# TECHNICAL EVALUATION REPORT
# Decommissioning Work Plan for the
# Surface Ship Support Barge Dismantlement and Disposal
# Docket No.: 99902091

**May 20, 2021**

# Contents

## 1. Introduction

The U.S. Navy's Surface Ship Support Barge (SSSB) is a non-powered vessel that was used to support nuclear-powered aircraft carrier reactor refueling. The function of the SSSB was to receive, hold, and prepare previously used reactor components designated for ship-out or reuse. The SSSB provided the ability to perform maintenance functions like those performed in a typical pressurized water reactor spent fuel pool, although the SSSB was not used for long-term spent fuel storage.

The SSSB was originally a portion of the World War II era T-2 tanker (SS *Cantigny*). *Cantigny* was constructed in 1945 by the Sun Shipbuilding Company in Chester, Pennsylvania. Some of the remainder of *Cantigny* was reused with a new and larger midsection and bow constructed by Burmeister and Wain of Copenhagen, Denmark. The rebuilt *Cantigny* was operated until it was scrapped in Spain in 1984.

The *Cantigny* mid-body section was converted to a nuclear support facility in 1964 by Newport News Shipbuilding and was originally referred to as the Prototype Waterborne Expended Fuel Container (PWEFC). The PWEFC was used in support of the first two CVN-65 (USS ENTERPRISE) refuelings. The PWEFC was extensively refurbished by Newport News Shipbuilding in the late 1980s. Much of the original hull and tank structure was replaced and new longitudinal bulkheads were installed. In 1990 the PWEFC was upgraded to provide an additional 50-years of service through repair and alteration. During the repair, the PWEFC was renamed the SSSB. Thus, the SSSB bears little resemblance to the original *Cantigny*.

In September 2019, the Nuclear Regulatory Commission (NRC) entered into an agreement with Naval Sea Systems Command (NAVSEA) to provide technical support to the Navy regarding the dismantlement and disposal of the SSSB consistent with NRC requirements. NAVSEA awarded a contract for completing decommissioning of the SSSB to APTIM Federal Services, LLC (APTIM) in 2020. On April 7, 2021, as supplemented on May 10, 2021 (NRC Agencywide Document Management System (ADAMS) Accession Nos. ML21097A263 and ML21130A576, respectively), APTIM has submitted a revised decommissioning work plan (DWP) for NAVSEA approval which, consistent with the terms of the interagency agreement, was evaluated by NRC staff.

In the DWP, APTIM proposes towing the SSSB from Virginia to the Alabama Shipyards in Mobile, AL for dismantlement and disposal. Approximately 85% of the SSSB is planned for disposal as low-level waste, and approximately 15% is planned to be released as non-radiologically contaminated material.

## 2. Regulatory Framework

The SSSB is not NRC licensed or regulated. It is regulated pursuant to the separate authority of Nuclear Reactors (which is a component both of the Department of the Navy and the Department of Energy) as part of the U.S. Navy Nuclear Propulsion Program.

The DWP was generally reviewed in accordance with NRC's NUREG -1757, Volume 1, Consolidated Decommissioning Guidance as a modified Group 4 decommissioning due to NUREG-1757 being written for land-based fuel cycle facilities and the unique nature of the SSSB as a vessel under the auspices of the Naval Nuclear Propulsion Program. NRC staff also utilized NRC's NUREG 1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) in their review, and NUREG 1520, Standard Review Plan for Fuel Cycle Facilities License Applications,

Consistent with the NRC/NAVSEA interagency agreement, NRC performed a similar review and will perform similar inspections[1] during and after decommissioning as it would for an NRC-regulated decommissioning activity. Key steps in this process include the following:

- NAVSEA's contract with APTIM requires SSSB dismantlement and disposal in compliance with all NRC regulations.
- APTIM will prepare a DWP in accordance with NRC requirements.
- On April 14, 2021 (ADAMS Accession No. ML21123A200), NAVSEA transferred possession of the SSSB to APTIM, which was then moved by tugboat on April 18, 2021 from Newport News Shipyard to Colonna's Shipyard in Norfolk, VA.
- NRC staff will review the DWP and make an acceptability recommendation to NAVSEA, including this Technical Evaluation Report (TER).
- NRC staff will inspect the progress of dismantlement and disposal for consistency with the DWP and with NRC regulations using publicly available inspection procedures focused on radiological hazards. These findings will be provided to NAVSEA for resolution.
- Upon completion of dismantlement of the SSSB, NRC will perform any necessary inspections, reviews and confirmatory surveys to ensure the site is acceptable for

[1] While these inspections do not determine regulatory compliance (as is the case for NRC inspections typically), we use this term in its conventional sense to refer to NRC documentary and site evaluations to assess if APTIM is performing consistent with the DWP and NRC regulations, and to refer issues to NAVSEA for any follow-up action, as appropriate.

unrestricted release, and document findings in a closure letter and recommendation to NAVSEA.

This TER describes the NRC staff evaluation of the DWP and associated references, as supplemented, for conformity with the radiological criteria for license termination for unrestricted use provided in 10 CFR 20.1402 Subpart E – “Radiological Criteria for License Termination” and specifically 10 CFR 20.1402, “Radiological Criteria for Unrestricted Use,” which establishes the requirements for the release of a site for unrestricted use.

### 2.1. Facility Radiological Status

APTIM, the decommissioning contractor, had limited access to the SSSB and operational records when generating the decommissioning workplan (DWP). Therefore, the radiological status of the vessel was based on descriptions of historical use, general historical statements, and an engineering evaluation of the various areas and systems. This information was summarized by room and system for the SSSB in Tables 3.1 and 3.2 of the DWP and is reproduced in relevant part below.

**Table 3-1 Structural Areas (based on Table 3-1 in the DWP)**

| Area | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| ***Upper Deck*** | | | | |
| Heavy Component Shop | Impacted | RW | | Historically a Radiologically Controlled Area |
| Casualty Control Station | Not Impacted | RW | | |
| Guard House / Vestibule | Not Impacted | RW | | Access to Change Room |
| Change Room / Restroom | Potentially Impacted | RW | | Will reduce in size and use as Change Room during decommissioning |
| Anti-C Removal Area (Control Point) | Impacted | RW | | Will move in-board and use as Control Point |
| Fan Room 2 | Potentially Impacted | RW | | Used for initial cooling and ventilation |
| Dirty Tunnel | Impacted | RW | | Access to Wet Pit |
| Clean Tunnel | Not Impacted | RW | | Access to non-contaminated portion of Clean House |
| Clean House | Impacted | RW | | Containment for cleaning/removing Wet Pit |
| Log Room | Not Impacted | RW | | |
| Counting Room | Impacted | RW | | |
| Main Pump Room Entrance | Impacted | RW | | Access to Pump Room |
| Auxiliary Pump Room Entrance | Potentially Impacted | RW | | Access to Auxiliary Pump Room |
| Office Space | Impacted | RW | | |
| Fan Room 1 | Potentially Impacted | RW | | |
| Machine Shop (Repurposed) | Impacted | RW | | Area repurposed to crew break room |
| Upper Deck Exterior | Not Impacted | NA | | |
| ***Below Upper Deck*** | | | | |
| Port Wing Tank 3 | Not Impacted | Release | Class 2 | Controlled Pure Water Storage |

| Area | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| Port Wing Tanks 4, 5, 8 | Not Impacted | RW | | Ballast tanks |
| Port Wing Tank 9 | Not Impacted | Release | Class 2 | Ballast tank |
| Port Wing Tanks 6, 7 | Potentially Impacted | RW | | Ballast tanks; access via Dirty Tunnel |
| Starboard Wing Tank 3 | Not Impacted | Release | Class 2 | Controlled Pure Water Storage |
| Starboard Wing Tanks 4, 5, 6, 7 | Not Impacted | RW | | Ballast tanks |
| Starboard Wing Tank 9 | Not Impacted | Release | Class 2 | Ballast tanks |
| Starboard Wing Tank 8 | Impacted | RW | | Ballast tank. Previously contained phosphate water. Sludge was determined to be contaminated and the tank decontaminated and considered radiologically clean. |
| Centerline Tank 3 | Not Impacted | Release | Class 2 | Ballast tank |
| Centerline Tank 4 | Impacted | RW | | Used for contaminated liquid storage |
| Centerline Tank 8 | Potentially Impacted | RW | | Ballast tank; Wet Pit Boundary |
| Centerline Tank 9 | Impacted | Release | Class 2 | Ballast tank. Previously contained phosphate water. Sludge was determined to be contaminated and the tank decontaminated and considered radiologically clean |
| Wet Pit | Impacted | RW | | Radiological Use |
| Dry Pit | Impacted | RW | | Radiological Use |
| Port Wet Pit Voids (Aft & Forward) | Impacted | RW | | Wet Pit Shield Water |
| Starboard Wet Pit Voids (Aft & Forward) | Impacted | RW | | Wet Pit Shield Water |
| Port Wing Voids 4, 5, 6, 7 | Potentially Impacted | RW | | Wet Pit Boundary; Dirty Tunnel Access |
| Starboard Wing Voids 4, 5, 6, 7 | Potentially Impacted | RW | | Wet Pit Boundary |

| Area | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| Centerline Tank 3 Void | Potentially Impacted | Release | Class 2 | Centerline Tank 4 Boundary |
| Main Pump Room Operating Level | Impacted | RW | | Wet Pit systems |
| Main Pump Room Lower | Impacted | RW | | Wet Pit systems |
| Auxiliary Pump Room Operating Level | Potentially Impacted | RW | | Boundary Area, Controlled pure water systems |
| Auxiliary Pump Room Lower | Potentially Impacted | RW | | Boundary Area, Controlled pure water systems |
| Laundry Drain Tank | Impacted | RW | | Used for contaminated liquid storage |
| Laundry Drain Tank Void (Port & Starboard) | Potentially Impacted | RW | | Laundry Drain Tank Boundary |
| Hull Exterior | Not Impacted | | | |

* RW – radioactive waste

**Table 3-2 Vessel Systems (based on Table 3-2 in the DWP)**

| System | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| ***Upper Deck*** | | | | |
| Wet / Dry Pit Covers | Impacted | RW | | |
| Wet Pit Tools and Equipment | Impacted | RW | | Radioactive Materials |
| Chiller Cooling Loop | Potentially Impacted | RW | | Secondary system |
| HVAC Forward (Fan Room 1) | Impacted | RW | | High Efficiency Particulate Air (HEPA) system servicing impacted areas |
| HVAC Aft (Fan Room 2) | Impacted | RW | | HEPA system servicing impacted areas |
| HVAC – Offices (Fan Room 1) | Impacted | RW | | |
| HVAC –Machine Shop | Impacted | RW | | |

| System | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| Electrical and Lighting | Per Area Classification | Per Area | | |
| Communications | Per Area Classification | Per Area | | |
| Indicating Systems and Alarms | Per Area Classification | Per Area | | |
| Service and Hatch Air | Per Area Classification | Per Area | | |
| 2T Bridge Crane (Heavy Component Shop) | Per Area Classification | RW | | |
| 3T Bridge Crane Aft (Clean House) | Per Area Classification | RW | | |
| 3T Bridge Crane Forward (Clean House) | Per Area Classification | RW | | |
| 5T Bridge Crane Aft (Clean House) | Per Area Classification | RW | | |
| 5T Bridge Crane Forward (Clean House) | Per Area Classification | RW | | |
| 1T Bridge Crane (Machine Shop) | Per Area Classification | RW | | |
| Diesel Generator and Enclosure er | Impacted | RW | | |
| Chiller Unit A | Impacted | RW | | |
| Chiller Unit B | Impacted | RW | | |
| ***Below Upper Deck*** | | | | |
| Fresh Water | Not Impacted | Per Area | | |
| Controlled Pure Water | Not Impacted | Per Area | | |
| Wet Pit circulating system | Impacted | RW | | Contaminated system |

| System | Radiological Status | Planned Disposition* | Classification | Notes |
|---|---|---|---|---|
| Reactor Discharge Water Holding System | Impacted | RW | | Contaminated system |
| Shore Piping Connection (Port and Starboard) | Impacted | RW | | Contaminated system |
| Contaminated Drain Collection | Impacted | RW | | Contaminated system |
| Bilge | Per Area Classification | Per Area | | |
| Ballast | Per Area Classification | Per Area | | |
| Sanitary | Not Impacted | RW | | |
| Sounding tubes, air escapes, overflow | Per Area Classification | Per Area | | |
| Cathodic Protection | Per Area Classification | Per Area | | |

* RW – radioactive waste

Lack of access to the vessel and information has resulted in a relative minimum of radiological information in the DWP. No quantifiable exposure rate data or surface contamination data was provided, although contingencies for this lack of information were made in the DWP. APTIM plans to perform a characterization of the SSSB once it has been relocated to the Alabama Shipyard that will then be used to plan dismantlement work and assess potential dose prior to performing the work. NRC staff will review APTIM characterization data when it is provided for consistency with the DWP.

While the SSSB is a sea vessel and as such there is no soil or groundwater associated with its decommissioning, the dismantlement and disposal work will take place in a shipyard that could potentially be impacted. APTIM plans to minimize any risk of contaminating these media by laying a liner over the SSSB work site prior to siting the SSSB and placing a berm around the site to control any surface water runoff that may occur during dismantlement operations. APTIM also stated that the SSSB fully encloses radiological materials while it is not being dismantled so there is no plan to monitor for radiological materials outside of the SSSB until the dismantlement work is being performed. Later phases of the dismantlement will take place inside a containment structure, but the amount of radiological materials involved during those phases of work will be much reduced and are expected to have low impacts to the area. According to APTIM, the Alabama Shipyard has no history of work involving nuclear-powered vessels or other non-sealed radioactive sources; consequently, activated corrosion products are not expected to be present on the site either from the proposed dismantlement or previous work. This assumption will be validated by baseline surveys of the work areas prior to positioning the SSSB for dismantlement and disposal.

***NRC Evaluation: Facility Radiological Status***

NRC staff find this approach to characterizing the SSSB prior to planning the radiological controls for deconstructing the vessel to be adequate since all radiologically contaminated portions of the SSSB will be disposed of as radiological waste. The NRC staff also finds that the use of baseline surveys of the work areas in the Alabama Shipyard prior to positioning the SSSB for dismantlement and disposal to confirm the absence of activated corrosion products to be appropriate to confirm the absence of any radiological contamination at the site prior to arrival of the SSSB based upon the historical activities performed at the Alabama shipyard.

### 2.2. Radiological Constituents of Potential Concern

Section 4.2 of the DWP describes the approach used to identify the radiological constituents of potential concern (RCOPCs) and a preliminary estimate of the relative activities of these radionuclides. According to the DWP, the preliminary isotopic distribution was based on radionuclide distributions in 2006 guidance from the Navy for the characterization of waste produced by the servicing of Navy Nuclear Propulsion powered vessels. The DWP noted that the 2006 Navy guidance included ratios for both “filtered” and “unfiltered” waste streams, with the unfiltered distribution representing waste streams that have not had suspended particulates removed through filtration. According to the submittal, the unfiltered distribution best represents

the radionuclide mix on the SSSB. The DWP states that the ratios developed in the 2006 Navy guidance were decayed from the 2006 date of publication of the guidance to 2021 to develop the preliminary isotopic distribution. These ratios are included in Table 4-1 of the DWP.

A total of 16 radionuclides were included in the initial estimation of the isotopic distribution. The DWP states that only those radionuclides that were estimated to be present at greater than 1% after decay were carried forward as the radiological contaminants of potential concern. These radionuclides include Co-60, Fe-55, Ni-63, C-14, and Cs-137.

The submittal also includes an estimate of the tritium concentration expected in waste from the SSSB using a similar approach as was used for the other radionuclides. The concentration of tritium in water in the waste was estimated to be 0.0025 µCi/mL based on decaying the concentration of tritium provided in Navy guidance (0.005 µCi/mL) from the year of publication of the guidance (2006) to 2021. A calculation of what the tritium activity would be in a standard waste container (e.g., a B-25 box) with 1% water and the estimated concentration of tritium was provided in the submittal. The DWP indicated that the tritium contribution to the surface contamination sum of fractions (SoF) was negligible at a similar facility with a similar radionuclide mixture due to the high default screening value and low amount of tritium present.

During a telephone conversation on February 26, 2021, the NRC staff provided a comment on the DWP indicating that the basis for decay correcting the radionuclides in the 2006 report to 2021 was not clear. In response to the NRC's comment, APTIM stated that text would be added to the DWP clarifying that that the RCOPCs as listed and determined in Table 4-1 are for preliminary planning purposes and that these will be updated along with their relative abundances following characterization of the vessel. The April 7, 2021 revision of the DWP contains this clarification and also includes a commitment to confirm the nuclide distribution through samples collected from the wet pit deposits and other representative locations and to adjust the nuclide distribution consistent with the results of characterization samples. The DWP further included a commitment to confirm that the tritium contribution to the surface contamination is negligible, or account for it in the radiological inventory.

***NRC Evaluation: Radiological Constituents of Potential Concern***

The NRC staff reviewed the approach used to determine the RCOPCs, the preliminary estimated isotopic distribution of the radionuclides, and APTIM's proposed approach for confirming and updating the RCOPCs and their relative abundances.

The NRC staff finds that the use of the 2006 Navy guidance as a starting point for developing the waste stream is appropriate given that the guidance was specifically developed for waste streams like the waste stream from the SSSB (i.e., waste generated as a result of the servicing of Navy Nuclear Propulsion powered vessels.) However, the NRC staff considers that developing the ratios by decaying the radionuclides from 2006 to 2021 is not appropriate and this approach appears to be using the Navy guidance in a different manner than it was intended. The NRC staff similarly finds that the decaying of the tritium concentration from 2006 to 2021 is not justified. The 2006 date is the publication date of the guidance and does not appear to have

any physical connection to the time at which the radioactivity was generated and introduced to the SSSB. For example, activities which could have introduced new radioactivity into the barge took place more recently than 2006, such as the defueling of the Ex-Enterprise after it was inactivated in December 2012.

In addition to the relative amounts of the RCOPCs ratios not being justified, the NRC staff finds that confirmation is needed of the radionuclides selected as RCOPCs. The selection process was to include any radionuclide that was greater than 1% of the calculated activity decayed from 2006 to 2021. A few of the radionuclides (e.g, Co-58 and Mn-54) are present in higher fractions than 1% in the original 2006 estimation of the ratios. Given the short half-lives of these radionuclides they are likely to have decayed significantly between when the barge was last used to handle radioactive material and now, though the amount of decay is likely less than was estimated by decaying from 2006. In addition, the RCOPC list was estimated based on expected contamination and has not yet been confirmed using characterization data. Finally, as discussed below in Section 2.3.1, the NRC staff notes that the criteria for releasing the equipment and materials for unrestricted use is non-detection and any radionuclide detected above the levels described in Section 2.3.1 should be considered to be a RCOPC. For these reasons, the NRC staff concludes that an evaluation should be performed of the radionuclides selected as RCOPCs to confirm that the list is appropriate once characterization data is available.

The NRC staff recognizes that APTIM only recently gained access to the barge after the DWP was written, and APTIM therefore did not have characterization data on which to base their evaluation of RCOPCs and the expected relative ratios of the radionuclides. APTIM indicated that the RCOPC information in Table 4-1 of the DWP was preliminary and that it would be updated following characterization of the vessel. APTIM did commit to characterizing the waste from the barge and updating the RCOPCs and relative abundances of the radionuclides through samples at representative locations. APTIM also committed to confirming that the tritium contamination is negligible. As described above, the NRC staff does not agree with APTIM's approach for developing the preliminary isotopic distribution of radiological constituents for the SSSB and identifying the RCOPCs. However, the NRC staff concludes that the overall approach proposed in the DWP for the RCOPCs is appropriate because APTIM committed to providing updates to the RCOPCs and their relative abundances based on the results of characterization of representative samples prior to waste packaging and disposal.

### 2.3. Release Criteria

The entirety of the SSSB structure and systems will be dismantled and dispositioned. Most is anticipated to be dispositioned as low-level radiological waste (LLRW) while the remainder will be cleared for unrestricted use (referred to as unrestricted release in the DWP) and disposed at either a hazardous landfill, nonhazardous industrial waste landfill, or recycled. A final status survey (FSS) will be performed on the area of the shipyard on which the SSSB is dismantled after the SSSB has been deconstructed and supporting equipment has been removed after being appropriately released.

### 2.3.1. Release Criteria for Structural Materials and Equipment

The unrestricted release criteria for structural materials and equipment released from the SSSB for unrestricted use is “no detectable activity” on surfaces of the material and equipment. “No detectable activity” is defined as “less than 5,000 dpm/100 $cm^2$ total and 1,000 dpm/100 $cm^2$ removable beta-gamma activity from nuclear power reactors as defined in Inspection and Enforcement (I&E) Circular 81-07.”

The I&E Circular also states, “If alpha contamination is suspected, appropriate surveys and/or laboratory measurements capable of detecting 100 dpm/100 $cm^2$ fixed and 20 dpm/100 $cm^2$ removable alpha activity should be performed.” Alpha-emitting radionuclides are not anticipated to be present on the SSSB. This will be confirmed during characterization and material and equipment release surveys. APTIM noted, and NRC staff confirmed, that the unrestricted release criteria as specified are below the NRC building surface screening values contained in NUREG -1757 “Consolidated Decommissioning Criteria”, Vol. 1 Appendix B Table B.1 “Acceptable License Termination Screening Values of Common Radionuclides for Building Surface Contamination.”

### 2.3.2. Release Criteria for Shipyard Surfaces and Soil

The SSSB will be dismantled at the Alabama Shipyard (ASY), which is located on Pinto Island in Mobile Bay. The DWP states that the area around Pinto Island has been used for industrial uses since the 1700s and that Pinto Island is zoned for heavy industry. According to the DWP, there is no residential land on the island and the undeveloped areas of the island to the northeast is a wetland with a potential use for dredge spoils in the future. The DWP further says that the groundwater at the site is considered fresh but is not potable and the river water near the site is brackish due to the tidal water from Mobile Bay. Water is provided to the site by a municipal utility company. The land at the shipyard is anticipated to continue to be used for shipbuilding, ship breaking, and port operations. The conceptual model used for the shipyard in the DWP is industrial use of the site with no residences being built, no crops grown, and no livestock raised on the site.

The area of the shipyard on which the SSSB will be dismantled is a concrete surface with embedded steel plates that support stands cradling the vessel and some unpaved soil/crushed limestone surfaces. APTIM committed to a baseline facility survey over the SSSB dismantlement area prior to the SSSB being positioned for dismantlement and disposal, as well as an FSS over the SSSB dismantlement area after the SSSB has been deconstructed and supporting equipment has been removed.

APTIM plans to use the Default Screening Values (DSVs) presented in NUREG-1757, Vol 1, Tables B.1 and B.2 when demonstrating compliance with the unrestricted release criteria in 10 CFR 20, Subpart E (Table 3-3 below). APTIM clarified that, for the FSS, the Derived Concentration Guideline Limit (DCGL) is the same as the DSV listed for each radionuclide.

Radionuclide concentrations will be measured with minimum detectable concentrations (MDC) that are at least as low as the DSVs for the matrix surveyed or sampled.

**Table 3-3 Default Screening Values (DSVs) for Radiological Constituents of Potential Concern (RCOPCs) (based on Table 1 in the SSSB Final Status Survey Summary)**

| Isotope | Soil DSV (pCi/g) | Surface DSV (dpm/100 $cm^2$) |
|---|---|---|
| C-14 | 12 | 3,700,000 |
| Fe-55 | 10,000 | 4,500,000 |
| Co-60 | 3.8 | 7,100 |
| Ni-63 | 2,100 | 1,800,000 |
| Cs-137 | 11 | 28,000 |

APTIM has stated that the unrestricted release criteria are the NRC DSVs with an as low as reasonably achievable (ALARA) goal of no statistical difference between baseline and post dismantlement and disposal measurements. Co-60 is both the predominant radionuclide the contractor is anticipating, based on activity, and also has the most restrictive screening DCGL of the RCOPCs anticipated by the contractor. In the FSS Summary, APTIM clarified that it will attribute activity measurements of gross beta/gamma radiation on surfaces to Co-60 instead of accounting for the other radionuclides by means of scaling Co-60 measurements to account for them.

For soil/sediment samples, the unity rule will be applied to evaluate the isotopic results obtained from samples collected from each location. If the unity rule is satisfied for every sample location (i.e., SoF ≤1), the average survey unit residual radioactivity meets the release criterion. If not all of the samples meet the unity rule, then statistical testing will be used to evaluate the average level of contaminants in a survey unit (using either the Wilcoxon Rank Sum test or the Sign test).

Finally, it is noted that APTIM does not anticipate any soil or groundwater contamination at the dismantlement site although stormwater sediments will routinely be monitored.

***NRC Evaluation: Release Criteria***

NRC staff finds the criteria proposed by APTIM for release of materials and equipment consistent with NRC guidance. The NRC staff also find that the use of the DSVs from NUREG-1757 is appropriate because the expected amount of residual contamination at the shipyard due to SSSB decommissioning activities is expected to be minimal and the configuration of any residual radioactivity at the shipyard is expected to be consistent with the assumptions used in the development of the screening criteria described in NUREG-1757 Vol 2 Rev 1, Section 5.1.2.

Also, NRC staff verified the values presented by APTIM in Table 1 of the FSS Summary are consistent with the screening value DCGLs in NRC guidance in NUREG-1757, Vol. 2. for license termination. NRC staff notes that the criteria proposed assume no contamination of groundwater or surface water will occur at the site in the Alabama Shipyard and that maintaining adequate effluent control and monitoring is important to ensuring that this assumption remains appropriate. NRC staff also finds that attributing gross beta/gamma radiation on surface to Co-60 is reasonable given that Co-60 is both the predominant radionuclide anticipated and it has the most restrictive DCGL of the RCOPCs anticipated. As stated in Section 4.2 of the DWP, APTIM has committed to verifying the RCOPCs present during characterization. The NRC staff also concludes that the use of the unity rule to evaluate the results from soil/sediment samples and the use of statistical testing if the SoF exceeds one in any sample in a given survey unit is consistent with NRC guidance in MARSSIM. For these reasons, the NRC staff concludes that the release criteria proposed for the SSSB are consistent with the NRC criteria in 10 CFR 20.1402 of 25 mrem/yr and would be ALARA.

### 2.4. Decommissioning Tasks

Chapter 5 of the DWP summarizes the planned decommissioning activities as described below. The sequence, cut lines, and details may be revised pending further engineering analysis of actual vessel condition and firsthand inspections by APTIM.

***Summary of Decommissioning Activities.*** Preparations will be made at the ASY facility prior to the arrival of SSSB including:

- Establishment of a security perimeter in accordance with the site security plan,
- Establishment of perimeter environmental monitoring stations,
- Conduct a baseline radiological survey,
- Placement of an 80-mil liner under the footprint of SSSB,
- Placement of mounting blocks for SSSB atop the liner,
- Placement of elastomer belting on liner for self-propelled modular transporters (SMPTs),
- Placement of a protective gunnite or similar layer atop the liner (after SSSB move), and
- Preparation of two stair towers to provide personnel access to the upper deck.

Upon arrival at the ASY, any ballast water remaining in the SSSB will be removed and treated according to local regulations at the ASY prior to the start of decommissioning activities. The SSSB will be moved from the deck barge onto blocks using self-propelled modular transporters and will be positioned under the ASY's bridge crane within reach of two gantry cranes which will be used in the decommissioning process. During initial dismantlement activities, the SSSB will provide containment, and the existing ventilation systems will be operated to maintain negative pressure and HEPA filtration. Hatches on the SSSB will be opened temporarily for insertion of materials and equipment and for removing packaged waste. During these temporary openings, any adjacent work with the potential to produce airborne radioactivity concentrations above the limits discussed in Section 2.7.6 of this evaluation will be suspended. In addition, barriers will be

placed between active work areas and the heavy component shop (HCS) (an enclosed space previously used for handling and storage of contaminated or radioactive components, tools and equipment for inspection and refurbishment during refueling operations, which was also used for storage and handling of waste) where most waste will be removed from the clean house.

After the SSSB is in place, one or more Containment Structures (CS) will be erected to the east. The CS will be approximately 120 feet wide x 285 feet long x 80-foot eave height and connected to a pulse-jet dedusting filter as well as HEPA filtered ventilation to provide negative air pressure environment during dismantlement, sizing, and loading operations. It will have a telescoping roof to allow large sections of the SSSB to be placed and then covered with the roof.

The CS will be used to contain work while sizing sections of the SSSB for disposal. The CS will include road plates for heavy equipment traffic. Initially, the forward and aft sections of the SSSB will be cut and lifted into the CS for further sizing. Eventually, the SSSB remnant will be moved under the CS for final sizing and removal. SSSB sections will be sized to fit into Intermodal containers (IMC) within the negative air CS using conventional metal cutting methods (shears, torches, and saws).

IMCs that contain LLRW will be staged in the Waste Handling and Storage area. Up to 24 IMCs will be placed in this area using either cranes or a large forklift. The IMCs will be completely closed and surveyed prior to placement in these areas while awaiting shipping for a period typically 14 days or less but never more than 90 days.

At the start of dismantlement, equipment and systems from the HCS, dry pit, wet pit, clean house, and pump rooms will be placed in IMCs or U.S. Department of Transportation (DOT) Industrial Package Type 1 (IP-1) bags and removed from the SSSB. Sections of two bulkheads aft of the clean house will be removed to facilitate transfer of loaded IMCs and packages off the vessel and transfer of empty containers onto the vessel. The remaining ~18 inches of water in the wet pit will be filtered and solidified for disposal as LLRW or transferred into tank trucks for proper disposal off-site.

In parallel with equipment removal, forward portions of the SSSB including the Machine Shop, Fan Room Number 1, Ballast Tank #4 Centerline, Port Wing Tank #4, and Starboard Wing Tank #4 will be removed and transferred to the CS for size reduction and loading into IMCs. Based on preliminary characterization data, it is anticipated that forward Ballast Tank #3, Centerline and adjacent void, and both forward Port Wing Tank #3 and Starboard Wing Tank #3 will be released for unrestricted use after they are radiologically surveyed in accordance with the Section 11.3.2 of the DWP.

The Upper Clean Room will be placed in the CS for size reduction and containerization. Saw-cut steel and concrete shielding will be placed in contamination control bags within the negative air-handling environment on the SSSB then transferred to IP-1 bags on the dock for disposal as LLRW.

The aft portions of the SSSB will be removed for disposal as LLRW. This includes the HCS, Fan Room Number 2, Ballast Tank #8 Centerline, and Port Wing Tank #8 and Starboard Wing Tank #8. These structures will be removed in large sections using cranes and placed under the CS for size reduction. Ballast Tank #9 Centerline as well as #9 Port and Starboard Wing Tanks are likely candidates for unrestricted use.

The remainder of the SSSB will then be relocated to the CS for size reduction and containerization. After the SSSB is relocated, the vessel blocks, stormwater containment system materials, CS, vehicle mats/plates, and CS filter housings and ductwork will be surveyed and, either released for unrestricted use, disposal as unrestricted solid waste, or disposal off-site as LLRW.

***NRC Evaluation: Decommissioning Tasks***

NRC staff finds the proposed decommissioning tasks to be consistent with the decommissioning guidance provide in NUREG 1757. APTIM has described the remediation activities and associated safety precautions in sufficient detail for NRC staff to make a qualitative assessment of the adequacy of the proposed activities with respect to safety consistent with NRC requirements. Therefore, NRC finds the DWP proposed SSSB decommissioning tasks and activities acceptable.

### 2.5. Organization & Roles and Responsibilities

Sections 6.1 and 6.2 of the DWP summarize the project management organization for decommissioning of the SSSB as follows:

The SSSB Program/Project Manager (PM) reports to APTIM senior management and is the key team point of contact with NAVSEA and NRC personnel. The PM is responsible for overseeing the development of the project's technical approach to the day-to-day conduct of work, including integration of input from supporting disciplines and subcontractors and reporting appropriate information to NAVSEA and NRC.

The Site Manager (SM) reports directly to the PM. The SM is responsible for the overall direction and management of field project tasks associated with decommissioning during implementation, including oversight of field staff and subcontractors, proper execution of procedures, activity documentation, and the completion of decommissioning.

The project Certified Health Physicist (CHP) is a qualified individual who is responsible for overall oversight of the radiation protection program. The project CHP reports to the Corporate Director of Health Physics. The radiation safety organization maintains organizational independence via a formal reporting relationship to the corporate environmental safety, health, and quality organization.

The APTIM Waste Transportation and Disposal Coordinator is responsible for supervising activities associated with the transportation and disposal of radioactive, hazardous, mixed, and nonhazardous wastes, and other materials that will be transported off the project site for disposal or unrestricted release. The Waste Transportation and Disposal Coordinator will communicate and coordinate decommissioning activities with the PM and SM. The Waste Transportation and Disposal Coordinator is responsible for verifying that waste transportation, disposal, and documentation requirements are followed. The Waste Transportation and Disposal Coordinator shall have current DOT and Resource Conservation and Recovery Act (RCRA) waste training and will hold Certified Hazardous Materials Manager certification or equivalent.

The APTIM Corporate Safety Manager (CSM) is responsible for managing all health, safety, and environmental aspects of company operations. The CSM is responsible for developing, implementing, and administering health, safety & environmental protection programs affecting occupational health, employee and public safety, fire protection and prevention, incident investigation and loss control, responsible environmental practices and equipment & property protection. The CSM shall have a minimum of a baccalaureate degree in safety, environmental, engineering, or related field, and 15 years of progressive health, safety, and environmental (HSE) supervisory and management experience, including experience in working with U.S. government clients and their associated HSE requirements. The CSM reports directly to APTIM's Chairman and Chief Executive Officer.

The APTIM Project Radiation Safety Officer is responsible for oversight and review of all radiological decommissioning activities and radiological surveying data collected for the purpose of radiation safety or contamination assessment. For the SSSB project the Project Radiation Safety Officer (PRSO) reports to the PM through the CHP. The PRSO is responsible for ensuring radiological protection and has stop-work authority for the project.

***NRC Evaluation: Organization & Roles and Responsibilities***

NRC staff finds that the descriptions of the decommissioning project management organization and individual project unit responsibilities are sufficiently detailed to describe how APTIM will ensure that decommissioning will be conducted safely, and that the project reporting hierarchy and lines of authority within the decommissioning project do not create conflicts that could compromise safety during decommissioning. Based on the review, NRC staff finds that workers and the decommissioning organization provide the responsibility and authority to bring safety concerns to decommissioning project management and that stop-work authority is provided to the unit responsible for safety and health. NRC staff also finds that APTIM's proposed decommissioning management organization is adequate to accomplish decommissioning of the SSSB in a manner that is protective of workers and the public consistent with the decommissioning guidance provided in NUREG 1757 and consistent with 10 CFR 50.82(b)(4)(ii). Therefore, NRC finds the DWP proposed SSSB decommissioning organizational structure acceptable.

### 2.6. Contractors

Section 6.4 of the DWP discusses APTIM's use of contractor support as summarized below.

Contractor Work Quality

APTIM's Quality Assurance Manager (QAM) is the corporate management representative for quality and reports to senior management with lines of communication to the SSSB PM. The QAM is responsible for ensuring that the SSSB project team implements both the corporate and required site-specific policies and procedures, and that corrective actions are performed as necessary. The QAM will ensure that established protocols and quality procedures are implemented and that the work is performed in accordance with the DWP. The QAM is responsible for directing, planning, implementing, and tracking quality activities and maintaining internal project and corporate communication on quality. Additionally, the QAM will ensure adequate personnel are assigned to the project and that data evaluation, data verification, and reporting procedures are followed in order to produce data that satisfies the DWP.

Health, Safety and the Environment

The APTIM HSE Manager and Site Safety and Health Officer (SSHO) provide health and safety oversight and will communicate and coordinate decommissioning activities with the PM and SM. The SSHO is responsible for verifying that site safety and health requirements are followed and that all site personnel are appropriately trained as required.

Contracted Laboratories

The APTIM Project Chemist is responsible for overseeing all SSSB project sampling and analytical activities. The Project Chemist communicates and coordinates decommissioning activities with the PM and SM and liaisons with all subcontracted analytical laboratories. The Project Chemist is responsible for the project Sampling and Analysis Plan and verifying correct sampling equipment, procedures, and documentation.

***NRC Evaluation: Contractors***

The NRC staff has reviewed the description of the decommissioning project management organization, position descriptions, management and safety position qualification requirements and the manner in which APTIM will use contractors during the decommissioning of the SSSB at the ASY according to NUREG 1757, Section 17.2 ("Decommissioning Plan: Project Management and Organization"). Based on this review, the NRC staff has determined that APTIM has provided sufficient information to allow the NRC staff to evaluate the decommissioning project management organization and structure. NRC staff has determined that APTIM's contractor support management program provides appropriate organizational

controls and procedures to ensure that the decommissioning can be conducted safely and consistent with 10 CFR 50.82(b)(4)(ii).

### 2.7. Radiation Protection

For evaluation of the adequacy of the Radiation Protection (RP) commitments in the DWP, Radiation Safety Program (RSP), and Radiation Protection Plan (RPP), NRC staff utilized applicable guidance in NUREG-1520, Rev 2, Chapter 4. Not all criteria in the guidance were applicable to the SSSB project and exceptions to this guidance are noted in the NRC evaluations following the stated acceptance criteria.

#### 2.7.1. Radiation Protection Program Implementation

***Acceptance Criteria:***

1) A documented management commitment to keep exposures ALARA;

***NRC Evaluation:*** Section 4.2 of the RSP includes the statement “APTIM endorses and applies ALARA principles to radiological work so that personnel exposures to radiation are maintained as low as reasonably achievable (ALARA).” This satisfies acceptance criteria 1.

2) A trained and qualified RP organization with independence from the facility’s operations, well-defined responsibilities, and sufficient authority to carry out those responsibilities;

***NRC Evaluation:*** The DWP, in Section 7, states that APTIM will administer a comprehensive RPP (attached to the DWP) in support of the SSSB decommissioning and dismantlement. The RPP abides by the elements of the RSP (also attached to the DWP) that are applicable to the work. The RSP, in Section 4, establishes responsibilities of the HSE Manager, the Director Radiation Safety (DRS), and the PM/Responsible Manager. The PM will have responsibility for:

- Conducting work safely and in compliance with all applicable permits, licenses, client contracts, and other applicable radiation safety controlling documents,
- Manage work to ensure radiation exposure is kept ALARA,
- Make resources and staffing available to develop and implement the RPP in compliance with applicable regulations, requirements, and commitments, and see that it is approved in a timely manner, and
- In collaboration with the PRSO or assigned health physicist, address all radiation issues during proposal/plan development.

In addition, the RPP, in Section 2.0, describes the individuals who will comprise the radiation safety staff on the project. This will include the DRS, a project CHP, the PRSO, the PM, the SM, the Radiological Controls Supervisor (RCS), Radiological Controls Technicians (RCTs), and the radiation workers. It is noted that the PRSO will have primary responsibilities with respect to implementing the RPP at the SSSB project site, providing appropriate training, observing work to ensure compliance, performing investigations and conducting weekly safety audits, and coordinating with the PM regarding control of existing and potential radiological hazards. The PRSO reports through the CHP to the PM.

Staff also noted in Section 6.2 of the DWP, that APTIM states that all workers have the responsibility (and authority) to "stop-work" if imminent risks to safety, environment, or mission are identified. The worker has the responsibility to identify and notify their management of the discrepant conditions so that appropriate corrective action can be taken.

NRC staff consider the statements in the DWP, RSP, and RPP adequate to satisfy acceptance criterion 2.

3) Adequate facilities, equipment, and procedures to effectively implement the program; and

***NRC Evaluation:*** The RSP, in Section 4.2, states that work will not begin unless an approved RPP is in place ensuring that work can be performed in a safe and compliant manner. Subsections of 4.2 discuss the various elements that the RPP will address. In Section 4.2.21, the RSP states that the RPP will be reviewed when work conditions change and reviewed periodically (minimum annually) during the project. APTIM commits in Section 19 of the RPP to developing work plans, monitoring work, training, and providing personnel with work instruction and/or Radiological Work Permits (RWPs) that include the radiological protection measures and controls necessary for safe and compliant completion of the job. APTIM further stipulates in the RPP that performance of radiological work will be governed by an RWP or equivalent document, developed from information obtained during the work planning phase.

Section 4.2.7 of the RSP states that "control of work involving radioactive materials, sources, and radiation-producing machines will be accomplished by establishing radiation standards and responsibilities, using first-line supervisors and RP personnel to monitor performance of radiation work, training workers in radiation hazards, and providing personnel with operating procedures and/or RWPs that establish job-specific RP measures and controls necessary for safe and compliant completion of the job." Section 19 of the RPP provides additional detail and states that "the performance of radiological work will be governed by an RWP or an equivalent document (such as a Hazardous Work Permit, which includes controls on the non-radiological hazards of the task) developed from the information obtained during the work planning phase." RWPs provide administrative control of all activity within radiologically controlled areas (RCAs) and are a useful tool in maintaining exposures ALARA. The RWP will be generated by the RCS or PRSO and approved by the RCS, PRSO, or CHP and by

operations supervision (and safety and health supervision for Hazardous Work Permits). Staff notes that the RPP, in Attachment 1, contains a listing of the field implementing procedures applicable to the radiation protection program.

NRC staff also notes that the DWP describes the facilities and engineering controls that will be established. The SSSB is a stand-alone vessel but will be dismantled and dispositioned in the ASY. APTIM will prepare the SSSB work site by placing a liner, gravel, and a berm surrounding the SSSB work site prior to placing the SSSB. The SSSB itself will serve as primary ventilated containment during most of the removal of radiological materials using the existing systems that are on the barge. Temporary plastic containment will also be used for contamination control. In later phases of the work, APTIM will utilize a CS to contain much of the sizing and loading operations outside of the SSSB itself and including once the SSSB is dismantled sufficiently for the CS to encompass the remainder of the SSSB. Waste containers will be sealed and staged on site until transporting the waste for disposal. APTIM will have site security and appropriate access controls for the site after the SSSB has been placed in the ASY. The final site conditions, after demobilization, should be similar to the shipyard prior to beginning site preparations, which APTIM expects to demonstrate by comparisons to a baseline survey it will conduct prior to the project beginning.

NRC staff finds that these commitments are adequate to satisfy acceptance criterion 3.

4) The review, at least annually, of the RP program's content and implementation, as [described in] 10 CFR 20.1101(c). The review should consider facility changes, new technologies, and other process enhancements that could improve the effectiveness of the overall program.

***NRC Evaluation:*** As has been previously discussed, APTIM has developed a RSP and a site-specific RPP which it has submitted along with the DWP. The scope of work in the DWP is projected to take less than 4 years to complete. In the RSP, Section 4.2.21, APTIM states that the RPP will go in effect once it has been reviewed and approved by the Director of Radiation Safety or designee. RPPs will be reviewed when work conditions change and reviewed periodically (minimum annually) during the project.

NRC staff finds that this commitment is adequate to satisfy acceptance criterion 4.

NRC staff find that APTIM's commitments to a RP program with qualified staffing, management commitment to ALARA, controls for work with radiological materials, and at least annual reviews of the program to be adequate to ensure implementation of the RSP for this project.

### 2.7.2. Commitment to an ALARA Program

***Acceptance Criteria:***

1) Establish a written, comprehensive, and effective ALARA program.

2) Prepare policies and procedures to ensure that occupational radiation exposures are maintained ALARA and that such exposures are consistent with [] 10 CFR 20.1101.
3) Outline specific ALARA program goals, establish an ALARA program organization and structure, and include written procedures for its implementation in the plant design and operations.
4) Establish an ALARA committee or equivalent organization with sufficient staff, resources, and clear responsibilities to ensure that the occupational radiation exposure does not exceed the dose limits of 10 CFR Part 20 under normal operations.
5) Use the ALARA program as a mechanism to facilitate interaction between RP and operations personnel.
6) Regularly review and revise, when appropriate, the ALARA program goals and objectives and incorporate, when appropriate, new approaches, technologies, operating procedures, or changes that could reduce potential radiation exposures at a reasonable cost.

***NRC Evaluation:*** As has already been stated, the APTIM RSP, in Section 4.2 contains the management commitment to ALARA. Section 4.1.1 of the RSP includes the commitment for a Radiation Safety Committee (RSC) which, in part, will meet informally at least once per month, and can convene formally to review high risk work, planned special exposures (PSE), review radiological incidents, review support requests, or otherwise as needed to ensure program implementation. In Section 4.2.6 of the RSP, commitments are presented for ALARA to be addressed in all RPPs including a written plan for review of ALARA efforts to be conducted, minimally, on an annual basis. The RPP, in Section 9, addresses the ALARA program for the SSSB. It includes a commitment to use of engineering and administrative controls to limit radiation exposure to workers and the public and ensure all exposures are held below the regulatory limits. The program will take technological, social, and economic factors into account. It states that the SSSB project ALARA program will include:

a. Management commitment, engineering, and administrative control levels for control of radiation exposure to workers and members of the public,
b. Review of plans, procedures, and facilities to determine where controls could be used to limit doses,
c. Use of surveying and monitoring techniques to determine RCAs and controlling access to these areas,
d. Prevention of unnecessary handling of radioactive materials,
e. Use of personnel dosimeters to verify radiological exposures in the RCAs,
f. ALARA goals/radiological performance goals, and
g. Records of ALARA program elements.

NRC staff find the commitments for an ALARA program in the RSP and RPP to be adequate for the projected work and to satisfy the ALARA acceptance criteria. A short duration (<4 yr) project should neither necessitate an ALARA committee nor an ALARA organization; the RSC can fulfill

the purpose of such bodies. As such, the lack of a formal ALARA committee/organization is permissible for this project given the RPP structure described by APTIM.

### 2.7.3. Organization and Personnel Qualifications

***Acceptance Criteria:***

1) Appoint RP personnel and identify their authority and responsibilities for implementing the RP program functions.

***NRC Evaluation:*** The RPP, Section 2.0, describes the individuals who will comprise the radiation safety staff on the project. There will be a Director of Radiation Safety responsible for reviewing and approving the RPP and ensuring compliance with all applicable regulatory requirements for radiation safety. This involves ensuring the program is implemented either as written into the various licensing documents and/or is implemented by acceptable additional or alternative documents and procedures.

A project CHP will be responsible for overall oversight of the RPP which includes conducting reviews and audits of the implementation of the RPP. The CHP will also be responsible for reviewing and approving the RP portions of the Accident Prevention Plan and providing guidance to the PRSO as required. The CHP will review all Technical Work Documents and RWPs and work with the PRSO to oversee work plans and procedures for matters related to RP. Internal intake, dose assessment, and applicable monitoring will be evaluated by the CHP. The project CHP shall be qualified by training and experience in RP including a baccalaureate degree in health physics, science, or related field, and 15 years' experience in the field of health physics or RP. This individual will also have current certification by the American Board of Health Physics.

The PRSO is the individual assigned to implement the RPP at the SSSB work site. The PRSO is responsible for oversight and review of all radiological decommissioning activities and radiological data collected for the purpose of radiation safety and control. This will include: implementing the DWP; handling and transportation of radioactive material; training of on-site personnel; reviewing results of surveys, sampling, and environmental monitoring to identify trends or potential for personnel exposure; identification of potential radiological hazards and means of protection; specify proper levels of personal protection equipment (PPE) and resources necessary to ensure health and safety of workers; observe work in progress to verify adherence to day-to-day radiation safety operations and implementing procedures; investigate accidents/incidents and potential accidents/incidents involving radioactive materials or radiation exposures; conduct weekly safety audits and complete required documentation; and coordinate with the PM regarding the control of existing and potential radiological hazards. The PRSO is minimally qualified by having at least 5 years experience of documented hands-on training in radiological controls. In addition, the PRSO will have training and experience that includes the uses of the types and quantities of

radioactive material identified on the project so that the PRSO is able to oversee the RSP during normal and emergency conditions.

The PM will be responsible for ensuring work is conducted safely and in compliance with all applicable permits, client contracts, and other applicable controlling documents. The PM also ensures adequate resources and staffing are available to implement the RPP.

The SM is responsible for assuring that personnel under his/her direction comply will all radiological requirements, including applicable site-specific procedures, training requirements, RWPs, and verbal instructions provided by radiological control personnel.

The RCS supervises the RCTs and oversees daily radiological operations. The RCS may serve as the PRSO's designee when the PRSO is not on site. The RCS will have documented training as specified in procedure APTIM-SSSB-001, Personnel Training Requirements.

RCTs are responsible for performing work in compliance with the RPP and applicable radiological site-specific procedures and work instructions. RCTs will install and maintain radiation monitoring devices and air sampling equipment, perform periodic instrument checks, perform radiological surveys, workplace monitoring, and collect and prepare samples for laboratory analysis. The RCTs will also maintain RCAs and perform surveys of personnel and equipment exiting RCAs. RCTs will have, as a minimum a high school diploma, and at least 12 months of applied health physics experience. RCTs will complete qualification cards that include formal evaluations of knowledge and skills prior to providing job coverage alone and participate in ongoing radiation safety training consistent with their duties and responsibilities.

Radiation Workers (the radiologically trained general labor force) are responsible for performing work in RCAs per the requirements of the applicable RWP or as directed by the RCT, RCS, of PRSO. All must complete required radiation worker training.

NRC staff finds that these commitments adequate to satisfy acceptance criterion 1 because APTIM has sufficiently described the responsibilities and staff authority for a project RP program.

2) Establish clear organizational relationships among the individual positions responsible for the RP program and other line managers.

***NRC Evaluation:*** The DWP, in Section 6, Figure 6-1, presents a project organization line chart and contains descriptions for the major positions. This shows the RP organization reporting up to the PM separate from the other key project personnel.

NRC staff finds that this chart in the DWP and organization description in the RPP is adequate to satisfy acceptance criteria 2.

3) Appoint a suitably educated, experienced, and trained RP program director (typically referred to as the radiation safety officer) who (1) has direct access to the plant manager, (2) is skilled in the interpretation of data and regulations pertinent to RP, (3) is familiar with the operation of the facility and RP concerns of the site, (4) participates as a resource in radiation safety management decisions, and (5) will be responsible for establishing and implementing the RP program.

***NRC Evaluation:*** The DWP, RSP, and RPP all call for a PRSO who will be the primary SSSB personnel responsible for implementing the RPP at the job site. The PRSO will report up to the PM through the project CHP, who will have primary oversight responsibilities of the RP program, and the Corporate Director of Health Physics. The RPP states that the PRSO will coordinate with the PM regarding the control of existing and potential radiological hazards. As previously stated, the PRSO is minimally qualified by having at least 5 years experience of documented hands-on training in radiological controls and will have training and experience that includes the uses of the types and quantities of radioactive material identified on the project so that the PRSO is able to oversee the RSP during normal and emergency conditions.

NRC staff find this commitment adequate to satisfy acceptance criteria 3.

4) Describe the minimum education, experience, and training requirements for the RP program director and staff.

***NRC Evaluation:*** Figure 6-1 of the DWP includes names for the SSSB's CHP position and Corporate Director of Health Physics whom staff looked up on the American Board of Health Physics (ABHP) web site and verified that both individuals were certified health physicists. Staff also noted that the named Radiation Control Supervisor for APTIM is also a CHP and there are several different methods through which the Radiation Control Technicians can be qualified although, at a minimum, a high school diploma and at least 12 months of health physics experience (see Sections 2.7 and 7.3 of the RPP) . As per the RPP, Section 2, certification by the ABHP or a minimum of 10 years experience supervising in health physics would be the minimal qualifications for individuals filling the project CHP or higher level RP staff and the PRSO shall have at least 5 years of RP experience. The Radiation Control Supervisor and the Radiation Control Technicians shall have a minimum of 12 months of applied experience with radiological controls and be otherwise qualified as discussed in APTIM procedures and/or the RPP, Section 7.3.

NRC staff finds these commitments adequate to satisfy acceptance criteria 4.

### 2.7.4. Commitment to Written Procedures

***Acceptance Criteria:***

1) Prepare written, approved procedures to carry out activities related to the RP program. Procedures should address applicable RP requirements found in 10 CFR 19, 20, 70, and 71, and any other applicable regulations.

***NRC Evaluation:*** APTIM has established throughout the RSP and RPP that it will have written approved procedures. Section 4.2.7 of the RSP states “Control of work involving radioactive materials, sources and radiation-producing machines will be accomplished by establishing radiation standards and responsibilities, using first-line supervisors and RP personnel to monitor performance of radiation work, training workers in radiation hazards, and providing personnel with operating procedures and/or RWPs that establish job-specific RP measures and controls necessary for safe and compliant completion of the job.” Attachment 1 to the RPP lists those field procedures which have applicability to the radiation protection program. Staff’s review of the DWP, RSP, and RPP as well as other related documents verified that APTIM will strive to meet all applicable regulations.

NRC staff find the commitments in the DWP, RSP, and RPP adequate to satisfy acceptance criterion 1.

2) Establish a process for procedure generation or modification, authorization, distribution, and training, such that changes in technology or practices are communicated effectively and in a timely manner. Review and revise procedures, as necessary, to incorporate any facility or operational changes, including changes in the Integrated Safety Analysis (ISA). The radiation safety officer, or an individual who has the qualifications of the radiation safety officer, should approve all procedures related to RP.

***NRC Evaluation:*** Section 26 of the RPP states that field implementing procedures for the RPP are reviewed/approved by the RCS/PRSO, project CHP, and PM. Should changes be required to the procedures, the changes will be controlled and subject to the same level of technical and management reviews as the original document. In addition, Section 10.3.5 of the DWP discusses procedural controls. It states that “workers will be provided with, and instructed in, the most current procedure for them to conduct their specific task. Should changes be required to written procedures, the changes will be controlled and subject to the same level of technical and management reviews as the original document. When concurrence has been granted by all reviewers, the controlled, revised procedure will be provided, and revised instructions given to the affected workers.”

NRC staff find these commitments adequate to satisfy acceptance criterion 2 in establishing a process for procedure generation, maintenance, distribution and training.

3) Specify written, approved RWPs for activities involving licensed material that are not covered by written RP procedures. RWPs should define the authorized activities, the level of approval required (a radiation specialist, as a minimum), information

requirements, period of validity, expiration and termination times, and recordkeeping requirements.

***NRC Evaluation:*** Section 19 of the RPP discusses RWPs. It states that "the performance of radiological work will be governed by an RWP or equivalent document (such as a Hazardous Work Permit, which includes controls on the non-radiological hazards of the task) developed from the information obtained during the work planning phase. The RWP will be generated by the RCS or PRSO and approved by the RCS, PRSO, or CHP and by operations supervision (and safety and health supervision for Hazardous Work Permits). The RWP will specify all the relevant information concerning the task to be performed." Figure 19-1 of the RPP is an example RWP form which contains the various fields that will be filled out. This includes initiation and expiration dates, area and personnel monitoring requirements, personal protective equipment, site area information needed to inform workers of the hazards to be encountered, and approval blocks.

NRC staff finds these statements and the example RWP adequate to satisfy acceptance criterion 3.

### 2.7.5. Radiation Safety Training

***Acceptance Criteria:***

1. Design and implement an employee RP training program is consistent with 10 CFR Parts 19 and 20.

***NRC Evaluation:*** While APTIM does not appear to have explicitly incorporated 10 CFR Parts 19 and 20 training requirements into its RP training program, from commitments in the DWP, RSP, and RPP, NRC staff finds that the RP training program will incorporate topics sufficient to be consistent with these regulations. APTIM, in the DWP's quality assurance section, states that adequate training and procedures will be utilized to assure everyone can do their job in the manner expected. APTIM will have policies, procedures, work instructions, and forms it will maintain that will address a variety of disciplines anticipated for the project work, including: project management and controls, human resources, procurement, quality, safety, construction engineering, and nuclear safety. A job qualification training will be implemented (i.e., indoctrination training) to prepare for the decommissioning effort with specific examples including, but not limited to: Site-Specific Awareness Indoctrination, radiation worker training, Initial 40-hour and subsequent 8-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) training.

In Section 6.4 of the DWP, APTIM commits to a training plan that will be developed in accordance with the Accident Prevention Plan (APP) and RPP. Orientation training (radiological, safety and security) will be provided to all individuals before being allowed unescorted access to the SSSB. Training will be administered by the Site Safety Officer/

PRSO and will include appropriate topics given the individual's prior training, work assignments, and degree of exposure to potential safety, industrial hygiene, and radiological hazards. The orientation training will be defined in the APP. Training will be mandatory for all personnel and a written examination will be administered.

The RSP, in Section 4.2.4, states that "the level of training for personnel will be commensurate with the level of exposure anticipated and will be compliant with applicable regulations, requirements, and commitments. Radiation safety training must be established for general employees, radiation workers, and visitors and meet applicable regulatory requirements and requirements of AMS-710-05-PR-01900, 'HSE Education and Training.'"

The RPP, in Section 7, and in its subsections, discusses the training requirements for site visitors, radiation workers, and the Radiological Control Technicians. Additional training requirements may be specified in project work plans and Radiation Work Permits as discussed in Section 19 of the RPP.

Staff finds the radiological training commitments in the DWP, RSP, and RPP to be adequate to satisfy criterion 1.

2. Provide training to all personnel and visitors entering restricted areas that is commensurate with the health risk to which they may be exposed or provide escorts who have received the appropriate training.

***NRC Evaluation:*** In Section 4.2.4 of the RSP, APTIM commits that the "level of training for personnel will be commensurate with the level of exposure anticipated and will be compliant with applicable regulations, requirements, and commitments. Radiation safety training must be established for general employees, radiation workers, and visitors and meet applicable regulatory requirements and requirements of AMS-710-05-PR-01900, *HSE Education and Training*." Section 7.1 of the RPP states that visitors that may access RCAs with an escort will receive a site briefing consisting of a description of site-specific hazards, locations on site that the visitors are allowed to access, emergency response and evacuation routes, potential exposure to radiation and radioactive material, and other applicable information. Visitors will be prohibited from entering: contamination areas; radiation and high-radiation areas; any areas which exceed a dose rate of two mrem/hr; and, airborne radioactivity areas.

NRC staff find these commitments adequate to satisfy, acceptance criterion 2.

3. Provide a level of training commensurate with the potential radiological health risks associated with that employee's work responsibilities.

***NRC Evaluation:*** Section 7.2 of the SSSB RPP states that all individuals who may access RCAs without escort will receive annual site-specific radiation worker training. Also, Section 19 of the SSSB RPP discusses RWPs. It states that the performance of radiological work

will be governed by an RWP or equivalent document developed from information obtained during the work planning phase. The RWP will specify all the relevant information concerning the task to be performed. RWPs will specify any special instructions or precautions pertinent to radiation hazards in the area, including listing the radiological hazards present. Personnel performing the work will acknowledge they are aware that they will be working in an RCA by signing the RWP Access Control Log.

NRC staff find this commitment adequate to satisfy acceptance criterion 3.

4. Conduct refresher training, at least every 3 years that will accurately address changes in policies, procedures, requirements, and the facility ISA.

***NRC Evaluation:*** The SSSB project is only expected to have a duration of less than 4 years, and, due to the nature of the project, there is not expected to be any major changes in the policies, procedures, and requirements of the project during this time. APTIM will incorporate training requirements into project work plans and RWPs, as needed, based on the nature of the work. Also, an ISA is not applicable for non-fuel cycle facilities. APTIM will have an APP that appropriate personnel will be trained to and that will have a focus appropriate for a decommissioning project. As was mentioned earlier, Section 7.2 of the RPP calls for annual radiation worker training. Staff find this adequate, in this case, to satisfy acceptance criterion 4, because the period of active decommissioning work for the SSSB Project is estimated to be approximately 3 years and because work specific training will be incorporated into work instructions/RWPs.

5. Incorporate into the RP training program the provisions in 10 CFR 19.12 and additional relevant topics, such as the following (the asterisk denotes those topics with a basis in 10 CFR 19.12):

    a) correct handling of radioactive materials
    b) the storage, transfer, or use of radiation or radioactive material as relevant to the individual's activities*
    c) minimization of exposures to radiation or radioactive materials*
    d) access and egress controls and escort procedures
    e) radiation safety principles, policies, and procedures*
    f) monitoring for internal and external exposures
    g) radiation exposure reports available to workers*
    h) monitoring instruments
    i) contamination control procedures, including protective clothing and equipment*
    j) ALARA and exposure limits*
    k) radiation hazards and health risks*
    l) emergency response*
    m) responsibility to report promptly any condition that may lead to, or cause, a violation of regulations and licenses or create unnecessary exposure*

***NRC Evaluation:*** Section 7.2 of the RPP lists the topics that the radiation worker training will incorporate:

- Review and acknowledgment of the site-specific RPP
- Principles of ionizing radiation
- Health effects from exposure to radioactive material
- Radiation emissions and associated risks of the types of radioactive material that have been found on SSSB
- Radiation exposure limits
- ALARA goals
- ALARA work principles and techniques such as methods used to minimize exposure, purposes, and functions of protective devices
- Purpose and proper use of dosimetry
- Storage, transfer, or use of radioactive material
- RCA restrictions and postings
- Applicable regulations for the protection of personnel from exposure to radioactive material
- Recognition of site-specific radiation hazards
- Notification procedure for radioactive material found in areas where it is not anticipated
- Notification procedure and expected actions in the event of an emergency, breakage, or spill of radioactive material
- Radiological Emergency Response
- Contamination control
- Radiation survey instrumentation
- Responsibilities of employees and management

NRC staff find that the training commitments in the DWP, RSP, and RPP are adequate to satisfy acceptance criterion 5.

6) Review and evaluate the accuracy, effectiveness, and adequacy of the RP training program curriculum and instructors, as applicable, at least every 3 years.

***NRC Evaluation:*** NRC staff consider this criterion to not be applicable as the SSSB decommissioning and dismantlement project is anticipated to take between 3 and 4 years, with the active decommissioning portion being approximately 3 years. APTIM does state in Section 7.2 that a written and practical examination will be given to each radiation worker and that successful completion of radiation training requires a score of 80 percent or higher on the examination. Also, a daily tailgate safety meeting will be conducted at the beginning of each shift to discuss the tasks of the day, hazards and controls related to those tasks, and applicable RWPs. NRC staff find these measures adequate to address the training and changes involved in the task of dismantling the SSSB and satisfies acceptance criterion 6.

### 2.7.6. Ventilation and Respiratory Protection Programs

Acceptance Criteria:

1) Install appropriately sized ventilation and containment systems in areas of the plant identified as having potential airborne concentrations of radionuclides that could exceed the occupational derived air concentration values specified in 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," during normal operations. Air flow in buildings housing these operations should be directed toward the area(s) of highest potential contamination.

***NRC Evaluation:*** Section 5 of the DWP discusses the planned decommissioning activities for the SSSB decommissioning and dismantlement. In this section, it states that it is expected that 99% of the radiological material will be removed while the SSSB itself is used as containment for removal of the most contaminated structures, systems, equipment, as well as wet pit water. The existing HEPA filtered ventilation in the SSSB will be utilized during most of this work. In Section 5.1.1, the DWP states that the HCS of the SSSB will be used as a negative air RCA to package systems and equipment from the wet pit, dry pit, and clean house for removal from the SSSB in IMCs. Plastic sheeting will be used to isolate contamination from areas that are opened to the environment during transport of packaging to/from the SSSB. After packaging of systems and equipment is complete, the existing SSSB ventilation system operations will be terminated and portable HEPA filter ventilation units and HEPA vacuums will be used to collect any fumes and debris generated during final preparations for removal of the HCS from the SSSB. Any remaining system ductwork and piping will have openings plugged, capped, or covered with poly sheeting and taped. Similar approaches are described for other sections of the SSSB.

The HCS, as well as several other sections of the SSSB, will eventually be cut from the SSSB, and moved to the CS for size reduction. The CS will be closed and HEPA filtered ventilation will be connected to the CS to provide a negative air pressure. Pulse-jet filters will be used to remove 99% of three-micron particulate matter from the recirculation air, with approximately three air changes per hour. The HEPA filtration will remove 99.97% of 0.3 micron particulate matter from the discharge air. Eventually, the SSSB will be moved within the CS once it has been reduced in size to fit.

APTIM clarified that a negative air flow environment, generally toward areas of ongoing dismantlement or sizing work, will be maintained in the SSSB during initial dismantlement activities. The SSSB will provide containment and the existing ventilation systems will be operated to maintain negative pressure and HEPA filtration. During later phases of work, the SSSB will be located within the CS so that structure will provide negative airflow containment. Local area HEPA ventilation and plastic sheeting will be used to minimize the spread of contamination.

As stated in Section 8.1.2 of the DWP, the CS building exhaust air will be HEPA filtered and operated to ensure air flow is directed from areas with less potential for contamination to areas with more potential for contamination. Movable air equipment and local ventilation will be installed to maintain building and system pressure at approximately -0.1 inches of water or more and tested or monitored using air flow meters or pressure gauges. All air-handling equipment will be operated and maintained in accordance with the manufacturer's recommendation.

The CS ventilation will include roughing filters, prefilters, and a HEPA filter bank. Roughing and prefilters will be routinely changed to protect downstream HEPA filters. Differential pressures for the CS will be established and openings tested using smoke testing or flow meters to ensure adequate flow through sized openings and into exhaust ducts, with minimum capture velocities of approximately 100 linear feet per minute.

In addition to the HEPA filters, a pulse-jet dedusting filter with continuous particulate removal is used to precondition air from operations that generate high particulate matter loads (e.g., torch cutting). This unit discharges to the HEPA filter inlet.

NRC staff find the special nature of this work to necessitate that a negative pressure be generally applied to both the SSSB work areas and the CS. Requirements for local ventilation are expected to be specified in project specific work plans or RWPs. APTIM's commitments in the DWP, RSP, and RPP are adequate to satisfy acceptance criterion 1.

2) Describe management measures, including preventive and corrective maintenance and performance testing, to ensure that the ventilation and containment systems operate when required and are within their design specifications.

***NRC Evaluation:*** Ventilation and containment performance are further discussed and evaluated (e.g., criterion 4) below. This criterion is not specifically applicable to the SSSB project as management measures are specifically associated with ISAs as required in 10 CFR 70, but are not required for non-fuel cycle facilities.

3) Describe the operations criteria for the ventilation and containment systems, including minimum flow velocity at openings in these systems, maximum differential pressure across filters, and types of filters to be used.

***NRC Evaluation:*** APTIM states in Section 2.1.7 of the DWP that the SSSB HVAC system provides ventilation and temperature control for the SSSB workspaces. When all doors and other temporary openings on the SSSB are closed, the systems are designed to maintain minimum negative pressures of 0.15 inches of water in the clean house, HCS, pump room, and counting room, and 0.10 inches of water in the dirty tunnel. During initial dismantlement activities, the SSSB will provide containment, and the existing ventilation systems will be operated to maintain negative pressure and HEPA filtration. The systems on the SSSB will be operated in accordance with the applicable technical specification document during that period.

As stated in Section 8.1.2 of the DWP, a CS will also be used for size reduction of the SSSB components. Building exhaust air will be HEPA filtered and operated to ensure air flow is directed from areas with less potential for contamination to areas with more potential for contamination. Movable air equipment and local ventilation will be installed to maintain building and system pressure at approximately -0.1 inches of water or more and tested or monitored using air flow meters or pressure gauges. All air-handling equipment will be operated and maintained in accordance with the manufacturer's recommendation.

The CS ventilation will include roughing filters, prefilters, and a HEPA filter bank. Roughing and prefilters will be routinely changed to protect downstream HEPA filters. Differential pressures for the CS will be established and openings tested using smoke testing or flow meters to ensure adequate flow through sized openings and into exhaust ducts, with minimum capture velocities of approximately 100 linear feet per minute.

NRC staff find APTIM's commitments for testing of the ventilation to be adequate for the SSSB dismantlement operations to satisfy acceptance criterion 3.

4) Describe the frequency and types of tests to measure the performance of ventilation and containment systems, the acceptance criteria, and the actions to be taken when the acceptance criteria are not satisfied.

***NRC Evaluation:*** As stated in Section 8.1.2 of the DWP, roughing and pre-filters will be routinely changed to protect downstream HEPA filters. Differential pressures for the CS will be established and openings tested using smoke testing or flow meters to ensure adequate flow through sized openings and into exhaust ducts, with minimum capture velocities of approximately 100 linear feet per minute. Aerosol testing of HEPA filter banks will be done on initial installation or operation. If a test fails to achieve the require removal efficiency, the system seals will be inspected, resealed, and the system retested until it passes. Additionally, if negative pressures cannot be maintained, operations will be stopped until the ventilation and air-handling systems can be restored to meet operating specifications.

Also, in Section 15 of the RPP, APTIM states that the removal of any temporary engineering control such as local HEPA ventilation or isolation sheeting and tents will be performed once the activities requiring such controls are complete and surveys support the removal because conditions are consistent with the current postings of the surrounding areas. The specific work-controlling documents (e.g., task specific RWPs, procedures, and work instructions) will specify the criterion to all down-posting and removal of controls as applicable.

Section 10.5.1 of the DWP states that the PRSO, SSHO, Waste Transportation and Disposal Coordinator, and designated subcontractor personnel, aided by the Project Chemist, as appropriate, will select field sampling equipment/media, testing and measuring equipment, safety instruments, and laboratory analytical instruments to be used as test and measuring instruments. This equipment will be as specified in the approved measuring and testing methods presented in the SAP and within task-specific planning documents for radiological

testing methods. An example of the test specifications in this section includes air monitoring equipment. Section 10.5.3 of the DWP states that, generally, all testing and measuring equipment will be checked at a minimum of daily or before use (and after use, as required) by the manufacturer's instructions and/or the approved method.

NRC staff find the commitments for testing of the ventilation systems to be adequate for the SSSB dismantlement and to satisfy acceptance criterion 4.

5) Establish a respiratory protection program that meets the requirements of Subpart H of 10 CFR Part 20.

***NRC Evaluation:*** While APTIM does not anticipate needing respiratory protection for this work, it does have a respiratory protection program referenced in Section 7.2 of the DWP and Section 11 of the RPP. APTIM clarified that the respiratory protection program, as enacted by its procedures, will be compliant with the requirements in Subpart H of 10 CFR Part 20. NRC staff find this adequate to satisfy acceptance criterion 5.

6) Prepare written procedures for the selection, fitting, issuance, maintenance, testing, training of personnel, monitoring, and recordkeeping for individual respiratory protection equipment and for specifying when such equipment is to be used.

***NRC Evaluation:*** In Section 11 of the RPP, references to procedures applicable to the respiratory protection program are present. It includes procedures for fit testing, selection and use, and inspection, maintenance and control of respiratory protection equipment. Staff find this adequate to meet acceptance criterion 6.

7) Revise the written procedures for the use of individual respiratory protection equipment, as applicable, when making changes to processing, the facility, or the equipment.

***NRC Evaluation:*** Respiratory Protection, as well as other PPE requirements, are expected to be established in an RWP, when applicable. NRC staff find this will appropriately address the requirements for respiratory protection based on the nature of work and adequately addresses criterion 7.

8) Maintain records of the respiratory protection program, including training in respirator use and maintenance.

***NRC Evaluation:*** Sections 10.4 and subsection 10.4.2 of the DWP discuss document control and document life cycle process. Section 10.4 states that all project data and records will be protected and controlled within Sharepoint, an Electronic Document Management System. NRC staff consider this commitment adequate to satisfy criterion 8.

### 2.7.7. Radiation Surveys and Monitoring Programs

**Acceptance Criteria:**

1) Provide radiation survey and monitoring programs that are consistent with 10 CFR Part 20 and that are reasonable to evaluate the magnitude and extent of radiation levels, the concentrations or quantities of radioactive material, and the potential radiological hazards.

***NRC Evaluation:*** In Section 11 of the DWP, APTIM states it will perform surveys for release of materials and equipment (M&E), segregating waste materials, assessing the nature and extent of contamination (scoping and characterization surveys and media sampling), defining and verifying radiological conditions, verifying the adequacy of radiological controls, guiding remedial actions, and demonstrating compliance with established release criteria. Section 7 of the DWP discusses the workplace air sampling program, and means of determining internal exposure and external exposure. Staff note that the primary means of assessing internal exposures will be through comparing airborne concentrations to the DAC for Co-60 which is pulled from 10 CFR 20, Appendix B, Table 1, Column 3. In Section 7.6 of the DWP, APTIM discusses the contamination control program which also involves baseline surveys of the SSSB work area, characterization of the SSSB, and areas of the vessel needed to establish proper radiological controls and postings. It further clarifies that RWPs will be used to establish proper controls for all radiological work including personnel monitoring and survey requirements. NRC staff notes that the unrestricted release of M&E limit is “no detectable activity” consistent with I&E Circular 81-07 as stated in Section 11.1 of the DWP. Attachment 3 of the DWP, Rev. 1, is the Environmental Monitoring Plan for the ASY during the SSSB project. The environmental monitoring program will include air sampling, direct radiation exposure monitoring, and storm water and sediment sampling. NRC staff find these commitments satisfy criterion 1.

2) Prepare written procedures for the radiation survey and monitoring programs that include an outline of the program objectives, sampling procedures, data-analysis methods, types of equipment and instrumentation, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when measurements exceed 10 CFR Part 20 or administrative levels established by the applicant.

***NRC Evaluation:*** Multiple procedures are referenced in Attachment 1 of the RPP that pertain to this subject and there is a commitment in Section 4.2.10 of the RSP that states that the RPP will include procedures that provide guidance for developing the survey and monitoring plans necessary to evaluate exposure to personnel and concentrations of radioactive material. The DWP states it will perform baseline surveys, workplace monitoring, contamination control monitoring, additional surveys and monitoring as required by RWPs, and final status surveys upon completion of the work. There will also be an environmental monitoring program as discussed in Section 8 of the DWP and waste characterization efforts. In Section 11.4.1 of the DWP, APTIM states that, once the SSSB is sited in the dismantlement area at the ASY, a routine survey schedule and survey frequencies will be established and posted in the PRSO office. Survey areas will include: Control Points, Radiological Work Areas, Uncontrolled Areas

and buffer zones, Personnel break areas, and site perimeter. Staff further note that the contractor has committed to meeting dose limits consistent with 10 CFR 20 (e.g., see Table 5-1 of the RPP) and established Administrative Limits that are significantly less than these limits. Staff consider that this project has sufficient commitments for monitoring in the DWP, RSP, and RPP, and will use RWPs to document survey and monitoring requirements for workers and work areas. NRC staff therefore finds that the DWP satisfies acceptance criterion 2.

3) Design and implement a personnel monitoring program for external occupational radiation exposures that outlines methods or procedures to do the following:
   a. Identify the criteria for worker participation in the program.
   b. Identify the types of radiation to be monitored.
   c. Specify how exposures will be measured, assessed, and recorded.
   d. Identify the type and sensitivity of personal dosimeters to be used, when they will be used, and how they will be processed and evaluated.
   e. Identify the plant's administrative exposure levels or the levels at which actions are taken to investigate the cause of exposures exceeding these levels.

***NRC Evaluation:*** Section 5.1 of the RPP states that internal and/or external dose monitoring will be required for individuals who can reasonably be expected to receive a dose greater than 10 percent of the maximum permissible dose. Section 12 of the RPP states that APTIM will require monitoring of an individual's external radiation dose for all workers entering an RCA, although short stay visitors and vendors may be exempted by the PRSO. APTIM will require external dose monitoring for occupationally exposed individuals as deemed necessary to demonstrate compliance with APTIM administrative limits and federal regulations (documented in Table 5-1 of the RPP). Section 5.4 of the RPP states that trained radiation workers entering an SSSB RCA will wear dosimetry issued by APTIM as specified on the applicable RWP. A National Voluntary Laboratory Accreditation Program (NVLAP) accredited dosimetry service will be used to provide dosimetry. Section 5.10 of the RPP states that personnel and environmental dosimeters will be exchanged on a quarterly basis unless the PRSO and project CHP determine that a more frequent exchange is necessary. Finally, staff notes that APTIM has a procedure, "APTIM-SSSB-015, Personnel Monitoring," which, APTIM states, has directions for monitoring of personnel.

NRC staff finds the commitments in the RPP to be adequate to satisfy criterion 3.

4) Design and implement a personnel monitoring program for internal occupational radiation exposures based on 10 CFR 20.1201, "Occupational Dose Limits for Adults"; 10 CFR 20.1204, "Determination of Internal Exposure"; and 10 CFR 20.1502(b) that outlines methods or procedures to do the following:
   a. Identify the criteria for worker participation in the program.
   b. Identify the type of sampling to be used, the frequency of collection and measurement, and the minimum detection levels.
   c. Specify how worker intakes will be measured, assessed, and recorded.
   d. Specify how the data will be processed, evaluated, and interpreted.

e. Identify the plant's administrative exposure levels or the levels at which actions are taken to investigate the cause of exposures exceeding these levels.

***NRC Evaluation:*** As stated in Section 5.5 of the RPP, monitoring for internal exposure is not anticipated during the SSSB project. Although not anticipated, work will be continually evaluated by health physics and internal dose monitoring will be required on an as needed basis. Personnel whose estimated intake may exceed 200 DAC-hrs over the course of a year (or the project duration if less than a year) or up to 12 DAC-hrs in a week shall be monitored for intake by bioassay or DAC-hr tracking. If airborne radioactive material hazards exist, the use of breathing zone (BZ) air sampling for the purpose of assigning internal exposures may be used by DAC-hr tracking rather than bioassay, which is the preferred technique for accuracy. Dose will not be assigned unless BZ samples indicate the present of airborne contamination in excess of 10 percent of the DAC (accounting for respirator protection factors, if worn). In Section 13 of the RPP, APTIM further states that internal monitoring will be performed by DAC-hr tracking or bioassay at the discretion of the PRSO as described in procedure APTIM-SSSB-017, "Bioassay Sampling." Internal dose assessments will be conducted in accordance with procedure APTIM-SSSB-019, "Internal Dose Assessments." As stated in Section 7.3 of the DWP, work will be routinely evaluated by use of work area monitoring including contamination surveys and air monitoring to determine if internal dose assessment by in-vitro or in-vivo monitoring is required. If personnel are part of a respiratory protection program for airborne radiological hazards, a bioassay program or DAC-hr tracking system will be implemented to document internal exposure to personnel. Also, unplanned exceedance of administrative dose limits listed in Table 5-1 of the RPP would be investigated by the PRSO and will be entered into the APTIM Radiological Improvement Report program for corrective action tracking.

NRC staff find these commitments for internal exposure monitoring satisfy acceptance criterion 4.

5) Design and implement an air sampling program in areas of the plant identified as potential airborne radioactivity areas to conduct airflow studies and to calibrate and maintain the airborne sampling equipment in accordance with the manufacturers' recommendations.

***NRC Evaluation:*** As stated in Section 13 of the RPP, significant internal exposure risks are not expected to be encountered during activities associated with the SSSB project. However, air monitoring for airborne particulate will be performed when radiological activities with the potential to disturb contaminated material or generate dust occur. Requirements for air monitoring, including action levels, frequency, sample methods, and sample analysis will be found in procedure APTIM-SSSB-016, "Air Sampling and Analysis," job-specific RWPs, and site-specific work instructions. An air sampling program will be implemented when an evaluation of potential airborne radioactive material hazards indicates the presence of airborne contamination in excess of 10 percent of the DAC. NRC staff have previously discussed APTIM's negative air flow commitments in Section 9.6 of this TER.

NRC staff consider these commitments adequate to satisfy acceptance criterion 5.

6) Implement additional procedures, as [described in] 10 CFR Part 20 and the ISA summary, to control exposure to airborne radioactive material (e.g., control of access, limitation of exposure times to licensed materials, and use of respiratory protection equipment).

***NRC Evaluation:*** While the project does not require an ISA, the RPP, in Section 17, includes commitments to establish the SSSB work site as a controlled area with site security and staging areas for the planned work, including vessel access, materials storage areas, project offices, and crew facilities. The site will be controlled to limit public access and to provide the necessary work areas to support the decommissioning and dismantlement of the SSSB. Section 18 of the RPP states that radiological areas will be posted in accordance with 10 CFR 20.1902 and Table 18-1 of the RPP, which includes radiation areas, contamination areas, and airborne radioactivity areas. In Section 19 of the RPP, APTIM commits to developing work plans, monitoring the performance of radiological work, training working on radiation hazards, and providing personnel with work instructions and/or RWPs that include the radiological protection measures necessary for save and compliant completion of the job. The performance of radiological work will be governed by an RWP or equivalent document. The RWP will include the tasks to be performed, an entry/exit log, the radiological survey and monitoring requirements, protective clothing requirements (including respiratory protection if needed), and routine and special dosimetry requirements. Section 15 of the RPP discusses contamination control measures which includes work area setup controlling the flow of personnel, equipment, and supplies into and out of areas with radiological hazards. Control points and/or contamination reduction zones, and support zones will be established to maintain control and limit access to and from RCAs. Engineering controls (such as containment devices, fixatives, and general and local air filtering ventilation) will be in place and administrative controls (such as access control and PPE use) will be used in accordance with plant procedure APTIM-SSSB-005, “Selection and Use of Personnel Protective Equipment.”

As discussed in Attachment 3 to the DWP, “SSSB Project Environmental Monitoring Plan,” TLDs or optically stimulated luminescence devices (OSLs) will be used to monitor direct exposure at the site perimeter fencing and air samplers will be established at roughly each compass point along the site fencing during the dismantlement work as preliminarily shown in Appendix A to Attachment 3 of the DWP. This equipment will be used to track/trend environmental impacts and assess public exposures from site operations.

NRC staff find the commitments in the RPP and Environmental Monitoring Plan adequate to satisfy criterion 6.

7) Conduct a contamination survey program in areas of the [facility] most likely to be radiologically contaminated; the program must include the types and frequencies of surveys for various areas of the plant and the action levels and actions to be taken when contamination levels are exceeded.

***NRC Evaluation:*** Section 14 of the RPP states that routine surveys will be conducted at frequencies and locations dependent on the work activities performed to monitor working conditions and identify any changing radiological conditions. Contamination surveys will be performed at all control points at a frequency (daily or weekly) dependent on the contamination potential in the work area as determined by the PRSO. Weekly surveys of the general radiological work areas as well as contamination surveys of egress routes, personnel break areas, and the count room will also be performed. Monthly and/or quarterly surveys of general office spaces and support areas and site perimeters will be performed as verification of project controls. Methods used to perform these surveys include air sampling, removable contamination surveys (smears), beta surface scanning, dose rate measurement, collection and analysis of samples, source dose modeling, and general observations. In addition to routine workplace monitoring, APTIM will also be performing baseline surveys prior to siting the SSSB, characterization surveys to ensure the proper radiological postings and controls are established, surveys for unrestricted release of M&E, and environmental monitoring of the general area around the project site. Performance and documentation of radiological surveys will be performed per APTIM-SSSB-009, “Performance of Radiological Surveys.”

In Section 15 of the RPP, APTIM states that an area shall be identified and controlled as a Contamination Area when removable contamination levels exceed 1,000 disintegrations per minute (dpm)/100 square centimeters ($cm^2$) of beta/gamma-emitting radionuclides or 20 dpm/100 $cm^2$ of transuranic alpha-emitting radionuclides. An action level of 500 dpm/100 $cm^2$ has been established for removable activity in non-radiological controlled areas and 50 times the removable contamination limit in a controlled area in which the PRSO will initiate an investigation as to the source of contamination in the applicable area. Any unplanned contamination event above the action levels will be investigated by the PRSO and will be entered into the APTIM Radiological Improvement Report program for corrective action tracking.

In Section 11.4.1 of the DWP, APTIM states that routine surveys will be conducted at frequencies and locations dependent on the work activities performed. Contamination surveys will be performed of all control points at a frequency (daily or weekly) dependent on the contamination potential in the work area as determined by the PRSO. The purpose of the surveys is to ensure contamination is not tracked out of controlled areas. Weekly surveys will be performed at general radiological work areas as well as contamination surveys at egress routes, personnel break areas, and the count room. Monthly and/or quarterly surveys of general office spaces and support areas and site perimeters will be performed as verification of project controls.

NRC staff finds the commitments in the DWP and RPP adequate to satisfy criterion 7 because APTIM has described a survey program focused on those areas most likely to be radiologically contaminated, and described survey frequencies and actions when action levels are exceeded.

8) Implement the facility’s corrective action program when the results of personnel contamination monitoring exceed the applicant’s administrative personnel contamination levels.

***NRC Evaluation:*** APTIM states in Section 15 of the RPP, “any personnel contamination event will be evaluated and entered in the APTIM Radiological Improvement Report program for corrective action tracking.” NRC staff find this adequate for compliance with acceptance criterion 8.

9) Implement the facility’s corrective action program when any incident results in either unplanned occupational exposures exceeding the facility’s administrative limits or unplanned airborne contamination exceeding the applicable concentration in Appendix B to 10 CFR Part 20 for one week. Note that applicants utilizing soluble uranium may be more restricted by the soluble uranium intake limit in 10 CFR 20.1201(e) than the values in Appendix B to 10 CFR 20.

***NRC Evaluation:*** In Section 10.6.1 of the DWP, APTIM notes that once any noncompliant materials/conditions or deficiencies have been identified by any individual, they are responsible for stopping that activity immediately and formally conveying its existence to management and/or the Contractor Quality System Manager. Existence of the deficient condition will be documented as either a nonconformance or variance. The project team will use standard APTIM procedures and forms for tracking and documenting the non-compliances from identification through acceptable corrective action. Activities or processes that are found to be noncompliant are documented through the corrective and preventive action process. An analysis of the root cause of the deficiency will be identified through a process of reviewing the work plan, the condition(s) encountered, interviewing appropriate personnel, reviewing work procedures and documentation, and obtaining feedback from NAVSEA, project management, and subcontractor(s), as needed.

Also, in Section 13 of the RPP, APTIM states that all air samples will be evaluated, and any elevated airborne activity investigated. This includes any air sample exceeding 10% of the DAC in an uncontrolled area, 30% of the DAC (i.e., ~12 DAC-hours/week) in a controlled area not posted as an airborne radioactivity area and any samples exceeding 10 DAC in an airborne radioactivity area where respiratory protection is worn. Any unplanned airborne activity event will be investigated by the PRSO and will be entered into the APTIM Radiological Improvement Report program for corrective action tracking.

NRC staff find these commitments consistent with acceptance criterion 9.

10) Use equipment and instrumentation with sufficient sensitivity for the type or types of radiation being measured and calibrate and maintain equipment and instrumentation in accordance with the manufacturers’ recommendations or applicable ANSI standards.

***NRC Evaluation:*** In Section 7.7 of the DWP, APTIM provides a listing of typical instruments that will be used for the SSSB dismantlement along with their sensitivities. It further states that all portable survey instruments will be calibrated on an annual basis and procedures for calibration, maintenance, accountability, operation, and quality control (QC) of radiation

detection instruments will be implemented per ANSI standards ANSI N323-1997 and ANSI N42.17A-2003, *American National Standard Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Normal Environmental Conditions.* In Section 16 of the RPP, APTIM states that, it has procedures for instrument calibration and maintenance, general operations of instruments, and quality assurance (QA)/QC of radiation survey instruments. As a data quality objective, the minimum detectable activities (MDAs) for instruments will be set to the extent practical to be equal or less than 50 percent of the applicable guideline value. Table 16-1 includes a listing of instruments anticipated for the project, radiation detected, estimated MDC of the instrument, and its use.

NRC staff find the commitments along with the instruments and sensitivities listed in Tables 7-1 of the DWP and 16-1 of the RPP to be consistent with acceptance criterion 10.

11) Establish policies to ensure that equipment and materials removed from restricted areas to unrestricted areas are not contaminated above the release levels presented in Appendix A, "Acceptable Surface Contamination Levels," to Regulatory Guide 8.24.

***NRC Evaluation:*** In Section 15 of the RPP, APTIM states that equipment, materials, and tools shall not be removed from a posted RCA without being surveyed for release. In general, tools, equipment, and materials will be released provided there is no detectable activity, which means the measured radioactivity is not statistically different than background variations when determined using instrumentation that has the sensitivities listed in Table 15-1 of the RPP. Staff notes that Table 15-1 is consistent with Inspection & Enforcement (IE) Circular No. 81-07, "Control of Radioactively Contaminated Material," as well as being a subset of limits found in Appendix A of Regulatory Guide 8.24. Staff finds this commitment adequate to meet criterion 11 of the acceptance criteria.

12) Leak test all sealed sources consistent with direction provided in Appendix C, "Leak Test Requirements," to Regulatory Guide 8.24 or the applicable regulations for the materials involved (e.g., 10 CFR 31.5(c)(2) has direction for leak testing of certain byproduct devices).

***NRC Evaluation:*** APTIM, in Section 21.1 of the RPP, states that leak tests will be done upon receipt and every 3 months for alpha-emitting non-exempt sealed sources and every 6 months for beta/gamma-emitting non-exempt sealed sources. Leak testing will consist of collecting a smear sample collected on the source (encapsulated sources only) or the source storage container of electroplated sources and counting the smear. The smear counting instrument will be able to detect less than 0.005 microcuries of activity. If a source is found to be leaking, the source will be isolated, contained (e.g., bagged), and the immediate area surveyed in accordance with APTIM-SSSB-008 for damaged sources. Proper notification (as described below) will be made, as applicable, and recovery actions performed to ensure no spread of contamination. The source will be removed from service and properly dispositioned.

NRC staff find the commitments in the RPP adequate for leak testing of sealed sources comparable to the guidance in Appendix C of Regulatory Guide 8.24, and consistent with acceptance criterion 12.

13) Establish and implement an access control program that ensures that (1) signs, labels, and other access controls are properly posted and operative, (2) restricted areas are established to prevent the spread of contamination and are identified with appropriate signs, and (3) step-off pads, change facilities, protective clothing facilities, and personnel monitoring instruments are provided in sufficient quantities and locations.

***NRC Evaluation***: As has been previously discussed, Section 17 of the RPP states that the SSSB work site will be established as a controlled area with site security and staging areas for the planned work. It will be controlled to limit public access. In Section 18 of the RPP, APTIM commits to posting of Radiological areas as required in 10 CFR 20.1902 and as shown in Table 18-1 of the RPP. In Section 15 of the RPP, APTIM states that a key component of contamination control will be the identification and establishment of posted work areas to properly communicate the radiological hazards. Control points and/or contamination reduction zones and support zones will be established to maintain control and limit access to and from posted RCAs. The support zone will include controlled access points/radiological control points into and from the contamination reduction zone through which all personnel and equipment and materials will pass. It further states that all equipment, materials, and tools will be surveyed prior to being removed from a posted RCA. Control points will be of adequate size and have support facilities as necessary for the proper flow of personnel, equipment, and materials. This includes areas for the selection, inspection, and donning of PPE, staging of equipment and materials as wells as adequate space for the safe doffing of PPE when exiting. Frisking stations will also be set up at the control point for monitoring personnel, equipment and materials when exiting a controlled area. NRC staff find the commitments in the RPP adequate to satisfy criterion 13.

14) Establish a reporting program that is consistent with the requirements of 10 CFR Part 19 and 10 CFR Part 20.

***NRC Evaluation***: While APTIM is not an NRC licensee, the NRC is providing technical support to NAVSEA. In Section 7 of the DWP, APTIM states that emergency response is an integral part of its RP program. This is detailed in APTIM procedure APTIM-SSSB-002, Emergency Response, and covers 10 CFR 20, Subpart M, “Reports,” and will be covered in detail as part of radiation worker training. Specifically, it addresses the response and notification requirements for incidents including personnel injury, radiological spills, personnel over-exposure and off-scale dosimetry, loss or theft of radioactive material, fire in RCAs, and releases to the environment and the public. Notification requirements are specified in the procedure and will include both the NRC and NAVSEA. The NRC and NAVSEA will also be included in incident reporting to other regulatory or government entities such as non-radiological incidents. All reportable incidents including any as outlined in the DWP and RPP will be included in the APTIM Radiological Improvement Report for corrective action tracking. In Section 5.9 of the RPP, APTIM states that personnel exposure records will be generated and maintained in

accordance with 10 CFR 19.13, “Notices and Reports to Individuals.” NRC staff find these commitments sufficient to satisfy criterion 14.

### 2.7.8. Control of Radiological Risk Resulting from Accidents

***NRC Evaluation:*** This section of the NUREG-1520, Chapter 4 acceptance criteria is based on 10 CFR 70, Subpart H, “Additional Requirements for Certain Licensees Authorized To Possess a Critical Mass of Special Nuclear Material” and is normally used to evaluate a licensee’s ISA and equipment and procedures specified therein to limit radiological risk to workers and the public. While ISAs are only required for fuel cycle facilities which is not a category that the SSSB falls into, APTIM will have an APP and will train personnel who may respond to radiological emergencies on the plan to ensure adequate accident response.

### 2.7.9. Additional Program Commitments

***Acceptance Criteria:***

1) Maintain records of the RP program (including program provisions, audits, and reviews of the program content and implementation), radiation survey results (air sampling, bioassays, external exposure data from monitoring of individuals, internal intakes of radioactive material), results of corrective action program referrals, RWPs, and PSEs.

***NRC Evaluation:*** Section 24 of the RPP states that records relating to radiological characterization, radiation and contamination control (e.g., instrumentation, surveys, logs, air sample results, environmental sample results, and RWPs), training personnel dose, waste characterization, unconditional release of material and equipment, self-assessments, management reviews, audits, radiological occurrences, corrective actions, and other responses to such findings or incidents will be retained by APTIM as part of the project record. Records will be maintained for durations specified by contractual, APTIM, permit, and regulatory requirements. APTIM states in Section 27 of the RPP that PSEs are not permitted on this project. NRC staff find the commitments for records in the RPP are sufficient to satisfy criterion 1.

2) Establish a program to report to the NRC, within the timeframe stated in regulations, incidents specified in 10 CFR 20.2202, “Notification of Incidents,” and safety significant events specified in 10 CFR 70.74. Refer reportable incidents or events to the facility’s corrective action program and report to the NRC both the corrective action(s) taken (or planned) to protect against a recurrence and any proposed schedule to achieve compliance with applicable license conditions.

***NRC Evaluation:*** As has been previously discussed, APTIM states in Section 7 of the DWP that it will use an emergency response procedure, “APTIM-SSSB-002, Emergency Response,” which includes reporting to the NRC and NAVSEA. This procedure will incorporate reporting of incidents as outlined in Subsection M of 10 CFR 20 which includes “Notification of Incidents.” It

further states that all reportable incidents, including any as outlined in the DWP and RPP, will be included in the APTIM Radiological Improvement Report for corrective action reporting. NRC staff find APTIM's commitments for reporting and inclusion in its corrective action system adequate to satisfy criterion 2.

3) Prepare and submit to the NRC an annual report of the results of individual monitoring, as described in 10 CFR 20.2206(b). Establish a program that will assure shipment and receipt of radioactive materials consistent with regulations in 10 CFR 20, 10 CFR 71, 49 CFR, and others, as applicable. This includes having (a) qualified personnel performing these operations, (b) procedures to implement the program and generate and maintain appropriate records, and (c) a supporting QA function.

***NRC Evaluation:*** As previously discussed, APTIM has clarified in Section 7 of the DWP that it will make the reports described in 10 CFR 20, Subpart M, to NAVSEA and the NRC. Subpart M includes the annual report of individual monitoring as described in 10 CFR 20.2206(b). Section 22 of the RPP states that a Waste Transportation and Disposal Plan will be established to detail procedures for shipping and transportation of radioactive material. Also, Section 9 of the DWP describes the Waste Management Program for the SSSB project. It states that all waste generated during the decommissioning of the SSSB will be managed in accordance with all applicable federal and state laws and applicable procedures. A Waste Management Plan will be prepared to address the characterization, including sorting and sizing of waste to meet the disposal site waste acceptance criteria (WAC), waste profile generation for different waste streams being generated, and packaging of waste streams. APTIM states that the Waste Management Plan will incorporate measures taken in order to meet disposal site WAC and processing to meet applicable state and federal disposition requirements. The Waste Transportation and Disposal Coordinator will have primary responsibilities for supervising activities associated with the transportation and disposal of radioactive, hazardous, mixed, and nonhazardous wastes and other materials that will be transported off the project site. This individual will coordinate decommissioning activities with the PM and SM and is responsible for verifying that waste transportation, disposal, and documentation requirements are followed. APTIM states in Section 6.2.4 of the DWP that the Waste Transportation and Disposal Coordinator shall have current DOT and RCRA waste training and will hold Certified Hazardous Materials Manager certification or equivalent. Finally, Section 10.3 of the DWP states that a QA program will be established to address basic elements such as: commitment to quality through the approved project DWP, submittals, project quality meetings, tests/inspections, surveillance and audits, documentation, and notification of changes and/or noncompliance. Section 10.2.2.8 of the DWP describes the Waste Transportation and Disposal Coordinator's responsibilities within the QA program.

NRC staff find the commitments in the DWP adequate to satisfy acceptance criterion 3.

### 2.7.10. Radiation Protection Conclusions

The NRC staff find the commitments in the APTIM's DWP, RSP, and RPP adequate, in this case, to ensure the project will have adequate:

Radiation Safety Program
ALARA Program Equivalence
Organization and Personnel Qualifications
Written Procedures
Radiation Safety Training
Ventilation and Respiratory Protection, as applicable
Radiation Surveys and Monitoring
Additional Requirements, as applicable, such as notification of incidents, receiving and shipping packages of radioactive material, transportation, and leak testing of sealed sources.

## 2.8. Radiological Waste Management

Section 9 of the DWP addresses the waste management program for the SSSB. As noted previously, the entirety of the SSSB is to be characterized, dismantled, and segregated based on the expected disposition. It will then be treated, if needed, and dispositioned as either radioactive, hazardous, or mixed waste or for unrestricted release (i.e., cleared from the site). APTIM notes that all radiological and hazardous waste streams will be collected and stored within the confines of the SSSB until transported to the disposal facility. During the early stages of the project and prior to the initiation of LLRW-generating activities, an LLRW storage area will be established within the SSSB. The area will accommodate several IMCs. Packages of hazardous or low-level mixed waste (LLMW) will not be stored for periods exceeding 90 days so that a RCRA storage permit is not required.

Packaged waste materials will be off-loaded from the SSSB and either placed directly on transport conveyances or staged for shipment in the SSSB Dismantlement and Survey area. The majority of the waste will be shipped to Waste Control Specialists in Andrews, TX which will receive all the Class A LLRW and LLMW streams generated from dismantlement of the SSSB. APTIM anticipates non-radiologically contaminated materials will either be sent to ASM Recycling in Mobile, AL, or the Chastang Landfill in Mt. Vernon, AL. APTIM acknowledges that preexisting liquid waste streams may be present within the SSSB. Any liquids collected or generated will be controlled to minimize the potential for migration outside of the specified containment boundaries. APTIM states that liquids will be collected in appropriate containers, sampled for radiological and/or hazardous constituents, and managed and disposed of accordingly. Section 9.6 of the DWP describes the anticipated quantities of solid, liquid, and mixed radiological wastes that APTIM anticipates as well as the various disposition methods expected.

Packaged waste materials will be lowered from the SSSB to the project site for subsequent placement onto the transport vehicle. Further waste packaging, sizing, and containerization will

take place in the CS. Bulk packaging (IP-1 bags, intermodals, cargo containers, sea lands, roll-offs, etc.) will, at a minimum, meet the applicable requirements in 49 CFR 173.24, “General Requirements for Packaging and Packages,” and 49 CFR 173.410, “General Design Requirements.” All bulk packaging must be covered and the top completely enclosed with no opening along the sides or top. Bulk packaging must also be tightly sealed to prevent waste from leaking or water from intruding into the package.

Small-volume waste streams such as radioactively contaminated lead paint chips and polychlorinated biphenyl (PCB) containing items, hazardous waste, etc., will be packaged into metal drums, soft sided bags, standard waste containers (e.g., B-12s, or B-25s), and possible combinations of these.

APTIM also states that some M&E on the SSSB will be free of chemicals or radioactivity and will be disposed as nonhazardous and nonradioactive waste. M&E will be characterized to substantiate this designation using MARSAME processes and, if deemed nonhazardous/nonradioactive, will be cleared from the site as such. Staff notes that the radiological clearance criteria the contractor commits to is to be non-detectable with detection limits for instrumentation as discussed in Section 3.0 of the Materials Categorization, Survey, and Release Plan, which are consistent with I&E Circular No. 81-07. APTIM further stated in Section 6.5.1 that it will determine ambient background measurements on all instruments prior to use to establish whether the instrumentation has become contaminated. The daily background will be plotted to track any trends and identify any underlying concerns that may need to be addressed. This will be performed as one of the instrument performance indicators and used to determine if the direct measurement and surface scans have detection sensitivities established for both fixed-point measurements and scans.

All radiologically contaminated waste will be stored in designated areas within the project site. APTIM stated that all waste will be packaged and stored in compliance with applicable RCRA, DOT, and NRC requirements and inspected and documented accordingly.

Finally, APTIM will utilize its electronic data management system to store waste container inspection, inventory, and closure information, to include: the type of waste contained, container type, volume of waste contained, pertinent waste stream profile, date loaded, date disposed, related container or waste material certifications, etc. Each package and/or conveyance will have a unique identifier that is traceable back to the waste origin and will be linked to all chemical and radiological characterization data, package surveys, disposal locations, shipment identification, and shipment/manifest documents, certifications of disposal, and any other federal/state requirements.

APTIM will designate a Waste Transportation and Disposal Coordinator to oversee all waste-related activities. This individual will establish waste management plans, characterization strategies, and generally implement APTIM’s waste management program throughout the project. The APTIM Waste Transportation and Disposal Coordinator is responsible for supervising activities associated with the transportation and disposal of radioactive, hazardous,

mixed, and nonhazardous wastes and other materials that will be transported off the project site for disposal or recycling. The Waste Transportation and Disposal Coordinator shall have current DOT and RCRA waste training and will hold Certified Hazardous Materials Manager certification or equivalent.

***NRC Evaluation: Waste Management***

NRC staff finds APTIM's commitments to its Radiological Waste Program adequate to address the waste anticipated to be generated for dismantlement and disposal of the SSSB.

### 2.9. Quality Assurance Program

The DWP provides APTIM's QA program objectives, including a commitment to follow NUREG 1757 guidance, meeting contract requirements, conducting QA training for the SSSB project team, performing periodic QA audits, and documenting all activities affecting quality. The DWP states that the SSSB QA program will rely upon the APTIM Management System (AMS) to provide the organizational framework and standard procedures and processes from APTIM for the SSSB project. The QA program includes periodic quality meetings, procedural controls, periodic management assessment of work activities, implementation of indoctrination, and training and job qualification programs. The DWP describes APTIMs establishment of quality acceptance criteria, APTIMS' document control program, APTIMs QA controls for measuring and test equipment for the SSSB project, the corrective action program for the SSSB project, APTIMs QA records management system, and APTIMs auditing and surveillance program.

***NRC Evaluation: Quality Assurance Program***

NRC staff reviewed the QA program in Section 10.3 of the DWP for consistency with NUREG 1757, Volume 1, Section 17.6.2 and finds APTIM's commitments to its QA program adequate to address the dismantlement and disposal of the SSSB.

### 2.10. Final Status Survey Plan (FSSP)

NRC staff reviewed the FSS Summary (Attachment 7 to the DWP, Rev. 1), for consistency with NUREG-1757, Volume 2, Section 4.4. APTIM stated that it will have an FSS plan that inspectors can review on site as well.

Consistent with NUREG-1757, Vol 2, Section 4.4, NRC evaluated the FSS Summary for adequacy to ensure the FSS design is consistent with the following criteria:

- Appendix A of NUREG-1757, Volume 2, for general guidance on implementing the MARSSIM approach for conducting FSS,
- Appendix B of NUREG-1757 Volume 2, for guidance on alternative methods of FSS for simple situations,

- MARSSIM Sections 4.4 and 4.6 for classifying areas by residual radioactivity levels and dividing areas into survey units of acceptable size,
- MARSSIM Section 4.5 for methods to select background reference areas and materials,
- NUREG–1505, Chapter 13, for a method to account for differences in background concentrations between different reference areas,
- MARSSIM Section 5.5.2 for statistical tests,
- Appendix A of NUREG-1757, Volume 2, Section A.7.2 for decision errors,
- MARSSIM Sections 6.5.3 and 6.5.4 for selection of acceptable survey instruments, calibration, and operational checkout methods,
- MARSSIM Section 6.7 for methods to determine measurement sensitivity,
- NUREG–1507 for instrument sensitivity information,
- MARSSIM Sections 5.5.2.4, 5.5.2.5, 5.5.3, 7.5, and 7.6 for scanning and sampling,
- MARSSIM Section 7.7 for sample analytical methods (Table 7.2 of Section 7.7 provides acceptable analytical procedural references),
- MARSSIM Sections 7.5 and 7.6 for methods for sample collection,
- MARSSIM Section 5.5.2.6 for survey investigation levels, and
- Appendix G of NUREG-1757, Volume 2 for surveys for special structural or land situations.

***NRC Evaluation: Final Status Survey Plan***

NRC staff reviewed Attachment 7 of the DWP, Rev. 1, the FSS Summary. In general, NRC staff found the survey plan is consistent with MARSSIM methodologies and Appendix A of NURG-1757, Vol 1. The survey unit classifications and area size limitations are consistent with MARSSIM guidance. APTIM will perform baseline surveys using methods consistent with the FSS prior to the placement of the SSSB in the Alabama Shipyard. Data from the baseline surveys will function as background/reference data for the site post SSSB dismantlement, if needed. Because the ASY has no history of this type of radiological work, staff find the approach to establishing reference data adequate. Figure 1 of the FSS Summary shows the preliminary survey unit layout for the site in the shipyard. In their email dated May 10, 2021, (ADAMS Accession No. ML21130A576), APTIM has also confirmed that the survey unit layout will be changed in the field to appropriately address different site media encountered (e.g., hard surface such as concrete vs fine surfaces such as crushed limestone or sanding grit).

APTIM discussed the various potential radiological constituents of concern (PRCOCs) that are expected and that it will utilize the criteria for Co-60 for all non-nuclide specific measurements (the Co-60 criteria are most limiting), which NRC staff finds bounding and adequate. The presumptions as to PRCOCs fractional activities will be verified and adjusted, if needed, during the SSSB characterization (prior to the FSS) and the criteria adjusted, when appropriate. APTIM will use typical handheld gas flow proportional detectors to take gross beta measurements and a large area gas flow proportional detector (floor monitor) to perform scanning measurements. Instruments will be calibrated annually at an off-site facility in accordance with American National Standards Institute Standard N323A-1997, American National Standard, “Radiation Protection Instrumentation, Test and Calibration, Portable Survey Instruments.” Instruments will

be calibrated to Tc-99 (a beta emitter), which is similar in energy and abundance to the beta emissions from Co-60 decay. Any open land areas, sediments, or other media will be scanned using 2" NaI detectors and sampled, as appropriate. All PRCOCs will be analyzed for in any samples with a minimum sensitivity of half of the DSV. The instruments described are typical for performing surveys of these media and NRC staff finds the selection and calibration of instruments to be adequate.

Data collected for each survey unit will be evaluated using either the Wilcoxon Rank Sum statistical test or the Sign statistical test with Type 1 and Type 2 error rates established at 5% ($\alpha = \beta = 0.05$). The number of samples/measurements for each survey unit will be based on Table 5.5 or 5.3 of MARSSIM, as applicable. Direct measurements and scan MDCs will utilize methodologies consistent with MARSSIM and NUREG-1507 accounting for various surface geometries, coverings, and surveyor performance. Also, scanning coverage of surface area in a survey unit will be consistent with MARSSIM survey unit classifications. APTIM does not anticipate any Class 1 survey units, but if measurements greater than the $DCGL_w$ are encountered, it will subdivide the affected survey unit and resurvey consistent with MARSSIM for Class 1 surveys and evaluate any elevated areas per MARSSIM. The investigation levels established for the FSS are consistent with those in MARSSIM.

Rev 1 of the DWP also contained Attachment 6, the "SSSB Project Materials Categorization, Survey, and Release Plan." APTIM used this Attachment to describe how it will release any M&E not dispositioned as radiologically contaminated. The primary consideration are portions of the SSSB which are not expected to be contaminated. APTIM will use a combination of MARSAME and MARSSIM methods. It will take measurements consistent with NUREG-1757 considerations of coverings and perform scanning in each designated survey unit. It will constrain the area of survey units being released to that for Class 2 survey units (<1,000 $m^2$) and take a minimum of 15 systematic measurements in each survey unit consistent with the Sign test, Type 1, and Type 2 error rates of 0.05, and a relative shift of two. They will also scan the survey units for a minimum of 25% of the area. The criteria proposed is to only release the materials if no activity is detected above background assuming a minimum detectable concentration consistent with IE Circular No. 81-07, "Control of Radioactively Contaminated Materials." Samples of any surface coverings or potentially volumetrically contaminated materials will be taken and analyzed to ensure no detectable Co-60 is present with a detection sensitivity of 3 pCi/g.

NRC staff find the methods proposed for the FSS are adequate to demonstrate consistency with 10 CFR 20.1402 and NRC guidance and MARSSIM. The methods proposed for release of M&E are consistent with IE Circular No. 81-07, MARSSIM, and MARSAME.

### 2.11. Physical Security

APTIM's site security program for the SSSB project is described in Section 5.3 of the DWP. This section of the DWP describes a layered physical security and access control system to provide continuous control of radiological material. NRC staff finds the described security system

adequate to provide for security of radiological material in storage, and control of radiological material not in storage consistent with the requirements of 10 CFR 20.1801 and 1802.

### 3. Decommissioning Work Plan Change Control Process

In Section 14 of the DWP, APTIM provided change control criteria for making changes to the DWP. Proposed changes to the DWP must not meet any of the following criteria:

- Result in the potential for significant environmental impacts that have not previously been reviewed.
- Detract or negate the reasonable assurance that adequate funds will be available for decommissioning.
- Decrease a survey unit area classification without providing a minimum 14-day notification before implementing the change.
- Increase the DCGLs and related MDCs for both scan and fixed measurement methods.
- Increase the radioactivity level, relative to the applicable DCGL, at which an investigation occurs.
- Change the statistical test applied to a test other than the Sign test or Wilcoxon Rank Sum test.
- Increase the approved Type I decision error when using Scenario A or the Type II error when using Scenario B.
- Change the approach used to demonstrate compliance with the dose criteria.
- Change parameter values or pathway dose conversions such that the resultant dose is lower than in the approved DWP, if a dose assessment is being used to demonstrate compliance.
- Change the location of any of the decommissioning operations described in the DWP.

***NRC Evaluation:*** **DWP Change Control Process**

NRC staff reviewed the DWP change control process program in Section 114 of the DWP for consistency with NUREG 1700, Appendix B, and finds APTIM's commitments to its DWP change control process consistent with NRC guidance to provide appropriate controls for changes to the DWP for dismantlement and disposal of the SSSB. Changes to the DWP that involve the above criteria will be reviewed, and if appropriate approved by NAVSEA, with input from the NRC in accordance with applicable agreements.

## 4. Conclusion

The NRC staff determine that the DWP, as supplemented, establishes a program for dismantlement and disposal of the SSSB that is consistent with NRC regulations.

Based upon the review above, the NRC staff recommends NAVSEA approval of the DWP, subject to the following commitments previously discussed:

- APTIM will provide updated DWP RCOPCs and their relative abundances based on the results of characterization of representative samples:
    - Include representative sampling of waste
    - Confirm the RCOPCs appropriately capture any potentially significant radionuclides
    - Confirm that the dose contribution from tritium is negligible
- APTIM will monitor effluents to confirm there is no groundwater and no surface water contamination
- APTIM will maintain constant negative pressure ventilation in areas with loose or unpackaged contamination to control possible contaminated particles

## 5. References


- NUREG-1757, “Consolidated Decommissioning Guidance, Volume 1,” Revision 2, September 2006
- NUREG-1575, “Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)”, Supplement 1, January 2009
- NUREG-1520, “Standard Review Plan for Fuel Cycle Facilities License Applications,” Revision 2, June 2015
- NUREG-1700, “Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans”, Revision 2, April 2018
- Inspection Manual Chapter 2565, “Regional Inspection Activities for Naval Reactors Naval Vessels Undergoing Decommissioning”, August 2020