
MFLAT
TSI 17A


STAGE
FEED WATER
HEATER
NSS14 FLAT
TSI 18A


NSS
14 FLAT
TSI 19A


NSS
TSI 20A


NSS


RSS 14 FLAT


NSS
14 FLAT


NSS
14FLAT
TS124A


S-[redacted]RC -

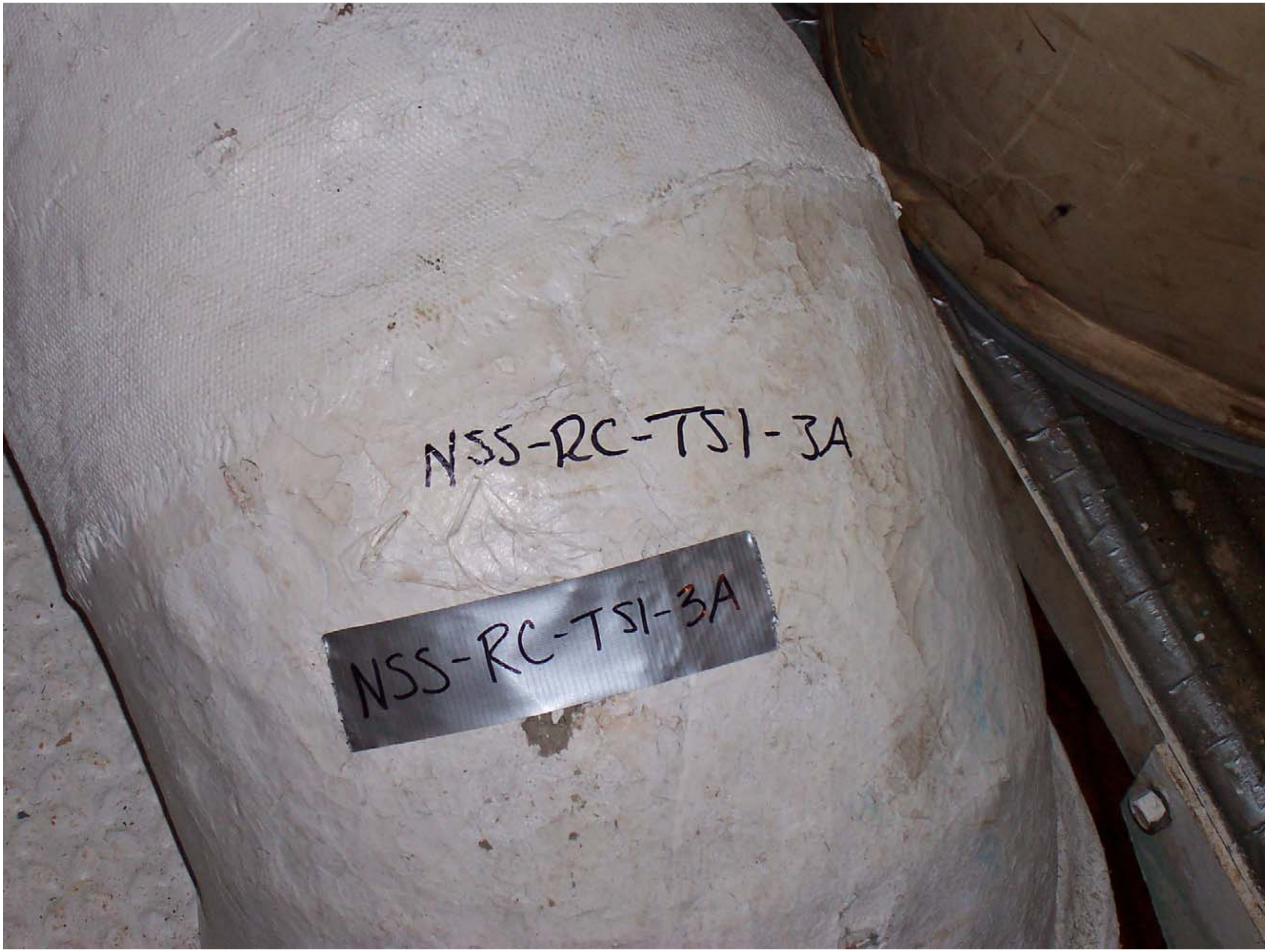

RC-TSI-1B


-RC-TSI-TC


NSS-RC-TSI-2A


NSS-RC-TS1-2B


NSS-RC-TSI-2C
NSS-RC-TSI-2C


NSS-RC-TSI-3A
NSS-RC-TSI-3A


NSS-RC-TSI-3B
NSS-RC-TSI-3B

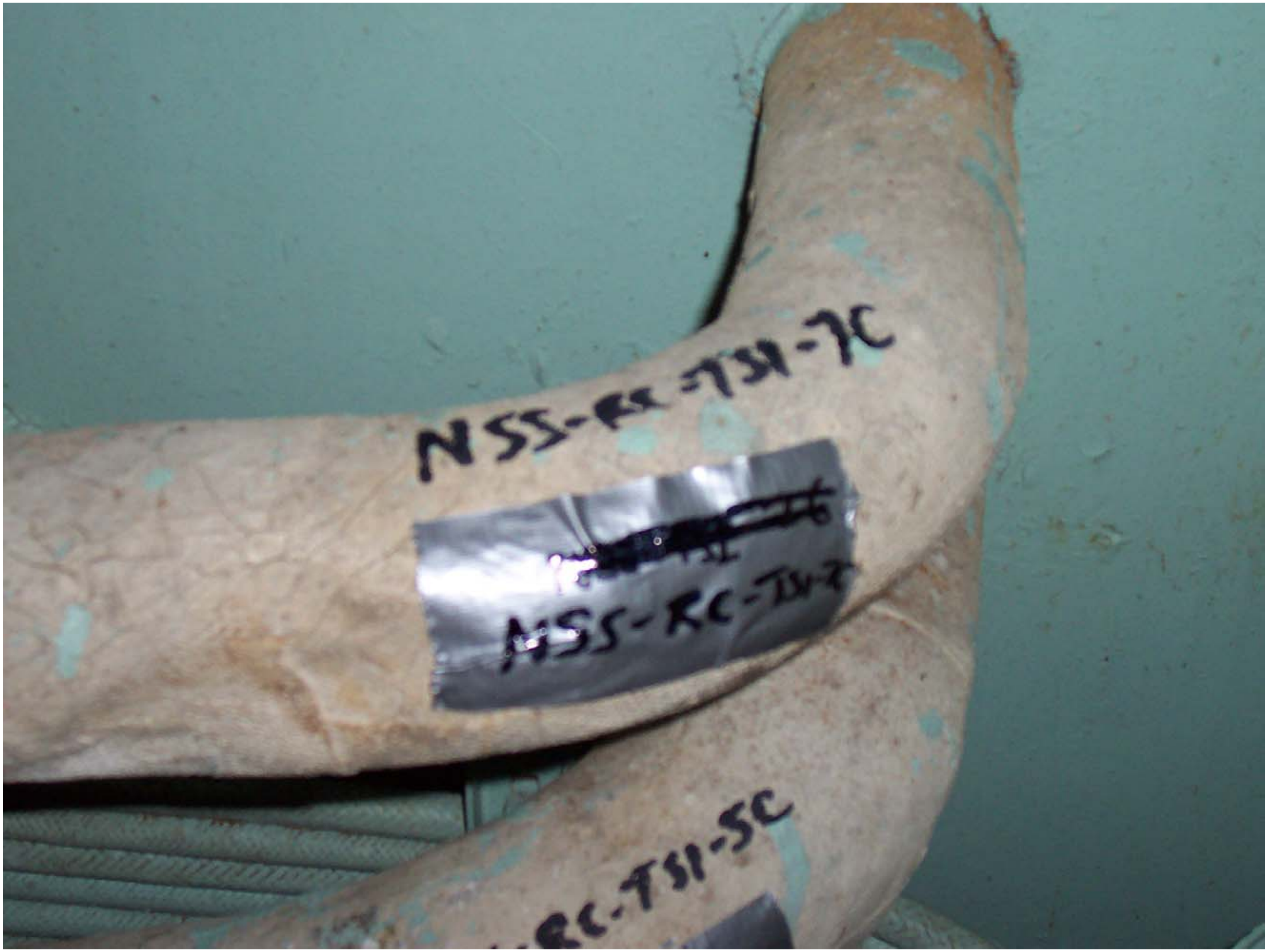

NSS-RC-TSI-3C


NSS-RC-TSI-5C
NSS-RC-TSI-5C


NSS-RC-TSI-4B
NSS RC -TSI-4B


NSS-RC-TSI-5B


NSS-RC-TSI-4C
NSS-RC-TSI-4C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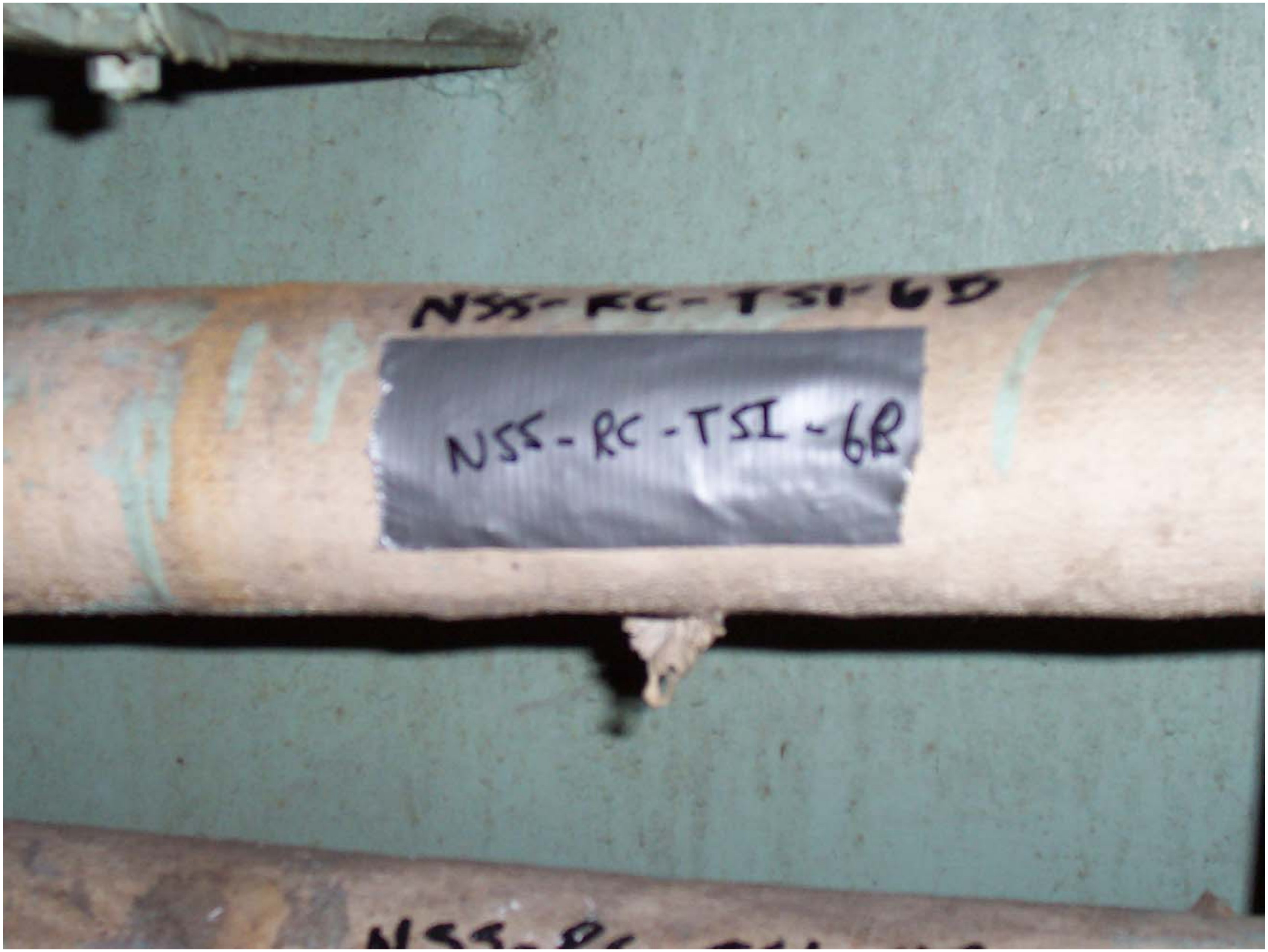
NSS-RC-TSI-7
RC-TSI-5C


NSS-RC-TSI-6B


NSS-RC-TS1-7B


NSS-RC-TSI-6C
NSS-RC-TSI-6C


NSS-RC-TSI-8B


NSS-RC-TSI-9B

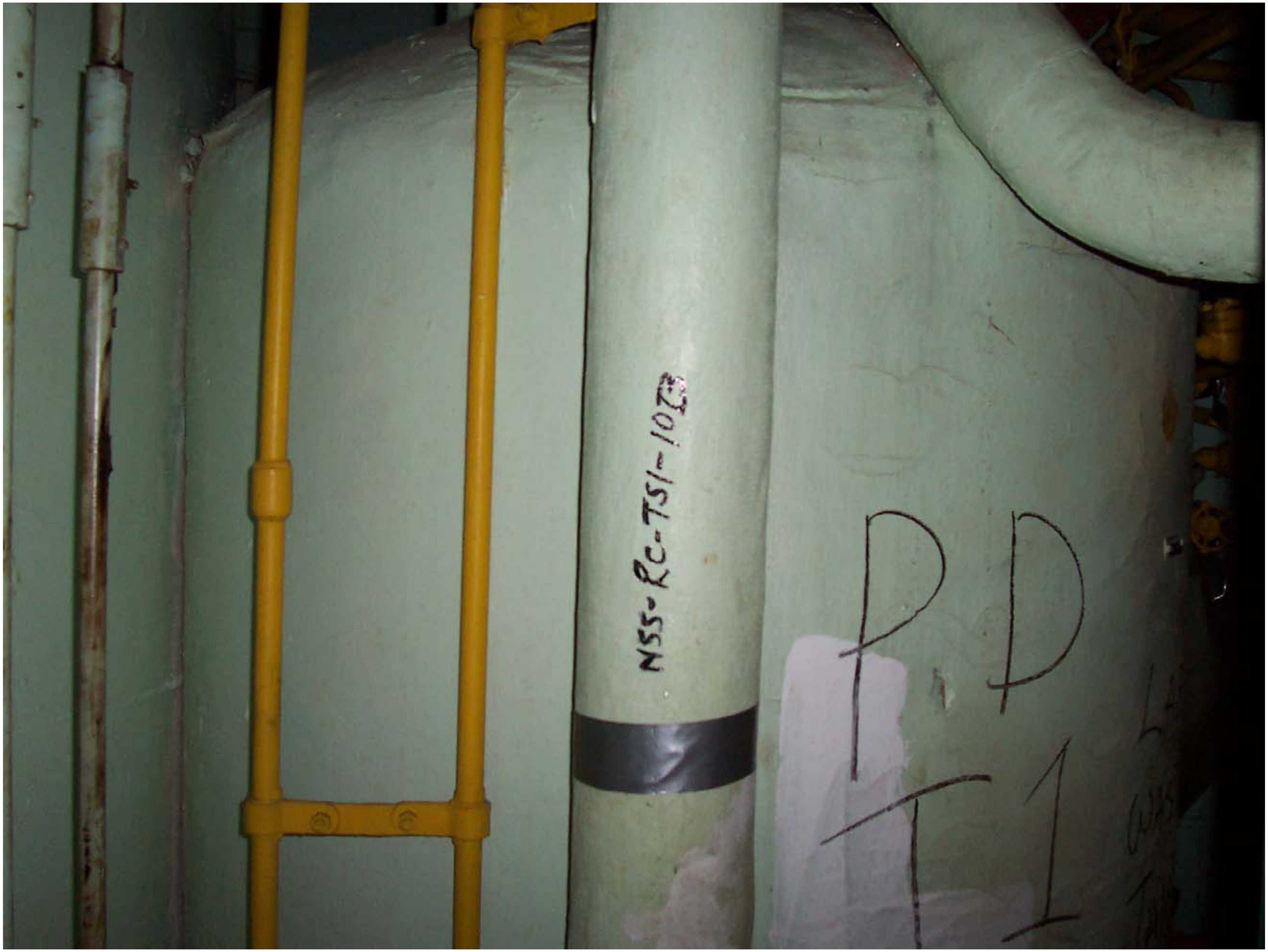

NSS-RC-TSI-8C


NSS-RC-TSI-9C


NSS-RC-TSI-9A


NSS-RC-TSI-8A


NSS-RC-TSI-10A


NSS-RC-TSI-1073
PD
T1

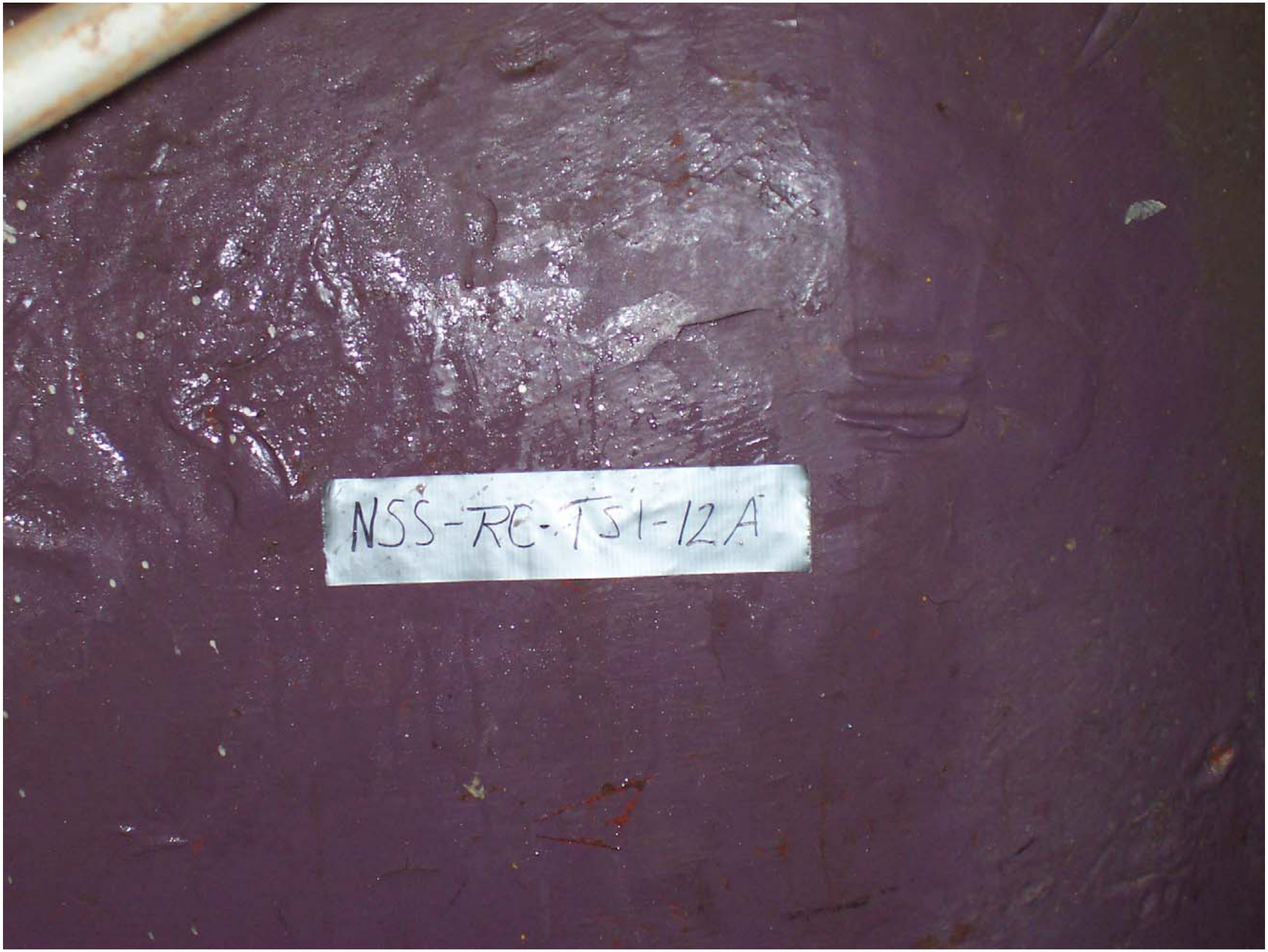

NSS-RC-TS1-10C


NSS-RC-TSI-11B


NSS-RC-
NSS-RC-TSI-


NSS -RC-
TSI- 11 A
11 A


NSS-RC-TS1-12A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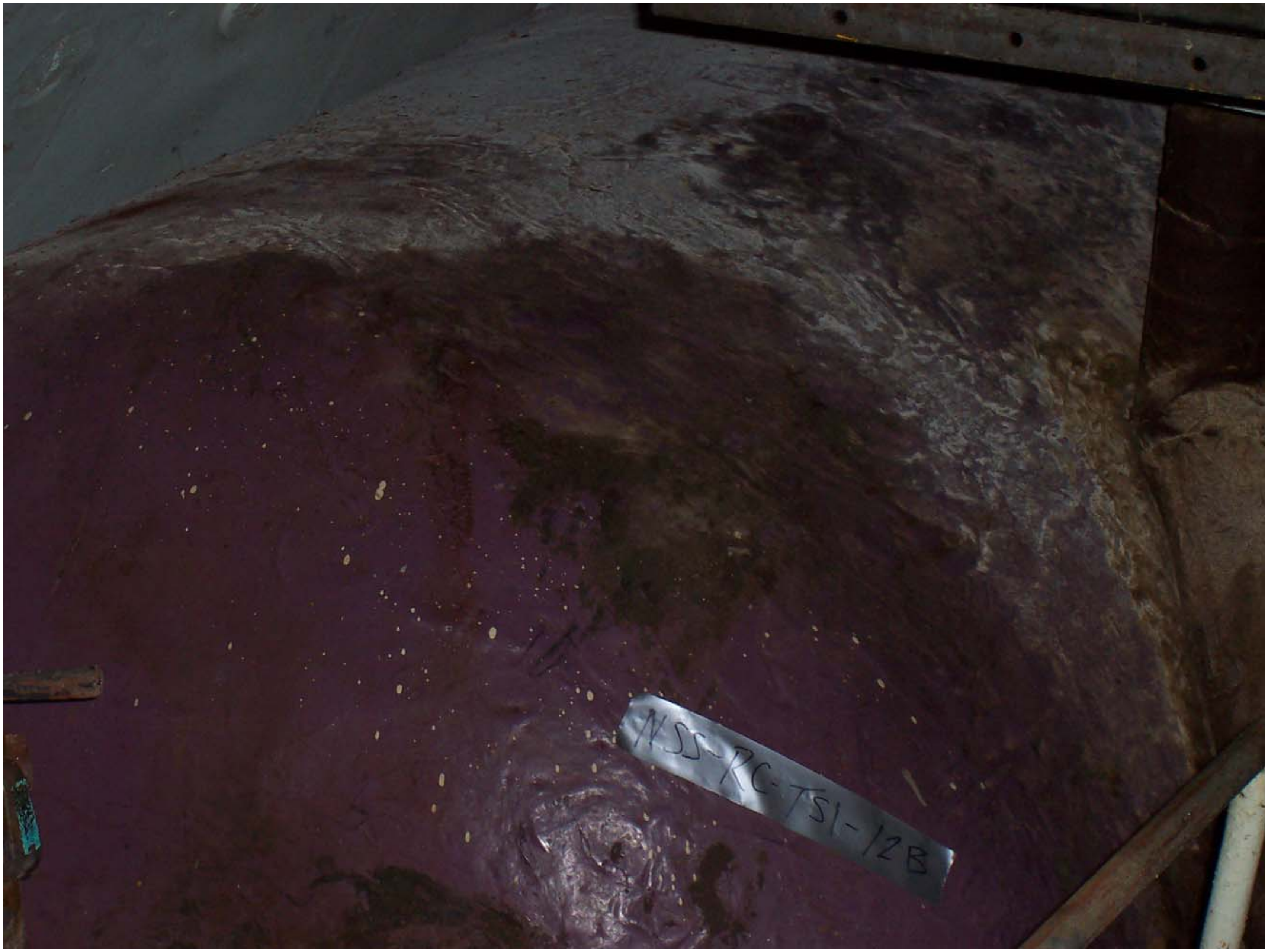
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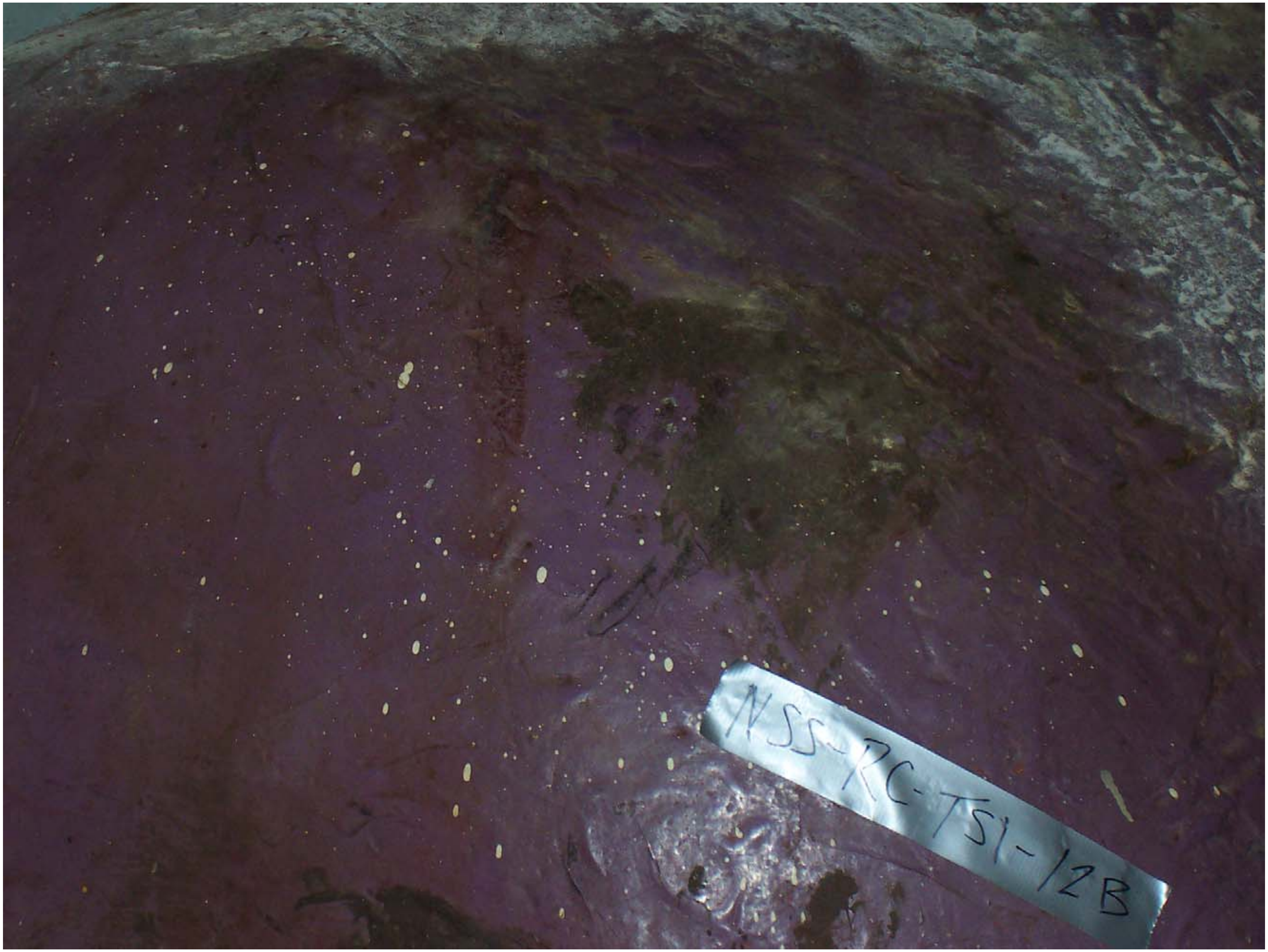
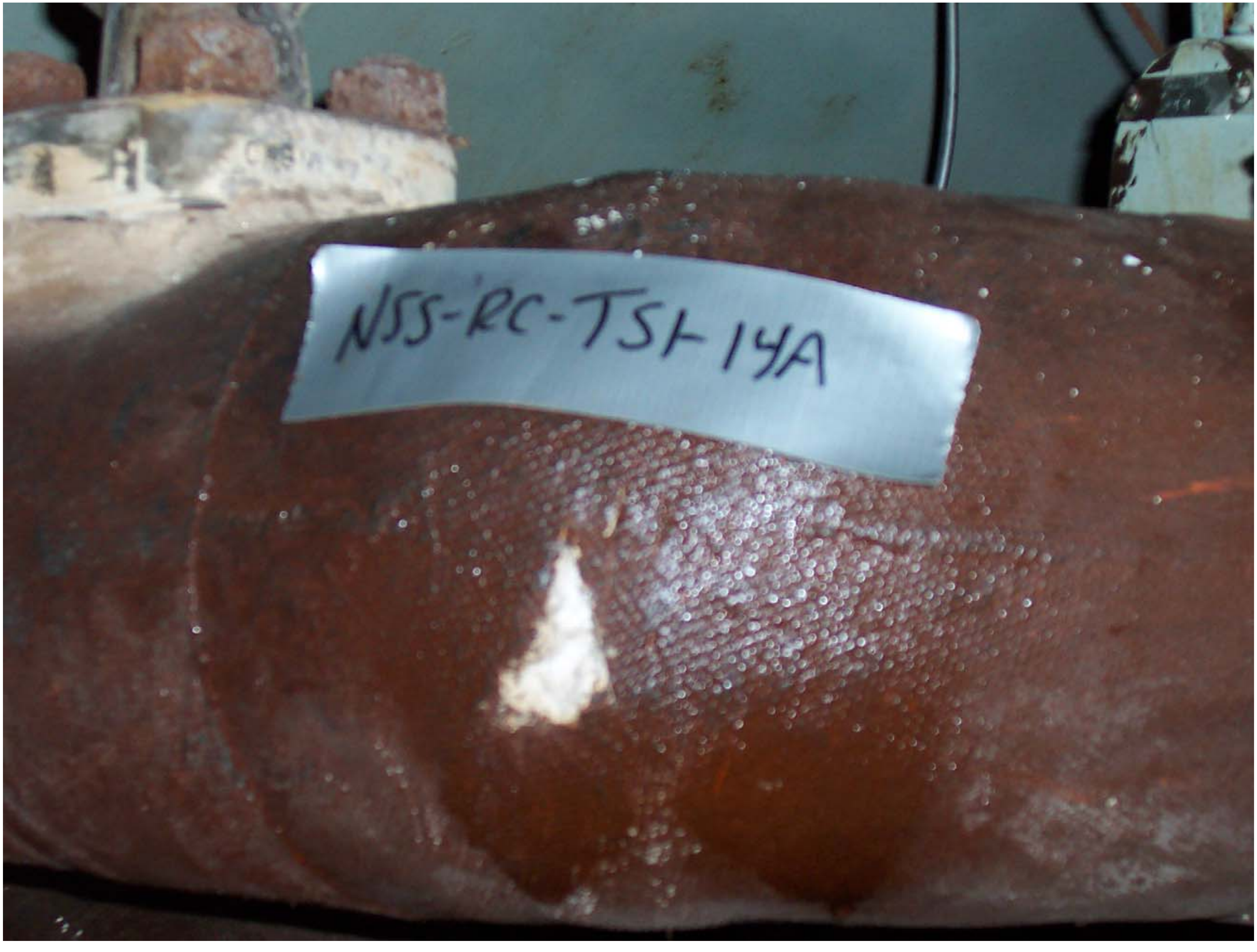

NSS-RC-TS1-12B


NSS-RC-TS1-12B


NSS-RC-TSI-13A


NSS-RC-TSI-13B


TSL-13C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NSS-RC-TSI-14B

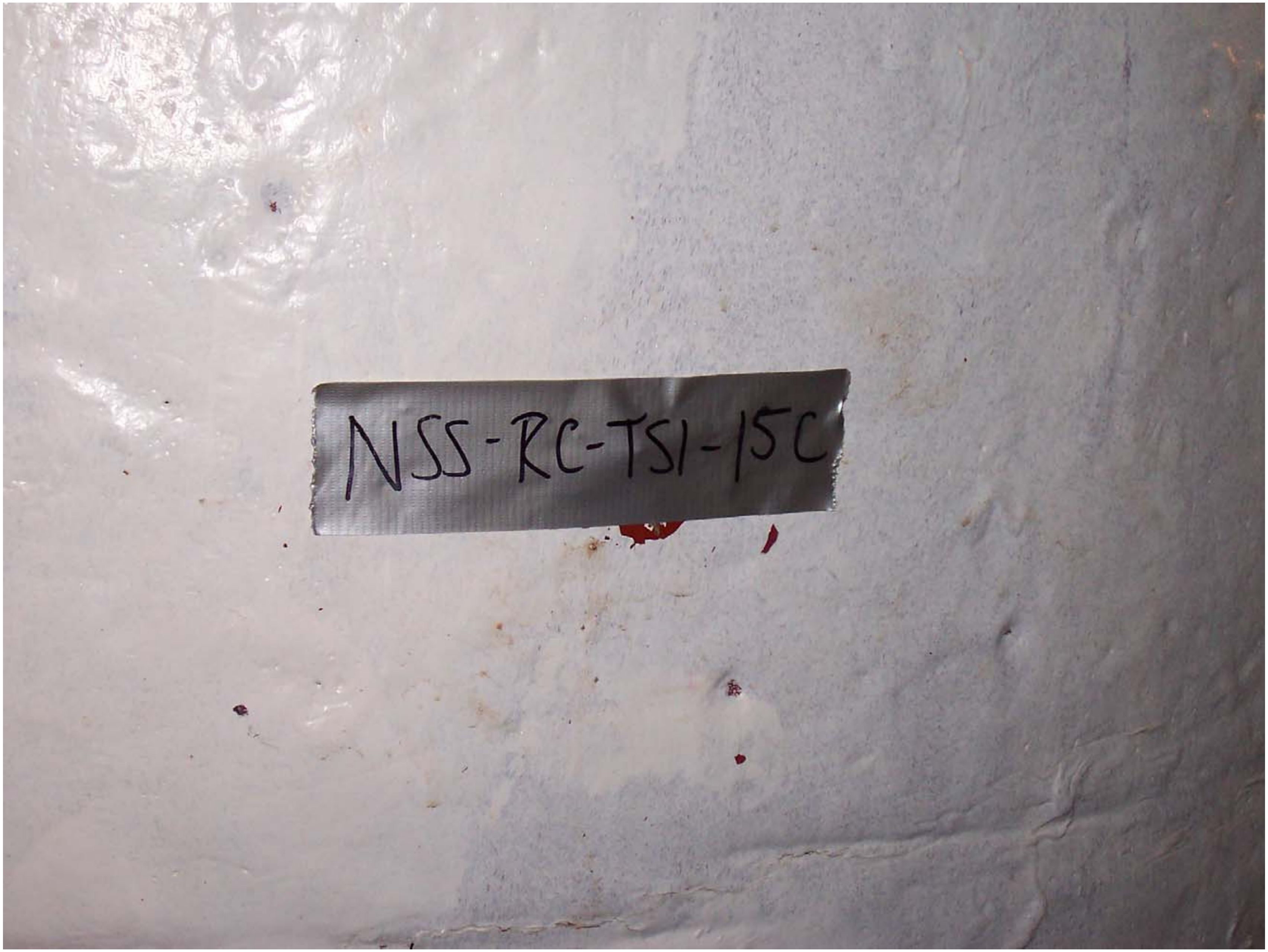

NSS-RC-TSI-14C


NSS-RC-TSI-14C


NSS-RC-TSI-12G


NSS-RC-TS1-15A

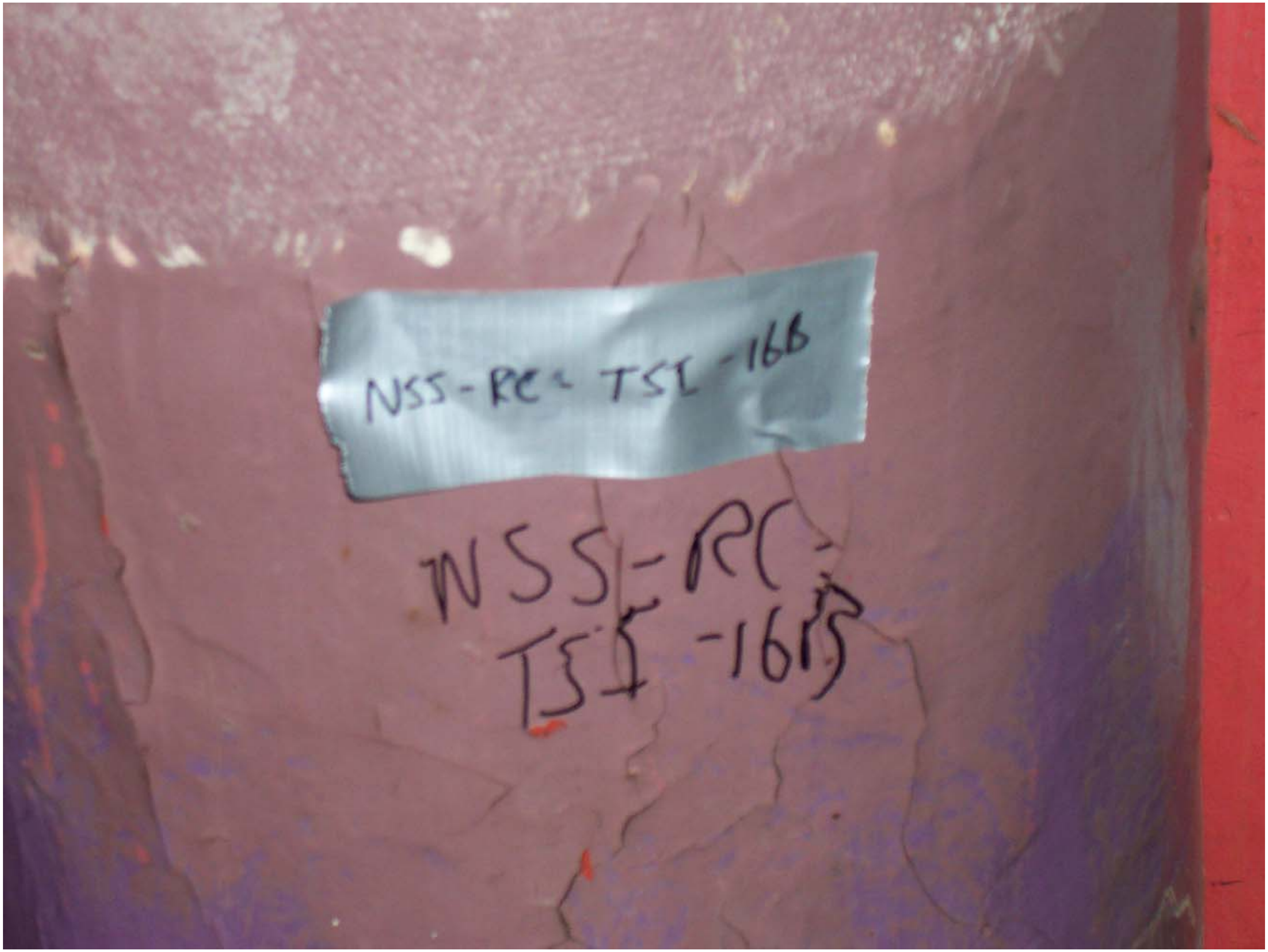

NSS-RC-TS1-15B


NSS-RC-TSI-15C


NSS-RC-TS1-17B


NSS-RC-TSI-16A


NSS-RC-TSI-17C
NSS-RC-TSI-17C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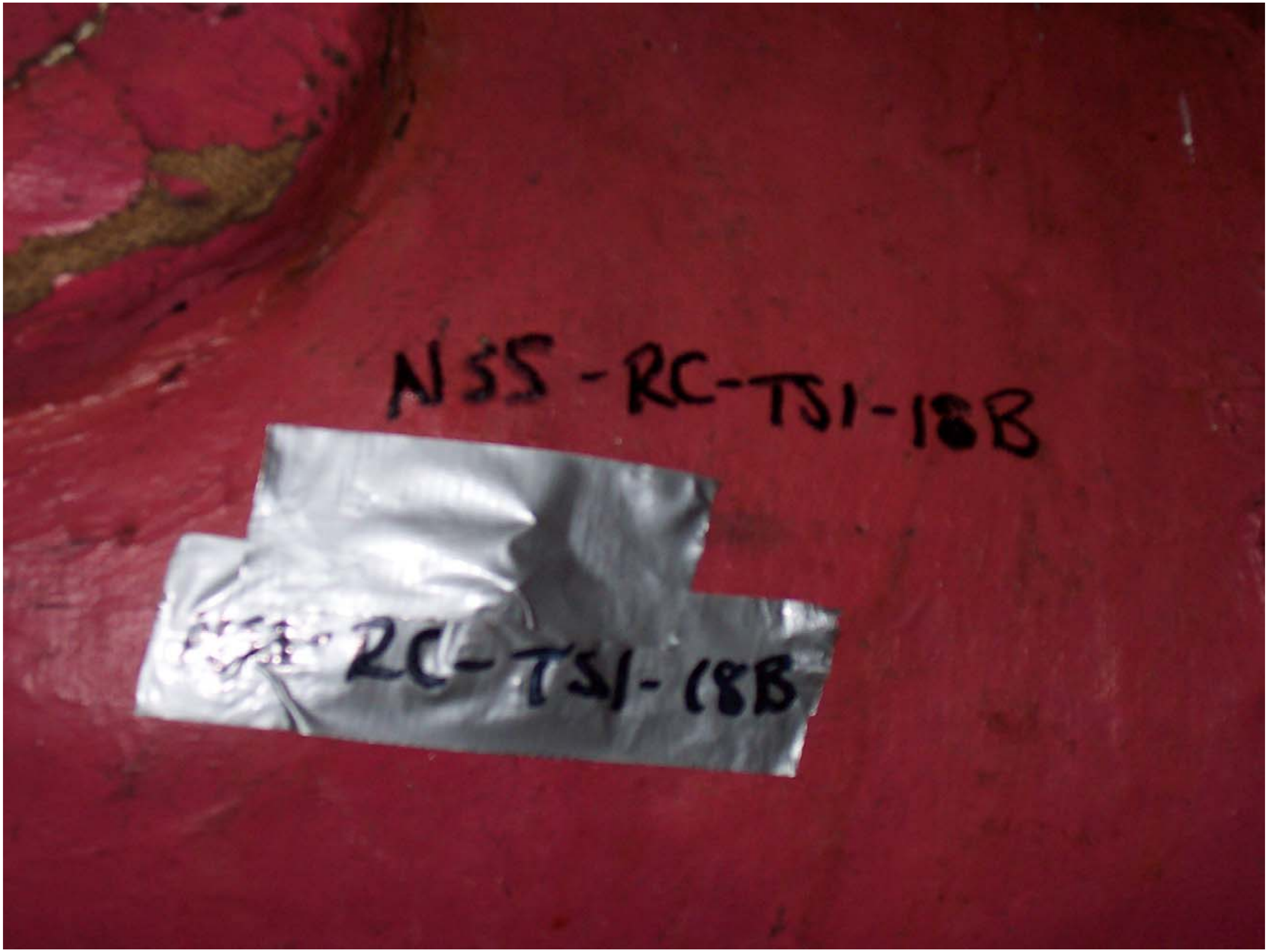
NSS-RC-
TSI-165


N55-RC-TS1-19A


MSS-RC-TSI-18C
RC
MSS-TSI-18C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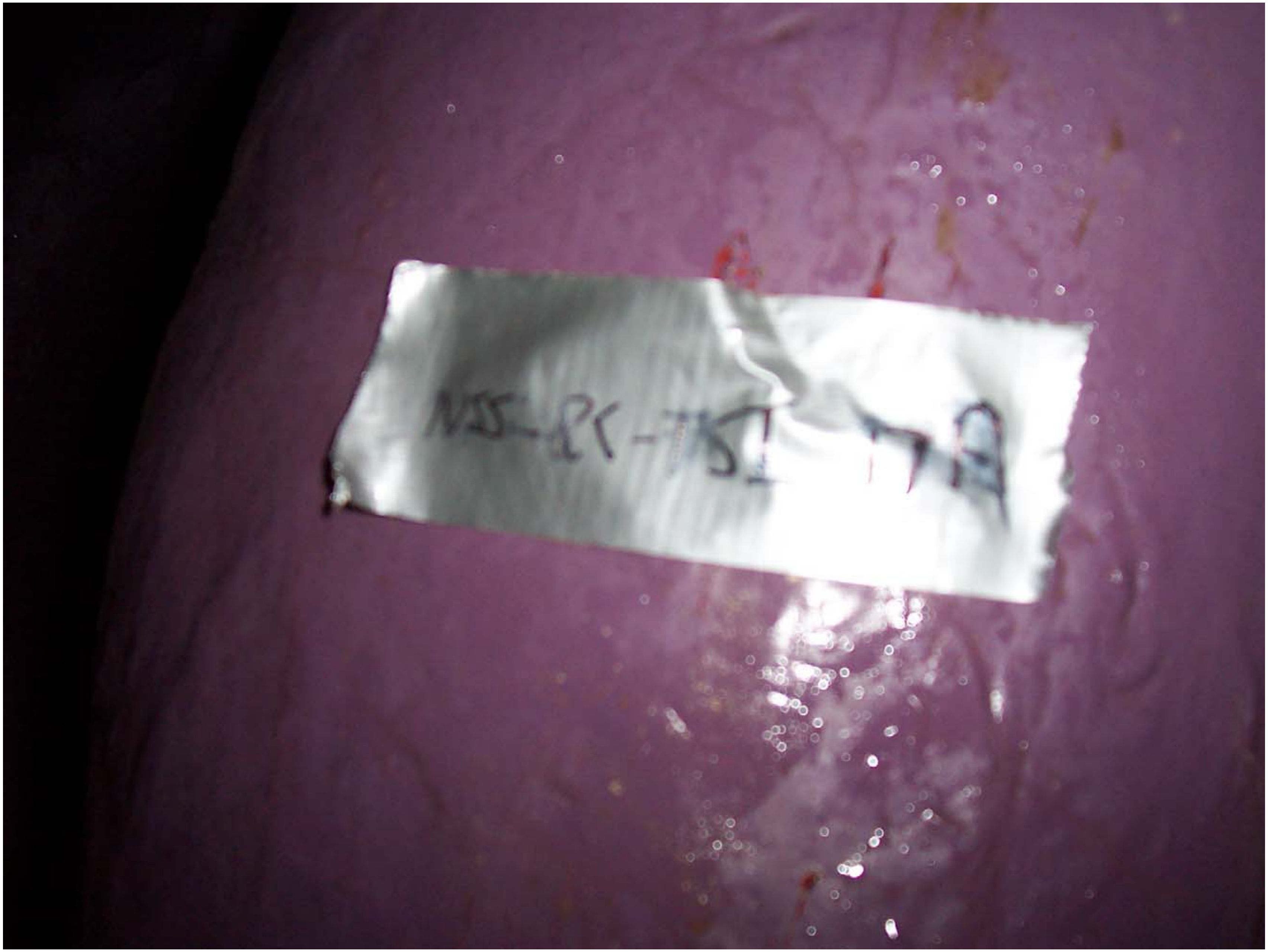
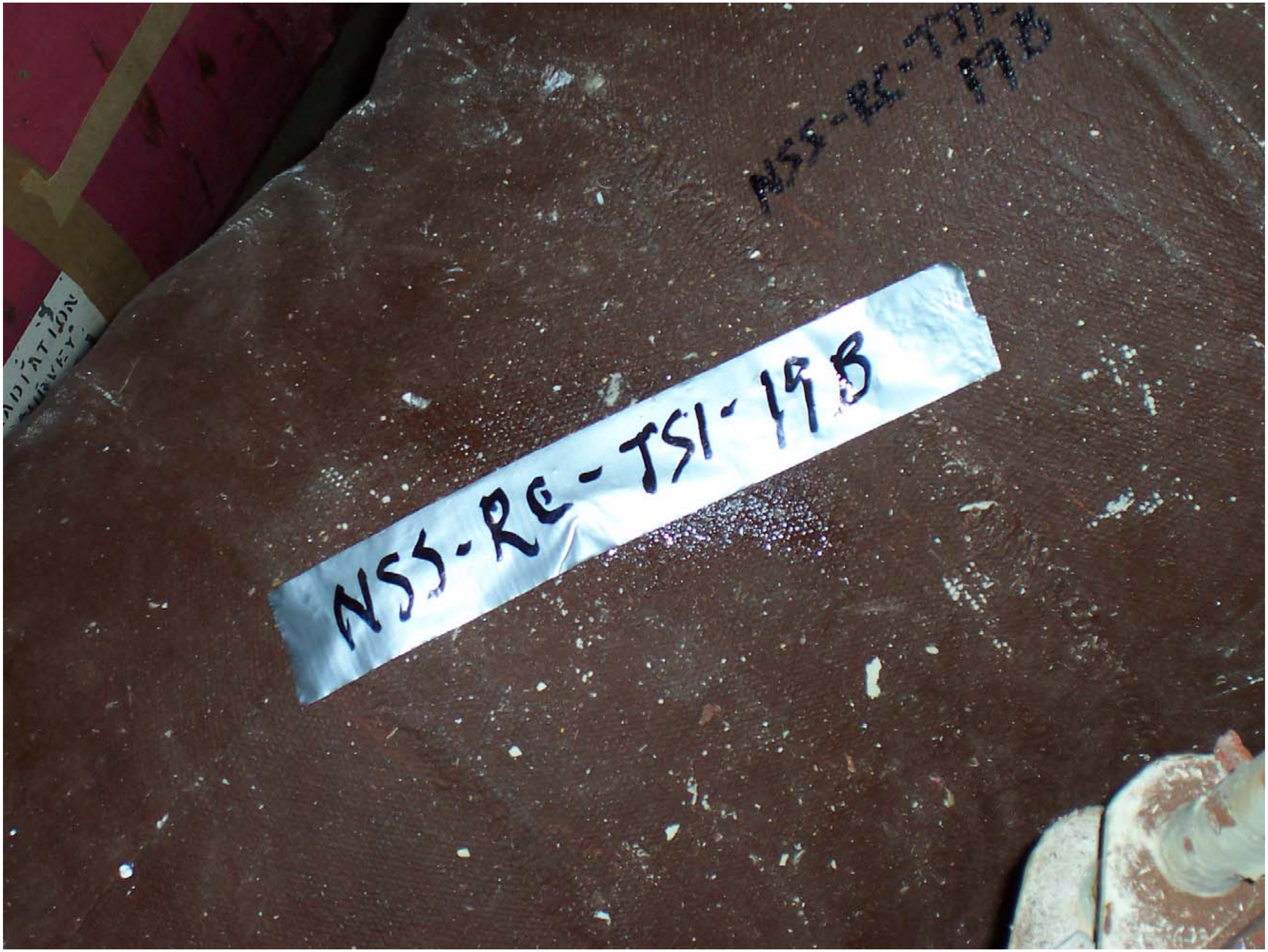
RC-TS1-18B


NSS-RC-TSI-16C

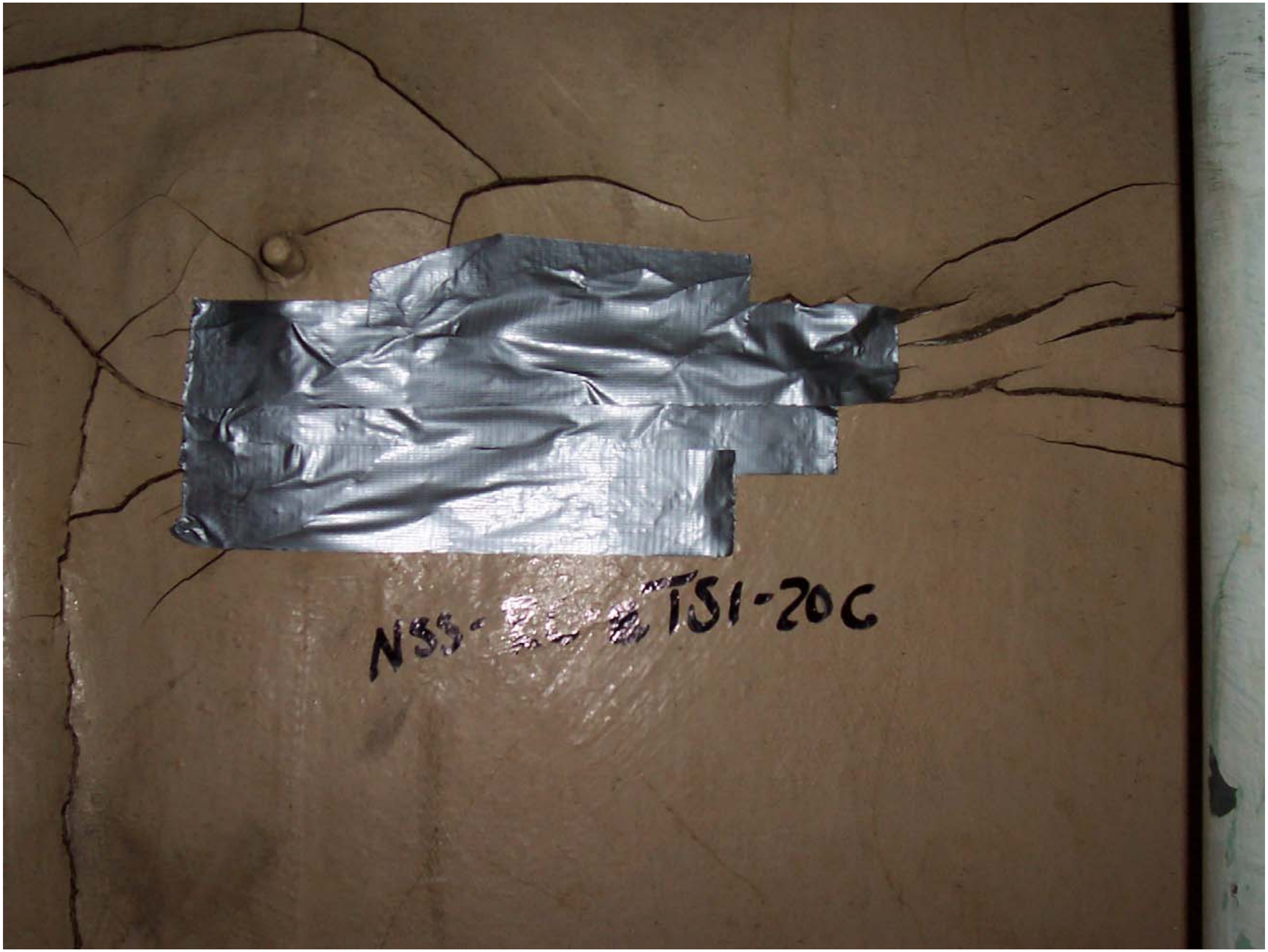

NSS-RC-TSI-17A




NSS-RC-TSI-19B
NSS-RC-TSI-19B


NSS-RC-TSI-18A
NSS-RC-TSI-18A


NSS-RC-TSI-19C
NSS-RC-TSI-19C


NSS-
TSI-20C


NSS-RC-TSI-20B

Appendix K
Asbestos Survey Field Data

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Navigation Bridge Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-NBD-FT-1A, -1B, -1C	Green ,9"x9" floor tile with white lines and associated mastics	Throughout Navigation Bridge Deck	Fair		x
NSS-NBD-MM-2A, -2B, -2C	White wall board with pinhole pattern	Navigation Bridge Deck-Gyro Radar Room	Good		x
NSS-NBD-TSI-3A, -3B, -3C	Straight run pipe insulation associated with piping above ceilings	Navigation Bridge Deck above ceiling	Good	x	
NSS-NBD-TSI-4A, -4B, -4C	Elbow pipe insulation associated with piping above ceiling	Navigation Bridge Deck above ceiling	Good	x	
NSS-NBD-MM-5A, -5B, -5C	White, drywall associated with walls (1' thickness)	Navigation Bridge Deck Staterooms	Good	x	
NSS-NBD-MM-6A, -6B, -6C	White, drywall associated with ceiling	Navigation Bridge Deck Staterooms	Good	x	
NSS-NBD-MM-7A, -7B, -7C	Brown mastic associated with baseboard molding	Throughout Navigation Bridge Deck	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Navigation Bridge Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSS-NBD-MM-8A, -8B, -8C	White sub-floor (baseboard)	Throughout Navigation Bridge Deck	Good	x	
NSS-NBD-TSI-9A, -9B, -9C	Straight run pipe insulation associated with generator	Navigation Bridge Deck-Generator Room	Good	x	
NSS-NBD-TSI-10A, -10B, -10C	Elbow pipe insulation associated with generator	Navigation Bridge Deck-Generator Room	Good	x	

Due to time limitations, physical samples were not taken of this deck. The materials that were observed are similar to materials that are located on other decks of the ship. The table identifies samples that ERM would have sampled had time permitted.

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Boat Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS-BoatDeck-FT-1A, -1B, -1C	Black 18"x18" floor tile with white specks and associated mastic	Boat Deck stairwell	Good		x
NSS-BoatDeck-MM-2A, -2B, -2C	White, drywall associated with the wall (1' thickness)	Boat Deck Cabins	Good	x	
NSS-BoatDeck-MM-3A, -3B, -3C	White, drywall associated with ceiling (1/2" thickness)	Boat Deck Staterooms	Good	x	
NSS-BoatDeck-MM-4A, -4B, -4C	White sub-floor (baseboard)	Throughout Boat Deck	Good		x
NSS-BoatDeck-FT-5A, -5B, -5C	Green, 9x9 floor tile with white lines and associated mastic	Throughout Boat Deck	Poor		x
NSS-BoatDeck-MM-6A, -6B, -6C	Brown mastic associated with baseboard molding	Throughout Boat Deck	Good		x
NSS-BoatDeck-TSI-7A, -7B, -7C	Straight run pipe insulation above ceiling	Boat Deck above ceiling	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Boat Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS-BoatDeck-TSI-8A, -8B, -8C	Elbow pipe insulation	Boat Deck above ceiling	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Promenade Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-PromDeck-FT-1A, -1B, -1C	Dark green, 18" x18" floor tile with white lines and associated mastics	Promenade Deck-Veranda	Good		x
NSS-PromDeck-FT-2A, -2B, -2C	White, 18"x18" floor tile with white lines and associated mastics	Promenade Deck-Veranda	Good		x
NSS-PromDeck-MM-3A, -3B, -3C	Black sub-floor (baseboard)	Promenade Deck-Throughout floor	Good		x
NSS-PromDeck-MM-4A, -4B, -4C	White, 4'x4' ceiling panels with pinholes	Promenade Deck-Veranda and Main Lounge	Good		x
NSS-PromDeck-MM-5A, -5B, -5C	White drywall (1/2" thickness) associated with walls	Promenade Deck-Veranda	Good	x	
NSS-PromDeck-MM-6A, -6B, -6C	White drywall (1" thickness) associated with ceilings	Promenade Deck-Veranda	Good	x	
NSS-PromDeck-MM-7A, -7B, -7C	Brown mastic associated with baseboard molding	Promenade Deck-Veranda and Main Lounge	Good		x

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Surface Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSSurfaceDeck-MM-1A, -1B, -1C	Black asphalt sealant associated with cargo hold doors	Surface Deck	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckA-FT-1A, -1B, -1C	Green, 9"x9" floor tile with white lines and associated mastic	Deck A- Throughout infirmary	Good		x
NSSDeckA-TSI-2A, -2B, -2C	Straight run pipe insulation	Deck A- Piping located above ceiling	Good	x	
NSSDeckA-TSI-3A, -3B, -3C	Elbow pipe insulation	Deck A- Piping located above ceiling	Good	x	
NSSDeckA-FT-4A, -4B, -4C	Brown, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-5A, -5B, -5C	Black, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-6A, -6B, -6C	Light brown, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-7A, -7B, -7C	Tan, "9x9" floor tile with white brown specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckA-MM-8A, -8B, -8C	White drywall (1/2" thickness) associated with ceilings	Deck A	Good	x	
NSSDeckA-MM-9A, -9B, -9C	White drywall (1" thickness) associated with walls	Deck A	Good	x	
NSSDeckA-FT-10A, -10B, -10C	White, 9"x9" floor tile and associated mastic	Deck A- Main Lobby	Good		x
NSSDeckA-FT-11A, -11B, -11C	Gray, 18"x18" floor tile and associated mastic	Deck A –Main Lobby	Good		x
NSSDeckA-FT-12A, -12B, -12C	Black, 9"x9" floor tile and associated mastic	Deck A- Main Lobby	Good		x
NSSDeckA-CT-13A, -13B, -13C	White, 2'x3' ceiling panel with pinholes	Deck A- Main Lobby	Good		x
NSSDeckA-MM14A, -14B, -14C	Black sub-floor (baseboard)	Deck A – Main Lobby and forward areas	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSDeckA-FT-15A, -15B, -15C	Tan, 9"x9" floor tile and associated mastic	Deck A- Lab Assistant Office	Poor		x
NSSDeckA-FT-16A, -16B, -16C	Orange, 9"x9" floor tile and associated mastic	Deck A- Barber Shop	Good		x
NSSDeckA-FT-17A, -17B, -17C	Brown, 9" x9" floor tile with black and white specks and associated mastic	Deck A- Port and starboard side stairwells	Fair		x
NSSDeckA-FT-18A, -18B, -18C	Tan, 9" x9" floor tile with brown specks and associated mastic	Deck A- Port and starboard side stairwells	Fair		x
NSSDeckA-FT-19A, -19B, -19C	Tan, 9" x9" floor tile with brown specks and associated mastic	Deck A- Staterooms rear of Main Lobby and Pursers Office	Fair		x
NSSDeckA-MM-20A, -20B, -20C	Brown mastic associated with baseboard molding	Deck A	Good		x
NSSDeckA-MM-21A, -21B, -21C	White sub-floor (baseboard)	Deck A- Area rear of Main Lobby	Good	x	
NSSDeckA-FT-22A, -22B, -22C	Red, 9"x9" floor tile with white lines and associated mastic	Deck A- Forward port side stairwell	Good		x

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-B Deck-FT-1A, -1B, -1C	Blue, 9"x9" floor tile with white lines	Deck B- Dining Room	Fair		x
NSS-B Deck-Mastic-2A, -2B, -2C	Mastic associated with blue 9"x9" floor tile with white lines	Deck B-Dining Room	Fair		x
NSS-B Deck-FT-3A, -3B, -3C	White, 18" x18" floor tile	Deck B-Dining Room	Fair		x
NSS-B Deck-Mastic-4A, -4B, -4C	Mastic associated with 18" x18" floor tile	Deck B-Dining Room	Fair		x
NSS-B Deck-Mastic-5A, -5B, -5C	Brown mastic associated with baseboard molding	Deck B-Dining Room	Fair		x
NSS-B Deck- FT-6A, -6B, -6C	Light green, 9" x9" floor tile with white specks	Deck B- Stateroom hallway rear of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-7A, -7B, -7C	Mastic associated with light green 9x9 floor tile with white specks	Deck B- Stateroom hallway rear of Cargo Loading Passage	Fair		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS-B Deck-MM-8A, -8B, -8C	Brown mastic associated with stair treads	Deck-B Dining Room	Good		x
NSS-B Deck-Fiberboard-9A, -9B, -9C	White fiberboard padding beneath floor tile	Deck B- Area rear of Cargo Loading Passage	Fair	x	
NSS-B Deck-FT-10A, -10B, -10C	Dark green, 9" x9" floor tile with white lines	Deck B- Area rear of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-11A, -11B, -11C	Mastic associated with 9" x9" floor tile with white lines	Deck B- Area rear of Cargo Loading Passage	Fair		x
NSS-B Deck-FT-12A, -12B, -12C	Gray, 9"x9" floor tiles with specks	Deck B- Throughout area forward of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-13A, -13B, -13C	Mastic associated with gray 9" x9" floor tile with specks	Deck B- Throughout area forward of Cargo Loading Passage	Fair		x
NSS-B Deck-Subfloor-14A, -14B, -14C	Gray sub-floor (baseboard)	Deck B- Forward of Cargo Loading Passage	Fair		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSS-B Deck-MM-15A, -15B, -15C	White drywall (1/2" thickness) associated with ceiling	Deck B-Throughout staterooms and hallways	Fair	x	
NSS-B Deck-FT-16A, -16B, -16C	Tan, 9" x9" floor tile with brown lines and associated mastic	Deck B- Starboard side stateroom forward of the Cargo Loading Passage	Fair		x
NSS-B Deck-MM-17A, -17B, -17C	White, 18"x18" ceiling panels with pinholes	Deck B– Dining room and office rear of Cargo Loading Passage	Good		x
NSS-B Deck-TSI-18A, -18B, -18C	Straight run pipe insulation	Deck B– Piping that is located above ceiling	Good	x	
NSS-B Deck-TSI-19A, -19B, -19C	Elbow pipe insulation	Deck B– Piping that Is located above ceiling	Good	x	
NSS-B Deck-MM-20A, -20B, -20C	White drywall (1" thickness) associated with walls	Deck B – Throughout staterooms and hallways	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck C
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckC-FT-1A, -1B, -1C	Tan, 9"x9" floor tiles with white lines and associated mastics	Deck C-Staterooms	Good		x
NSSDeckC-MM-2A, -2B, -2C	White drywall (1/2" thickness) associated with state room ceiling	Deck C-Staterooms	Good	x	
NSSDeckC-MM-3A, -3B, -3C	White drywall (1" thickness) associated with state room walls	Deck C-Staterooms and Hallways	Good	x	
NSSDeckC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with pipes above ceiling	Deck C	Good	x	
NSSDeckC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with pipes above ceiling	Deck C	Good	x	
NSSDeckC-FT-6A, -6B, -6C	Brown, 9" x9" floor tile with black specks and associated mastic	Deck C- Hallways	Good		x
NSSDeckC-FT-7A, -7B, -7C	Tan, 9" x9" floor tile with black and white specks and associated mastic	Deck C- Hallways	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck C
NSS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSDeckC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with piping	Deck C – Carpenters workshop	Good	x	
NSSDeckC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with piping	Deck C- Carpenters workshop	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS14Flat-TSI-1A, -1B, -1C	Straight run pipe insulation associated with heating system	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-2A, -2B, -2C	Elbow pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-3A, -3B, -3C	Straight run pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-4A, -4B, -4C	Elbow pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-5A, -5B, -5C	Straight run pipe insulation associated with auxiliary exhaust	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-6A, -6B, -6C	Elbow pipe insulation associated with auxiliary exhaust	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-7A, -7B, -7C	Straight run pipe insulation associated with fire station 37 (4" diameter)	Deck 14 Flat-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS14Flat-TSI-8A, -8B, -8C	Elbow pipe insulation associated with fire station 37 (4" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-9A, -9B, -9C	Insulation (body) associated with HP/LP crossover system (60" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-10A, -10B, -10C	Insulation (body) associated with HP/LP crossover system (36" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-11A, -11B, -11C	Elbow pipe insulation associated with HP/LP crossover system (36" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-12A, -12B, -12C	Elbow pipe insulation associated with steam dump pipe (24" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-13A, -13B, -13C	Straight run pipe insulation associated with steam dump pipe (24" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-14A, -14B, -14C	Straight run pipe insulation (4" diameter)	Deck 14 Flat-Shaft Alley	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS14Flat-TSI-15A, -15B, -15C	Elbow pipe insulation (4" diameter)	Deck 14 Flat-Shaft Alley	Good	x	
NSS14Flat-TSI-16A, -16B, -16C	Straight run pipe insulation associated with main feed pump	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-17A, -17B, -17C	Elbow pipe insulation associated with main feed pump	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-18A, -18B, -18C	Insulation associated with first stage water heater (body)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-19A, -19B, -19C	Straight run pipe insulation associated with solenoid valve	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-20A, -20B, -20C	Elbow pipe insulation associated with solenoid valve	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-21A, -21B, -21C	Straight run pipe insulation associated with shell coil system	Deck 14 Flat-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS14Flat-TSI-22A, -22B, -22C	Elbow pipe insulation associated with shell coil system	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-23A, -23B, -23C	Straight run pipe insulation associated with crossover drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-24A, -24B, -24C	Elbow pipe insulation associated with crossover drain	Deck 14 Flat-Engine Room	Fair	x	
NSSDeckD-FT-25A, -25B, -25C	White, 9"x9" floor tile and associated mastics	Deck D-Control Room	Good		x
NSSDeckD-FT-26A, -26B, -26C	Green, 9"x9" floor tile and associated mastics	Deck D-Control Room	Good		x
NSSDeckD-TSI-27A, -27B, -27C	Straight run pipe insulation associated with cooling system (green)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-28A, -28B, -28C	Elbow pipe insulation associated with cooling system (green)	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSDeckD-TSI-29A, -29B, -29C	Insulation associated with cooling system tank (green)	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-30A, -30B, -30C	Straight run pipe insulation associated with diesel engine exhaust	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-31A, -31B, -31C	Elbow pipe insulation associated with diesel engine exhaust	Deck D-Engine Room	Good	x	
NSSDeckD-MM-32A, -32B, -32C	Gaskets associated with boiler	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-33A, -33B, -33C	Insulation associated with steam generator (pink)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-34A, -34B, -34C	Straight run pipe insulation associated with steam generator	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-35A, -35B, -35C	Elbow pipe insulation associated with steam generator	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSSDeckD-TSI-36A, -36B, -36C	Straight run pipe insulation associated with compressors	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-37A, -37, -37C	Elbow pipe insulation associated with compressors	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-38A, -38B, -38C	Pipe insulation associated with boiler duct	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-39A, -39B, -39C	Elbow pipe insulation associated with ADT pipe system (green)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-40A, -40B, -40C	Straight run pipe insulation associated with ADT pipe system (green)	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-41A, -41B, -41C	Straight run pipe insulation associated with steam valve system	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-42A, -42B, -42C	Straight run pipe insulation associated with engine (red)	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSSDeckD-TSI-43A, -43B, -43C	Elbow pipe insulation associated with engine (red)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-44A, -44B, -44C	Straight run pipe insulation associated with evaporators	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-45A, -45B, -45C	Elbow pipe insulation associated with evaporators	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-46A, -46B, -46C	Straight run pipe insulation associated with generators	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-47A, -47B, -47C	Elbow pipe insulation associated with generators	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-48A, -48B, -48C	Straight run pipe insulation associated with steam valves	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-49A, -49B, -49C	Elbow pipe insulation associated with steam valves	Deck D-Engine Room	Fair	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckD-TSI-50A, -50B, -50C	Straight run pipe insulation associated with boiler water treatment system	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-51A, -51B, -51C	Insulation associated with vent to first stage heater (body)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-52A, -52B, -52C	Straight run pipe insulation associated with condensate line	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-53A, -53B, -53C	Straight run pipe insulation associated with diesel engine exhaust (upper section)	Deck D-Engine Room	Good	x	
NSSDeckD-FT-54A, -54B, -54C	Tan, 9"x9" floor tile with black specks and associated mastic	Deck D- Food Storage Area	Poor		x
NSSDeckD-FT-55A, -55B, -55C	Brown 9" x9" floor tile with black and white specks and associated mastic	Deck D- Food Storage Area	Poor		x
NSSDeckD-TSI-56A, -56B, -56C	Straight run pipe insulation	Deck D-Food Storage Area	Good	x	
NSSDeckD-TSI-57A, -57B, -57C	Elbow pipe insulation	Deck D- Food Storage Area	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-RC-TSI-1A, -1B, -1C	Straight run pipe insulation associated with electrical cord	Secondary Containment- Deck A Level	Good	x	
NSS-RC-TSI-2A, -2B, -2C	Straight run pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Good	x	
NSS-RC-TSI-3A, -3B, -3C	Elbow pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Good	x	
NSS-RC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-6A, -6B, -6C	Straight run pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-7A, -7B, -7C	Elbow pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-RC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-10A, -10B, -10C	Straight run pipe insulation associated with waste tanks	Lower Secondary Containment	Good	x	
NSS-RC-TSI-11A, -11B, -11C	Elbow pipe insulation associated with waste tanks	Lower Secondary Containment	Good	x	
NSS-RC-TSI-12A, -12B, -12C	Insulation associated with the secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-13A, -13B, -13C	Straight run pipe insulation associated with pressurizer system (red in color)	Primary Containment	Good	x	
NSS-RC-TSI-14A, -14B, -14C	Elbows insulation associated with pressurizer system (red in color)	Primary Containment	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NS-RC-TSI-15A, -15B, -15C	Insulation associated with pressurizer system tank (red in color)	Primary Containment	Good	x	
NSS-RC-TSI-16A, -16B, -16C	Straight run pipe insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-17A, -17B, -17C	Elbow insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-18A, -18B, -18C	Straight run pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Good	x	
NSS-RC-TSI-19A, -19B, -19C	Elbow pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Good	x	
NSS-RC-TSI-20A, -20B, -20C	Canvas wrap associated with fiberglass insulation	Primary and Secondary Containment	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Appendix L
Field Data Sheets and Results

Field Data Sheets and Results for Radiation Areas

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-RC-TSI-1A, -1B, -1C	Straight run pipe insulation associated with electrical cord	Secondary Containment- Deck A Level	Good	x	
NSS-RC-TSI-2A, -2B, -2C	Straight run pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Good	x	
NSS-RC-TSI-3A, -3B, -3C	Elbow pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Good	x	
NSS-RC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-6A, -6B, -6C	Straight run pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-7A, -7B, -7C	Elbow pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-RC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Good	x	
NSS-RC-TSI-10A, -10B, -10C	Straight run pipe insulation associated with waste tanks	Lower Secondary Containment	Good	x	
NSS-RC-TSI-11A, -11B, -11C	Elbow pipe insulation associated with waste tanks	Lower Secondary Containment	Good	x	
NSS-RC-TSI-12A, -12B, -12C	Insulation associated with the secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-13A, -13B, -13C	Straight run pipe insulation associated with pressurizer system (red in color)	Primary Containment	Good	x	
NSS-RC-TSI-14A, -14B, -14C	Elbows insulation associated with pressurizer system (red in color)	Primary Containment	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Reactor Containment
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NS-RC-TSI-15A, -15B, -15C	Insulation associated with pressurizer system tank (red in color)	Primary Containment	Good	x	
NSS-RC-TSI-16A, -16B, -16C	Straight run pipe insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-17A, -17B, -17C	Elbow insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Good	x	
NSS-RC-TSI-18A, -18B, -18C	Straight run pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Good	x	
NSS-RC-TSI-19A, -19B, -19C	Elbow pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Good	x	
NSS-RC-TSI-20A, -20B, -20C	Canvas wrap associated with fiberglass insulation	Primary and Secondary Containment	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Asbestos Survey Sampling Data (4-15 April 2005)
NS-Savannah – Fort Eustis, Virginia
ERM Work Order No. 0028178

Sample #	*Material Description*	*Sample Location(s)*[1]	*Friable?*[2]	*Condition*[3]	*PLM Results*[4] *(Asbestos Percent/Type)*
NSS-RC-TSI-1A, -1B, -1C	Straight run pipe insulation associated with electrical cord	Secondary Containment- Deck A Level	Yes	Good	NAD
NSS-RC-TSI-2A, -2B, -2C	Straight run pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Yes	Good	25% -Chrysotile and Amosite
NSS-RC-TSI-3A, -3B, -3C	Elbow pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	Yes	Good	35%-Amosite
NSS-RC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Yes	Good	20%-Chrysotile and Amosite
NSS-RC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	Yes	Good	35%-Chrysotile and Amosite
NSS-RC-TSI-6A, -6B, -6C	Straight run pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Yes	Good	20%-Chrysotile and Amosite
NSS-RC-TSI-7A, -7B, -7C	Elbow pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	Yes	Good	25%-Chrysotile and Amosite

Asbestos Survey Sampling Data (4-15 April 2005)
NS-Savannah – Fort Eustis, Virginia
ERM Work Order No. 0028178

Sample #	*Material Description*	*Sample Location(s)*[1]	*Friable?*[2]	*Condition*[3]	*PLM Results*[4] *(Asbestos Percent/Type)*
NSS-RC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Yes	Good	20%-Chrysotile and Amosite
NSS-RC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	Yes	Good	30%-Chrysotile and Amosite
NSS-RC-TSI-10A, -10B, -10C	Straight run pipe insulation associated with waste tanks	Lower Secondary Containment	Yes	Good	25%-Chrysotile and Amosite
NSS-RC-TSI-11A, -11B, -11C	Elbow pipe insulation associated with waste tanks	Lower Secondary Containment	Yes	Good	45%-Chrysotile and Amosite
NSS-RC-TSI-12A, -12B, -12C	Insulation associated with the secondary heat exchanger (purple in color)	Primary Containment	Yes	Good	25%-Chrysotile and Amosite
NSS-RC-TSI-13A, -13B, -13C	Straight run pipe insulation associated with pressurizer system (red in color)	Primary Containment	Yes	Good	40%-Amosite
NSS-RC-TSI-14A, -14B, -14C	Elbows insulation associated with pressurizer system (red in color)	Primary Containment	Yes	Good	15%-Chrysotile and Amosite

Asbestos Survey Sampling Data (4-15 April 2005)
NS-Savannah – Fort Eustis, Virginia
ERM Work Order No. 0028178

Sample #	*Material Description*	*Sample Location(s)*[1]	*Friable?*[2]	*Condition*[3]	*PLM Results*[4] *(Asbestos Percent/Type)*
NSS-RC-TSI-15A, -15B, -15C	Insulation associated with pressurizer system tank (red in color)	Primary Containment	Yes	Good	20%-Chrysotile and Amosite
NSS-RC-TSI-16A, -16B, -16C	Straight run pipe insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Yes	Good	25%-Amosite
NSS-RC-TSI-17A, -17B, -17C	Elbow insulation associated with secondary heat exchanger (purple in color)	Primary Containment	Yes	Good	15%-Amosite
NSS-RC-TSI-18A, -18B, -18C	Straight run pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Yes	Good	40%-Amosite
NSS-RC-TSI-19A, -19B, -19C	Elbow pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	Yes	Good	5%-Chrysotile and Amosite
NSS-RC-TSI-20A, -20B, -20C	Canvas wrap associated with fiberglass insulation	Primary and Secondary Containment	Yes	Good	30%-Chrysotile

Information presented is based upon observations made during an asbestos survey conducted by ERM on 4-15 April 2005.
"NAD" – No Asbestos Detected
(1) Only the general locations from which samples were obtained are included in this table. Material may also be located in other areas of the buildings (see Tables 1 and 2 of the survey report). Where possible, floor tile and drywall samples were taken in areas of pre-existing localized damage.
(2) A non-friable material can become friable if the condition of the material has significantly diminished or if its structural integrity has been compromised.

(3) The condition of a material reported herein is based upon observations made by an accredited inspector. The condition of floor tile mastics are assumed equal to that of the tile to which they are adhered.
(4) A material that contains greater than one percent asbestos is classified, and therefore must be managed as an ACM.

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Table 1 Materials Classified as Non-ACMs Based on Sampling Results (4-15 April 2005)
NS-Savannah – Fort Eustis, Virginia

Sample #	*Material Description*	*Material Location*
NSS-RC-TSI-1A, -1B, -1C	Straight run pipe insulation associated with electrical cord	Secondary Containment- Deck A Level

Information presented is based upon observations made during an asbestos survey conducted by ERM on 4-15 April 2005. Materials that contain one percent or less asbestos are classified as non-asbestos-containing materials (non-ACMs).

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Table 2 *Materials Classified as ACMs Based on Sampling Results (4-15 April 2005)*
NS-Savannah – Fort Eustis, Virginia

Sample #	*Material Description*[1]	*Material Locations*	*% Asbestos*[2] *(Type)*	*Estimated Quantity*[3]
NSS-RC-TSI-2A, -2B, -2C	Straight run pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	25% -Chrysotile and Amosite	100 linear feet
NSS-RC-TSI-3A, -3B, -3C	Elbow pipe insulation associated with UV tanks (12" diameter)	Secondary Containment	35%-Amosite	20 elbows
NSS-RC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	20%-Chrysotile and Amosite	500 linear feet
NSS-RC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with 4" diameter pipes	Primary and Secondary Containment	35%-Chrysotile and Amosite	50 elbows
NSS-RC-TSI-6A, -6B, -6C	Straight run pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	20%-Chrysotile and Amosite	500 linear feet
NSS-RC-TSI-7A, -7B, -7C	Elbow pipe insulation associated with 2" diameter pipes	Primary and Secondary Containment	25%-Chrysotile and Amosite	20 elbows
NSS-RC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	20%-Chrysotile and Amosite	800 linear feet
NSS-RC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with 10" diameter pipes	Primary and Secondary Containment	30%-Chrysotile and Amosite	70 elbows

Table 2 Materials Classified as ACMs Based on Sampling Results (4-15 April 2005)
NS-Savannah – Fort Eustis, Virginia (continued)

Sample #	*Material Description*[1]	*Material Locations*	*% Asbestos*[2] *(Type)*	*Estimated Quantity*[3]
NSS-RC-TSI-10A, -10B, -10C	Straight run pipe insulation associated with waste tanks	Lower Secondary Containment	25%-Chrysotile and Amosite	200 linear feet
NSS-RC-TSI-11A, -11B, -11C	Elbow pipe insulation associated with waste tanks	Lower Secondary Containment	45%-Chrysotile and Amosite	40 elbows
NSS-RC-TSI-12A, -12B, -12C	Insulation associated with the secondary heat exchanger (purple in color)	Primary Containment	25%-Chrysotile and Amosite	1600 square feet
NSS-RC-TSI-13A, -13B, -13C	Straight run pipe insulation associated with pressurizer system (red in color)	Primary Containment	40%-Amosite	150 linear feet
NSS-RC-TSI-14A, -14B, -14C	Elbows insulation associated with pressurizer system (red in color)	Primary Containment	15%-Chrysotile and Amosite	10 elbows
NSS-RC-TSI-15A, -15B, -15C	Insulation associated with pressurizer system tank (red in color)	Primary Containment	20%-Chrysotile and Amosite	1500 square feet
NSS-RC-TSI-16A, -16B, -16C	Straight run pipe insulation associated with secondary heat exchanger (purple in color)	Primary Containment	25%-Amosite	1,000 linear feet
NSS-RC-TSI-17A, 17B, -17C	Elbow insulation associated with secondary heat exchanger (purple in	Primary Containment	15%-Amosite	60 elbows

Table 2 Materials Classified as ACMs Based on Sampling Results (4-15 April 2005) NS-Savannah – Fort Eustis, Virginia (continued)

Sample #	*Material Description*(1)	*Material Locations*	*% Asbestos*(2) *(Type)*	*Estimated Quantity*(3)
	color)			
NSS-RC-TSI-18A, -18B, -18C	Straight run pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	40%-Amosite	500 linear feet
NSS-RC-TSI-19A, -19B, -19C	Elbow pipe insulation associated with primary heat exchanger system (24" in diameter and red in color)	Primary Containment	5%-Chrysotile and Amosite	60 elbows
NSS-RC-TSI-20A, -20B, -20C	Canvas wrap associated with fiberglass insulation	Primary and Secondary Containment	30%-Chrysotile	2,000 linear feet

Materials that contain greater than one percent asbestos are classified as asbestos-containing materials (ACMs).
Information presented is based upon observations made during a building survey conducted by ERM from 4-15 April 2005.

(1) The friability and condition of ACMs are reported as observed on 4-15 April 2005. A non-friable ACM can become friable if the condition of the material has significantly diminished or if its structural integrity has been compromised.

(2) Asbestos–content determined by Polarized-light Microscopy (PLM) by AMA Analytical Services, Inc. of Lanham, Maryland.

(3) Quantities are presented as plus or minus 50 percent.

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

AMA Analytical Services, Inc.

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

CERTIFICATE OF ANALYSIS

Client: Environmental Resource Management, Inc.
Address: 200 Harry S. Truman Drive, Suite 400
Annapolis, Maryland 21401

Job Name: NS - Savannah
Job Location: Not Provided
Job Number: 0028178
P.O. Number: Not Provided

Chain Of Custody: 136891
Date Analyzed: 4/26/2005
Person Submitting: Matt Baxter

Attention: Matt Baxter

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0533813	NSS-RC-TSI-1A	NAD	--	--	--	--	--	--	70	--	--	30	Brown	Homogeneous	CK	
0533814	NSS-RC-TSI-1B	NAD	--	--	--	--	--	--	70	--	--	30	Brown	Homogeneous	CK	
0533815	NSS-RC-TSI-1C	NAD	--	--	--	--	--	--	70	--	--	30	Brown	Homogeneous	CK	
0533816	NSS-RC-TSI-2A	25	5	20	--	--	--	--	--	--	--	75	Off-White	Homogeneous	CK	
0533817	NSS-RC-TSI-2B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533818	NSS-RC-TSI-2C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533819	NSS-RC-TSI-3A	35	--	35	--	--	--	--	--	--	--	65	Gray	Homogeneous	CK	
0533820	NSS-RC-TSI-3B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533821	NSS-RC-TSI-3C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533822	NSS-RC-TSI-4A	20	5	15	--	--	--	--	--	--	--	80	Off-White	Homogeneous	CK	
0533823	NSS-RC-TSI-4B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533824	NSS-RC-TSI-4C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop

AMA Analytical Services, Inc.

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

CERTIFICATE OF ANALYSIS

Client:	Environmental Resource Management, Inc.	**Job Name:**	NS - Savannah	**Chain Of Custody:**	136891
Address:	200 Harry S. Truman Drive, Suite 400	**Job Location:**	Not Provided	**Date Analyzed:**	4/26/2005
	Annapolis, Maryland 21401	**Job Number:**	0028178	**Person Submitting:**	Matt Baxter
		P.O. Number:	Not Provided		
Attention:	Matt Baxter				

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0533825	NSS-RC-TSI-5A	35	30	5	--	--	--	--	--	--	--	65	Gray	Homogeneous	CK	
0533826	NSS-RC-TSI-5B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533827	NSS-RC-TSI-5C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533828	NSS-RC-TSI-6A	20	6	14	--	--	--	--	--	--	--	80	Off-White	Homogeneous	CK	
0533829	NSS-RC-TSI-6B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533830	NSS-RC-TSI-6C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533831	NSS-RC-TSI-7A	25	10	15	--	--	--	--	--	--	--	75	Off-White	Homogeneous	CK	
0533832	NSS-RC-TSI-7B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533833	NSS-RC-TSI-7C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533834	NSS-RC-TSI-8A	20	10	10	--	--	--	--	--	--	--	80	Gray	Homogeneous	CK	
0533835	NSS-RC-TSI-8B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533836	NSS-RC-TSI-8C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop

AMA Analytical Services, Inc.

NVLAP 101143-0 NY ELAP 10920 AIHA 100470

CERTIFICATE OF ANALYSIS

Client: Environmental Resource Management, Inc.
Address: 200 Harry S. Truman Drive, Suite 400
Annapolis, Maryland 21401

Attention: Matt Baxter

Job Name: NS - Savannah
Job Location: Not Provided
Job Number: 0028178
P.O. Number: Not Provided

Chain Of Custody: 136891
Date Analyzed: 4/26/2005
Person Submitting: Matt Baxter

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0533837	NSS-RC-TSI-9A	35	30	3	2	--	--	--	--	--	--	65	Gray	Homogeneous	CK	
0533838	NSS-RC-TSI-9B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533839	NSS-RC-TSI-9C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533840	NSS-RC-TSI-10A	25	5	20	--	--	--	--	--	--	--	75	Off-White	Homogeneous	CK	
0533841	NSS-RC-TSI-10B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533842	NSS-RC-TSI-10C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533843	NSS-RC-TSI-11A	45	40	5	--	--	--	--	--	--	--	55	Gray	Homogeneous	CK	
0533844	NSS-RC-TSI-11B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533845	NSS-RC-TSI-11C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533846	NSS-RC-TSI-12A	25	15	10	--	--	35	--	--	--	--	40	Beige	Homogeneous	CK	
0533847	NSS-RC-TSI-12B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533848	NSS-RC-TSI-12C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

AMA Analytical Services, Inc.

NVLAP 101143-0
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CERTIFICATE OF ANALYSIS

Client:	Environmental Resource Management, Inc	Job Name:	NS - Savannah	Chain Of Custody:	136891
Address:	200 Harry S. Truman Drive, Suite 400	Job Location:	Not Provided	Date Analyzed:	4/26/2005
	Annapolis, Maryland 21401	Job Number:	0028178	Person Submitting:	Matt Baxter
		P.O. Number:	Not Provided		
Attention:	Matt Baxter				

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0533849	NSS-RC-TSI-13A	40	--	40	--	--	--	--	--	--	--	60	Gray	Homogeneous	CK	
0533850	NSS-RC-TSI-13B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533851	NSS-RC-TSI-13C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533852	NSS-RC-TSI-14A	15	3	12	--	--	5	--	--	--	--	80	Gray	Homogeneous	CK	
0533853	NSS-RC-TSI-14B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533854	NSS-RC-TSI-14C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533855	NSS-RC-TSI-15A	20	15	5	--	--	15	--	--	--	--	65	Gray	Homogeneous	CK	
0533856	NSS-RC-TSI-15B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533857	NSS-RC-TSI-15C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533858	NSS-RC-TSI-16A	25	--	25	--	--	--	--	--	--	--	75	Gray	Homogeneous	CK	
0533859	NSS-RC-TSI-16B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533860	NSS-RC-TSI-16C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop

AMA Analytical Services, Inc.

NVLAP 101143-0
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CERTIFICATE OF ANALYSIS

Client:	Environmental Resource Management, Inc.	Job Name:	NS - Savannah	Chain Of Custody:	136891
Address:	200 Harry S. Truman Drive, Suite 400	Job Location:	Not Provided	Date Analyzed:	4/26/2005
	Annapolis, Maryland 21401	Job Number:	0028178	Person Submitting:	Matt Baxter
		P.O. Number:	Not Provided		

Attention: Matt Baxter

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0533861	NSS-RC-TSI-17A	15	--	15	--	--	--	--	--	--	--	85	Gray	Homogeneous	CK	
0533862	NSS-RC-TSI-17B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533863	NSS-RC-TSI-17C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533864	NSS-RC-TSI-18A	40	--	40	--	--	--	--	--	--	--	60	Gray	Homogeneous	CK	
0533865	NSS-RC-TSI-18B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533866	NSS-RC-TSI-18C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533867	NSS-RC-TSI-19A	5	3	2	--	--	55	--	--	--	--	40	Gray	Homogeneous	CK	
0533868	NSS-RC-TSI-19B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533869	NSS-RC-TSI-19C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533870	NSS-RC-TSI-20A	30	30	--	--	--	--	--	30	--	--	40	Off-White	Homogeneous	CK	
0533871	NSS-RC-TSI-20B	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop
0533872	NSS-RC-TSI-20C	--	--	--	--	--	--	--	--	--	--	--			CK	Sample Not Analyzed-Positive Stop

AMA Analytical Services, Inc.

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	Environmental Resource Management, Inc.	**Job Name:**	NS - Savannah	**Chain Of Custody:**	136891
Address:	200 Harry S. Truman Drive, Suite 400	**Job Location:**	Not Provided	**Date Analyzed:**	4/26/2005
	Annapolis, Maryland 21401	**Job Number:**	0028178	**Person Submitting:**	Matt Baxter
		P.O. Number:	Not Provided		

Attention: Matt Baxter

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"   TR = "Trace equals less than 1% of this component"

Crystal Kellam
Crystal Kellam

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Field Data Sheets for Non-Radiation Areas

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Navigation Bridge Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-NBD-FT-1A, -1B, -1C	Green ,9"x9" floor tile with white lines and associated mastics	Throughout Navigation Bridge Deck	Fair		x
NSS-NBD-MM-2A, -2B, -2C	White wall board with pinhole pattern	Navigation Bridge Deck-Gyro Radar Room	Good		x
NSS-NBD-TSI-3A, -3B, -3C	Straight run pipe insulation associated with piping above ceilings	Navigation Bridge Deck above ceiling	Good	x	
NSS-NBD-TSI-4A, -4B, -4C	Elbow pipe insulation associated with piping above ceiling	Navigation Bridge Deck above ceiling	Good	x	
NSS-NBD-MM-5A, -5B, -5C	White, drywall associated with walls (1' thickness)	Navigation Bridge Deck Staterooms	Good	x	
NSS-NBD-MM-6A, -6B, -6C	White, drywall associated with ceiling	Navigation Bridge Deck Staterooms	Good	x	
NSS-NBD-MM-7A, -7B, -7C	Brown mastic associated with baseboard molding	Throughout Navigation Bridge Deck	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Navigation Bridge Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-NBD-MM-8A, -8B, -8C	White sub-floor (baseboard)	Throughout Navigation Bridge Deck	Good	x	
NSS-NBD-TSI-9A, -9B, -9C	Straight run pipe insulation associated with generator	Navigation Bridge Deck-Generator Room	Good	x	
NSS-NBD-TSI-10A, -10B, -10C	Elbow pipe insulation associated with generator	Navigation Bridge Deck-Generator Room	Good	x	

Due to time limitations, physical samples were not taken of this deck. The materials that were observed are similar to materials that are located on other decks of the ship. The table identifies samples that ERM would have sampled had time permitted.

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Boat Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS-BoatDeck-FT-1A, -1B, -1C	Black 18"x18" floor tile with white specks and associated mastic	Boat Deck stairwell	Good		x
NSS-BoatDeck-MM-2A, -2B, -2C	White, drywall associated with the wall (1' thickness)	Boat Deck Cabins	Good	x	
NSS-BoatDeck-MM-3A, -3B, -3C	White, drywall associated with ceiling (1/2" thickness)	Boat Deck Staterooms	Good	x	
NSS-BoatDeck-MM-4A, -4B, -4C	White sub-floor (baseboard)	Throughout Boat Deck	Good		x
NSS-BoatDeck-FT-5A, -5B, -5C	Green, 9x9 floor tile with white lines and associated mastic	Throughout Boat Deck	Poor		x
NSS-BoatDeck-MM-6A, -6B, -6C	Brown mastic associated with baseboard molding	Throughout Boat Deck	Good		x
NSS-BoatDeck-TSI-7A, -7B, -7C	Straight run pipe insulation above ceiling	Boat Deck above ceiling	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Boat Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS-BoatDeck-TSI-8A, -8B, -8C	Elbow pipe insulation	Boat Deck above ceiling	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Promenade Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-PromDeck-FT-1A, -1B, -1C	Dark green, 18" x18" floor tile with white lines and associated mastics	Promenade Deck-Veranda	Good		x
NSS-PromDeck-FT-2A, -2B, -2C	White, 18"x18" floor tile with white lines and associated mastics	Promenade Deck-Veranda	Good		x
NSS-PromDeck-MM-3A, -3B, -3C	Black sub-floor (baseboard)	Promenade Deck-Throughout floor	Good		x
NSS-PromDeck-MM-4A, -4B, -4C	White, 4'x4' ceiling panels with pinholes	Promenade Deck-Veranda and Main Lounge	Good		x
NSS-PromDeck-MM-5A, -5B, -5C	White drywall (1/2" thickness) associated with walls	Promenade Deck-Veranda	Good	x	
NSS-PromDeck-MM-6A, -6B, -6C	White drywall (1" thickness) associated with ceilings	Promenade Deck-Veranda	Good	x	
NSS-PromDeck-MM-7A, -7B, -7C	Brown mastic associated with baseboard molding	Promenade Deck-Veranda and Main Lounge	Good		x

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckA-FT-1A, -1B, -1C	Green, 9"x9" floor tile with white lines and associated mastic	Deck A- Throughout infirmary	Good		x
NSSDeckA-TSI-2A, -2B, -2C	Straight run pipe insulation	Deck A- Piping located above ceiling	Good	x	
NSSDeckA-TSI-3A, -3B, -3C	Elbow pipe insulation	Deck A- Piping located above ceiling	Good	x	
NSSDeckA-FT-4A, -4B, -4C	Brown, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-5A, -5B, -5C	Black, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-6A, -6B, -6C	Light brown, 9"x9" floor tile with white specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x
NSSDeckA-FT-7A, -7B, -7C	Tan, "9x9" floor tile with white brown specks and associated mastic	Deck A-Throughout hallways adjacent to staterooms	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckA-MM-8A, -8B, -8C	White drywall (1/2" thickness) associated with ceilings	Deck A	Good	x	
NSSDeckA-MM-9A, -9B, -9C	White drywall (1" thickness) associated with walls	Deck A	Good	x	
NSSDeckA-FT-10A, -10B, -10C	White, 9"x9" floor tile and associated mastic	Deck A- Main Lobby	Good		x
NSSDeckA-FT-11A, -11B, -11C	Gray, 18"x18" floor tile and associated mastic	Deck A –Main Lobby	Good		x
NSSDeckA-FT-12A, -12B, -12C	Black, 9"x9" floor tile and associated mastic	Deck A- Main Lobby	Good		x
NSSDeckA-CT-13A, -13B, -13C	White, 2'x3' ceiling panel with pinholes	Deck A- Main Lobby	Good		x
NSSDeckA-MM14A, -14B, -14C	Black sub-floor (baseboard)	Deck A – Main Lobby and forward areas	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck A
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSDeckA-FT-15A, -15B, -15C	Tan, 9"x9" floor tile and associated mastic	Deck A- Lab Assistant Office	Poor		x
NSSDeckA-FT-16A, -16B, -16C	Orange, 9"x9" floor tile and associated mastic	Deck A- Barber Shop	Good		x
NSSDeckA-FT-17A, -17B, -17C	Brown, 9" x9" floor tile with black and white specks and associated mastic	Deck A- Port and starboard side stairwells	Fair		x
NSSDeckA-FT-18A, -18B, -18C	Tan, 9" x9" floor tile with brown specks and associated mastic	Deck A- Port and starboard side stairwells	Fair		x
NSSDeckA-FT-19A, -19B, -19C	Tan, 9" x9" floor tile with brown specks and associated mastic	Deck A- Staterooms rear of Main Lobby and Pursers Office	Fair		x
NSSDeckA-MM-20A, -20B, -20C	Brown mastic associated with baseboard molding	Deck A	Good		x
NSSDeckA-MM-21A, -21B, -21C	White sub-floor (baseboard)	Deck A- Area rear of Main Lobby	Good	x	
NSSDeckA-FT-22A, -22B, -22C	Red, 9"x9" floor tile with white lines and associated mastic	Deck A- Forward port side stairwell	Good		x

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSS-B Deck-FT-1A, -1B, -1C	Blue, 9"x9" floor tile with white lines	Deck B- Dining Room	Fair		x
NSS-B Deck-Mastic-2A, -2B, -2C	Mastic associated with blue 9"x9" floor tile with white lines	Deck B-Dining Room	Fair		x
NSS-B Deck-FT-3A, -3B, -3C	White, 18" x18" floor tile	Deck B-Dining Room	Fair		x
NSS-B Deck-Mastic-4A, -4B, -4C	Mastic associated with 18" x18" floor tile	Deck B-Dining Room	Fair		x
NSS-B Deck-Mastic-5A, -5B, -5C	Brown mastic associated with baseboard molding	Deck B-Dining Room	Fair		x
NSS-B Deck- FT-6A, -6B, -6C	Light green, 9" x9" floor tile with white specks	Deck B- Stateroom hallway rear of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-7A, -7B, -7C	Mastic associated with light green 9x9 floor tile with white specks	Deck B- Stateroom hallway rear of Cargo Loading Passage	Fair		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS-B Deck-MM-8A, -8B, -8C	Brown mastic associated with stair treads	Deck-B Dining Room	Good		x
NSS-B Deck-Fiberboard-9A, -9B, -9C	White fiberboard padding beneath floor tile	Deck B- Area rear of Cargo Loading Passage	Fair	x	
NSS-B Deck-FT-10A, -10B, -10C	Dark green, 9" x9" floor tile with white lines	Deck B- Area rear of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-11A, -11B, -11C	Mastic associated with 9" x9" floor tile with white lines	Deck B- Area rear of Cargo Loading Passage	Fair		x
NSS-B Deck-FT-12A, -12B, -12C	Gray, 9"x9" floor tiles with specks	Deck B- Throughout area forward of Cargo Loading Passage	Fair		x
NSS-B Deck-Mastic-13A, -13B, -13C	Mastic associated with gray 9" x9" floor tile with specks	Deck B- Throughout area forward of Cargo Loading Passage	Fair		x
NSS-B Deck-Subfloor-14A, -14B, -14C	Gray sub-floor (baseboard)	Deck B- Forward of Cargo Loading Passage	Fair		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck B
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSS-B Deck-MM-15A, -15B, -15C	White drywall (1/2" thickness) associated with ceiling	Deck B-Throughout staterooms and hallways	Fair	x	
NSS-B Deck-FT-16A, -16B, -16C	Tan, 9" x9" floor tile with brown lines and associated mastic	Deck B- Starboard side stateroom forward of the Cargo Loading Passage	Fair		x
NSS-B Deck-MM-17A, -17B, -17C	White, 18"x18" ceiling panels with pinholes	Deck B– Dining room and office rear of Cargo Loading Passage	Good		x
NSS-B Deck-TSI-18A, -18B, -18C	Straight run pipe insulation	Deck B– Piping that is located above ceiling	Good	x	
NSS-B Deck-TSI-19A, -19B, -19C	Elbow pipe insulation	Deck B– Piping that Is located above ceiling	Good	x	
NSS-B Deck-MM-20A, -20B, -20C	White drywall (1" thickness) associated with walls	Deck B – Throughout staterooms and hallways	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck C
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSSDeckC-FT-1A, -1B, -1C	Tan, 9"x9" floor tiles with white lines and associated mastics	Deck C-Staterooms	Good		x
NSSDeckC-MM-2A, -2B, -2C	White drywall (1/2" thickness) associated with state room ceiling	Deck C-Staterooms	Good	x	
NSSDeckC-MM-3A, -3B, -3C	White drywall (1" thickness) associated with state room walls	Deck C-Staterooms and Hallways	Good	x	
NSSDeckC-TSI-4A, -4B, -4C	Straight run pipe insulation associated with pipes above ceiling	Deck C	Good	x	
NSSDeckC-TSI-5A, -5B, -5C	Elbow pipe insulation associated with pipes above ceiling	Deck C	Good	x	
NSSDeckC-FT-6A, -6B, -6C	Brown, 9" x9" floor tile with black specks and associated mastic	Deck C- Hallways	Good		x
NSSDeckC-FT-7A, -7B, -7C	Tan, 9" x9" floor tile with black and white specks and associated mastic	Deck C- Hallways	Good		x

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Deck C
NSS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSDeckC-TSI-8A, -8B, -8C	Straight run pipe insulation associated with piping	Deck C – Carpenters workshop	Good	x	
NSSDeckC-TSI-9A, -9B, -9C	Elbow pipe insulation associated with piping	Deck C- Carpenters workshop	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS14Flat-TSI-1A, -1B, -1C	Straight run pipe insulation associated with heating system	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-2A, -2B, -2C	Elbow pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-3A, -3B, -3C	Straight run pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-4A, -4B, -4C	Elbow pipe insulation associated with heating system drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-5A, -5B, -5C	Straight run pipe insulation associated with auxiliary exhaust	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-6A, -6B, -6C	Elbow pipe insulation associated with auxiliary exhaust	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-7A, -7B, -7C	Straight run pipe insulation associated with fire station 37 (4" diameter)	Deck 14 Flat-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSS14Flat-TSI-8A, -8B, -8C	Elbow pipe insulation associated with fire station 37 (4" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-9A, -9B, -9C	Insulation (body) associated with HP/LP crossover system (60" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-10A, -10B, -10C	Insulation (body) associated with HP/LP crossover system (36" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-11A, -11B, -11C	Elbow pipe insulation associated with HP/LP crossover system (36" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-12A, -12B, -12C	Elbow pipe insulation associated with steam dump pipe (24" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-13A, -13B, -13C	Straight run pipe insulation associated with steam dump pipe (24" diameter)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-14A, -14B, -14C	Straight run pipe insulation (4" diameter)	Deck 14 Flat-Shaft Alley	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSS14Flat-TSI-15A, -15B, -15C	Elbow pipe insulation (4" diameter)	Deck 14 Flat-Shaft Alley	Good	x	
NSS14Flat-TSI-16A, -16B, -16C	Straight run pipe insulation associated with main feed pump	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-17A, -17B, -17C	Elbow pipe insulation associated with main feed pump	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-18A, -18B, -18C	Insulation associated with first stage water heater (body)	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-19A, -19B, -19C	Straight run pipe insulation associated with solenoid valve	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-20A, -20B, -20C	Elbow pipe insulation associated with solenoid valve	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-21A, -21B, -21C	Straight run pipe insulation associated with shell coil system	Deck 14 Flat-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	**No**
NSS14Flat-TSI-22A, -22B, -22C	Elbow pipe insulation associated with shell coil system	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-23A, -23B, -23C	Straight run pipe insulation associated with crossover drain	Deck 14 Flat-Engine Room	Good	x	
NSS14Flat-TSI-24A, -24B, -24C	Elbow pipe insulation associated with crossover drain	Deck 14 Flat-Engine Room	Fair	x	
NSSDeckD-FT-25A, -25B, -25C	White, 9"x9" floor tile and associated mastics	Deck D-Control Room	Good		x
NSSDeckD-FT-26A, -26B, -26C	Green, 9"x9" floor tile and associated mastics	Deck D-Control Room	Good		x
NSSDeckD-TSI-27A, -27B, -27C	Straight run pipe insulation associated with cooling system (green)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-28A, -28B, -28C	Elbow pipe insulation associated with cooling system (green)	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSDeckD-TSI-29A, -29B, -29C	Insulation associated with cooling system tank (green)	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-30A, -30B, -30C	Straight run pipe insulation associated with diesel engine exhaust	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-31A, -31B, -31C	Elbow pipe insulation associated with diesel engine exhaust	Deck D-Engine Room	Good	x	
NSSDeckD-MM-32A, -32B, -32C	Gaskets associated with boiler	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-33A, -33B, -33C	Insulation associated with steam generator (pink)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-34A, -34B, -34C	Straight run pipe insulation associated with steam generator	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-35A, -35B, -35C	Elbow pipe insulation associated with steam generator	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable? Yes	Friable? No
NSSDeckD-TSI-36A, -36B, -36C	Straight run pipe insulation associated with compressors	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-37A, -37, -37C	Elbow pipe insulation associated with compressors	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-38A, -38B, -38C	Pipe insulation associated with boiler duct	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-39A, -39B, -39C	Elbow pipe insulation associated with ADT pipe system (green)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-40A, -40B, -40C	Straight run pipe insulation associated with ADT pipe system (green)	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-41A, -41B, -41C	Straight run pipe insulation associated with steam valve system	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-42A, -42B, -42C	Straight run pipe insulation associated with engine (red)	Deck D-Engine Room	Good	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSSDeckD-TSI-43A, -43B, -43C	Elbow pipe insulation associated with engine (red)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-44A, -44B, -44C	Straight run pipe insulation associated with evaporators	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-45A, -45B, -45C	Elbow pipe insulation associated with evaporators	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-46A, -46B, -46C	Straight run pipe insulation associated with generators	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-47A, -47B, -47C	Elbow pipe insulation associated with generators	Deck D-Engine Room	Poor	x	
NSSDeckD-TSI-48A, -48B, -48C	Straight run pipe insulation associated with steam valves	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-49A, -49B, -49C	Elbow pipe insulation associated with steam valves	Deck D-Engine Room	Fair	x	

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-14 Flat and Deck D
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSSDeckD-TSI-50A, -50B, -50C	Straight run pipe insulation associated with boiler water treatment system	Deck D-Engine Room	Fair	x	
NSSDeckD-TSI-51A, -51B, -51C	Insulation associated with vent to first stage heater (body)	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-52A, -52B, -52C	Straight run pipe insulation associated with condensate line	Deck D-Engine Room	Good	x	
NSSDeckD-TSI-53A, -53B, -53C	Straight run pipe insulation associated with diesel engine exhaust (upper section)	Deck D-Engine Room	Good	x	
NSSDeckD-FT-54A, -54B, -54C	Tan, 9"x9" floor tile with black specks and associated mastic	Deck D- Food Storage Area	Poor		x
NSSDeckD-FT-55A, -55B, -55C	Brown 9" x9" floor tile with black and white specks and associated mastic	Deck D- Food Storage Area	Poor		x
NSSDeckD-TSI-56A, -56B, -56C	Straight run pipe insulation	Deck D-Food Storage Area	Good	x	
NSSDeckD-TSI-57A, -57B, -57C	Elbow pipe insulation	Deck D- Food Storage Area	Good	x	

Note: All pipes are recorded as total diameter of the pipe and the associated insulation.

Survey Conducted on 4-15 April 2005
Survey Conducted by: ERM

Asbestos Survey Field Data Sheet-Surface Deck
NS-Savannah
Fort Eustis, VA

Sample ID	Material Description	Location	Condition	Friable?	
				Yes	No
NSSSurfaceDeck-MM-1A, -1B, -1C	Black asphalt sealant associated with cargo hold doors	Surface Deck	Good		x

Appendix M
Lead-Based Paint Survey Results

Table I
Positive ($\geq$ 1.0 mg/cm^2) Lead Based Paint Results
NS Savannah
Ft. Eustis, Virginia
April 2005

Test Number	Area Location	Color	Component	Substrate	Result (mg/cm^2)
April 4, 2005					
008	A deck level	Grey	Center wall	Metal	1.6
010	A deck level	White	Ship side	Metal	6.1
020	A deck level	White	Ship wall	Metal	2.7
021	A deck level	White	Side rail	Metal	5.4
026	Upper deck level	White	House wall	Metal	7.5
029	Upper deck level	White	House wall	Metal	5.5
033	A deck level	White	Winch tower support	Metal	1.0
035	A deck level	White	Winch tower floor	Metal	6.5
April 5, 2005					
006	A deck main lobby	Off white	Wall	Metal	1.0
077	SE passage corridor	Red	Wall	Drywall	1.9
078	SE passage corridor	Red	Wall	Drywall	3.2
079	SE passage corridor	Red	Wall	Drywall	1.6
080	SE passage corridor	Red	Ceiling	Drywall	3.6
084	SR A-29	Red	Door	Metal	3.0
085	SR A-29	Red	Door casing	Metal	2.2
092	Linen Locker	Red	Door	Metal	2.6
093	SE passage corridor	Red	Wall	Drywall	2.8
096	Stairwell	Red	Wall	Drywall	2.7
114	Boat deck	White	Railing support	Metal	1.6
117	Boat deck	White	Stair carriage	Metal	1.0
119	NBD	White	Wall	Metal	1.8
120	NBD	White	Wall	Metal	>9.9
121	NBD	White	Door	Metal	8.7
146	B deck/ Fan room	Orange	Handrail	Metal	1.9
202	B deck/ NS corridor	Blue	Handrail	Metal	1.9
203	B deck/ No. 4 hatch	White	Wall	Metal	1.7
204	B deck/ No. 4 hatch	Red	Floor	Metal	2.8
207	B deck/ No. 4 hatch	White	Wall	Metal	1.7
211	B deck/ No. 4 hatch	White	Duct	Metal	2.0
212	B deck/ No. 4 hatch	White	Floor	Metal	3.1
April 6, 2005					
047	C deck/ hallway	Yellow	Electric box	Metal	2.4
048	C deck/ stairwell	Orange	Railing	Metal	1.6

Table I
Positive (≥ 1.0 mg/cm^2) Lead Based Paint Results
NS Savannah
Ft. Eustis, Virginia
April 2005

Test Number	Area Location	Color	Component	Substrate	Result (mg/cm^2)
April 6, 2005					
053	C deck/ NS corridor	Green	Cables	Metal	3.9
063	C deck/ load passage	Red	Floor	Metal	3.4
067	C deck/ load passage	Yellow	I-beam	Metal	2.6
070	C deck/ load passage	Green	I-beam	Metal	2.7
071	C deck/ mach. space	Green	Elevator shaft	Metal	8.1
073	C deck/ mach. space	Red	Floor	Metal	2.8
080	C deck/ mach. space	Green	Cables	Metal	1.9
098	C deck/ locker	White	Cables	Metal	3.6
127	D deck/ machine room	Yellow	Compressor Delaval	Metal	7.1
128	D deck/ machine room	Green	Turbine	Metal	1.6
144	14' D deck	Orange	Handrail	Metal	5.9
151	14' D deck	Yellow	Tank	Metal	3.8
156	14' D deck shaft alley	Orange	Handrail	Metal	2.1
157	14' D deck	Yellow	Pipe	Metal	2.2
163	A deck-pursers office	Orange	Door	Metal	1.0
171	D deck/ control center	Green	Wires	Metal	2.3
177	D deck/ workshop	Green	Wires	Metal	1.5
181	D deck/ engine spares	Orange	Wall	Metal	2.5
185	D deck/ stewards room	Orange	Wall	Metal	2.4
April 7, 2005					
004	Ship starboard side	Red	Hull	Metal	5.8
022	B deck/ stairwell	Yellow	Wall	Metal	3.0
April 8, 2005					
009	Reactor room	Tan	Reactor wall	Insulation	8.2
012	Reactor room	Orange	Handrail	Metal	1.0
021	Reactor room	Tan	Reactor wall	Insulation	>9.9
023	Reactor room	Green	Cables	Metal	1.0

Table II
Lead Paint Chip Sample Results
NS Savannah
Ft. Eustis, Virginia
April 2005

Sample Number	Color	Location	Component	Surface	Paint Chip Result (%)
05121040601P	Red/ Orange	A Deck	Wall	Metal	3.2
05121040602P	White	Bridge Deck	Wall	Metal	0.71
05121040603P	White	Veranda	Wall	Metal	0.034
05121040604P	Blue	B Deck	Wall	Metal	0.3
05121040605P	Red	B Deck	Floor	Metal	3.9

JOB NAME: N S Savannah

ADDRESS: James River, Ft. Eustis, VA

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS NIST Value=1.0	TEST NO.	RESULT(mg/cm2)
001	CALIBRATION							001	0.9
002								002	0.8
003								003	0.8
004	A Deck Level - Bow P2	Deck	Green	Deck	Metal	N.I.	0.3 -	004	0.3
005	A Deck Level - Side P2	NE side	White	Side	M	NI	0.0 -	005	0.0
006	A Deck level - P2	NW Side	Grey	Tie-off	M	NI	0.2 -	006	0.2
007	A Deck level P2	Center	Grey	Anchor Winch	M	NI	0.1 -	007	0.1
008	A Deck Level (P3)	Center	Grey	Center Wall	M	NI	1.6 +	008	1.6
009	A Deck Level (P4)	Center	Green	Cargo Cover	M	NI	0.3 -	009	0.3
010	A Deck Level (P5)	NW Side	White	Side	M	NI	6.1 +	010	6.1
011	A Deck Level	Center	Green	Deck	M	NI	0.0 -	011	0.0
012	A Deck Level	NE Side	White	Side	M	NI	0.2 -	012	0.2
013	A Deck Level (P6)	Center	Green	Cargo Cover	M	NI	0.4 -	013	0.4
014	A Deck Level	Mast	White	Hatch Door	M	NI	0.2 -	014	0.2
015	A Deck Level P7 ~~P6~~	Mast	White	Winch	M	NI	0.0 -	015	0.0
016	A Deck Level P7	Mast	White	Pipe	M	NI	0.2 +	016	0.2
017	A Deck Level P8	Entrance	White	Wall	M	NI	0.2 -	017	-0.2
018	A Deck Level	NW side	White	Wall	M	NI	0.4 -	018	0.4
019	A DL	NW side	White	Wall	M	NI	0.4 -	019	0.4
020	A DL	NW side	White	wall	M	NI	2.7 +	020	2.7

JOB# 05121 DATE: 4-4-05 ~~0932~~ 0934

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis, VA

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
021	A DL	NW side	White	Side Rail	M	NI	5.4 +	021	5.4
022	A DL	NE side	White	Side Rail	M	NI	0.0 -	022	0.0
023	A DL P9	center	black	Stair tred	M	NI	0.2 -	023	-0.2
024	A DL P9	center	white	Stair carriage	M	NI	0.0 -	024	0.0
025	UDL - Deck 1	center	Green	Deck	M	NI	0.1 -	025	0.1
026	UDL - P10+11	center	white	Bridge House Wall (E)	M	NI	7.5+	026	7.5
027	UDL -	center	white	box adjacent to wall	M	NI	- 0.3 -	027	0.3
028	UDL -	Center	Green	cargo cover	M	NI	0.1 -	028	-0.1
029	UDL -	Center	White	~~Bridge~~ House Wall (W)	M	NI	5.5 +	029	5.5
030	UDL -	W side	Grey	tie-off	M	NI	0.0 -	030	0.0
031	UDL - P12	W side	white	box	M	NI	0.0 -	031	0.0
032	UDL -	E side	red	chain attachment	M	NI	0.2 -	032	-0.2
033	A DL	Center	white	winch tower support	M	NI	1.0 +	033	1.0
034	A DL	Center	white	winch motor	M	NI	0.3 -	034	0.3
035	A DL	Center	white	winch floor	M	NI	6.5+	035	6.5
036	A DL	center	white	winch cross support	M	NI	0.3 -	036	0.3
037	A DL	center	white	winch elevated hand rail	M	NI	0.2 -	037	0.2
038	A DL	E side	white	Wall	M	NI	0.4 -	038	0.4
039	A D Corridor N/S	W1	Green	Wall	M	NI	0.0	039	0.0
040	A D to N/S Corridor	W2	Green	Wall	M	NI	0.1 -	040	-0.1

JOB# 05121

DATE: 4-4-05-0934

JOB NAME: N/S Savannah

ADDRESS: James River, Ft. Eustis, VA

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
041	AD N/S Corridor	W3	Green	Wall	M	NI	0.2 -	041	-0.2
042	AD N/S Corridor	W4	off white	Wall	M	NI	0.2 -	042	-0.2
043	AD N/S Corridor	Ceiling	off white	Ceiling	M	NI	0.4 -	043	-0.4
044	AD N/S Corridor	W1	tan	door	M	NI	0.1 -	044	-0.1
045	AD State Room 3	W1	Green	Wall	sheet rock	I	0.1 -	045	0.1
046	" "	W2	" "	" "	" "	I	0.0 -	046	0.0
047	" "	W3	" "	" "	" "	I	0.0 -	047	0.0
048	" "	W4	" "	" "	" "	I	0.1 -	048	-0.1
049	" "	C	" "	C	" "	I	0.1 -	049	-0.1
050	" "	C	" "	metal ceiling deck	M	NI	metal ceiling above dry wall ceiling 0.1 -	050	-0.1
051	" "	W2	Green	window sill	dry wall	NI	0.1 -	051	-0.1
052	" "	W2	" "	window casing	" "	NI	0.0	052	0.0
053	AD State Rm 3 Bathroom "	W3	Yellow	Wall	sheet rock	NI	0.1 -	053	0.1
054	AD State Room 3	W4	Green	door	M	NI	0.1 -	054	0.1
055	" "	W4	Green	door casing	M	NI	0.0 -	055	0.0
056	AD State Room 7	W1	OW	Wall	SR	NI	0.1 -	056	-0.1
057	" "	W2	OW	Wall	SR	NI	0.1 -	057	0.1
058	" "	W3	OW	wall	SR	NI	0.1 -	058	0.1
059	" "	W4	OW	Wall	" "	NI	0.1 -	059	-0.1
060	" "	ceiling	White	ceiling	SR	NI	0.1 -	060	-0.1

JOB# 05121

DATE: 4/4/05 - 0934

PAGE 3 OF 4

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis, VA

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
061	AD State Room 7	W3	white	cabinets	M	NI	0.0 -	061	0.0
062	" "	" "	" "	door	M	NI	0.1 -	062	-0.1
063	" "	" "	" "	door casing	M	NI	0.0 -	063	0.0
064	AD State Room 7	W2	OW	metal chair rail	M	NI	0.2 -	064	-0.2
065	AD State Room 15	W1	OW	wall	dW	NI	0.1 -	065	-0.1
066	" "	W2	OW	wall	dW	NI	0.1 -	066	-0.1
067	" "	W3	" "	" "	" "	" "	0.1 -	067	-0.1
068	" "	W4	" "	" "	" "	" "	0.0 -	068	0.0
069	" "	ceiling	white	ceiling	dW	NI	0.1 -	069	-0.1
070	" "	W4	orange	door	M	NI	0.1 -	070	-0.1
071	" "	W4	orange	door casing	M	NI	0.0 -	071	0.0
072	" "	W3	yellow	closet	dW	NI	0.1 -	072	-0.1
073	" "	W3	yellow	closet door	M	NI	0.1 -	073	-0.1
074	" "	W1	yellow	bathroom wall	dW	NI	0.2 -	074	-0.2
075	" "	W2	white	bathroom tile	ceramic tile	I	0.2 -	075	-0.2
076	~~AD Lounge~~ CALIBRATION						NIST Value = 1.0	076	**0.9**
077								077	**0.8**
078								078	**0.8**
079									
080									

JOB# 05121

DATE: 4/4/05 -0934

PAGE 4 OF 4

Rob Schoenagel

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS NIST Value=1.0	TEST NO.	RESULT(mg/cm2)
001	CALIBRATION							001	**0.8**
002								002	**0.8**
003								003	**0.8**
004	AD - ~~E~~ Main Lobby	W1	OW	wall	dw	NI	-0.3-	004	-0.3
005		W2			dw		-0.1-	005	-0.1
006		W3			M		1.0+	006	**1.0**
007		W4			dw		0.1-	007	0.1
008		W1	tan	door casing	M		-0.1	008	-0.1
009		W1	tan	door	M		-0.1	009	-0.1
010		ceiling	OW	ceiling	transite	I	-0.4	010	-0.4
011	AD - West ~~East~~ N/S Corridor	W1	tan	door casing	M	NI	0.2	011	0.2
012		W1	tan	door	M		-0.1	012	-0.1
013		W2	OW	wall	dw		-0.3	013	-0.3
014		W3	OW	wall			-0.3	014	-0.3
015		ceiling	OW	ceiling			-0.2	015	-0.2
016		ceiling	OW	crown molding	M	NI	0.0	016	0.0
017	Laundry Adj. to SR2	W1	OW	wall	M	NI	0.1	017	0.1
018		W2	OW	wall	M	NI	-0.1	018	-0.1
019		W3					-0.2	019	-0.2
020		W4					0.0	020	0.0

JOB# 05121

DATE: 4/5/05 - 0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
021	Laundry adj to SR2	W3	OW	heater	M	NI	-0.3	021	-0.3
022		ceiling		air duct			0.1	022	0.1
023		W4		cabinet			-0.1	023	-0.1
024		ceiling		support			-0.3	024	-0.3
025	SR-2	W1	yellow	wall			0.2	025	0.2
026		W2					0.0	026	0.0
027		W3					-0.1	027	-0.1
028		W4					-0.1	028	-0.1
029		ceiling	W	ceiling	dw		-0.1	029	-0.1
030		W4	yellow	chair rail	M		-0.1	030	-0.1
031		W4		window sill	dw		-0.2	031	-0.2
032		W4		window casing	dw		-0.0	032	0.0
033		W2	Green	door	M		0.0	033	0.0
034		W2	Green	door casing	M		0.1	034	0.1
035	SR-21 bathroom	W1	yellow	wall	dw		0.0	035	0.0
036		W1	W	ceramic tile	ceramic		-0.2	036	-0.2
037		W1	Y	door	M		0.1	037	0.1
038		W1	Y	door casing	M		-0.1	038	-0.1
039	Ladies Room (SR6)	W1	Green	wall	dw		0.0	039	-0.2
040		W2	Green	wall	dw		0.0	040	0.0

JOB# 05121

DATE: 4/3/05 0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
041	Ladies Room - SR-6	W3	Green	Wall	dW	NI	-0.1	041	-0.1
042		W4	Green	Wall	dW	NI	-0.2	042	-0.2
043		ceiling	W	ceiling	dW	NI	-0.1	043	-0.1
044		ceiling	Y	ceiling joist	M		0.2	044	0.2
045	Ladies Room / closet - (SR6)	W1	OW	wall	dW		-0.1	045	-0.1
046		W3	Green	door	M		-0.1	046	-0.1
047		W3	Green	door casing	M		-0.1	047	-0.1
048	Ladies Room Shower (SR6)	W1	Y	wall	M		-0.2	048	-0.2
049	Doctors Office	W1	Mauve	wall	dW		-0.1	049	-0.1
050	Operating Room	W2	OW	Wall	dW		x 0.1	050	-0.1
051	operating Room	W3	OW	wall	dW		-0.1	051	-0.1
052	Doctors Office	W4	Mauve	wall	dW		0.1	052	0.1
053		ceiling	OW	ceiling	dW		-0.1	053	-0.1
054		W1	OW	door	M		0.0	054	0.0
055		W1	OW	door casing	M		-0.1	055	-0.1
056	operating Room	W4	OW	Wall	M		-0.2	056	-0.2
057	Doctors Office	W4	mauve	electrical panel	M		0.1	057	0.1
058		W4	mauve	pipe	M		0.1	058	0.1
059	Stairwell adja. to Hosp. Ent Corr	W1	Green	Wall	M		0.0	059	0.0
060		W2	Green	Wall	M		0.3	060	0.3

JOB# 05(2)

DATE: 4/5/05 .0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
061	Stairwell adj to Hosp. Ent Corr.	W3	Green	wall	M	NI	-0.1	061	-0.1
062		W4	Green	wall	M		0.0	062	0.0
063		W4	Green	fan room door	M		0.1	063	0.1
064		W1	Green	hatch door	M		-0.1	064	-0.1
065		W1	Green	Hatch door handle	M		0.3	065	0.3
066		ceiling	W	ceiling	M		-0.1	066	-0.1
067		W1	Green	pipe	M		0.3	067	0.3
068		floor	Red	floor	M		0.0	068	0.0
069	A-20 Service Pantry	W1	OW	wall	M		-0.1	069	-0.1
070		W2					-0.1	070	-0.1
071		W3					-0.2	071	-0.2
072		W4					0.2	072	0.2
073		ceiling	OW	ceiling	M		0.0	073	0.0
074		W2	OW	dumb waiter door	M		0.0	074	0.0
075		W2	Grey	door	M		-0.0	075	0.0
076		W2	Grey	door casing	M		-0.1	076	-0.1
077	SE Passage Corridor	W1	Red	wall	~~M~~ Tran		1.9	077	1.9
078	P1	W2	Red	wall	~~M~~ Tran		3.2	078	3.2
079	P2	W4	Red	wall	Tran		1.6	079	1.6
080		ceiling	Red	ceiling	Tran		3.6	080	3.6

JOB# 05121

DATE: 4/5/05 0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT (mg/cm2)
081	SR A-29	W1	W	Wall	dw	NI	0.0	081	0.0
082		W3		Wall	dw		0.0	082	0.0
083		ceiling		ceiling	dw		-0.2	083	-0.2
084		W4	Red	door	M		3.0	084	**3.0**
085		W4	Red	door casing	M		2.2	085	**2.2**
086		W3	W	door	M		-0.0	086	0.0
087		W3	W	door casing	M		-0.1	087	-0.1
088	Linen Locker Across from A-27	W1	W	Wall	M		-0.1	088	-0.1
089		W3	W	Wall	M		0.1	089	0.0
090		W3	W	pipe along ceiling	M		-0.1	090	-0.1
091		ceiling	W	ceiling deck	M		-0.1	091	-0.1
092		W2	Red	door	M		2.6	092	**2.6**
093	SE Passage Corr. Adj to A-31	W4	Red	Wall	Tran		2.8	093	**2.8**
094	SR A-33	W1	Lt Blue	Wall	SR		-0.0	094	0.0
095		ceiling	W	ceiling	SR		-0.2	095	-0.2
096	Stairwell SE of Lobby	W1	Red	Wall	SR		2.7	096	**2.7**
097		Hand Rail	Black	Rail	M		-0.0	097	0.0
098	SW Passage Corridor Adj to A-32	W2	W	Wall	SR		-0.3	098	-0.3
099		W4	W	Wall	SR		-0.4	099	-0.4
100		ceiling	W	ceiling	SR		-0.1	100	-0.1

JOB# 05121

DATE: 4/5/05 - 0759

JOB NAME: NS Savannah

ADDRESS: James River; Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
101	SR A-32	W1	Blue	Wall	SR	NI	-0.2	101	-0.2
102		W3	Blue	Wall	SR		-0.1	102	-0.1
103		W1	Blue	Door	M		-0.1	103	-0.1
104		W1	Blue	Door casing	M		-0.1	104	-0.1
105	SR A-34	W2	Yellow	Wall	M		-0.1	105	-0.1
106	Prom Deck (PD) Veranda	W2	W	Wall	SR		-0.1	106	-0.1
107		W4	W	Wall	SR		-0.1	107	-0.1
108		ceiling	W	ceiling	SR		-0.2	108	-0.2
109		W2	W	window casing	M		-0.2	109	-0.2
110	Weather Deck	East tie off	Gray	tie-off	M		0.0	110	0.0
111		Floor	Green	Floor	M		-0.2	111	-0.2
112		winch tower	W	support beam	M		-0.4	112	0.4
113	Boat Deck	House exterior	W	outside of cable stair	M		0.0	113	0.0
114		Railing	W	Rail support	M		1.6	114	**1.6**
115		floor	Green	floor	M		0.0	115	0.0
116		winch	W	support	M		-0.1	116	0.1
117		W stairwell up to NBD	W	stair carriage	M		1.0	117	**1.0**
118	NBD	Floor	Green	Floor	roofing material		-0.3	118	0.3
119		Deck N. wall	W	wall	M		1.8	119	**1.8**
120		Pilot House exterior	W	wall	M		>9.9	120	**>9.9**

JOB# 05121

NBD = Navig Bridge Deck

DATE: 4/5/05 0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
121	NBD	Pilot House Exterior	W	Door on E side	M	NI	+8.7	121	8.7
122	Boat Deck	Front side winch	W	winch support	M		-0.5	122	0.5
123	A Deck ~~#1 Hatch~~	#7 Hatch	Green	Hatch cover	M		-0.1	123	-0.1
124	↓	Freight office	Grey	WAll	M		-0.1	124	0.1
125	Top of Freight Office	Railing	Grey	Rail	M		-0.4	125	0.4
126	~~A Deck~~ ↓	Floor	Green	floor	M		-0.3	126	0.3
127	A Deck	Exterior of Cargo Machine Room	W	Wall	M		-0.0	127	0.0
128	Boat Deck (BD) - officers lounge	~~[illegible]~~ W2	Blue ~~[illegible]~~	Wall	M		-0.0	128	0.0
129	↓	ceiling	W	ceiling	dw		-0.0	129	0.0
130		W1	Blue	door	M		-0.0	130	0.0
131		W1	Blue	door casing	M		-0.1	131	-0.1
132		W2	Blue	window casing	M		0.4	132	0.4
133	(BD) Corridor outside officers Lounge	W2	tan	Wall	M		0.0	133	0.0
134	↓	W4	tan	Wall	M		-0.1	134	-0.1
135		W1	tan	door	M		-0.2	135	-0.2
136		W1	tan	door casing	M		-0.1	136	-0.1
137	(BD) Hallway west side officers Q.	Floor	Green	floor	M		-0.2	137	-0.2
138	↓	W2	W	Wall	dw		-0.0	138	0.0
139		W4	W	wall	dw	↓	0.0	139	0.0
140	BD - Fan Room	ceiling	tan	ceiling Deck	M		0.2	140	0.2

JOB# 05121

DATE: 4/5/05 -0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
141	BD - Fan Room	Floor	Red	Floor	M	NI	- 0.0	141	0.0
142		Duct	tan	insulation	fiberglass	NI	- 0.1	142	-0.1
143		Duct	Pink	Duct	M	NI	- 0.2	143	0.2
144		Storage tank	Peach	fiberglass	M		0.0	144	0.0
145		Electric Panel Box	Blue	Elec Panel Box	M		0.2	145	0.2
146		Railing	Orange	hand rail	M		1.9	146	**1.9**
147		ladder	Red	ladder	M		-0.4	147	0.4
148		ceiling	Gray	ceiling Deck	M		0.0	148	0.0
149	Chief Engineer Day Room	W1	tan	Wall	SR		0.2	149	0.2
150		W3	tan	Wall	SR		- 0.1	150	-0.1
151		W1	tan	door	M		0.0	151	0.0
152		W1	tan	door casing	M		0.0	152	0.0
153		W3	W	door	M		-0.0	153	0.0
154	Pilot House (NBD)	Floor	Green	Floor	tile		0.1	154	0.1
155		W1	Green	Wall	dw		- 0.0	155	0.0
156		ceiling	Green	ceiling	dw		0.0	156	0.0
157		W2	Green	door casing	M		0.3	157	0.3
158	Top of House - Stairwell	W4	Green	Wall	M		0.1	158	0.0
159		Railing	Black	hand rail	M		0.0	159	0.0
160	Top of House - Deck Grating	Floor	Green	Floor	M		0.0	160	0.0

JOB# 0512

DATE: 4/5/05 - 0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT (mg/cm2)
161	Top of House Exterior Deck	W1	W	Rail Wall	M	NI	0.4	161	0.4
162		Radar Tower	Grey	Tower Pole	M		0.5	162	0.5
163		Intake duct	W	duct Work	M		0.0	163	0.0
164	NDB = Emerg. Gen Rm.	Gener.	Green	Generator	M		-0.1	164	-0.1
165		Elect Panel	Blue	Panel	M		-0.2	165	-0.2
166		W4	Green	Wall	M		0.1	166	0.1
167	Calibration						Calibrated on Deck A	167	1.1
168							Hand rail bare	168	1.0
169							metal w/ NIST Std. Film	169	1.1
170	Main Galley - BD	W4	W	Wall	M		NIST SRM 2573=1.04 -0.2	170	-0.2
171		Ceiling	W	Ceiling	M		0.1	171	0.1
172		W3	W	Elect Panel Box	M		-0.1	172	-0.1
173		W4	Blue	Door	M		-0.1	173	-0.1
174		W4	Blue	Coaming	M		-0.1	174	-0.1
175		W1	W	Wall	M		0.0	175	0.0
176	BD - N/S Corridor - East Side	W2	tan	Wall	M		-0.2	176	-0.2
177		Ceiling	W	ceiling	dw		-0.1	177	-0.1
178		W4	tan	door	M		-0.1	178	-0.1
179	BD - SR B-5	W1	Blue	Wall	dw		0.2	179	0.2
180		W3	Blue	Wall	dw		0.2	180	0.2

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
181	BD - SR B-5	~~ceiling~~ W3	Blue	bed frame	M	NI	- 0.0	181	0.0
182	BD - SR B-5	~~[illegible]~~ W3	Blue	locker	M		0.0	182	0.0
183		~~Floor~~ W4	Blue	Door	M		- 0.1	183	-0.1
184		W4	Blue	Door casing	M		- 0.1	184	-0.1
185	BD - Crew Laundry	W1	W	Wall	M		0.0	185	0.0
186		ceiling	W	pipe	M		- 0.2	186	-0.2
187		W3	W	wall brace	M		- 0.1	187	-0.1
188	BD - Linen Locker Stairs (W)	floor	Green	floor	M		0.2	188	0.2
189		Stairs	Green	stairwell carriage	M		0.3	189	0.3
190		stairs	Black	hand rail	M		0.0	190	0.0
191		W4	Green	wall	M		- 0.0	191	0.0
192	BD - N/S Corridor W side	W2	Green	wall	M		- 0.1	192	-0.1
193		W4	Green	Wall	M		0.1	193	0.1
194		ceiling	W	ceiling	dW		- 0.1	194	-0.1
195	BD - officers Mess	W1	Blue	Wall	dW		- 0.1	195	-0.1
196		W4	tan	wall	dW		- 0.0	196	0.0
197		Partition	blue	wall	dW		0.0	197	0.0
198		ceiling	W	ceiling	dW		- 0.2	198	-0.2
199		table	Blue	table post	M		0.3	199	0.3
200		W2	Blue	door	M		- 0.2	200	-0.2

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

Zoo level

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
001	BD - officers mess	W2	Blue	door casing	M	N1	- 0.0	201	0.0
002	BD - N/S Corridor W side	W2	Blue	hand rail	M		1.9	202	***1.9***
003	BD - No. 4 Hatch	W1	W	Wall	M		1.7	203	***1.7***
004		floor	Red	floor	M		2.8	204	***2.8***
005		Ceiling	W	I beam	M		-0.1	205	-0.1
006		W3	W	Wall	M		-0.1	206	-0.1
007		W2	W	Wall	M		1.7	207	***1.7***
008		W2	silver	wood slats	Wood		-0.1	208	0.1
009		fence	black	Rail	M		0.0	209	0.0
010		Ceiling	W	ceiling deck	M		-0.1	210	-0.1
011		duct work along wall	W	duct	M		2.0	211	***2.0***
012		Floor	W	Floor	M		3.1	212	***3.1***
013		W4	W	Wall	Wood		-0.1	213	-0.1
014	BD - ~~[illegible]~~ Ladies Rm Hatch 4	W1	W	Wall	Wood		-0.1	214	-0.1
015		W2	W	door	Wood		-0.2	215	-0.2
016		W2	Gray	door casing	wood		0.1	216	0.1
017	BD - Steward Laundry	W1	tan	Wall	M		0.0	217	0.0
018		W1	tan	Duct	M		-0.2	218	-0.2
019	BD - Elect Ctrl Platform	W3	Blue	Wall	M		-0.1	219	-0.1
020		Floor	Red	floor	M		-0.0	220	0.0

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
021	BD - Officers Mess	W4	OW	Wall	SR	NI	-0.1	221	-0.1
022		W2	OW	Wall	SR		-0.1	222	-0.1
023		W2	tan	Door	M		-0.0	223	0.0
024		W2	tan	Door casing	M		-0.1	224	-0.1
025	BD - Cargo ~~Hold~~ Landing Passage	W3	W	Wall	M		-0.1	225	-0.1
026		W1	Blue	elevator door	M		-0.2	226	-0.2
027		W1	W	I beam	M		-0.2	227	-0.2
028		W1	Blue	Door	M		-0.1	228	-0.1
029	NS Passage - BD - SW Side	W2	tan	Wall	dW		-0.0	229	0.0
030		W4	tan	Wall	M		-0.1	230	-0.1
031		ceiling	W	ceiling	dW		-0.0	231	0.0
032		W4	tan	door	M		-0.1	232	-0.1
033		W4	tan	door casing	M		-0.1	233	-0.1
034		W4	tan	window cover	M		-0.1	234	-0.1
035	Calibration						NIST Value = 1.0	235	0.9
036								236	1.0
037								237	1.0
038									
039									
040									

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Rob Schoennagel

JOB NAME: NS Savannah

ADDRESS: James River, FT. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS NIST Value=1.0	TEST NO.	RESULT (mg/cm2)
001	CALIBRATION							001	0.9
002								002	0.9
003								003	0.8
004	BD-SR B-10	W1	Blue	Wall	SR	NI	0.1	004	0.1
005		W3	Blue	Wall			0.0	005	0.0
006		ceiling	W	ceiling	SR		0.0	006	0.0
007		W4	Blue	Window casing	M		-0.2	007	-0.2
008		W2	Blue	Door	M		-0.1	008	-0.1
009		W2	Blue	Door casing	M		-0.1	009	-0.1
010	BD-SR B-16	W1	Blue	Wall	SR		0.1	010	0.1
011		W3	Blue	Wall	SR		0.1	011	0.1
012		W3	Blue	Door	M		-0.1	012	-0.1
013	BD-SR B-16 Bathroom	W3	yellow	Wall	SR		-0.1	013	-0.1
014	BD-SW N/S Corridor Stairs	W1	tan	Wall	M		-0.2	014	-0.2
015		W3	tan	Wall	M		-0.3	015	-0.3
016		stairs	tan	stair carriage	M		-0.1	016	-0.1
017	BD-Conference Room	W1	tan	Wall	SR		0.1	017	0.1
018		W3	tan	Wall	SR		0.2	018	0.2
019		W4	tan	door	M		-0.0	019	0.0
020	BD-SE N/S Corridor	W2	tan	Wall	SR		0.0	020	0.0

JOB# 05121 DATE: 4-6-05 -0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
021	BD-SE N/S Corridor	W4	tan	~~SE~~ Wall	SR	NI	-0.2	021	-0.2
022	↓	W4	tan	Vent	M		-0.1	022	-0.1
023	BD-SR B-53	W1	Blue	Wall	SR		-0.4	023	-0.4
024		W3	Blue	Wall	SR		-0.1	024	-0.1
025		W2	Blue	Window cover	M		-0.5	025	-0.5
026		W2	Blue	Window casing	M		-0.2	026	-0.2
027		W4	Blue	door	M		-0.1	027	-0.1
028	BD-SE N/S Corridor Fire Sta. #23	W2	Red	Fire hose holder	M		-0.0	028	0.0
029	BD-SR B-37	W1	Green	Wall	SR		-0.1	029	-0.1
030		W3	Green	Wall	SR		-0.0	030	0.0
031		W1	Green	Bathroom Door	M		-0.0	031	0.0
032	Hand rail on wall outside of B-37	W4	Black	Rail	M		0.6	032	0.6
033	BD - Elevator Door near B17	W4	Blue	Door	M		-0.2	033	-0.2
034	CD - Crews Passage adj. to Stewards Stores	W2	Green	Wall	M		-0.1	034	-0.1
035		W4	Green	Wall	SR		0.1	035	0.1
036		W3	Green	Door	M		0.4	036	0.4
037		Ceiling	W	Ceiling	SR		-0.0	037	0.0
038		Rr W2	Black	railing	M		0.0	038	0.0
039	↓	W1	Blue	Door ctrl. Panel	M		-0.1	039	-0.1
040	CD-SR C4	W1	Green	Wall	SR		0.2	040	0.2

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
041	CD - SR C-4	W3	Green	Wall	SR	NI	-0.1	041	-0.1
042		partition wall W3	Green	pipe	M		-0.0	042	0.0
043		W4	Grey	window casing	M		-0.2	043	-0.2
044		W2	Grey	Door	M		-0.0	044	0.0
045	CD-SR C-4 Bathroom	W3	OW	Wall	M		-0.2	045	-0.2
046		ceiling	W	I beam	M		-0.1	046	-0.1
047	CD Hall outside SR-C4	W2	Yellow	Shore power elect. box	M		2.4	047	2.4
048	CD-Stairwell adj to SR-C2	W1	Orange	Railing	M		1.6	048	1.6
049		W1	W	Wall	M		-0.0	049	0.0
050		ceiling	W	pipe	fiberglass		-0.1	050	-0.1
051	CD-N/S Corridor E side near C9	floor	Green	floor	M		-0.6	051	0.6
052		W2	Green	Wall	M		-0.2	052	-0.2
053		W4	Green	cables	M		3.9	053	3.9
054		W4	Blue	door	M		0.0	054	0.0
055		W4	Blue	cable Panel	M		-0.1	055	-0.1
056	CD-SR-C11	W1	Green	Wall	SR		0.3	056	0.3
057		W3	Green	Wall	SR		0.0	057	0.0
058		W3	Green	Pipe	M		0.2	058	0.2
059		W4	Green	window sill	M		-0.2	059	-0.2
060		Ceiling	W	ceiling	SR		-0.0	060	0.0

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS		TEST NO./RESULT(mg/cm2)	
061	CD-Mach. Load. Passage adj to C-11	W1	Green	Wall	M	NI		0.4	061	0.4
062		W3	Green	Wall	M			0.0	062	0.0
063		floor	Red	floor	M			3.4	063	3.4
064		W1	Red	Wall base board	M			-0.1	064	-0.1
065		W2	Green	Side Port Door	M			0.1	065	0.1
066		ceiling	Green	ceiling	M			0.0	066	0.0
067		ceiling	Yellow	I beam	M			2.6	067	2.6
068		W3	Green	Pipe	M			-0.0	068	0.0
069		W3	Green	Pipe housing	M			0.1	069	0.1
070		ceiling	Green	I beam	M			2.7	070	2.7
071	CD - Machine Space	W2	Green	Elevator Shaft	M			8.1	071	8.1
072		W4	Green	Wall	M			-0.2	072	-0.2
073		floor	Red	floor	M			2.8	073	2.8
074		W4	Red	Duct	M			-0.2	074	0.2
075		W2	Orange	Duct	cal-mag			0.1	075	0.1
076		stairs	red	stair carriage	M			0.1	076	0.1
077		pipe	red	pipe duct	M			-0.0	077	0.0
078		ceiling	Green	I beam	M			0.1	078	0.1
079		~~B~~ W3	Green	Door	M			-0.1	079	-0.1
080		W4	Green	cable	M		same as shot 53	1.9	080	1.9

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
081	CD - Mach. Casing Gallery	W1	W	Wall	M	NI	-0.4	081	-0.4
082		W3	Green	Wall	M		0.0	082	0.0
083		W2	Green	door casing	M		-0.1	083	-0.1
084	CD - Passageway near C-22	W2	Green	Wall	M		-0.1	084	-0.1
085		W4	Green	Wall	M		-0.1	085	-0.1
086		Ceiling	W	ceiling	SR		-0.1	086	-0.1
087		W2	black	hand rail	M		-0.6	087	0.6
088	CD - SR C-20	W1	Green	Wall	SR		0.1	088	0.1
089		W3	Green	Wall	SR		0.2	089	0.2
090		W4	Green	window sill	M		-0.1	090	-0.1
091		ceiling	W	ceiling	SR		-0.1	091	-0.1
092		W1	Green	door	M		-0.1	092	-0.1
093	CD-SR C-20 Bathroom	W1	W	Wall	M		-0.2	093	-0.2
094	~~CD - SR~~	W2	W	pipe	fiber glass		-0.1	094	-0.1
095	CD - SR C-20	W2	Green	door casing	M		-0.1	095	-0.1
096	~~SR~~ CD-Service Sink Locker	W1	W	Wall	M		-0.1	096	-0.1
097		W1	~~Red~~ Grey	Shelf	M		-0.1	097	-0.1
098		W4	W	cable	M		3.6	098	3.6
099	CD - SR C-15	W1	Green	Wall	SR		-0.2	099	0.2
100	CD - SR	W3	Green	Wall	SR		0.1	100	0.1

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JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
101	CD - SR C-15	ceiling	W	ceiling	SR	NI	-0.2	101	-0.2
102		W2	Green	window casing	M		-0.0	102	0.0
103	CD - SR C-15 Bathroom	Wall	W	Wall	M		-0.1	103	-0.1
104		W4	W	pipe	fiber glass		-0.2	104	-0.2
105		ceiling	W	I beam	M		-0.1	105	-0.1
106		ceiling	W	ceiling deck	M		-0.1	106	-0.1
107		floor	W	baseboard tile	ceramic		-0.2	107	-0.2
108	CD N/S Passageway near C-21	W2	Green	Wall	M		-0.2	108	-0.2
109		W4	Green	Wall	M		-0.1	109	-0.1
110		W4	Green	door	M		-0.0	110	0.0
111		ceiling	W	ceiling	SR		-0.1	111	-0.1
112	CD-CO_2 Room	W1	tan	Wall	M		0.3	112	0.3
113		W3	tan	Wall	M		-0.1	113	-0.1
114		floor	red	floor	M		-0.2	114	-0.2
115		ceiling	tan	Pipe	M		0.2	115	0.2
116		W4	Green	door	M		-0.1	116	-0.1
117	CD-Main Laundry	W2	tan	wall	M		-0.0	117	0.0
118		ceiling	tan	duct	M		0.0	118	0.0
119		W4	Grey	washer	M		0.0	119	0.0
120		ceiling	W	I beam	M		-0.1	120	0.1

JOB# 05121

DATE: 4-6-05 -0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT (mg/cm2)
121	CD-Stores Loading Passage	Reactor	W	Wall	M	NI	-0.0	121	0.0
122	CD-Frozen Foods	floor	Black	floor	M		-0.3	122	-0.3
123	CD-Up Stairwell Adj to Frozen Foods	Stairs	Grey	stair casing	M		-0.1	123	-0.1
124		Stairs	Green	Stair tread	M		-0.1	124	-0.1
125		W2	Blue	wall	M		-0.0	125	0.0
126		railing	Black	hand rail	M		-0.0	126	0.0
127	DD-Machine Room P8	compressor	yellow	compress. DeLaval	M		7.1	127	7.1
128	P9	Turbine	Green	Turbine	M		1.6	128	1.6
129		Turbine	Red	Turbine	M		-0.1	129	-0.1
130		Floor	Red	floor	M		0.2	130	0.2
131		Group Ctrl	Blue	Box door	M		-0.2	131	-0.2
132		W4	Green	Wall	M		-0.2	132	-0.2
133		Group Ctrl.	Red	base	M		-0.3	133	0.3
134		Stairwell	Red	stair casing	M		-0.1	134	-0.1
135		valve	W	insulation	cal-mes		-0.2	135	-0.2
136		valve	Black	valve handel	M		0.1	136	0.1
137		Beam	Green	I beam	M		-0.1	137	-0.1
138		Generator	Peach	Generator	M		-0.0	138	0.0
139		Duct	Peach	Duct	M		-0.0	139	0.0
140		W3	Green	Wall	M		-0.0	140	0.0

JOB# 0512

DATE: 4-6-05 - 0759

JOB NAME: NS Savannah

ADDRESS: F James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT (mg/cm2)
141	DD-Machine Room	W2	Green	Wall	M	NI	-0.1	141	-0.1
142	14'D-Machine Room	W2	Black	Wall trim	M		-0.1	142	-0.1
143	P3	reactor vessle	yellow	vessle	M		0.0	143	0.0
144	P.10	hand rail	orange	rail	M		5.9	144	**5.9**
145		Pipe	W	Pipe	M		-0.0	145	0.0
146		reactor pipe	yellow	pipe	M		-0.1	146	-0.1
147		I-beam	Green	I-beam	M		-0.0	147	0.0
148		Pipe beneath floor	Red	pipe	M		0.4	148	0.4
149		Duct	Silver	~~Fiber glass~~ Duct	fiber glass		0.2	149	-0.2
150		Generator	Green	Generator	M		-0.1	150	-0.1
151	P-11	condensate tank	yellow	tank	M		3.8	151	**3.8**
152	14'D - Shaft Alley	~~Shaft alley~~ W3	Green	Wall	M		-0.1	152	-0.1
153		W3	Green	I-beam	M		-0.0	153	0.0
154		Shaft casing	yellow	shaft casing	M		-0.0	154	0.0
155		shaft housing	grey	shaft housing	M		-0.1	155	-0.1
156		hand rail	orange	rail	M		2.1	156	**2.1**
157	14'D-Machine Room	Pipe	yellow	pipe	M		2.2	157	**2.2**
158	DD-MR Control Room	W3	Green	Wall	M		0.1	158	0.1
159		control panel	Green	panel	M		-0.1	159	-0.1
160		W4 ~~control panel~~	Gray	panel	M		-0.0	160	0.0

JOB# 05121

DATE: 4-6-05 -0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
161	AD - Pursers Office	W2	tan	wall	wall	NI	-0.1	161	-0.1
162		W1	tan	wall	wall		0.0	162	0.0
163		W1	orange	door	M		1.0	163	**1.0**
164	CALIBRATION						Calibration on bare	164	**0.8**
165							metal surface w/	165	**1.0**
166							NIST Film	166	0.7
167	CALIBRATION						Calibration on bake	167	**1.1**
168							metal surface w/ NIST	168	**0.9**
169							Film - NIST SRM 2573 = 1.04	169	**1.0**
170	DD - Control Center	W3	Green	wall	M	NI	0.2	170	0.2
171		W3	Green	wires	M		2.3	171	**2.3**
172	DD - Work Shop Room	W2	Green	wall	M		-0.1	172	-0.1
173		W3	Green	wall	M		-0.2	173	-0.2
174		ceiling	Green	ceiling	M		0.2	174	0.2
175		support pole	Green	pole	M		0.0	175	0.0
176		floor	Green	floor	M		-0.2	176	-0.2
177		~~ceiling~~ W3	Green	wire	M		1.5	177	**1.5**
178	DD - Engine Spares Storage	ceiling	silver	I beam	M		-0.2	178	-0.2
179		W4	silver	wall	M		-0.0	179	0.0
180	DD MS-DA Equip. Rm Fire Station # 33A	W4	Red	wall	M		0.0	180	0.0

JOB# 05121

DATE: 4-6-05 -0759

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
181	DD-Engine Spares in Racks P13	W3	orange	wall	M	NI	2.5	181	**2.5**
182	DD-Chute Passage - W side	W4	red	chute	M		0.0	182	0.0
183	DD-Stores #1	W4	W	wall	M		0.0	183	0.0
184	DD-Bulk Stores	W1	W	wall	M		-0.0	184	0.0
185	DD-Stewards Dry Store Rm P14	W1	orange	wall	M		2.4	185	**2.4**
186	14' Flat - Chute Passage E side	W2	tan	wall	M		-0.1	186	-0.1
187		W2	tan	pipe	cal-mag		0.0	187	0.0
188		W2	tan	pipe hanger	M		0.2	188	0.2
189		W4	tan	Door	M		-0.1	189	-0.1
190		W4	tan	I beam	M		-0.1	190	-0.1
191	CALIBRATION						NIST Value=1.0	191	***0.9***
192								192	***0.9***
193								193	***0.9***
194									
195									
196									
197									
198									
199									
200									

JOB# 05121

DATE: 4-6-05 0759

Rob Schoennagel

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS NIST Value = 1.0	TEST NO.	RESULT (mg/cm2)
001	CALIBRATION							001	**1.0**
002								002	**0.8**
003								003	**0.9**
004	NS Savannah ~~[illegible]~~	Strbrd. ~~[illegible]~~	Red	Hull	M	NI	5.8	004	**5.8**
005		Strbrd.	W	lower Hull	M		0.4	005	0.4
006		Strbrd	W	upper ~~lower~~ Hull	M		0.4	006	0.4
007		Strbrd	Blue	upper Hull	M		0.1	007	0.1
008	CALIBRATION						Calibration on bare	008	**1.2**
009							metal using NIST	009	**0.9**
010							film - 60 sec. calibration	010	**0.8**
011	NS Savannah	Strbrd.	bare metal	upper Hull	M	NI	bare metal reading -0.0	011	0.0
012	Deck A ~~[illegible]~~	House Exterior	bare metal	WALL	M		bare metal reading - 0.1	012	-0.1
013	BD - Steering Gear Rm	corridor W1	W	WALL	M		NIST SRM 2573 = 1.04 - 0.0	013	0.0
014		corridor floor	Red	floor	M		0.1	014	0.1
015		corridor W3	Blue	door	M		- 0.1	015	-0.1
016		Motor	Silver	motor	M		- 0.2	016	-0.2
017		support	Red	support	M		-0.1	017	-0.1
018		steering gear	Yellow	pipe	M		0.2	018	0.2
019		W3	W	wall	M		- 0.2	019	-0.2
020	Bosun Stores	W3	W	wall	M		- 0.1	020	-0.1

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
021	Bosun Stores - BD	Ceiling	Red	Hatch	M	NI	0.1	021	0.1
022	BD - Stairwell to AD	~~[illegible]~~ W2	yellow	Wall	M	↓	3.0+	022	3.0
023	CD - Capt. Work Shop	W4 ~~[illegible]~~	tan	Wall	M	↓	0.2	023	0.2
024	CD - Capt. Workshop	W3	W	Wall	M	↓	-0.1	024	-0.1
025	BD - Stairwell to AD	~~Stairs~~ W3	Black	Wall under Stairwell	M	↓	- 0.0	025	0.0
026	Hold Deck - HP Stores Port	W1	Silver	Wall	M	↓	0.3	026	0.3
027	↓	Floor	Red	Floor	M	↓	-0.1	027	-0.1
028	CALIBRATION						Calibration on bare	028	1.1
029							metal using NIST	029	1.2
030							film SRM 2573: 1.04	030	1.1
031									
032									
033									
034									
035									
036									
037									
038									
039									
040									

JOB# 05121

DATE: 4-7-05 - 0817

Rob Schannagel

JOB NAME: NS Savannah

ADDRESS: Fort Eustis, VA

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO./RESULT(mg/cm2)	
001	CALIBRATION						NIST Value = 1.0	001	0.9
002								002	0.9
003								003	0.9
004		W3	Green	wall	M		-0.1	004	-0.1
005		W3	Blue	electric panel	M		-0.0	005	0.0
006		ceiling	Yellow	Duct	M		-0.1	006	-0.1
007		Platform	W	edge	M		-0.2	007	-0.2
008		Ceiling	Green	I Beam	M		-0.0	008	0.0
009		Reactor	tan	reactor wall	Insulation		8.2	009	8.2
010		Ceiling	Red	Duct	M		-0.1	010	-0.1
011		surge tank	yellow	insulation →	tank wall		-0.1	011	-0.1
012		Handrail	Orange	rail	M		1.0	012	1.0
013		Ladder	tan	side rail	M		-0.2	013	-0.2
014		W1	yellow	pipe	M		-0.1	014	-0.1
015		contain. vessle	tan	vessle top	M		-0.0	015	0.0
016		ceiling	green	ceiling deck	M		-0.1	016	-0.1
017	Level A	W2	green	wall	M		-0.0	017	0.0
018		ceiling	green	ceiling	M		-0.1	018	-0.1
019		floor	dark red	floor	M		-0.6	019	0.6
020		reactor	tan	reactor wall	M		0.3	020	0.3

JOB# 05121

DATE: 4-8-0827

JOB NAME: NS Savannah

ADDRESS: James River, Ft. Eustis

RMD LPA-1
FIELD FORM

TEST	ROOM	LOCATION	COLOR	COMPONENT	SUBSTRATE	CONDITION	COMMENTS	TEST NO.	RESULT(mg/cm2)
021	A Deck	reactor	tan	wall	insulation		79.9	021	>9.9
022	↓	W3	orange	dust	M		-0.1	022	-0.1
023	~~[illegible]~~ B Deck	W2	green	cable	M		1.0	023	1.0
024	C Deck	platform	yellow	platform	M		0.6	024	0.6
025	CALIBRATION						NIST Value=1.0	025	0.9
026								026	0.8
027								027	0.9
028									
029									
030									
031									
032									
033									
034									
035									
036									
037									
038									
039									
040									

JOB# 05121

DATE: 4-8-05 0827

Rob Schonnagel

AMA Analytical Services, Inc.

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	Aerosol Monitoring & Analysis, Inc	**Job Name:**	NS Savannah, James River	**Chain Of Custody:**	131706
Address:	PO Box 646, 1331 Ashton Road Hanover, Maryland 21076	**Job Location:**	Ft. Eustis, VA	**Date Submitted:**	4/11/2005
		Job Number:	05121	**Person Submitting:**	Patrick Dincher
		P.O. Number:	Not Provided	**Date Analyzed:**	4/12/2005
Attention:	Gary Urban			**Report Date:**	15-Apr-05 1st Revision

Summary of Atomic Absorption Analysis for Lead

Page 1 of 1

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Reporting Limit		Final Result		Comments
0531896	051210406 01P	Flame	Paint Chip	****	N/A	0.01	%Pb	3.2	%Pb	
0531897	051210406 02P	Flame	Paint Chip	****	N/A	0.01	%Pb	0.71	%Pb	
0531898	051210406 03P	Flame	Paint Chip	****	N/A	0.01	%Pb	0.034	%Pb	
0531899	051210406 04P	Flame	Paint Chip	****	N/A	0.01	%Pb	0.3	%Pb	
0531900	051210406 05P	Flame	Paint Chip	****	N/A	0.01	%Pb	3.9	%Pb	

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B
Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids : EPA 600/R-93/200(M)-7421; Water:

See QC Summary for analytical results of quality control samples associated with these samples.

N/A = Not Applicable mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)
%Pb = percent lead by weight ug = micrograms ug/L = parts per billion
Note: All samples were received in good condition unless otherwise noted.
Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results

Analyst: Julie Joseph

Technical Manager: G Edward Carney

Received Time Apr. 15. 2:58PM

Lead Paint Sampling Survey Sheet

Date Collected: April 6, 2005
Job Number: 05121
Job Site: NS Savannah

Address: James River Reserve Fleet, Fort Eustis, VA
Contact Person: Gary Urban / Brent Williams

Company: AMA / ERM
Telephone No.: (410) 684 - 3327
Samples Taken By: Rob Schoennagel
Chain of Custody #: 131706

Sample Number	Paint Color	Location	Component	Substrate	Condition of the Material	Results	Photo	Comments
05121 0406 01P	Red/ Orange	Deck A - Corridor outside of State Room	Wall 4	Metal	☐ Good ☒ Fair ☐ Poor		☐ Yes # ___ ☒ No	
05121 0406 02P	White	Navigation Bridge Deck outside of Pilot House	Exterior wall of Pilot House	Metal	☐ Good ☐ Fair ☒ Poor		☐ Yes # ___ ☐ No	
05121 0406 03P	White	Wall 1 of Veranda - Promenade Deck	Wall 1	Metal	☐ Good ☐ Fair ☒ Poor		☐ Yes # ___ ☐ No	
05121 0406 04P	Blue	B Deck - Cent. Mess Room	Wall 3	Metal	☐ Good ☐ Fair ☒ Poor		☐ Yes # ___ ☐ No	
05121 0406 05P	Red	B Deck - Cargo Hold #4	Floor	Metal	☐ Good ☒ Fair ☐ Poor		☐ Yes # ___ ☐ No	
					☐ Good ☐ Fair ☐ Poor		☐ Yes # ___ ☐ No	

AMA Analytical Services, Inc.
AIHA (#8863) NVLAP (#1143) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706
(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643
www.amalab.com

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) 131706

Mailing/Billing Information:
1. Client Name: AMA
2. Address 1: 1331 Ashton Road
3. Address 2: Hanover MD 21076
4. Address 3:
5. Phone #: 410 684 3327 Fax #: 410 684 3384

Submittal Information:
1. Job Name: NS Savannah James River
2. Job Location: Ft. Eustis VA
3. Job #: 05121 P.O. #: N/A
4. Contact Person: Gary Urban @ phone # 410 684 3327
5. Submitted by: Patrick Dishnev Signature:

Reporting Information (Results will be provided as soon as technically feasible):
Date & Time Results Required: 4 / 13 / 05 @ 1050 ☐ Immd. ☐ 24hr ☒ 48hr ☐ 72hr ☐ 5 Day + ☐ Immd. After-Hours* ☐ 24hr After-Hours* ☐ Late-Night* (*must be pre-scheduled)
☐ Verbals: ______ @ cell # ______ ☒ Fax Copy: Gary Urban @ fax # 410 684 3384 ☐ Email Copy: ______ @ ______

Asbestos Analysis
PCM Air – Please Indicate Filter Type:
PC MCE Porosity ___ in a 25mm 37mm
☐ NIOSH 7400 ___ (QTY)
☐ Fiberglass ___ (QTY)
TEM Air – Please Indicate Filter Type:
PC MCE Porosity ___ in a 25mm 37mm
☐ AHERA ___ (QTY)
☐ NIOSH 7402 ___ (QTY)
☐ Other (specify ___) ___ (QTY)
PLM Bulk
☐ EPA 600 – Visual Estimate ___ (QTY)
☐ EPA Point Count ___ (QTY)
☐ NY State Friable ___ (QTY)
☐ Grav. Reduction ELAP 198.1 ___ (QTY)
☐ Other (specify ___) ___ (QTY)

TEM Bulk
☐ ELAP 198.4/Chatfield ___ (QTY)
☐ NY State PLM/TEM ___ (QTY)
☐ Residual Ash ___ (QTY)
TEM Dust
☐ Qual. (pres/abs) Vacuum/Dust ___ (QTY)
☐ Quan. (s/area) Vacuum D5755-95 ___ (QTY)
☐ Quan. (s/area)Dust D6480-99 ___ (QTY)
TEM Water
☐ Qual. (pres/abs) ___ (QTY)
☐ ELAP 198.2/EPA 100.2 ___ (QTY)
☐ EPA 100.1 ___ (QTY)

Lead Analysis
☒ Paint Chip 5 (QTY)
☐ Dust Wipe (wipe type ___) ___ (QTY)
☐ Air ___ (QTY)
☐ Soil/Solid ___ (QTY)
☐ TCLP ___ (QTY)
☐ Drinking Water ___ (QTY)
☐ Waste Water ___ (QTY)
☐ Dust Wipe Furnace (wipe type ___) ___ (QTY)

Miscellaneous Analysis
☐ Radon ___ (QTY)
☐ Other (specify ___) ___ (QTY)

SAMPLE ANALYSIS INFORMATION

CLIENT ID NUMBER	SAMPLE LOCATION	DATE	VOLUME (LITERS)	WIPE AREA	TEM	PCM	PLM	LEAD	OTHER	AIR	BULK	WIPE	WATER AND OTHER
0512104060 1 P	Ft. Eustis VA	4-6-05						✓			✓		
thru													
05121040605 P													

NO OTHERS

CLIENT CONTACT (LABORATORY STAFF ONLY)
Date/Time: Contact: By:
Date/Time: Contact: By:
Date/Time: Contact: By:

LABORATORY STAFF ONLY: (CUSTODY)
1. Date/Time RCVD: 4 / 11 / 05 @ 1030 Via: FedEx By (Print): Daniel Nadeems Sign:
2. Date/Time Analyzed: ___ / ___ / ___ @ ___ By (Print): ___ Sign: ___
3. Results Reported To: ___ Via: ___ Date: ___ / ___ / ___ Time: ___ Initials: ___
4. Comments: ___

AMA Analytical Services, Inc.
A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	Environmental Resource Management, Inc.	**Job Name:**	NS Savannah	**Chain Of Custody:**	127633
Address:	200 Harry S. Truman Drive, Suite 400	**Job Location:**	Fort Eustis, VA	**Date Submitted:**	4/29/2005
	Annapolis, Maryland 21401	**Job Number:**	0028178	**Person Submitting:**	Brent Williams
		P.O. Number:	Not Provided	**Date Analyzed:**	4/29/2005
				Report Date:	29-Apr-05

Attention: Jeff Flanzenbaum

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft^2)	Reporting Limit	Final Result	Comments
0535026	RC-Pressure	Flame	Paint Chip	****	N/A	0.01 %Pb	0.23 %Pb	
0535027	RC - Cooling Tanks	Flame	Paint Chip	****	N/A	0.01 %Pb	0.95 %Pb	
0535028	RC - Reactor	Flame	Paint Chip	****	N/A	0.01 %Pb	4.9 %Pb	
0535029	RC - Second Cont.	Flame	Paint Chip	****	N/A	0.01 %Pb	0.64 %Pb	

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids : EPA 600/R-93/200(M)-7421; Water: SM-3113B

See QC Summary for analytical results of quality control samples associated with these samples.

N/A = Not Applicable mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)

%Pb = percent lead by weight ug = micrograms ug/L = parts per billion (ppb)

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

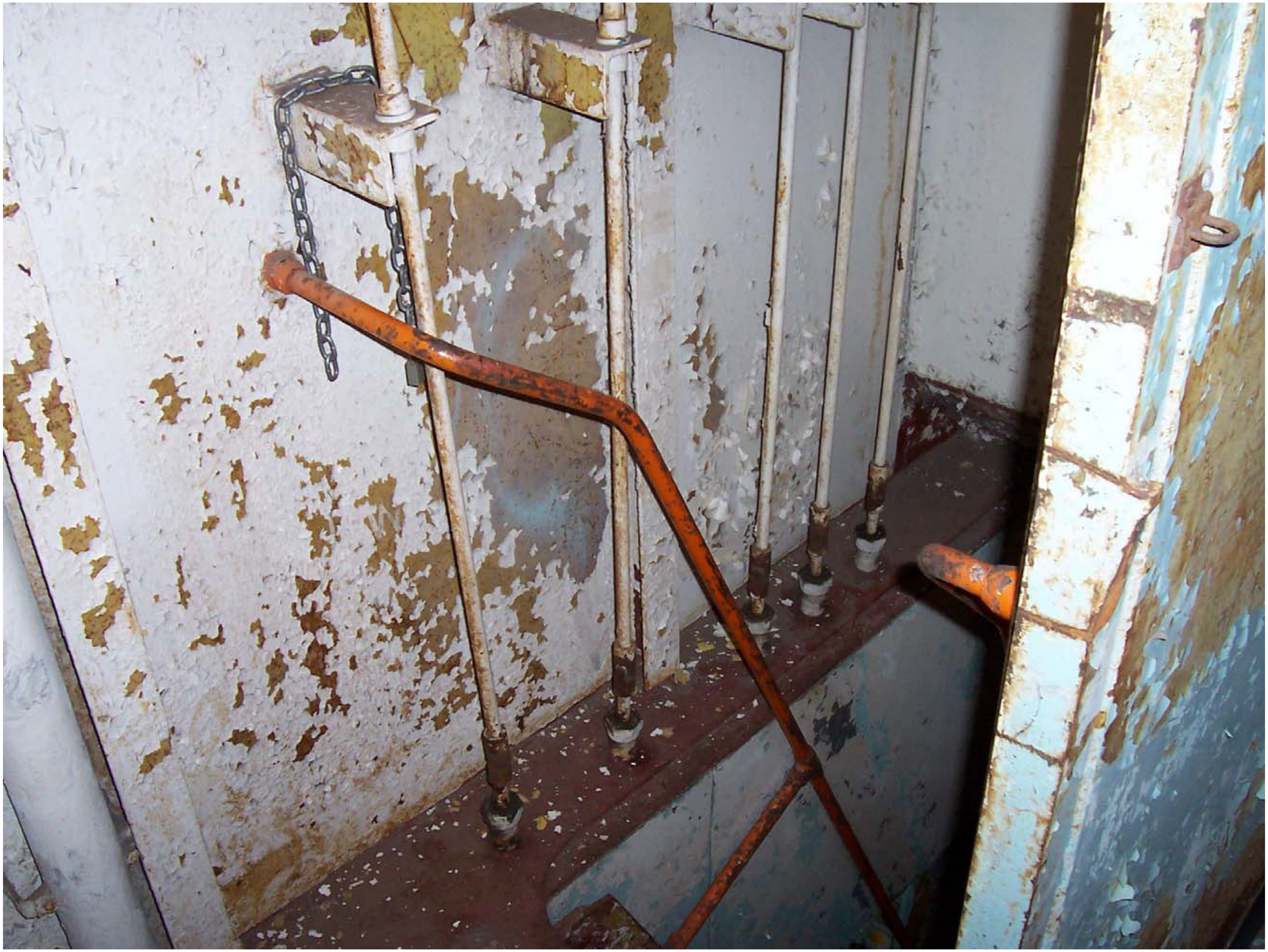
Air and Wipe results are not corrected for any blank results

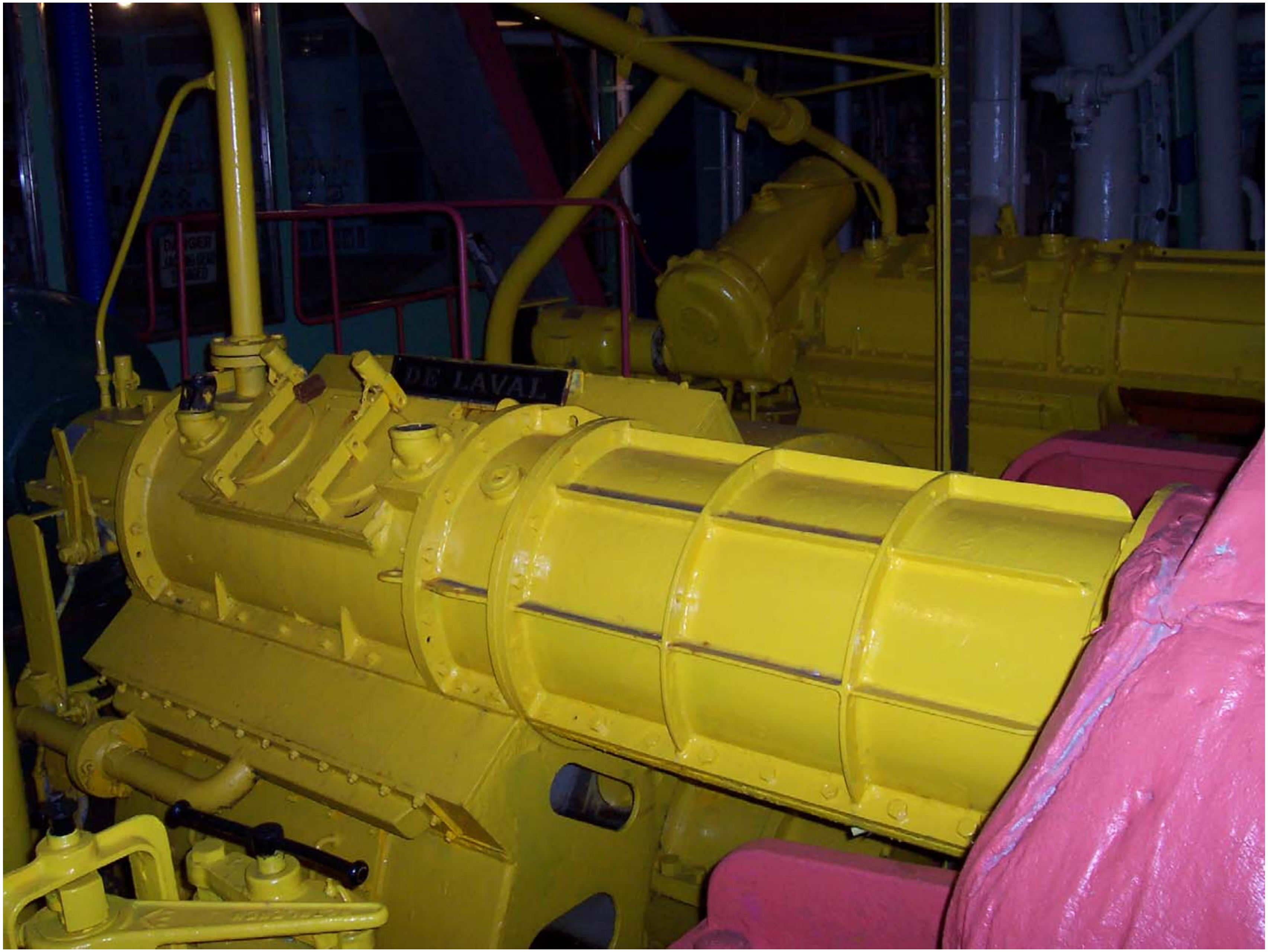
Analyst: Daniel P. Swanson **Technical Manager:** G Edward Carney

Appendix N
Lead-Based Paint Survey Photo Log


SHIP PERSONNEL ONLY
CREW AREA


INST
A
UNIVE
D.W.(P)
#4




DE LAVAL


VENT
SUPPLY


CAUTION
RADIATION AREA
NAT.
EXHAUST

Appendix O
Radiological Spaces Liquid Survey Results

FROEHLING & ROBERTSON, INC

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CERTIFICATE OF ANALYSIS

May 17, 2005

LAB#: 0504550

CLIENT: ERM
200 Harry S. Truman Parkway, Suite 400
Annapolis MD, 21401
Brent Williams

PROJECT: NS Savannah
PROJECT NO.: 0028178
SAMPLED BY: Brent Williams
RECEIVED: 04/26/05

Results to follow.

Audrey Brubeck
Manager Analytical Laboratory Services

HEADQUARTERS: 3015 DUMBARTON ROAD ● BOX 27524 ● RICHMOND, VA 23261-7524
TELEPHONE (804) 264-2701 ● FAX (804) 264-1202 ● www.FandR.com

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CERTIFICATIONS: VIRGINIA DRINKING WATER - 00150
NORTH CAROLINA DENR - 432
SOUTH CAROLINA DHEC- 93010001 & 93010
MARYLAND DRINKING WATER - 279

SINCE 1881

Lab ID: **0504550-01 (Water)**
Client ID: **Secondary Cont. Sump-2 (o)**
Sampled Date/Time: **4/25/05 10:25**

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
Metals								
Silver	BQL	0.02	mg/L	5/3/05 10:00	5/4/05 18:37	SW846/6010	TG	
Arsenic	BQL	0.01	"	5/3/05 10:00	5/9/05 13:46	"	TG	
Barium	BQL	0.01	"	5/3/05 10:00	5/9/05 13:46	"	TG	
Cadmium	**0.02**	0.01	"	5/3/05 10:00	5/9/05 13:46	"	TG	
Chromium	**0.3**	0.01	"	5/3/05 10:00	5/9/05 13:46	"	TG	
Mercury	**0.00027**	0.0002	"	5/3/05 10:01	5/3/05 16:23	SW846/7470 A	JLW	
Lead	**0.5**	0.01	"	5/3/05 10:00	5/9/05 13:46	SW846/6010	TG	
Selenium	BQL	0.01	"	5/3/05 10:00	5/9/05 13:46	"	TG	
Semivolatile Organic Compounds								
Acenaphthene	BQL	28	µg/L	4/27/05 15:00	5/13/05 20:02	SW846/8270C	JHV	
Acenaphthylene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Aniline	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Anthracene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Benzo(a)anthracene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Benzo(b)fluoranthene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Benzo(k)fluoranthene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Benzo(g,h,i)perylene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Benzo(a)pyrene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Bis(2-chloroethoxy)methane	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Bis(2-chloroethyl)ether	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Bis(2-chloroisopropyl)ether	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Bromophenylphenylether	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Bis(2-ethylhexyl)phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Butyl benzyl phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Chloroaniline	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Chloro-3-methylphenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Chloronaphthalene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Chlorophenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Chlorophenylphenylether	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Chrysene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Dibenz(a,h)anthracene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Dibenzofuran	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Di-n-butyl phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	

SINCE 1881

Lab ID: 0504550-01 (Water)
Client ID: Secondary Cont. Sump-2 (o)
Sampled Date/Time: 4/25/05 10:25

Semivolatile Organic Compounds

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
1,2-Dichlorobenzene	BQL	28	µg/L	4/27/05 15:00	5/13/05 20:02	SW846/8270C	JHV	
1,3-Dichlorobenzene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
1,4-Dichlorobenzene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
3,3'-Dichlorobenzidine	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4-Dichlorophenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Diethyl phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4-Dimethylphenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Dimethyl phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4,6-Dinitro-2-methylphenol	BQL	111	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4-Dinitrophenol	BQL	111	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4-Dinitrotoluene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,6-Dinitrotoluene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Di-n-octyl phthalate	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Fluoranthene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Fluorene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Hexachlorobenzene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Hexachlorobutadiene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Hexachlorocyclopentadiene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Hexachloroethane	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Indeno(1,2,3-cd)pyrene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Isophorone	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Methylnaphthalene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Methylphenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Methylphenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Napthalene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Nitroaniline	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
3-Nitroaniline	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Nitroaniline	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Nitrobenzene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2-Nitrophenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
4-Nitrophenol	BQL	111	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
N-Nitrosodimethylamine	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
N-Nitrosodiphenylamine	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
N-Nitroso-di-n-propylamine	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	

SINCE 1881

Lab ID: 0504550-01 (Water)
Client ID: Secondary Cont. Sump-2 (o)
Sampled Date/Time: 4/25/05 10:25

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
Semivolatile Organic Compounds								
Pentachlorophenol	BQL	111	µg/L	4/27/05 15:00	5/13/05 20:02	SW846/8270C	JHV	
Phenanthrene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Phenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Pyrene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
1,2,4-Trichlorobenzene	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4,5-Trichlorophenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
2,4,6-Trichlorophenol	BQL	28	"	4/27/05 15:00	5/13/05 20:02	"	JHV	
Volatile Organic Compounds								
Benzene	BQL	5	µg/L	5/2/05 10:37	5/3/05 1:57	SW846/8260B	SS	
Bromobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Bromochloromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Bromodichloromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Bromoform	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Bromomethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
n-Butylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
sec-Butylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
tert-Butylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Carbon tetrachloride	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Chlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Chloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Chloroform	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Chloromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
2-Chlorotoluene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
4-Chlorotoluene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Dibromochloromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2-Dibromo-3-chloropropane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2-Dibromoethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Dibromomethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,3-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,4-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Dichlorodifluoromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1-Dichloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	

SINCE 1881

Lab ID: **0504550-01 (Water)**
Client ID: **Secondary Cont. Sump-2 (o)**
Sampled Date/Time: **4/25/05 10:25**

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
Volatile Organic Compounds								
1,2-Dichloroethane	BQL	5	µg/L	5/2/05 10:37	5/3/05 1:57	SW846/8260B	SS	
1,1-Dichloroethene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
cis-1,2-Dichloroethene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
trans-1,2-Dichloroethene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2-Dichloropropane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,3-Dichloropropane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
2,2-Dichloropropane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1-Dichloropropene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Ethylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Hexachlorobutadiene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Isopropylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
p-Isopropyltoluene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Methylene chloride	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Naphthalene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
n-Propylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Styrene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1,1,2-Tetrachloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1,2,2-Tetrachloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Tetrachloroethene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Toluene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2,3-Trichlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2,4-Trichlorobenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1,1-Trichloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,1,2-Trichloroethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Trichloroethene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Trichlorofluoromethane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2,3-Trichloropropane	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,2,4-Trimethylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
1,3,5-Trimethylbenzene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
Vinyl chloride	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	
m,p-Xylene	BQL	10	"	5/2/05 10:37	5/3/05 1:57	"	SS	
o-Xylene	BQL	5	"	5/2/05 10:37	5/3/05 1:57	"	SS	

SINCE 1881

Lab ID: 0504550-02 (Oil)
Client ID: Stabilizer hyd. oil
Sampled Date/Time: 4/25/05 13:15

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
PCBs - Polychlorinated Biphenyls								
Aroclor 1016	**28**	1	mg/kg	5/9/05 15:00	5/10/05 10:22	SW846/8082	CLA	
Aroclor 1221	BQL	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Aroclor 1232	BQL	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Aroclor 1242	BQL	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Aroclor 1248	BQL	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Aroclor 1254	BQL	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Aroclor 1260	**12**	1	"	5/9/05 15:00	5/10/05 10:22	"	CLA	
Subcontracted Analysis (Air, Water & Soil, Inc.)								
Total Halogens	**73**	10	mg/kg	5/5/05 0:00	5/5/05 0:00	SW846/9076	sub	

SINCE 1881

Lab ID: 0504550-03 (Oil)
Client ID: Stabilizer lube oil
Sampled Date/Time: 4/25/05 13:40

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
PCBs - Polychlorinated Biphenyls								
Aroclor 1016	BQL	1	mg/kg	5/9/05 15:00	5/10/05 10:49	SW846/8082	CLA	
Aroclor 1221	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Aroclor 1232	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Aroclor 1242	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Aroclor 1248	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Aroclor 1254	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Aroclor 1260	BQL	1	"	5/9/05 15:00	5/10/05 10:49	"	CLA	
Subcontracted Analysis (Air, Water & Soil, Inc.)								
Total Halogens	BQL	10	mg/kg	5/5/05 0:00	5/5/05 0:00	SW846/9076	sub	

SINCE 1881

Lab ID: 0504550-04 (Water)
Client ID: Trip Blank
Sampled Date/Time: 4/25/05 0:00

Volatile Organic Compounds

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
Benzene	BQL	5	µg/L	5/2/05 10:37	5/2/05 19:48	SW846/8260B	SS	
Bromobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Bromochloromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Bromodichloromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Bromoform	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Bromomethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
n-Butylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
sec-Butylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
tert-Butylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Carbon tetrachloride	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Chlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Chloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Chloroform	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Chloromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
2-Chlorotoluene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
4-Chlorotoluene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Dibromochloromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2-Dibromo-3-chloropropane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2-Dibromoethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Dibromomethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,3-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Dichlorodifluoromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,4-Dichlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1-Dichloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2-Dichloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1-Dichloroethene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
cis-1,2-Dichloroethene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
trans-1,2-Dichloroethene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2-Dichloropropane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,3-Dichloropropane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
2,2-Dichloropropane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1-Dichloropropene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Ethylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	

SINCE 1881

Lab ID: 0504550-04 (Water)
Client ID: Trip Blank
Sampled Date/Time: 4/25/05 0:00

Analyte	Result	Quant Limit	Units	Prepared	Analyzed	Method	Analyst	Notes
Volatile Organic Compounds								
Hexachlorobutadiene	BQL	5	µg/L	5/2/05 10:37	5/2/05 19:48	SW846/8260B	SS	
Isopropylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
p-Isopropyltoluene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Methylene chloride	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Naphthalene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
n-Propylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Styrene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1,1,2-Tetrachloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1,2,2-Tetrachloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Tetrachloroethene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Toluene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2,3-Trichlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2,4-Trichlorobenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1,1-Trichloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,1,2-Trichloroethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Trichloroethene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Trichlorofluoromethane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2,3-Trichloropropane	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,2,4-Trimethylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
1,3,5-Trimethylbenzene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
Vinyl chloride	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	
m,p-Xylene	BQL	10	"	5/2/05 10:37	5/2/05 19:48	"	SS	
o-Xylene	BQL	5	"	5/2/05 10:37	5/2/05 19:48	"	SS	

Notes and Definitions

\# Does not pass acceptance criteria.

mg/L =	milligrams per Liter	mg/kg =	milligrams per kilogram	su =	standard units
µg/L =	micrograms per Liter	ppm =	parts per million	NTU =	Nephelometric Turbidity Units
pCi/L =	picocuries per Liter	CFU/mL =	Colony forming units per milliliter	MPN/100mL =	Most Probable Number per 100 milliliters
BQL =	Below the Quantitation Limit				

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CERTIFICATE OF ANALYSIS

May 17, 2005

LAB#: 0504527

CLIENT: ERM
200 Harry S. Truman Parkway, Suite 400
Annapolis MD, 21401
Brent Williams

PROJECT: NS Savannah
PROJECT NO.: 0028178
SAMPLED BY: Brent Williams
RECEIVED: 04/23/05

PARAMETER	PREP DATE/TIME	ANALYSIS DATE/TIME		METHOD	ANALYST
PCBs	5/9/05 15:00	5/10/05 9:29	5/14/05 12:35	SW846/8082	CLA
Total Halogens	4/27/05 9:30	4/27/05 9:30		SW846/9076	sub

					Quant	
LAB #	0504527-01	0504527-02	-	-		
SAMPLE ID	sec.cont. sump (0)	Pri. contain (0)	-	-		
DATE/TIME	04/15/05	04/15/05	-	-		
MATRIX	Oil	Oil	-	-	**Limit:**	**Units**
PCBs - Polychlorinated Biphenyls (Oil)						
Aroclor 1016	**76**	**1180**	-	-	1	mg/kg
Aroclor 1221	<1	<1	-	-	1	mg/kg
Aroclor 1232	<1	<1	-	-	1	mg/kg
Aroclor 1242	<1	<1	-	-	1	mg/kg
Aroclor 1248	<1	<1	-	-	1	mg/kg
Aroclor 1254	<1	<1	-	-	1	mg/kg
Aroclor 1260	**197**	**430**	-	-	1	mg/kg
Subcontracted Analysis (Primary Laboratories, Inc.) (Oil)						
Total Halogens	**107**	**242**	-	-	10	mg/kg

Notes and Definitions

mg/L = milligrams per Liter
µg/L = micrograms per Liter
BQL = Below the Quantitation Limit
mg/kg = milligrams per kilogram
ppm = parts per million
CFU/mL = Colony forming units per milliliter
su = standard units
NTU = Nephelometric Turbidity Units
MPN/100 mL = Most Probable Number per 100 milliliters

Audrey Brubeck
Manager Analytical Laboratory Services

APPENDIX P
SERAT REPORT

Radiological Sampling and Gamma Scans Aboard the N/S SAVANNAH
Conducted for the U.S. Maritime Administration
April 2005

Keith Welch, Erik Abkemeier, Zachary Edwards
Jefferson Lab, 12000 Jefferson Ave. Newport News, VA 23606

Background

Thomas Jefferson National Accelerator Facility (Jefferson Lab) has entered into an agreement with the U.S. Maritime Administration (MARAD) to provide support for the Savannah Emergency Response Assessment Team (SERAT) efforts related to N/S SAVANNAH in the event of an incident that might have radiological implications (Reimbursable Agreement #MA-5-A04, to fund Work for Others Project SURA 2004W007). The lab's role is advisory, related to the health physics concerns associated with initial response activities in the event of an emergency.

Commensurate with its role of health physics support for SERAT efforts, Jefferson Lab conducted a series of measurements to confirm the primary nuclides of concern remaining in the reactor systems of the N/S SAVANNAH. This report details the findings of the measurements.

Acknowledgements

Jefferson Lab was afforded access to the primary plant areas of Savannah in conjunction with work being conducted by WPI. WPI performed radiological and environmental assessments aboard N/S SAVANNAH which required opening all reactor-related spaces. The assessment included a breach of the primary reactor cooling water system, in which samples were taken by WPI. WPI provided various samples to Jefferson Lab for analysis. Jefferson Lab acknowledges the kind assistance of WPI in obtaining data for this report.

Introduction

The purpose of conducting the measurements described in this report is to obtain a measurement-based estimate of the quantity and distribution of radionuclides in reactor primary systems aboard the N/S SAVANNAH. The specific focus of this assessment is radioactivity in residual liquids and transferable contamination that may be subject to a spill or spread in the event of damage to the ship or flooding of compartments containing reactor systems. In the event of an emergency, knowledge of the reactor plant nuclide inventory is important in facilitating emergency response efforts in which Jefferson Lab may be involved. Previous calculations have been conducted to estimate volumetric nuclide content in the reactor vessel(1). This report does not address volumetric activation (neutron induced activity), but rather the distribution of internal surface contamination and contaminated liquids within piping and components of the primary system. The quantity of radioactivity deposited in the system as contamination is very small compared to the total activity in reactor vessel components.

Internal surface contamination content has been estimated previously, but the present assessment effort provided a rare opportunity to reevaluate radioactivity estimates based on a combination of measurement methods.

General Approach

Two methods were used to assess the residual radioactivity in the reactor systems. One method was to analyze samples from within the primary system. The second method was by direct scans with portable gamma spectroscopy equipment.

Samples (smears and liquid) taken from the primary system and within the reactor containment were quantitatively analyzed by high-resolution gamma spectroscopy at the Jefferson Lab Radiation Control Group (RCG) radioanalytical lab for presence and amounts of gamma-emitting radionuclides.

The direct gamma scan survey is qualitative in nature, its goal being to gather “snapshots” of the radiation field around various system components to further enhance the understanding of primary system nuclide content.

Equipment and Measurement Techniques

Measurements of sample media were made with a Canberra Industries ultrahigh-purity, coaxial germanium detector (relative efficiency, ~20%) with associated NIM electronics, operated via the Canberra Genie® software package. The system is energy- and efficiency-calibrated for a number of sample geometries annually and receives daily quality assurance checks according to Jefferson Lab RCG procedures. Jefferson Lab also participates in the U.S. Department of Energy Mixed Analyte Performance Evaluation Program (MAPEP) for measurement quality assurance.

Onboard gamma spectra were collected primarily with a Berkeley Nucleonics Corporation Model SAM-935® portable surveillance and measurement system, consisting of a 3 x 3 NaI(Tl) detector coupled to the base unit electronics. The collected spectra can be analyzed with built-in software or uploaded to a PC for analysis using third-party software. A few spectra were also collected with a portable high-resolution germanium detector coupled to a Canberra Inspector® electronics package and analyzed using the Genie® software. This system proved to be difficult to manage in the shipboard environment due to its bulkiness and required a lengthy stabilization period each time the detector was shut down for movement and subsequently restarted.

Energy calibration of the SAM-935 is initially conducted by the factory using a multinuclide source. The calibration coefficients are stored in the firmware of the instrument. Field adjustment/drift correction of the energy calibration is done with an automated calibration routine using a small Cs-137 check source. This routine can be conducted repeatedly at the user's discretion. In addition, to enhance the accuracy the field measurements, some spectra were collected with reference sources present. The reference sources provided gamma rays of known energy, which can be used for a posteriori energy calibration corrections.

Nuclide identification from the SAM spectra was conducted using on-board analysis routines. Some of the spectra were also analyzed using a third-party program, PGT Quantum® gamma analysis software. This was done to conduct manual energy calibration corrections that allowed better photopeak identification when a peak could not be confidently identified by the SAM. Quantum also contains a superior nuclide library.

Energy calibration of the portable high-resolution system was initially conducted at Jefferson Lab, with manual fine adjustments made in the field using reference peaks from small sources and known nuclides in the sampled spectrum.

Scope and Limitations

The direct survey is limited to those nuclides which decay with gamma emissions between approximately 30 keV and 3 MeV. Locations for measurement were chosen with the intent to monitor a reasonable cross-section of systems that contain radioactivity. Consideration had to be given to ambient radiation intensity such that the monitoring system could acquire spectra without encountering detector saturation problems (ambient radiation fields above about 1 mR/hour cause significant detector dead-time), as well as the physical constraints of manipulating the detector and associated equipment within the spaces aboard the ship and protecting the equipment from potential radioactive contamination. Several locations within and outside the primary containment were monitored. Since these measurements were made in a “general area” radiation field involving complex source geometries, quantitative results regarding the concentration of radioactive material are not possible. However, gamma energy peaks provide qualitative verification of the presence and distribution of the most predominant gamma-emitting nuclides.

A limitation inherent in all the area scans is that the spectra include contributions from all sources in the vicinity of the item being monitored. One cannot determine conclusively that the activity indicated is attributable exclusively to the item of interest. Another limitation in assessing the contents of components is the self-shielding of the radiation by the components themselves.

Analysis of samples from the primary system provides the best opportunity to determine what nuclides might be present in the event of a spill from the system. The gamma analysis system used for sample counting has a functional energy range of about 5–2000 keV. Detector response extends below 5 keV (making detection of Fe-55 possible in principle), but sample configuration and self-shielding probably prevent detection of photons below about 5–7 keV.

One goal of the WPI assessment team was to investigate the existence and quantity of water in the primary system beyond the reactor vessel. Steam generator hot-leg access was performed for this purpose. It was discovered that a significant quantity of water was present in the generators and lower hot-leg piping. Smear and water samples were obtained from inside the steam generators. An estimate of the total contamination inventory is made based on samples from the starboard steam generator. Also analyzed were smear samples from the primary containment enclosure that showed positive results during gross alpha/beta counting.

General Findings

Co-60 was expected to be the most widespread nuclide in the primary system due to the radiological decay characteristics of the isotopes involved. This expectation was confirmed in the measurements taken. All the area monitoring spectra taken around primary systems indicated Co-60 activity. Most monitored locations also indicated the presence of Cs-137 (this may have some practical implications, as is discussed below). A photopeak present in some of the spectra at approximately 75 keV is attributed to lead fluorescence X-rays (K_α—72.8 keV, K_β—74.9 keV), as significant quantities of lead shielding are present around the reactor vessel and in other monitored areas.

The WPI assessment team found very little surface contamination external to primary system piping and components. A few smear samples from reactor spaces showed a combination of Co-60 and Cs-137. In one case, only Cs-137 was present. This is reasonable given the low activity in that area and the ratio of Cs-137 to Co-60 on the other smears (see detailed findings). It might also be surmised that the presence of the contamination is due to past spills of system coolant or ion exchange media, rather than the dry release of crud from piping internals. This deduction is discussed further below.

Detailed Findings

Samples from inside the primary system showed the following characteristics. The steam generator water sample contained Cs-137 almost exclusively (Cs-137 concentration was about 1000 times greater than that of Co-60), but contamination on interior surfaces of the steam generator was found to contain only Co-60. This is undoubtedly a result of the chemical form of the contaminants. Co-60 is usually found as an insoluble oxide and tends to deposit on surfaces of reactor systems (forming the common “crud” deposits found in all reactors), whereas Cs-137 is present as a very soluble oxide or hydroxide.

A spill of the coolant would be likely to spread both Co-60 and Cs-137, as the Co-60 is easily removable and would be flushed from surfaces by any significant movement of the water (hence the speculation above that contamination on surfaces in the reactor compartment may be the result of past liquid (or ion exchange media) spills). A spill to the environment (i.e., into the James River) would probably behave similarly with respect to the distribution of these nuclides. The Cs-137 would likely remain dissolved in the river water, whereas insoluble components would eventually find their way into sediment.

The tables below summarize the area monitoring and sample analysis results. The area scans performed with the SAM 935 contain exposure rate estimates associated with the identified nuclides. This is a calculation made by the SAM using an algorithm that converts counts in a photopeak to an energy-corrected exposure rate. The exposure rate indication provides a reasonably accurate relative intensity measurement.

Table 1. Area Monitoring Results

Scan ref. #	Location	Component or system	Nuclides and exposure rate (μR/h)		Cs-137/ Co-60 exp. rate ratio	Notes
M1	Hold Deck, Port passageway	4" piping below deck level	Cs-137	0.95	0.03	
			Co-60	30		
M2	Hold Deck Port passageway	Aft end of passage, effluent piping under deck	Cs-137	0.08	0.05	
			Co-60	1.6		
M3	Hold Deck Port passageway between port charge pumps aft	Small-diameter pipe behind cage chg. pmp. buffer seal system	Cs-137	1.4	0.24	
			Co-60	5.9		
M4	Port Stabilizer Room	6" piping from charging pump buffer seal system	Cs-137	12.1	0.56	1
			Co-60	21.6		
M5	Primary Containment upper level	Primary coolant line interface to reactor vessel forward	Co-60	581	N/A	
M6	Primary Containment upper level	Primary coolant line interface to reactor vessel aft	Co-60	564	N/A	

Scan ref. #	Location	Component or system	Nuclides and exposure rate (μR/h)		Cs-137/ Co-60 exp. rate ratio	Notes
M7	Primary Containment upper level	Upper pressurizer head, port	Co-60	183	N/A	
M8	Primary Containment upper level	Forward upper regen./nonregen. heat exchanger	Cs-137	6	0.025	
			Co-60	242		
			Co-60	137		
M9	Primary Containment 2nd level	Crossover line from upper to lower regen./nonregen. heat exchanger	Cs-137	8.5	0.062	
M10	Primary Containment 3rd level	Main pressurizer leg to primary coolant line, just under pressurizer.	Cs-137	6.8	0.044	
			Co-60	156		
M11	Primary Containment 4th level	Check valve adjacent to forward primary coolant line near vessel	Cs-137	19	0.053	
			Co-60	360		
M12	Primary Containment 4th level	Reactor vessel (shield tank wall) forward, just starboard of center	Cs-137	11	0.023	
			Co-60	479		
M13	Primary Containment 1st level	Rx ventilation plenum duct, starboard	Cs-137	18	0.21	2
			Co-60	84.5		
M14	Cold Chem Lab upper level	Rx ventilation duct	Cs-137	0.043	0.17	2
			Co-60	0.25		
M15	Cold Chem Lab lower level	Primary sample sink, sample bulb inside sink hood	Cs-137	3.6	0.015	
			Co-60	242		
M16	Port Charge Pump Room	Between pumps at aft bulkhead	Cs-137	--	0.096	3
			Co-60	--		

1. Exposure rates estimated.
2. Measurement on ventilation ducts.
3. Measured with high-resolution Ge detector. Ratio taken from peak area data.

Table 2. Sample Analysis Results

Ref #	Location/Component	Sample Type	Nuclides	Activity
S1	Starboard steam generator tube sheet	Smear	Co-60	144,300 dpm/ 100 cm^2
S2	Starboard steam generator interior (average)[1]	Smear	Co-60	22,000 dpm/ 100 cm^2
W1	Starboard steam generator water	100 mL water	Cs-137	1.04E-3 µCi/ml
			Co-60	1.45E-6 µCi/ml
S3	Reactor 3rd level forward at pressurizer (highest)[2]	Smear	Cs-137	1200 dpm/100 cm^2
			Co-60	250 dpm/100 cm^2
S4	Reactor 1st level forward Rx head (average)[3]	Smear	Cs-137	350 dpm/100 cm^2

[1] Average of four smears, excludes tube sheet.

[2] Composite count of six smears, all activity attributed to one smear.

[3] Composite count of five smears, activity averaged over the total.

Calculation of Total Contamination Inventory

The total contamination inventory for the primary system was estimated based on the sample data. The contamination inventory is broken into two parts: internal surface contamination and contamination entrained in residual coolant.

Surface Contamination

The surface contamination estimate begins with an assessment of the steam generator contamination content. Published industry data[(2)] indicate that in pressurized-water reactors (PWRs), the majority of coolant-borne corrosion/fission products that are not removed by the chemical volume and control system (CVCS) are deposited in the steam generators. For a *reference PWR**, the generators contain about 85% of the total deposited activation product inventory. The balance of the activity is distributed in various other components based on relative surface area and deposition characteristics of the system/component.

Steam generator activity content was estimated based on the highest contamination level found in the starboard generator. Assumptions for the calculation are as follows:

- The only nuclide of concern for surface contamination is Co-60.
- Smears were taken over a 100-cm^2 area.
- The removal factor for smears is assumed to be 0.1

Steam generator dimensional estimates:

- Tube diameter: 0.5 inches (1.27 cm)
- Average tube length: 30 feet (900 cm)
- Number of tubes: 2000
- Shell interior diameter: 100 cm
- Total plenum length: 100 cm

*The *Reference PWR* in the literature was the Trojan Nuclear Plant. Distribution of radioactivity in three other PWRs was evaluated and reported in Ref. 2. The percentage of radioactivity deposited in steam generators was similar in each case.

Tube surface area: $2\pi(0.635)(900)(2000) = 7.18E6\ cm^2$.

Total tube sheet area: $2[\pi(50)^2 - \pi(0.635)^2(2000)] = 1.06E4\ cm^2$.

Plenum area: $2\pi(50)(100) = 3.14E4\ cm^2$.

Internal surface area of one steam generator: $7.18E6 + 1.06E4 + 3.14E4 = 7.2E6\ cm^2$.

Total activity in one generator in curies is calculated as follows:

$$\frac{144{,}300\ \text{dpm} \times 7.2E6\ \text{cm}^2}{0.1 \times 100\ \text{cm}^2 \times 2.22E12} = 0.0468\ \text{Ci, or 93.6 mCi for both steam generators.}$$

Adjusting for reactor/steam generator surface area ratios and unit layout (2-loop vs. 4-loop), activity distribution assignments were made based on the reference PWR. Associated activity levels were calculated and are summarized in the following table.

Table 3. Total Surface Contamination Inventory

System	Activity distribution (%)	Total activity (Ci)
Reactor vessel and internals	5	0.0054*
Steam generators	87	0.0936
RCS[1] piping	3	0.0032
Non-RCS piping	2.3	0.0025
Pressurizer	0.2	0.0002
Other	2.5	0.0027
Totals	100	0.108

* Excludes volumetrically distributed activation products in the reactor vessel

[1] RCS = Reactor Cooling System (main cooling loops)

Contamination in Residual Coolant

Using visual indications from the steam generator coolant content, the estimated volume of water in the primary system is calculated below, with the associated total radioactivity.

Volume of generator primary side: $\pi(0.635)^2(900)(2000) + \pi(50)^2(100) = 3.1E6$ cc (mL).

In addition, a portion of the RCS hot and cold legs run horizontally into and out of the generator. The total length of this piping is estimated to be about 26 feet (780 cm) for each loop. The piping diameter is estimated at 18 inches (45 cm).

Volume of horizontal piping: $\pi(22.5)^2(780) = 1.2E6$ mL.

Total volume of contiguous horizontal coolant envelope (1 loop): $1.2E6 + 3.1E6 = 4.6E6$ mL.

The water level in the starboard generator was observed to be about halfway up the generator tube sheet; the port generator was reported to be about one-third full. For this estimate, both will be considered half full.

Total water volume in horizontal legs: $\frac{4.6E6}{2}(2) = 4.6E6$ mL (~1200 gal).

It has been estimated by others that about 1100 gallons of water resides in the lower reactor head. We estimate another 200 gallons is distributed around the balance of the reactor systems (this is based partly on the observation discussed below regarding location of liquid via the presence of Cs-137). This brings the total volume to 2500 gallons ($9.5E^6$ mL). Assuming the activity in the water is uniform through the plant and represented by the activity in the steam generator, the total activity is:

Cs-137—(1.04E-3 µCi/mL)(9.5E6 mL) = 9840 µCi.
Co-60—(1.45E-6 µCi/mL)(9.5E6 mL) = 14 µCi.

Additional Observations and Some Speculation

The observed distribution of Co-60 and Cs-137 might serve as an indicator of the presence of liquid within various systems and components. If the same physical separation of nuclides found in the steam generator is assumed to exist throughout the system, one could use the presence of Cs-137 in an area scan of primary piping as an indicator of liquid in the component in question. If only Co-60 is present, it may be an indication that the piping or component is internally dry or contains little liquid.

The results of the area scans taken qualitatively support this idea. For instance, no Cs-137 was seen in scans of the upper main coolant lines at their interface to the Reactor Vessel. By comparison, all the scans of the lower-level reactor compartment (containing the primary side of the steam generators and other low-point piping) show Cs-137. Although not conclusive, these data are is consistent with the hypothesis that dry piping contains little or no Cs-137 contamination. The ratio of Cs-137 to Co-60 activity was found to be highest near piping outside the primary containment in the lowest levels of the ship (e.g., piping in the Hold level, Stabilizer Room lower level, and Charge Pump Room). Table 1 includes these ratios for information purposes.

Several gamma scans were taken on reactor ventilation ductwork, both inside and outside the primary containment. In these scans, the ratio of Cs-137 to Co-60 is considerably higher than in primary piping. (It is difficult to state this conclusively since the source of the radiation in any given scan cannot be isolated to a particular component, but this limitation is inherent to all the scans.) Based on the characteristics of the contaminants, we surmise the following process. Soluble Cs-137 was preferentially released to the atmosphere (compared to Co-60) during plant operations via “weeping” of small primary system leaks. The dissolved cesium contamination was released as an aqueous vapor and distributed through the ventilation system, some of it being deposited within the system. No samples from within the ventilation system were analyzed to confirm the nuclide ratio.

Conclusions

Scans and samples confirmed that the primary nuclide deposited on surfaces in reactor systems aboard N/S SAVANNAH is Co-60. It is estimated that the total inventory of Co-60 in surface deposits is approximately 100 mCi. This figure is in reasonable agreement with previous estimates[(1)]. Cs-137 is the predominant nuclide present in residual water within the primary system. We estimate the presence of about 2500 gallons of water total within the primary system. The total waterborne Cs-137 content in the reactor system is estimated at about 10 mCi.

We believe that this represents the bulk of the potentially mobile nuclide inventory. This result supports the conclusion that even a worst-case incident aboard SAVANNAH, resulting in the loss of all the transferable contamination to the environment, would have no significant impact on the environment or on dose to the public. The conclusion is based on the results of the characterization program that indicates that the radiological consequences of a breech to the primary system would be insignificant. It is not a problem due to dilution. The water in the primary system needs to be disposed of before decommissioning.

References

1. "Nuclear Ship Savannah Reactor Vessel, Internals and Neutron Shield Tank Characterization and Classification Assessment," April 2004, prepared by R. J. Stouky, J. W. Bowen, R. Ranellone, for U.S. DOT (attached as Appendix 4).

2. "Potential Recycling of Scrap Metal From Nuclear Facilities," Appendix A, September 2001, R. Anigstein, et al., for U.S. EPA. Available at http://www.epa.gov/radiation/docs/cleanmetals/tsd/scrap_tsd_041802_apa1.pdf.

3. Materials from meeting presentation "NS Savannah Decommissioning Plans" for NRC, September 24, 2003.