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ENVIRONMENTAL IMPACT STATEMENT/ OVERSEAS ENVIRONMENTAL IMPACT STATEMENT FOR DISPOSAL OF DECOMMISSIONED, DEFUELED EX-ENTERPRISE (CVN 65) AND ITS ASSOCIATED NAVAL REACTOR PLANTS

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Environmental Impact Statement/ Overseas Environmental Impact Statement

Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and Its Associated Naval Reactor Plants

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ES Executive Summary

ES.1 Summary

This document summarizes the Draft Environmental Impact Statement/Overseas Environmental Impact Statement for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and Its Associated Naval Reactor Plants. It provides background on the Naval Nuclear Propulsion Program (NNPP) and describes the purpose and need for the Proposed Action, environmental impacts of the alternatives considered, and the results of the public involvement process. A preferred alternative is identified at the end of this Summary.

ES.2 Introduction

The United States (U.S.) Department of the Navy (Navy) has prepared this Draft Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to evaluate the potential environmental impacts associated with disposal of the decommissioned, defueled aircraft carrier ex-Enterprise (CVN 65) to include its naval reactor plants. Because it is now decommissioned, USS Enterprise is referred to as ex-Enterprise throughout the EIS/OEIS.

The National Environmental Policy Act (NEPA), and the regulations promulgated by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Parts 1500-1508), establish environmental policy, set goals, and provide a means for implementing the policy. The key provision of NEPA requires preparation of an EIS for “major Federal actions significantly affecting the quality of the human environment” (40 CFR Part 1502.3). NEPA ensures that environmental information is available to public officials and citizens before decisions are made and actions are taken (40 CFR Part 1500.1(b)). This EIS/OEIS has been prepared in accordance with NEPA, as amended (42 United States Code [U.S.C.] Section 4321 et seq.), as well as CEQ regulations. The Navy also prepared this EIS/OEIS to comply with Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions*. The Navy is the lead agency for this EIS/OEIS pursuant to 40 CFR Part 1501.5. The U.S. Department of Energy (DOE) is a cooperating agency for this EIS/OEIS, pursuant to 40 CFR Part 1501.6 and Part 1508.5.

ES.3 Background

Ex-Enterprise (Figure ES-1), the first U.S. Navy nuclear-powered aircraft carrier, was commissioned in 1961, operated for over 50 years, and was decommissioned in 2017. Ex-Enterprise has eight reactor plants housed in four reinforced compartments inside the ship. As part of the decommissioning process, the nuclear fuel was removed from the eight reactor plants and handled in accordance with standing NEPA documents for spent naval nuclear fuel (DOE, 1995, 2016; Navy, 1994, 2009). The spent fuel now resides within the DOE Idaho National Laboratory property. Ex-Enterprise is currently stored pier-side at Huntington Ingalls Industries Newport News Shipbuilding in Newport News, Virginia.

Figure ES-1: USS Enterprise

In 1984, the Navy, with DOE as a cooperating agency, prepared the *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants*, which evaluated alternative processes for the disposal of reactor plants from various submarines (Navy & DOE, 1984). In the December 6, 1984, Record of Decision (ROD), the Navy selected a process to dispose of various submarine reactor plants by removing the reactor compartments from the submarines at Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, and sealing them to provide a high-integrity welded steel package meeting Department of Transportation, Nuclear Regulatory Commission (NRC), and DOE safety requirements (Navy, 1984). The alternative selected by the Navy includes transporting each reactor compartment package by barge to the Port of Benton barge slip in Richland, Washington followed by transferring the reactor compartment package to land disposal in Trench 94 (Figure ES-2) at the DOE Hanford Site near Richland, Washington, via multiple-wheel, high-capacity transporter.

In 1996, the Navy, with DOE as a cooperating agency, prepared an EIS, *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants* to evaluate the disposal of reactor plants from cruisers, Ohio-Class submarines, and Los Angeles-Class submarines (Navy & DOE, 1996), hereafter referred to as the 1996 EIS. The Navy signed a ROD on July 3, 1996, extending the reactor compartment disposal program at PSNS & IMF to these classes of ships. The 1996 EIS updated the analysis of reactor compartment disposal from the 1984 EIS for subsequent submarine and cruiser reactor compartment disposals. As of October 2021, the Navy has successfully shipped 138 reactor compartment packages from inactivated, defueled nuclear ships using the process described above.


Figure ES-2: Barge Transport and Reactor Compartment Disposal Trench 94

In 2012, the Navy, with DOE as a cooperating agency, prepared the *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)*, hereafter referred to as the 2012 EA (Navy & DOE, 2012). A Finding of No Significant Impact was signed August 23, 2012, by the Navy and publicly released in August 2012. The 2012 EA extended the established reactor compartment disposal program at PSNS & IMF to include disposal of reactor plants from ex-Enterprise in eight single reactor compartment packages transported to the DOE Hanford Site. Remnant hull sections would be removed and recycled under an existing PSNS & IMF program, as described in the *U.S. Naval Nuclear Powered Ship Inactivation, Disposal, and Recycling Report* (Navy, 2019). This program facilitates cruiser and submarine deconstruction for reactor compartment disposal under the 1996 EIS (Navy & DOE, 1996). Each of the eight single reactor compartment packages would be similar in size and weight to the ex-Long Beach cruiser reactor compartment packages evaluated in the 1996 EIS. This process would not require substantial changes to the infrastructure at PSNS & IMF, the Port of Benton barge slip, the transport road, or Trench 94 at the DOE Hanford Site.

Subsequent to the 2012 EA, the Navy identified additional action alternatives associated with dismantling and disposal of ex-Enterprise as part of a 2014 PSNS & IMF study (Navy, 2014). The study showed the new alternatives, which packaged the reactor compartments at PSNS & IMF in fewer packages, could reduce costs and worker radiation exposure while also improving execution schedule. Separately, the Navy identified available alternatives for dismantlement based on successful and ongoing conventional Navy aircraft carrier dismantlement (by contract at commercial facilities), successful ongoing commercial nuclear power plant decommissioning (by contract with nuclear services companies), and successful dismantlement of a U.S. Army barge (STURGIS) containing a defueled nuclear reactor (by contract with nuclear services companies at commercial facilities). Combining these models, the Navy determined it was feasible for contracted commercial companies to dismantle the entire ex-Enterprise including its naval reactor plants.

ES.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to reduce the Navy inactive ship inventory, eliminate costs associated with maintaining the ship in a safe stowage condition, and dispose of legacy radiological and hazardous wastes in an environmentally responsible manner, while meeting the operational needs of the Navy.

Dismantling and disposing of ex-Enterprise is needed to comply with NNPP statutory responsibilities and Chief of Naval Operations policy for inactive nuclear-powered ships stricken from the Naval Vessel Register. The NNPP, also known as the Naval Reactors Program, was established in 1948 and is a joint DOE and Navy organization with responsibility for all matters pertaining to naval nuclear propulsion from design through disposal. The integrated relationship, authorities, and responsibilities between DOE and Navy for naval nuclear propulsion are specified in EO 12344 and codified in 50 U.S.C. Sections 2511 and 2406. The NNPP mission is to provide the United States with safe, effective, and affordable naval nuclear propulsion plants and to ensure their continued safe and reliable operation through lifetime support, research and development, design, construction, specification, certification, testing, maintenance, and disposal. As required by CEQ regulations (40 CFR Part 1502.14) and Navy regulations (32 CFR Part 775) for implementing NEPA and EO 12114, the Navy must evaluate reasonable alternatives and a No Action Alternative. This EIS/OEIS complies with the CEQ regulations in 40 CFR Parts 1500-1508 (1978, as amended 1986 and 2005), because the Navy began this EIS/OEIS prior to the release of both the current regulations in effect May 20, 2022, and the previous regulations in effect September 14, 2020. Alternatives for the Proposed Action must be technically and economically feasible while meeting the purpose and need and supporting the Navy mission.

ES.5 Scope and Content of the Environmental Impact Statement/Overseas Environmental Impact Statement

CEQ regulations for implementing NEPA (40 CFR Part 1500) provide guidance for considering alternatives to a federally Proposed Action. This guidance requires rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined by the Navy to be reasonable require detailed analysis (see 40 CFR Part 1502.14). Reasonable alternatives are those that meet the purpose and need, meet screening factors, and are practical or feasible from a technical and economic standpoint. Those the Navy determined would not meet the purpose and need or screening factors, or were not practical or feasible, were not carried forward for detailed study.

The Navy has considered all potentially relevant environmental resource areas for analysis in this EIS/OEIS. To comply with NEPA, as well as CEQ, Navy, and DOE regulations, the discussion of the affected environment (e.g., existing conditions) focuses on those resource areas that would potentially be subject to more-than-negligible impacts as a result of the implementation of a given alternative. The level of detail describing a resource corresponds with the anticipated level of potential impact.

Describing the affected environment and analyzing impacts requires a comprehensive and systematic review of relevant literature and data to ensure the Navy uses the best available information for analysis. Each section in Chapter 3 (Affected Environment and Environmental Consequences) describes the data used and the characteristics of the best available data, and provides a general approach to analysis. Each resource section also lists the regulations applicable to that resource, discusses the affected environment and the environmental consequences of implementing the No Action and action alternatives, and summarizes potential impacts.

The Navy assessed potential impacts on eight resource categories in Chapter 3 (Sections 3.1 through 3.8). Table 3.9-1 presents the impacts in each of the resource categories analyzed. The eight resource categories assessed are as follows:

- Public and Occupational Health and Safety
- Hazardous and Radioactive Waste Management
- American Indian Tribal Resources and Treaty Rights
- Socioeconomics and Environmental Justice
- Biological Resources
- Air Quality (including greenhouse gas and climate change)
- Cultural Resources
- Noise

As part of the process of determining environmental consequences, the Navy applies current resource protection measures (e.g., standard operating procedures, management practices, conservation measures) that are integral to the activities covered by the Proposed Action and alternatives. If the analysis identifies potential adverse impacts on the resource from implementing the No Action or action alternatives, the Navy has identified methods and coordinated with federal agencies to minimize or mitigate those impacts, where appropriate and practical. Mitigation measures are discussed at the end of each resource section if applicable and summarized in Section 3.9 (Summary of Potential Impacts on Resources and Impact Avoidance and Minimization).

In accordance with the CEQ Regulations, 40 CFR Part 1505.2, the Navy will sign a ROD that provides the rationale for selecting one of the alternatives.

ES.6 Government and Public Involvement

ES.6.1 Scoping Process

Scoping is an early and open process for developing the “scope” of issues to be addressed in an EIS and for identifying significant issues related to a proposed action. The purpose of public involvement and outreach during the public scoping period of the EIS/OEIS is to (1) notify and inform tribes, stakeholders, and the public about the release of the Proposed Action and the intent of the Navy to prepare an EIS/OEIS, and (2) provide the opportunity for tribes, stakeholders, and the public to submit comments to inform the scope of the project and the environmental analysis.

In an effort to maximize public participation and ensure public input is considered, the Navy conducted public scoping for this EIS/OEIS. A Notice of Intent to prepare an EIS/OEIS was published in the Federal Register (FR) on May 31, 2019. The FR notice can be found in Appendix A (Federal Register Notices). The Notice of Intent announced the public scoping period and the dates, times, and locations of public scoping meetings. Display advertisements were published in 11 local and regional newspapers a total of 54 times from May 31, 2019, through June 23, 2019. The first series of advertisements was published to coincide with the release of the Notice of Intent. A second series was published 10 days before the public meetings, and a third series was published two to five days before the public meetings. A Spanish version of the advertisement was published in a Spanish-language newspaper in the Brownsville, Texas, area. Adjustments were made according to the newspaper’s publication frequency (e.g., daily, semi-weekly, weekly). The Navy sent tribal and stakeholder letters, postcards, and emails, and distributed news releases and public service announcements, to notify the public of the scoping period and public scoping meetings. A project website was established to provide the public with project information and to accept comments electronically. The Navy solicited public comments during the scoping period from May 31, 2019, through July 15, 2019.

The Navy held four public scoping meetings from June 18, 2019, through June 27, 2019, in Newport News, Virginia; Brownsville, Texas; Bremerton, Washington; and Richland, Washington. Each public meeting was held in an open-house-style format, with informational poster stations staffed by Navy representatives and an opportunity to provide written or oral comments.

As a result of comments received during the public scoping period, the Navy added the Mobile, Alabama area to the Study Area for the EIS/OEIS. In compliance with NEPA, the Navy held an additional public scoping period from August 12, 2020, through September 11, 2020. Display advertisements were published three times in the regional newspaper in Mobile, Alabama, and the Navy sent tribal and stakeholder letters, postcards, and emails, and distributed a news release, to notify the public of the reopened scoping period. Project information, including an updated fact sheet booklet and poster displays, were posted on the project website. Due to federal and state guidance and measures in response to the coronavirus disease of 2019 (COVID-19), the Navy was unable to hold an in-person public scoping meeting in Mobile, Alabama. To assist the public, the Navy established a project email address and responded to questions from the public. The public was able to submit comments by mail or the project website during the 30-day scoping period. The Navy received 120 comments during the 2019 public scoping phase and 34 comments during the 2020 public scoping phase. Of those, 1 comment was received from tribes, 4 from federal agencies, 10 from state and local agencies, 5 from non-governmental organizations, and 134 from the public. Appendix B (Public Involvement and Distribution) contains a brief description of the comments received during both scoping periods.

ES.6.2 Draft Environmental Impact Statement/Overseas Environmental Impact Statement

The Draft EIS/OEIS was released for public review on August 19, 2022, for a 45-day public comment period with the publication in the FR of a Notice of Availability of the Draft EIS/OEIS. A Notice of Public Meetings was published in the FR on August 19, 2022. Virtual public meetings are scheduled to be held on September 20 and 22, 2022. The purpose of public involvement and outreach during the public review and comment period of the Draft EIS/OEIS is to (1) notify and inform tribes, stakeholders, and the public about the Proposed Action and the release of the Draft EIS/OEIS; and (2) provide the opportunity to comment on the Draft EIS/OEIS. Display advertisements will be published in local newspapers to advertise the notice of availability of the Draft EIS/OEIS, the public meetings, and the public review and comment period.

This Draft EIS/OEIS was prepared to assess potential impacts of the Proposed Action on the environment. This Draft EIS/OEIS assessed potential impacts of all the alternatives (the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 [Preferred Alternative]).

ES.6.3 Final Environmental Impact Statement/Overseas Environmental Impact Statement and Record of Decision

The Final EIS/OEIS public review and 30-day wait period will begin with the publication of a Notice of Availability in the FR. The intent of public involvement efforts during the Final EIS/OEIS phase of the NEPA process is to notify tribes, stakeholders, and the public of the availability of the document, the 30-day wait period, and the next steps in the NEPA process.

The ROD phase of the NEPA process follows the Final EIS/OEIS 30-day wait period and includes selection of an alternative by the Office of the Assistant Secretary of the Navy.

A Notice of Availability of the ROD will be published in the FR. The intent of public involvement efforts during this phase of the NEPA process is to notify tribes, stakeholders, and the public of the availability of the ROD and where it can be accessed.

ES.7 Proposed Action and Alternatives

The Navy Proposed Action is to dispose of ex-Enterprise, including its naval reactor plants. Disposal includes dismantling and recycling the remnant hull sections at a government facility or through a contract with an authorized commercial facility in accordance with applicable federal, state, and local laws, and removing and packaging the reactor plants or components for transportation and disposal as low-level radioactive waste (LLRW) at an authorized radioactive waste facility or facilities.

Alternatives that incorporate the current reactor compartment disposal process at PSNS & IMF would first require partial dismantlement by removing portions of ex-Enterprise outside of reactor compartments at a commercial facility. An additional alternative (Alternative 3 [Preferred Alternative]) under consideration is for the entire ex-Enterprise, including its naval reactor plants, to be dismantled at a commercial facility. Materials that are not required to be controlled as radioactive would be properly disposed of or recycled. Radioactive materials would be packaged and shipped as radioactive waste to licensed commercial LLRW disposal sites, or to DOE radioactive waste disposal sites, if commercial sites are not available or practical. Alternative 3 (Preferred Alternative) is modeled after successful and ongoing conventional Navy aircraft carrier dismantlement by contract at commercial facilities; successful and ongoing commercial nuclear power plant decommissioning by contract with nuclear services companies; and the successful dismantlement of a U.S. Army barge STURGIS containing a defueled nuclear reactor by contract with nuclear services companies at commercial facilities. Several civilian, land-based, nuclear power plants, which are larger than Navy aircraft carrier reactor plants, have successfully been dismantled and disposed of by the commercial nuclear services industry.

The Navy has identified Alternative 3 – Commercial Dismantlement as the preferred alternative for the following reasons:

- The Navy has a strong operational focus in the Pacific region, and the PSNS & IMF work supporting the operational nuclear fleet is vital to the Navy's continued mission. As a result of growing workload due to a higher fleet operational tempo and capacity shortages across all of the Navy public shipyards, PSNS & IMF is challenged to execute their current and projected workload with existing and planned facilities. Leveraging options to perform ex-Enterprise disposal at commercial facilities is advantageous to the Navy and allows PSNS & IMF to prioritize the limited public shipyard infrastructure and workforce for active fleet maintenance.
- The workforce of the public shipyards of the Navy has been under tremendous pressure to execute their primary mission of maintaining the operational fleet. Commercial dismantlement of ex-Enterprise would allow the Navy to keep the specially trained and qualified PSNS & IMF workforce focused on high-priority fleet maintenance work and submarine inactivations that are already part of PSNS & IMF workload.
- Whether or not PSNS & IMF is assigned ex-Enterprise reactor compartment package availability, the planned workload at PSNS & IMF, plus anticipated growth, exceeds the existing workforce capacity identified in the latest 10-year workload projection.

- The environmental consequences identified for the three action alternatives are comparable, and analysis of commercial dismantlement actions in this EIS/OEIS concluded that commercial dismantlement actions would result in no significant impacts.
- The Navy is continually seeking ways to minimize costs and ensure that all work is completed in the most environmentally safe and cost-effective manner possible. Based on information about the known PSNS & IMF workload, the reactor compartment packaging alternatives would schedule the earliest completion of ex-Enterprise disposal between the years 2030 and 2040. Commercial dismantlement is estimated to be completed sooner and at a lower cost.

See Section 2.4 (Preferred Alternative) for a more detailed discussion of the reasoning for identifying Alternative 3 as the preferred alternative. While summarized below, the components of each alternative are presented in detail in Table 2-1.

ES.7.1 No Action Alternative

Under the No Action Alternative, ex-Enterprise would not be dismantled or disposed of and would be placed in waterborne storage for an indefinite time at its current location in Newport News Shipbuilding in Newport News, Virginia. This alternative would include maintenance and inspection work to prepare the ship for indefinite waterborne storage in a safe and environmentally acceptable manner.

ES.7.2 Alternative 1

Alternative 1 addresses a modification to the process described in the 2012 EA (Navy & DOE, 2012). The alternative would include towing the entire ex-Enterprise from Newport News Shipbuilding, along the coastline to an authorized commercial dismantlement facility in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama, where it would be partially dismantled by removing areas of the ship outside of reactor compartments, leaving a propulsion space section (about one-third of the aircraft carrier's original weight and length). The dismantlement work would be managed under Navy contract process. The propulsion space section, which contains the eight defueled reactor plants, would then be transported by heavy-lift ship around South America to PSNS & IMF in Bremerton, Washington, for further dismantlement and disposal. Upon arrival, PSNS & IMF would construct eight single reactor compartment packages for disposal at the DOE Hanford Site, following the established Navy program. Reactor compartment packages (Type B packages as defined by the NRC in 10 CFR Part 71.4) are constructed from heavy steel, are welded to meet stringent integrity requirements, and meet all applicable federal requirements for transportation of radiological material.

A containment structure would be built around the reactor compartments, enclosing them to form the packages (approximately 36 feet (ft.) L x 40 ft. W x 47 ft. H, and weighing 1,651 tons), similar in concept to past cruiser reactor compartment packaging. Reactor compartment packages would be transported by barge via the current program transport route to the Port of Benton barge slip on the west bank of the Columbia River at Richland, Washington. Each package would then be loaded onto multiple-wheel high-capacity transporters and hauled to Trench 94 at the DOE Hanford Site. Trench 94 is situated near the center of the DOE Hanford Site in the Central Plateau region and is approximately 1,600 ft. by 350 ft.

ES.7.3 Alternative 2

Partial dismantlement of ex-Enterprise at an authorized commercial facility under Alternative 2 would be the same as described under Alternative 1. The dismantlement work would be managed under the Navy contract process. However, under Alternative 2, the four conjoined pairs of reactor compartments would not be separated at PSNS & IMF. Instead, PSNS & IMF would construct and transport four dual reactor compartment packages (approximately 71 ft. L x 40 ft. W x 47 ft. H, and weighing 3,304 tons) to be disposed of at Trench 94 at the DOE Hanford Site near Richland, Washington.

Each of the four reactor compartment packages of Alternative 2 would be transported by a barge capable of handling the larger dual reactor compartment packages via the current transport route from PSNS & IMF to the Port of Benton barge slip at Richland, Washington. Each package would be transported to the DOE Hanford Site via a multiple-wheel high-capacity transporter similar to Alternative 1.

This alternative would require modifications to the Port of Benton barge slip and improvements to the transport route to Trench 94 at the DOE Hanford Site due to the heavier weight and larger size of the dual reactor compartment packages. Modifications would involve excavation and fill to allow the widening of the barge slip, inland pile driving and concrete work, and improving portions of the transport route.

ES.7.4 Alternative 3 (Preferred Alternative)

Alternative 3 (Preferred Alternative) includes towing the ex-Enterprise from Newport News Shipbuilding to an authorized commercial dismantlement facility in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama and contracting the complete dismantlement of the ship by an authorized ship dismantlement contractor. Dismantlement would be managed under a Navy contract process. Under this alternative, the contractor would prepare reactor plant dismantlement and disposal planning documents to conform with NRC standards. The Navy envisions contractually invoking NRC standards and obtaining NRC oversight via an interagency support agreement. The Navy would retain regulatory authority and contractually support use of the NRC requirements. The NRC would review project planning and engineering documents, conduct oversight of project execution, and provide the Navy recommendations for enforcement with the Navy's dismantlement contractor. The reactor plants and other LLRW from the ship would be packaged and disposed of as LLRW in accordance with applicable local, state, and federal laws.

Dismantlement of ex-Enterprise at an authorized commercial dismantlement facility includes disassembly of the eight defueled reactor plants for packaging into several hundred small containers. As applicable, waste transportation and other aspects of the proposed dismantlement would be conducted in accordance with applicable NRC, Department of Transportation, and DOE regulations.

There are suitable LLRW waste facilities available for radioactive waste produced by commercial dismantlement of ex-Enterprise. Non-radioactively contaminated portions of the ship would be recycled or disposed of in accordance with applicable local, state, and federal laws. All active, NRC agreement state-licensed waste facilities and the DOE LLRW waste facility that are being considered are listed below:

- Waste Control Specialists, LLC – Andrews, Texas
- EnergySolutions – Clive, Utah
- The DOE Savannah River Site – Aiken, South Carolina

This alternative is based on successful and ongoing conventional Navy aircraft carrier dismantlement by contract at commercial facilities, successful ongoing commercial defueled reactor plant dismantlement by contract with radiological service companies, and the successful dismantlement of a U.S. Army barge (STURGIS) containing a defueled nuclear reactor by contract with nuclear services companies at commercial facilities. Several civilian, land-based, defueled reactor plants, which are larger than Navy aircraft carrier reactor plants, have successfully been dismantled and disposed of by the commercial radiological services industry. Separately, there is a current program in Brownsville, Texas, where Navy conventional carriers similar in size to ex-Enterprise are being dismantled. Since the 2012 EA (Navy & DOE, 2012), four such Navy conventional aircraft carriers have been dismantled. A contract between such commercial ventures located at a facility that can dismantle carriers is envisioned for this alternative.

ES.8 Summary of Environmental Effects

Environmental effects that might result from the implementation of the Proposed Action have been analyzed in this EIS/OEIS. Physical resources that were considered for evaluation in this EIS/OEIS include biological resources (including threatened and endangered species) (Section 3.5) and air quality (Section 3.6). Human resources considered in this EIS/OEIS include public and occupational health and safety (Section 3.1), hazardous and radioactive waste management (Section 3.2), American Indian tribal resources and treaty rights (Section 3.3), socioeconomics and environmental justice (Section 3.4), cultural resources (Section 3.7), and noise (Section 3.8). Cumulative impacts (Chapter 4) were considered for all resources.

The Navy applied the best available science to all impact analyses in this EIS/OEIS. Table ES-2 and Table 3.9-1 summarize the potential environmental impacts and proposed mitigation of the Proposed Action.

ES.8.1 Health Risks from Radiation Exposure Associated with the Alternatives

Health risks from radiation exposure associated with the Proposed Action and alternatives would be within applicable federal limits. Detailed discussion of the nature of radiation, radiation measuring units, and dose are included in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives). Methods for quantifying health risks from radiation exposure for the Proposed Action and alternatives are described in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants). The federal limit for occupational radiation exposure is five roentgen equivalent man (rem) per year. The Environmental Protection Agency (EPA) annual dose limit associated with airborne emissions is 10 millirem (mrem) (40 CFR Part 61.102). The EPA Drinking water limits (40 CFR Parts 8, 141, and 142) are combined radium 226/228 of 5 Picocuries per liter of air, a gross alpha standard for all alphas of 15 Picocuries per liter of air (not including radon and uranium), 4 mrem/year for beta emitters, and 30 micrograms per liter for uranium. NNPP, DOE, and NRC radiation exposure limits are consistent with or lower than applicable Federal and EPA external and internal radiation exposure limits.

To place exposure into perspective with normal everyday activities of the general public, a typical person in the United States receives 310 mrem of radiation exposure each year from natural background radiation, (NCRP, 2009). Natural background radiation is radiation that all people receive every day from the sun or from cosmic radiation, and from the natural radioactive materials that are present in the environment, including surface rocks and soil. Table ES-1 shows other commonplace lifetime and occupational risks.

Table ES-1: Commonplace Lifetime and Occupational Risks

Occupational or Commonplace Risk	*Lifetime Risk Percent*
Cancer, All Causes[1]	19
Tobacco[2]	9.7
Accidents (all)[3]	4.0
Agriculture, Forestry, and Fishing[4]	1.0
Transportation and Warehousing[4]	0.6
Cancer: Alternatives 1, 2, and 3 (risk estimate)[5]	<0.4

[1](National Cancer Institute, 2021)
[2](CDC, 2011)
[3](National Center for Health Statistics, 2021)
[4](U.S. Department of Labor & U.S. Bureau of Labor Statistics, 2022)
[5]Alternatives 1 and 2 were calculated by multiplying 0.5 rem/year maximum expected NNPP exposure by the 15-year project duration and the ICRP conversion factor for workers (consistent with NNPP report NT-21-2, May 2021). Alternative 3 (Preferred Alternative) was conservatively calculated by multiplying a maximum of 2 rem/year typically received by 99% of the NRC occupationally exposed workforce (NRC, 2018) by the 5-year project duration and the ICRP conversion factor for workers. Lifetime risk percent associated with occupational radiation exposure for the No Action Alternative is negligible.

Another way to express hypothetical health effects is in terms of estimated potential latent cancer fatalities. The health risk conversion factors used in this evaluation are taken from the International Commission on Radiological Protection, which specifies 0.00055 latent cancer fatalities per person-rem of exposure to the public and 0.00041 latent cancer fatalities per person-rem for workers (ICRP, 2007). The conversion factor for the general public is slightly higher than that for workers because the general public includes infants and children, who are more susceptible to the development of cancer over the course of their life.

The estimated total occupational exposure associated with the No Action Alternative is conservatively estimated to be 0.025 rem per year per reactor plant over 15 years, for comparison with other alternatives (potential risk of 0.0012 additional latent cancer fatalities).

The estimated total Shipyard occupational exposure to prepare eight reactor compartment packages for disposal at the DOE Hanford Site (Alternatives 1 and 2 [the reactor compartment packaging alternatives]) is 300 rem over five years (potential risk of 0.12 additional latent cancer fatalities). The estimate for reactor compartment packages is based on scaling radiological exposure data for nuclear cruiser reactor compartment packaging and is expected to be conservative and bounding.

The estimated total occupational exposure to entirely dismantle the reactor plants (Alternative 3 [Preferred Alternative]) is 540 rem over three years (potential risk of 0.22 additional latent cancer fatalities). The estimate for commercial dismantlement is based on an estimate of total expected hours to complete the work applied to an average commercial dismantlement expected dose rate and is expected to be conservative and bounding. Additional information on radiation exposure is provided in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives).

A comparison of additional potential cancer fatalities associated with the No Action Alternative, the reactor compartment packaging alternatives, and the dismantlement (preferred) alternative is provided in Table ES-2.

ES.8.2 Cumulative Impacts

The analysis in the EIS/OEIS indicates that the incremental contribution of Alternative 1, 2, or 3 would not have the potential to contribute meaningfully to any potential significant cumulative impact with respect to any of the resource areas.

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Alternative Summary	Long-term waterborne storage of ex-Enterprise	Commercial partial dismantlement, (8) single reactor compartment packages, disposal at the DOE Hanford Site	Commercial partial dismantlement, (4) dual reactor compartment packages, disposal at the DOE Hanford Site	Complete commercial dismantlement, LLRW disposal at licensed LLRW waste site(s)
Navy Cost Estimate (2019 dollars – millions [M])	~$10 M per year	>$1,102 M–$1,358 M	$1,102 M–$1,358 M	$554 M–$696 M
Estimated Time for Disposal	Indefinite	>15 years (2025–2039)	15 years (2025–2039)	5 years (2025–2029)
Impact on SY Fleet Maintenance Schedule[1]	Minimal	Requires 1.561M man-days[2]	Requires 1.456M man-days[2]	N/A
Number of Radioactive Material Shipments Associated with Reactor Compartments[3]	0	8 (single reactor compartment packages)	4 (dual reactor compartment packages)	440 (CONEX boxes[4])
Required Infrastructure Improvements	No	No	Yes	No

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Public and Occupational Health and Safety (Section 3.1)				
Additional Fatalities Occupational[5] Public[6] (Radiological) Public[7] (Non-radiological)	 0.0012 Not applicable Not applicable	 0.12 0.0000039 0.00012	 0.12 0.0000037 0.00006	 0.22 0.016 0.45
Impacts on public and occupational health and safety are minimal, negligible, or not applicable for each alternative. See Table 3.1-4 (Summary of Impacts and Conclusions on Public and Occupational Health and Safety) for more information.				
Hazardous and Radioactive Waste Management (Section 3.2)				
Estimated total volume of hazardous waste (tons)	Not applicable	Commercial Site: 5,522 PSNS & IMF: 3,291	Commercial Site: 5,522 PSNS & IMF: 3,291	8,813
Estimated total volume of non-hazardous scrap (tons)	Not applicable	Commercial Site: 47,117 PSNS & IMF: 28,070	Commercial Site: 47,117 PSNS & IMF: 28,070	75,187
Impacts related to hazardous and radioactive wastes are minimal, negligible, or not applicable for each alternative. See Table 3.2-2 (Summary of Impacts and Conclusions on Hazardous and Radioactive Waste Management) for more information.				
American Indian Tribal Resources and Treaty Rights (Section 3.3)				
Impacts on Tribal Resources and Treaty Rights	None	Minimal	Minimal. Impacts would be reduced through use of proposed mitigations.	None
Impacts on Tribal Resources and Treaty Rights are minimal or not applicable for each alternative. See Table 3.3-1 (Summary of Impacts and Conclusions on American Indian Tribal Resources and Treaty Rights) for more information.				

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Socioeconomics and Environmental Justice (Section 3.4)				
Impacts on socioeconomics	None	None	Minimal	Minimal
Impacts on environmental justice	None	None	None	None
Impacts on socioeconomics and environmental justice are minimal or not applicable for each alternative. See Table 3.4-17 (Summary of Impacts and Conclusions on Socioeconomic Resources and Environmental Justice Populations) for more information.				
Biological Resources (Section 3.5)				
In-water hull cleaning (Hampton Roads Metropolitan Area)	Not applicable	Minimal. Potential impacts on biological resources would be reduced through risk reduction measures. [8]		
Probability of vessel or tow line strike	Not applicable	Minimal. Potential impacts would be reduced through risk reduction measures. [8]		
Vessel strike (heavy-lift ship)	Not applicable	Minimal.		Not applicable

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Ship noise	Not applicable	Minimal.[8]		
Impacts from Port of Benton barge slip and the DOE Hanford Site road modification work	Not applicable	Not applicable	Impacts from Port of Benton barge slip and the DOE Hanford Site road modification work	Not applicable
Impacts from long-term storage and transport actions are unlikely, minimal (low), negligible, or not applicable for each alternative. See Table 3.5-2 (Summary of Impacts and Conclusions on Biological Resources) for more information.				
Air Quality (Section 3.6)				
Emissions of criteria air pollutants from all activities	Below *de minimis* levels	Below *de minimis* levels	Below *de minimis* levels	Below *de minimis* levels
Greenhouse gas emissions from shipping, towing, or transport (Metric Tons CO_2 equivalent)	Negligible	Minimal (55,534)[9]	Minimal (53,143)[9]	Minimal (3,854)[9]
Impacts on Air Quality resources are below *de minimis* or negligible for each alternative. See Table 3.6-23 (Summary of Impacts and Conclusions on Air Quality) for more information.				

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Cultural Resources (Section 3.7)				
Impacts on known archaeological resources (or districts)	None	None	Potential impacts[10]	None
Impacts on architectural resources	None	None	None	None
Impacts on Traditional Cultural Properties	None	None	Potential impacts[10]	None
Impacts related to cultural resources are not applicable for all alternatives, except for Alternative 2. See Table 3.7-1 (Summary of Impacts and Conclusions on Cultural Resources) for more information.				
Noise (Section 3.8)				
Impacts on sensitive receptors (human)	No	No	Minimal. Impacts on sensitive receptors would be reduced by design, management practices, monitoring, or mitigation as necessary[10]	No
Change to community noise levels (Day-Night Levels)	No	No	Minimal impacts[10]	No
Impacts on community noise levels are minimal or negligible for each alternative. See Table 3.8-2 (Summary of Impacts and Conclusions on Noise Environment) for more information.				

Table ES-2: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)

[1]Schedule impact is determined by current and future shipyard work (in order to maintain operating nuclear-powered assets mission-ready), personnel availability (qualification and attrition), and increased cost due to delays in project schedules. Alternative 1 would require approximately 105,000 man-days of additional radiological work as compared to Alternative 2.

[2]For perspective, a notional six-month CVN Planned Incremental Availability (PIA) requires 164,500–225,000 man-days, and a notional 16-month CVN Docking Planned Incremental Availability (DPIA) requires 424,400–488,900 man-days.

[3]Indicates only waste generated from either packaging or dismantling of each reactor compartment. There are other LLRW shipments associated with dismantlement efforts, and they would be equivalent between all three action alternatives.

[4]Use of container express (CONEX) boxes would follow all federal, state, and local regulations. The number of CONEX boxes is considered bounding based on volume of the reactor compartments. This estimate does not preclude the potential for commercial vendors to ship larger packages, or multiple packages in one conveyance, meeting all applicable NRC, DOT, and DOE requirements.

[5]Potential occupational fatalities consist of onsite worker and transportation worker potential latent cancer fatalities. Occupational latent cancer fatalities are calculated by multiplying occupational exposure in rem by 0.00041 additional potential latent cancer fatalities per rem. For the No Action Alternative, a 15-year duration was used to provide comparison with other alternatives. For Alternatives 1 and 2, 300 rem collective exposure was used. For Alternative 3 (Preferred Alternative), 540 rem collective exposure was used.

[6]Public (Radiological) fatalities consist of radiation related potential latent cancer fatalities for the general population from public transportation of low-level radioactive materials, which are calculated by multiplying estimated general population exposure in rem by 0.00055 additional latent cancer fatalities per rem. The estimated number of radiological fatalities include those associated with transportation accidents, which account for less than 0.009 percent of the total for all of the alternatives.

[7]Public (non-radiological) fatalities consist of fatalities from non-radiological causes related to transportation accidents and transportation vehicle exhaust emissions.

[8]See Section 3.5 for more detail regarding the potential to impact biological resources. The Navy will consult with U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), pursuant to section 7 of the ESA, for ESA-listed species not covered under previous consultations.

[9]Greenhouse Gas value is the total for all activities. Per year emissions would be a fraction of this value and distributed across the period of the action.

[10]Impacts on cultural and noise resources for Alternative 2 are related to construction activities at the Port of Benton barge slip and improvements between barge slip to Trench 94 at the DOE Hanford Site.

Note: PSNS & IMF = Puget Sound Naval Shipyard and Intermediate Maintenance Facility

ES.9 Best Management Practices and Mitigation

In addition to the potential impacts and proposed mitigations presented in the above table, the Navy lists best management practices and discusses mitigation in detail for each resource in Sections 3.1–3.8. If reasonably foreseeable impacts are determined to result, mitigation measures beyond best management practices would be developed and implemented.

ES.9.1 Other Considerations

ES.9.1.1 Consistency with Other Federal, State, and Local Plans, Policies and Regulations

Based on an evaluation of consistency with statutory obligations, the Proposed Action would not conflict with the objectives or requirements of federal, state, regional, or local plans, policies, or legal requirements. The Navy is coordinating and will continue to coordinate with regulatory agencies as appropriate during the NEPA process and prior to implementation of the Proposed Action to ensure all legal requirements are met.

ES.9.1.2 Relationship Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity

In accordance with NEPA, this EIS/OEIS provides an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment (40 CFR Part 1502.16). The Proposed Action may result in both short- and long-term environmental effects. However, the Proposed Action would not be expected to result in any impacts that would reduce environmental productivity; permanently narrow the range of beneficial uses of the environment; or pose long-term risks to health, safety, or the general welfare of the public.

ES.9.1.3 Irreversible or Irretrievable Commitment of Resources

NEPA requires that environmental analysis include identification of "any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented" (42 U.S.C. Section 4332). Irreversible and irretrievable resource commitments are permanent and related to the long-term use of nonrenewable resources and resulting effects on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., petroleum-based fuels or minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site, building demolition).

Implementation of the Proposed Action and alternatives would involve the consumption of fuel, oil, and lubricants for construction vehicles, and loss of natural resources. These resources are irreversible in that they would be used for this project when they could have been used for other purposes. Human labor would also be expended and is considered an irretrievable resource.

Most impacts would be short term and temporary or, if long lasting, would be negligible. Therefore, implementation of the Proposed Action would not result in major irreversible or irretrievable commitment of resources.

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Environmental Impact Statement/ Overseas Environmental Impact Statement

Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants

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Acronyms and Abbreviations

Acronym	Definition
μg/m^3	micrograms per cubic meter
ACM	asbestos-containing material
ADDSCO	The Alabama Shipbuilding and Dry Dock Company
ADEM	Alabama Department of Environmental Management
AEA	Atomic Energy Act
AIRFA	American Indian Religious Freedom Act
ALARA	as low as reasonably achievable
ALDOT	Alabama Department of Transportation
AQCR	Air Quality Control Region
ARPA	Archaeological Resources Protection Act
ASCE	American Society of Civil Engineers
ASPA	Alabama State Port Authority
BCC	Benton County Code
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BIA (1)	Brownsville International Airport
BIA (2)	U.S. Bureau of Indian Affairs
BIH	Brazos Island Harbor
BMP	best management practice
BSC	Brownsville Ship Channel
CAA	Clean Air Act
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
Ci/m^3	curies per cubic meter
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CONEX	Container Express
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel
dB(A)	decibels, A-weighted
DNL	day-night level
DNR	Department of Natural Resources
DO	Dissolved Oxygen
DoD	Department of Defense
DOE	Department of Energy
DOE-PNSO	Department of Energy Pacific Northwest Site Office
DOE-RL	Department of Energy Richland Operations Office
DOI	Department of the Interior
DOT	Department of Transportation
DPS	distinct population segment
EA	Environmental Assessment
ECY	Washington State Department of Ecology
EIS	Environmental Impact Statement
EO	Executive Order

Acronym	Definition
EPA	U.S. Environmental Protection Agency
ES	EnergySolutions
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FONSI	Finding of No Significant Impact
FR	Federal Register
ft.	feet
FY	Fiscal Year
GAO	Government Accountability Office
GRR	General Reevaluation Report
HRBT	Hampton Roads Bridge-Tunnel
I-	Interstate
IBC	International Building Code
INRMP	Integrated Natural Resources Management Plan
km	kilometer(s)
kV	kilovolt
LBP	lead based paint
LCF	Latent Cancer Fatality
L_{eq}	equivalent sound level
LLMW	low-level mixed waste
LLRW	low-level radioactive waste
LLW	low-level waste
L_{max}	maximum sound level
M	Million
MARAD	Maritime Administration
MARS	Modern American Recycling & Repair Services
MBTA	Migratory Bird Treaty Act
MEI	maximally-exposed individual
MHPS	Mobile Historic Preservation Society
mi.	mile(s)
MMI	Modified Mercalli Intensity
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emission Simulator
mph	miles per hour
mrem	millirem
mrem/hr	Millirems per hour
MSL	Mean Sea Level
MSW	municipal solid waste
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAVBASE	Naval Base
NAVFAC	Naval Facilities Engineering Command
NAVOSH	Navy Occupational Safety and Health
NAVSEAINST	Naval Sea Systems Command Instruction
Navy	U.S. Department of the Navy
NCT	National Contingency Plan
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NH_3	ammonia
NHHC	Naval History and Heritage Command
NHPA	National Historic Preservation Act
NIOSH	The National Institute for Occupational Safety and Health
NM	nautical mile(s)
NMFS	National Marine Fisheries Service
NNPP	Naval Nuclear Propulsion Program

Acronym	Definition
NOA	Notice of Availability
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSTM	Naval Ships' Technical Manual
NWTT	Northwest Training and Testing
O_3	ozone
OEIS	Overseas Environmental Impact Statement
OSHA	U.S. Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PDA	Preservation Designated Area
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PNNL	Pacific Northwest National Laboratory
PNSO	Pacific Northwest Site Office
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
PSCAA	Puget Sound Clean Air Agency
PSD	Prevention of Significant Deterioration
PSNS & IMF	Puget Sound Naval Shipyard & Intermediate Maintenance Facility
PTS	Permanent Threshold Shift
RADTRAN	Radioactive Material Transport
RCRA	Resource Conservation and Recovery Act
rem	Roentgen equivalent man
ROI	Region of Influence
SEIS	Supplement Environmental Impact Statement
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SRS	Savannah River Site
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TCP	Traditional Cultural Property
TDEQ	Texas Department of Environmental Quality
TDOT	Texas Department of Transportation
TPY	tons per year
TSCA	Toxic Substances Control Act
U&A	usual and accustomed (fishing grounds and stations)
UNDS	Uniform National Discharge Standards
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code

Acronym	Definition
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
WAC	Washington Administrative Code
WCS	Waste Control Specialists
WDFW	Washington Department of Fish and Wildlife
WMP	Waste Management Procedures
$yd.^3$	cubic yard(s)

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) prepared this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to evaluate the potential environmental impacts associated with disposal of the decommissioned, defueled ex-Enterprise to include its reactor plants. This EIS/OEIS was prepared in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality (CEQ) and Navy regulations. The Navy also prepared this EIS/OEIS to comply with Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions*, as a portion of the Proposed Action (towing and the use of a heavy-lift ship) would occur outside the geographical borders of the United States and its territories. The Navy is the lead agency for this EIS/OEIS pursuant to 40 Code of Federal Regulations (CFR) Parts 1500–1508 (1978, as amended 1986 and 2005), and the Navy action proponent is the Director, Naval Nuclear Propulsion. The U.S. Department of Energy (DOE) is a cooperating agency pursuant to 40 CFR Parts 1501.6 and 1508.5. This EIS/OEIS complies with the CEQ regulations in 40 CFR Parts 1500–1508 (1978, as amended 1986 and 2005) because the Navy began creating this EIS/OEIS prior to the release of both the current regulations in effect May 20, 2022, and the previous regulations in effect September 14, 2020.

Ex-Enterprise, the first U.S. Navy nuclear-powered aircraft carrier, was commissioned in 1961, operated for over 50 years, and was decommissioned in 2017. Ex-Enterprise has eight reactor plants housed in four reinforced compartments inside the ship. As part of the decommissioning process, the nuclear fuel was removed from the eight reactor plants and handled in accordance with standing NEPA documents for spent naval nuclear fuel (DOE, 1995, 2016; Navy, 1994, 2009). The spent fuel resides within the DOE Idaho National Laboratory property. Ex-Enterprise is currently being stored waterborne at Newport News Shipbuilding in Newport News, Virginia.

1.2 Background

In 1984, the Navy, with DOE as a cooperating agency, prepared the *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants*, which evaluated alternative processes for the disposal of reactor plants from various submarines (Navy & DOE, 1984). In the December 6, 1984, Record of Decision (ROD), the Navy selected a process to dispose of various submarine reactor plants by removing the reactor compartments from the submarines at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, and sealing them to provide a high-integrity welded steel package meeting Department of Transportation (DOT), Nuclear Regulatory Commission (NRC), and DOE safety requirements (Navy, 1984). Each reactor compartment package would be transported by barge to the Port of Benton barge slip in Richland, Washington, then transferred to a multiple-wheel, high-capacity transporter and hauled to Trench 94 at the DOE Hanford Site near Richland, Washington, for land disposal.

In 1996, the Navy, with DOE as a cooperating agency, prepared an EIS, *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants* to evaluate the disposal of reactor plants from cruisers, Ohio-Class submarines, and Los Angeles-Class submarines (Navy & DOE, 1996), hereafter referred to as the 1996 EIS. The Navy signed a ROD on July 3, 1996, extending the reactor compartment disposal program at PSNS & IMF to these classes of ships. The 1996 EIS updated the analysis of reactor compartment disposal from the 1984 EIS for subsequent submarine and cruiser reactor compartment disposals. As of October 2021, the Navy has successfully shipped 138 reactor compartment packages from inactivated, defueled nuclear-powered ships using the process described above.

In 2012, the Navy, with DOE as a cooperating agency, prepared the *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)*, for the disposal of decommissioned, defueled reactor plants from ex-Enterprise, hereafter referred to as the 2012 EA (Navy & DOE, 2012). A Finding of No Significant Impact (FONSI) was signed August 23, 2012, by the Navy and publicly released in August 2012. The 2012 EA extended the established reactor compartment disposal program at PSNS & IMF to include disposal of reactor plants from ex-Enterprise in eight single reactor compartment packages transported to the DOE Hanford Site. Remnant hull sections would be removed and recycled under an existing PSNS & IMF program, as described in the *U.S. Naval Nuclear Powered Ship Inactivation, Disposal, and Recycling Report* (Navy, 2019). This program facilitates cruiser and submarine deconstruction for reactor compartment disposal under the 1996 EIS (Navy & DOE, 1996). Each of the eight single reactor compartment packages would be similar in size and weight to the ex-Long Beach cruiser reactor compartment packages evaluated in the 1996 EIS. This process would not require substantial changes to the infrastructure at PSNS & IMF, the Port of Benton barge slip, the transport road, or Trench 94 at the DOE Hanford Site.

Subsequent to the 2012 EA, the Navy identified additional action alternatives associated with dismantling and disposal of ex-Enterprise as part of a 2014 PSNS & IMF study (Navy, 2014a). The study showed the new alternatives, which packaged the reactor compartments at PSNS & IMF in fewer packages, could reduce costs and worker radiation exposure while also improving execution schedule. Separately, the Navy identified available alternatives for dismantlement based on successful and ongoing conventional Navy aircraft carrier dismantlement by contract at commercial facilities, successful ongoing commercial nuclear power plant decommissioning by contract with nuclear services companies, and successful dismantlement of a U.S. Army barge (STURGIS) containing a defueled nuclear reactor by contract with nuclear services companies at commercial facilities. Combining these models, the Navy determined it was feasible for contracted commercial companies to disassemble the entire ex-Enterprise and its reactor plants for disposal at established waste disposal facilities.

The alternatives discussed in Chapter 2 (Description of Proposed Action and Alternatives) of this EIS/OEIS were developed based on previous analyses in the 1984 EIS, 1996 EIS, and the 2012 EA; the scoping process for this EIS/OEIS; and recent developments in the commercial naval ship dismantlement and defueled reactor plant decommissioning industries.

This EIS/OEIS includes an evaluation of reactor compartment packaging alternatives and commercial alternatives for dismantling and disposing of ex-Enterprise and its reactor plants. Potential impacts from the movement of ex-Enterprise to designated storage or disposal facilities and the transportation of low-level radioactive waste (LLRW) from dismantlement facilities to existing suitable waste facilities are analyzed in this EIS/OEIS.

1.3 Locations

The study area for this EIS/OEIS varies by alternative (described in Chapter 2, Description of Proposed Action and Alternatives) but includes Navy, other government and commercial locations (Figure 1-1), and land and water transit routes.

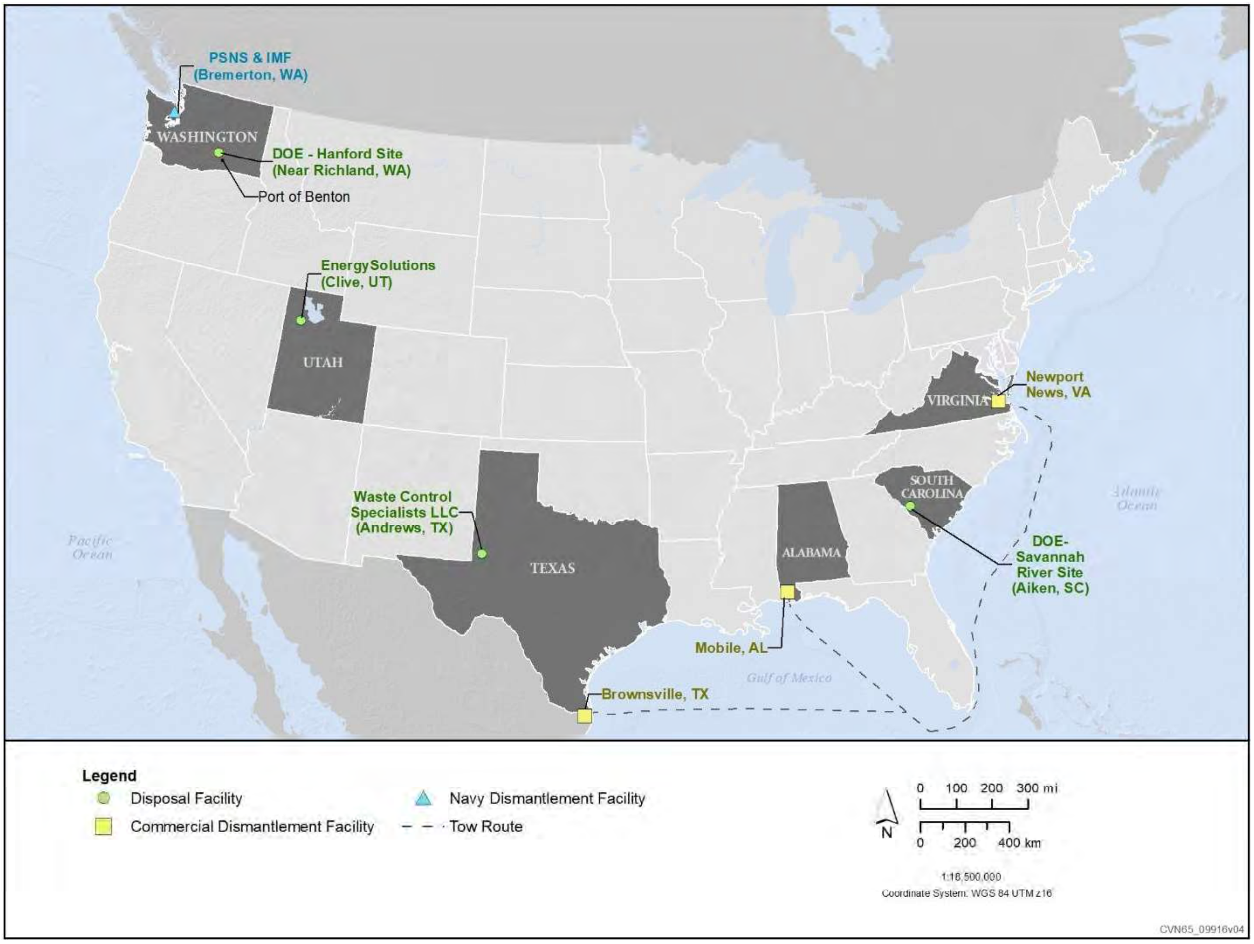


Figure 1-1: Dismantlement and LLRW Disposal Sites in the Study Area

Navy Locations:

- PSNS & IMF in Bremerton, Washington (Alternatives 1 and 2 [reactor compartment packaging alternatives])

Other Government Locations:

- Trench 94 at the DOE Hanford Site near Richland, Washington (reactor compartment packaging alternatives)
- Port of Benton barge slip in Richland, Washington (reactor compartment packaging alternatives)

Commercial Locations:

- Newport News Shipbuilding in Newport News, Virginia, where ex-Enterprise is currently stored waterborne under an agreement with the Navy (all alternatives)
- regional areas that have existing commercial industry capable of this work (Alternatives 1–3)
    a. Hampton Roads Metropolitan Area, Virginia (includes Newport News, Virginia)
    b. Brownsville, Texas
    c. Mobile, Alabama

Water Transit Routes:

- from current location of ex-Enterprise at Newport News Shipbuilding to a commercial dismantlement facility in Brownsville, Texas or Mobile, Alabama (Alternatives 1–3); the movement of ex-Enterprise to a different facility in the Hampton Roads Metropolitan Area, Virginia, would be a local tow
- from the selected commercial dismantlement facility to PSNS & IMF (reactor compartment packaging alternatives)
- from PSNS & IMF to the Port of Benton barge slip (reactor compartment packaging alternatives)

Land Transit Routes:

- from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site (reactor compartment packaging alternatives)
- from the selected commercial dismantlement facility to one or more approved waste facilities: Waste Control Specialists, LLC in Andrews, Texas; EnergySolutions in Clive, Utah; and/or the DOE Savannah River Site in Aiken, South Carolina (Alternative 3 [Preferred Alternative])

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to reduce the Navy inactive ship inventory, eliminate costs associated with maintaining ex-Enterprise in a safe stowage condition, and dispose of legacy radiological and hazardous wastes in an environmentally responsible manner, while meeting the operational needs of the Navy.

In accordance with Office of the Chief of Naval Operations Instruction 4770.5J, General Policy for the Inactivation, Retirement, and Disposition of U.S. Naval Vessels, dismantling is the only method approved for the disposition of nuclear-powered ships stricken from the Naval Vessel Register and is required to be accomplished in the United States or its territories in accordance with existing laws and regulations. In addition, dismantling and disposing of ex-Enterprise is needed to comply with statutory responsibilities of the Naval Nuclear Propulsion Program (NNPP). The NNPP, also known as the Naval Reactors Program, was established in 1948 and is a joint DOE and Navy organization with responsibility for all matters pertaining to naval nuclear propulsion from design through disposal. The integrated relationship, authorities, and responsibilities between DOE and Navy for naval nuclear propulsion are specified in EO 12344 and codified in 50 United States Code (U.S.C.) Section 2511 and 50 U.S.C. Section 2406. The mission of NNPP is to provide the U.S. with safe, effective, and affordable naval nuclear propulsion plants and to ensure their continued safe and reliable operation through lifetime support, research and development, design, construction, specification, certification, testing, maintenance, and disposal.

As required by CEQ regulations (40 CFR Part 1502.14) and Navy regulations (32 CFR Part 775) for implementing NEPA and EO 12114 (for transport via heavy-lift ship in international waters), the Navy must evaluate reasonable alternatives and a No Action Alternative. Alternatives for the Proposed Action must be technically and economically feasible while meeting the purpose and need and supporting the Navy mission.

1.5 Scope of Environmental Analysis

CEQ regulations for implementing NEPA (40 CFR Part 1500) provide guidance for considering alternatives to a federally Proposed Action. This guidance requires rigorous exploration and objective evaluation of reasonable alternatives.

As described in Section 2.2 (Screening Criteria) and Section 2.3 (Alternatives Carried Forward for Analysis), the Navy developed the alternatives after consideration and input by subject matter experts, cooperating agencies, tribes, and Navy environmental managers, scientists, and engineers. Additionally, the public submitted comments on the scope of the analysis, including environmental issues and potential viable alternatives, during the scoping period. The Navy considered substantive public comments submitted during the scoping process regarding potential alternatives and their impacts.

The Navy has considered what it believes are all potentially relevant environmental resource areas for analysis in this EIS/OEIS. To comply with NEPA, as well as CEQ, Navy, and DOE regulations, the discussion of the affected environment (e.g., existing conditions) focuses on those resource areas that would potentially be subject to more-than-negligible impacts as a result of the implementation of a given alternative. The level of detail describing a resource corresponds with the anticipated level of potential impact.

Describing the affected environment and analyzing impacts requires a comprehensive and systematic review of relevant literature and data to ensure the Navy uses the best available information for analysis. Each section in Chapter 3 (Affected Environment and Environmental Consequences) describes the data used and the characteristics of the best available data, and provides a general approach to analysis. Each resource section also lists the regulations applicable to that resource; discusses the affected environment and the environmental consequences of implementing the No Action and action alternatives; and summarizes potential impacts, mitigation measures, standard operating procedures, and best management practices.

The Navy assessed potential impacts on the following eight resource categories in Chapter 3 (Sections 3.1 through 3.8):

- Public and Occupational Health and Safety
- Hazardous and Radioactive Waste Management
- American Indian Tribal Resources and Treaty Rights
- Socioeconomics and Environmental Justice
- Biological Resources
- Air Quality (including greenhouse gases and climate change)
- Cultural Resources
- Noise

Resources considered but not carried forward for full analysis include water resources, geology, transportation, and infrastructure/utilities. However, potential impacts on water resources, as they relate to other resources, are addressed in the applicable sections. Water quality impacts related to the Port of Benton barge slip modifications and in-water hull cleaning are described in Chapter 3.5(Biological Resources). As discussed in Section 1.6 (Key Documents) and elsewhere in this EIS/OEIS, the Navy, DOE, and the U.S. Army Corps of Engineers (USACE) have developed numerous EISs and EAs for dismantlement and disposal of various nuclear-powered ships, which identified minimal impacts on these resources given compliance with applicable federal, state, and local environmental laws and regulations.

With regards to water resources and geology, the Proposed Action and alternatives would be conducted similar to activities that have occurred in the past with little to no water or geological impacts. The Proposed Action and alternatives would comply with all applicable federal, state, and local environmental laws and regulations. The Port of Benton barge slip modifications and transport route improvements that are part of Alternative 2 would be designed and constructed in accordance with the geotechnical report for the project and applicable building and grading codes, as well as a Stormwater Pollution Prevention Plan and best management practices. Therefore, because of the historical lack of impacts, the Proposed Action and alternatives would not be anticipated to impact existing water resource or geological conditions and would not generate any new water quality or geological impacts.

Potential impacts on transportation resources (i.e., traffic and infrastructure impacts) are also not carried forward in this EIS/OEIS; however, the by-products of transportation (e.g., air emissions, noise, radiological emissions) are discussed in relevant resource sections. Waste transportation would be conducted in accordance with applicable NRC, DOT, and DOE regulations. Radioactive materials must be packaged and transported in accordance with 49 CFR Parts 100 to 177, to protect the environment, transportation workers, and the public from potential exposure to radiation. The towing of ex-Enterprise to a commercial dismantling facility from its current location would not result in shipping impacts, as it would not change the shipping lanes, nor add an unprecedented amount of traffic to shipping lanes. The heavy-lift ship transport of the propulsion space section from one of the three commercial locations to PSNS & IMF would also be considered a normal shipping activity, as would barge transportation of reactor compartment packages under the reactor compartment packaging alternatives. Any trains used to transport the container express (commonly known as CONEX) boxes would have no impacts on transportation, as use of trains for shipment of up to 440 reactor plant components and CONEX boxes would qualify as normal rail activity. All land routes proposed are currently used for trucking, and the number of vehicles added to these routes would be low and spread out over a two-and-a-half year period with negligible impact on land transportation.

Although construction involving re-grading of portions of the transport route under Alternative 2 would cause temporary impacts on local transportation from increased construction vehicle movement, construction personnel commuting to and from the sites, and delays to commuters due to roadwork on the impacted areas, the construction activities would not add an unprecedented number of cars to the local routes, and construction activities would be localized to the project sites and temporary as the impacts would cease after the completion of the construction activity.

Additionally, the Navy has concluded that impacts on infrastructure and utilities should not be carried forward in this analysis. Commercial and Navy facilities are equipped with sufficient infrastructure and utilities to complete dismantlement activities following all applicable local, state, and federal laws and regulations, including compliance with the Occupational Safety and Health Administration; Clean Air Act;

Clean Water Act; Rivers and Harbors Act; and other applicable environmental, safety, and health regulations. The Proposed Action and alternatives would result in minor energy requirements that can be accommodated by existing infrastructure and utilities at the dismantlement facilities.

For the process of determining environmental consequences, the Navy applies current resource protection measures (e.g., standard operating procedures, best management practices, conservation measures) that are integral to the activities covered by the Proposed Action and alternatives. If the analysis identifies potential adverse impacts on the resource from implementing the No Action or action alternatives, the Navy has identified methods and consulted with cooperating and coordinating agencies to minimize or mitigate those impacts, where appropriate and practical. Mitigation measures are discussed at the end of each resource section if applicable and are summarized in Section 3.9 (Summary of Potential Impacts on Resources and Impact Avoidance and Minimization).

Through the environmental impact analysis process, the Navy has identified resources that may be potentially impacted, defined the expected geographic scope for each resource, and analyzed potential impacts on those resources. The Region of Influence (ROI) is the geographic area where impacts may potentially occur. For most resources, the ROI coincides with the air, land, and water areas potentially affected by the Proposed Action. However, there are variations in the breadth of the ROI for some resource areas, with some being relatively smaller and others relatively larger.

In accordance with NEPA and the Administrative Procedure Act of 1946 (5 U.S.C. Sections 551–559), the Navy used the best available data accepted by the appropriate regulatory and scientific communities by reviewing primary literature (e.g., journals, books, periodicals, bulletins, technical reports, theses/dissertations, Department of Defense operations reports) to assist in analysis of potential environmental consequences. The Navy searched for and evaluated websites for the credibility of the source, the quality of the information, and the relevance of the content to ensure the use of high-quality information. The Navy also collected, reviewed, and evaluated additional information, such as unique resource characteristics; public and agency scoping comments; previous environmental analyses; agency and tribal consultations; resource-specific information; and applicable laws, regulations, and EOs.

The Navy considered direct and indirect effects and cumulative impacts resulting from the action alternatives. Direct effects occur in the same location and at the same time as the agency action. Indirect effects are reasonably foreseeable and caused by the action, but they occur later in time or at a distance. Cumulative analysis includes consideration of past, present, and reasonably foreseeable future actions.

The effects of the action require consideration of both context and intensity. Considering context includes analyzing the impact of an action from several perspectives, such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. The impact varies with the setting of a Proposed Action. For instance, in the case of a site-specific action, level of impact typically depends on the effects in the locale rather than effects on a global scale. Both short- and long-term effects are relevant. Intensity refers to the severity or extent of the potential environmental impact, as well as the potential extent of the likely change. In general, the effect could be greater in a more sensitive context. Likewise, in a less sensitive context, an impact would need to be more intense to have the same level of effect.

While specific methods used to analyze the effects of the Proposed Action vary by resource, all resource analyses follow this general approach:

1. Describe existing resource conditions (affected environment) based on geographic areas and/or the resource area-specific ROI. Because the Proposed Action encompasses a large area, each resource section splits the affected environment discussion into four main areas (Washington; Newport News, Virginia; Brownsville, Texas; Mobile, Alabama).
2. Review existing federal, state, and local regulations and standards relevant to resource-specific management or protection.
3. Identify resource conditions or areas that require specific analytical attention, such as designated critical habitat for species listed under the Endangered Species Act (ESA).
4. Analyze the specific actions within a given alternative to determine which components of the alternative may affect the particular resource.
    a. Review and analyze data sources for information on the resource, including modeling efforts and scientific research.
    b. Determine specific impacts on the resource that could result from each alternative.
    c. Adjust initial impact determinations as appropriate to account for the use of standard operating procedures, best management practices, and other impact avoidance, minimization, or mitigation measures.
    d. Determine overall impacts on the resource associated with the Proposed Action and alternatives, given the applicable regulatory framework.
5. Summarize findings concerning impacts on the resource.

1.6 Key Documents

There are a number of key documents that provide information to inform analyses in this EIS/OEIS. Documents are considered to be key because of similar actions, analyses, or impacts that may apply to the Proposed Action. CEQ guidance encourages incorporating documents by reference. Documents incorporated by reference in part or in whole include the following:

- *Final Environmental Assessment Decommissioning and Dismantling of STURGIS and MH-1A* (USACE, 2014)
- *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)* (Navy & DOE, 2012)
- Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants (Navy & DOE, 1996)
- *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants, Volume 1* (Navy & DOE, 1984)

1.6.1 2014 Environmental Assessment Decommissioning and Dismantling of STURGIS and MH-1A

The USACE prepared this EA to evaluate the potential environmental consequences of the proposed decommissioning and dismantling of a U.S. Army barge containing a defueled nuclear reactor (STURGIS) and associated mobile nuclear high power plant MH-1A. Decommissioning and dismantling locations were screened, and the sites determined to be the most feasible were evaluated as Proposed Action Alternatives. There were four Proposed Action Alternative locations for which environmental effects were evaluated: Hampton Roads Metropolitan Area, Virginia; Baltimore, Maryland; Charleston, South

Carolina; Galveston, Texas; and Brownsville, Texas. Because STURGIS was towed to a commercial industrial facility that has restricted access, the Proposed Action presented no risk to many resource areas; only six resources (cultural, biological, water, health and safety, air quality, and waste management) were analyzed in detail. This EA determined that implementation of any of the Proposed Action Alternatives or the No-Action Alternative would not result in significant impacts on any resource area, and the FONSI was signed in April 2014.

1.6.2 2012 Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)

The Navy evaluated the potential environmental effects of removing the reactor compartments from ex-Enterprise at PSNS & IMF, preparing the reactor compartments for disposal as eight reactor compartment packages, recycling the remnant hull sections, and transporting the reactor compartment packages for disposal to Trench 94 at the DOE Hanford Site (Navy & DOE, 2012). The FONSI for the 2012 EA, signed August 23, 2012, stated the preferred alternative would have a negligible incremental effect on the environment surrounding PSNS & IMF, the transport route, and at the DOE Hanford Site (Navy, 2012). Accomplishment of the preferred alternative would have resulted in total and peak workloads that could be accommodated by the available workforce capacity. This work was expected to be performed within available resources (e.g., manpower, facilities) and existing permitted discharges of PSNS & IMF. Operations at PSNS & IMF, an industrial naval shipyard, were considered to be consistent to the maximum extent practicable with local and state shoreline management requirements and the Coastal Zone Management Act.

1.6.3 1996 Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio-Class, and Los Angeles-Class Naval Reactor Plants

The Navy analyzed alternative options for disposing of decommissioned, defueled reactor compartments from Navy nuclear-powered ships (USS Bainbridge, USS Truxtun, USS Long Beach, California and Virginia-Class) and submarines (Los Angeles- and Ohio-Class) (Navy & DOE, 1996). The alternatives examined in detail were (1) Preferred Alternative — shipment of the prepared compartments from PSNS & IMF in Bremerton, Washington for land disposal of the entire reactor compartment at Trench 94 at the DOE Hanford Site, Washington; (2) the No Action Alternative — protective waterborne storage for an indefinite period; (3) disposal and reuse of subdivided portions of the reactor compartments; and (4) indefinite storage above ground at the DOE Hanford Site.

Under the Preferred Alternative, the Navy proposed to prepare defueled reactor compartments for shipment at PSNS & IMF. Preparations involved draining the piping systems, tanks, vessels, and other components to the maximum extent practical; sealing radioactive systems; removing the reactor compartment; and enclosing it in a high-integrity, all-welded steel package. The reactor compartment packages would meet applicable DOT, NRC, and DOE Type B Packages requirements. Nonradioactive metal, such as submarine hulls, were proposed to be recycled. Each reactor compartment package would be transported by barge out of Puget Sound through the Strait of Juan de Fuca, south along the Washington coast, and up the Columbia River to the Port of Benton barge slip, where they would be loaded onto a multiple-wheel, high-capacity transporter and hauled to the DOE Hanford Site near Richland, Washington.

The 1996 EIS included updates to the analysis of reactor compartment disposal from the 1984 EIS and is the standing EIS for submarine and cruiser reactor compartment disposal. The conservative engineering practices described in the 1984 EIS were incorporated into the Preferred Alternative for nuclear-powered ships, Ohio-Class submarines, and Los Angeles-Class submarines. All practical means to avoid or minimize environmental impacts from the Preferred Alternative were adopted and no additional mitigative measures were necessary.

The Navy signed the ROD on July 3, 1996, with the concurrence of DOE, and decided to proceed with the Preferred Alternative to bury defueled reactor compartments at the DOE Hanford Site because this alternative was the environmentally preferable alternative; it supported the Navy mission by providing for responsible, permanent disposal of the defueled reactor plants from the nuclear-powered ships, reduced radiation exposure to the workforce and public, and could be implemented safely and at reasonable cost (Navy, 1996).

1.6.4 1984 Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants

The 1984 EIS included the evaluation of three methods the Navy and DOE considered for disposing of nuclear-powered submarines (Navy & DOE, 1984). The three alternatives evaluated were (1) bury the reactor compartment at the existing DOE Hanford Site or at the DOE Savannah River Plant in South Carolina, and dispose of the non-radioactive portions by sinking at sea or by cutting up for sale as scrap metal; (2) place the entire submarine on the bottom of the ocean in deep water (deeper than 2.5 miles) far from the U.S. coast; or (3) keep the submarine in protective storage at a Navy inactive ship facility after decommissioning for disposal on land or at sea at a later time.

An environmental impact assessment of the disposal site area was performed. The Navy considered permanent disposal to be environmentally safe and feasible using either land disposal or deep ocean options. The Navy used highly conservative estimates in the analyses of impacts, which compensated for any uncertainties for either disposal option. The Navy ultimately decided to proceed with disposal of the reactor compartments by land disposal. Land disposal is the method currently used in the United States for disposal of LLRW and complies with existing requirements for use of the disposal site. The Navy decided that disposal of LLRW at the DOE Hanford Site would be environmentally safe and could proceed with no unacceptable environmental impacts (Navy, 1984). The Navy signed the ROD on November 30, 1984, and it was published on December 6, 1984.

1.7 Relevant Laws, Regulations, and Policies

The Navy prepared this EIS/OEIS based on pertinent federal, state, and local statutes, regulations, and policies for the implementation of the Proposed Action, including but not limited to the following:

- NEPA (42 U.S.C. Sections 4321–4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500–1508)
- Navy regulations for implementing NEPA (32 CFR Part 775), which provides Navy policy for implementing CEQ regulations and NEPA
- Archaeological Resources Protection Act of 1979 (16 U.S.C. Sections 470aa–470mm)
- Atomic Energy Act (42 U.S.C. Sections 2011–2259)
- Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668–668c)
- Clean Air Act (42 U.S.C. Section 7401 et seq.)

- Clean Water Act (33 U.S.C. Section 1251 et seq.)
- Coastal Zone Management Act (16 U.S.C. Section 1451 et seq.)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. Section 9601 et seq.)
- Dredged Material Management Requirements
- Emergency Planning and Community Right-to-Know Act (EPCRA) (42 U.S.C. Section 11001 et seq.)
- Endangered Species Act (16 U.S.C. Section 1531 et seq.)
- Hazardous Materials Transportation Act of 1975 (49 U.S.C. Section 5101 et seq.)
- Low-Level Radioactive Waste Policy Amendments Act of 1985 (42 U.S.C. Sections 2021b-j)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Section 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. Section 1361 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. Sections 703–712)
- National Historic Preservation Act (54 U.S.C. Section 306108 et seq.)
- National Marine Sanctuaries Act (16 U.S.C. Section 1431 et seq.)
- The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. Section 3001-3013)
- Occupational Safety and Health Act of 1970; Occupational Safety and Health Administration OSHA Regulations in 29 CFR Part 1926, Subpart P; 10 CFR Part 851; and DOE G 450.4-1C Integrated Safety Management Guide
- Packaging and Transportation of Radioactive Material (10 CFR Part 71 and 49 CFR Parts 171 to 177)
- Resource Conservation and Recovery Act (42 U.S.C. Section 6901 et seq.)
- Rivers and Harbors Act (33 U.S.C. Section 401 et seq.)
- Standards for Protection Against Radiation (10 CFR Part 20)
- Toxic Substances Control Act (15 U.S.C. Sections 2601–2629)
- Washington State Building Code
- EO for Invasive Species: EO 11987, *Exotic Organisms*; EO 13112, *Invasive Species*; and EO 13751, *Safeguarding the Nation from Impacts of Invasive Species*
- EO 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*
- EO 12088, *Federal Compliance with Pollution Control Standards*
- EO 12114, *Environmental Effects Abroad of Major Federal Actions*

- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (amended by EO 14008, *Tackling the Climate Crisis at Home and Abroad*)
- EO 13007, *Indian Sacred Sites*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- EO 13840, *Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States*
- EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (revoked EO 13783, *Promoting Energy Independence and Economic Growth*; revoked EO 13792, *Review of Designations Under the Antiquities Act* (revoked EO 13807, *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects*, and revoked, in part, EO 13834, *Efficient Federal Operations*)

Chapter 5 (Other Considerations Required by NEPA, Table 5-1) presents a description of the consistency of the Proposed Action with these laws, regulations, and policies and the regulatory agencies responsible for their implementation.

Agency consultations for the Preferred Alternative (Alternative 3) will occur in parallel with development of the Final EIS/OEIS, and consultation outcomes will be documented in the Final EIS/OEIS. The Navy has been engaging agencies and tribes as applicable during development of the Draft EIS/OEIS.

The Navy will consult with Indian tribes throughout the development of this EIS/OEIS in accordance with 36 CFR Part 800 (regulations implementing Section 106 of the National Historic Preservation Act of 1966 [54 U.S.C. Section 300101 et seq.], as amended); EO 13175, *Consultation and Coordination with Indian Tribal Governments*; and regulations for implementing NEPA (40 CFR Part 1500 et seq.).

1.8 Public and Agency Participation and Intergovernmental Coordination

The Navy is committed to facilitating public and agency participation and input to ensure a complete environmental analysis and to make informed decisions. Public input and involvement are fundamental aspects of the NEPA process. The NEPA process requires public involvement during the "scoping" period and when the Draft EIS/OEIS is available for public review and comment. The public participates in the NEPA process during the following key stages:

- Scoping Period: The public can help the federal agency identify the scope of the EIS/OEIS, viable alternatives, and specific environmental topics for consideration in the analysis.
- Draft EIS/OEIS Public Review and Comment Period: The public can review, evaluate, and comment on the environmental impact analysis.
- Final EIS/OEIS 30-Day Wait Period: The public can review how the federal agency responded to public comments on the Draft EIS/OEIS.

A Notice of Intent to prepare an EIS/OEIS was published in the Federal Register (FR) on May 31, 2019. The FR notice can be found in Appendix A (Federal Register Notices). The public involvement and stakeholder outreach efforts throughout the course of the NEPA process are documented in Appendix B (Public Involvement and Distribution).

The Notice of Intent provided information about the Proposed Action, purpose and need, and alternatives. The Notice of Intent also announced the 45-day public scoping period; the dates, times, and locations of public scoping meetings; and instructions for submitting public scoping comments. Display advertisements were published in 11 local and regional newspapers (Virginia-Pilot, Daily Press [Norfolk, Virginia], Augusta Chronicle, Aiken Standard, Brownsville Herald, El Nuevo Heraldo [Brownsville, Texas], Seattle Times, Kitsap Sun, Tri-City Herald [Kennewick, Pasco, and Richland, Washington], Oregonian, and Portland Tribune) a total of 54 times from May 31, 2019, through June 23, 2019. The first series of advertisements was published to coincide with the publication of the Notice of Intent. A second series was published 10 days before the public scoping meetings, and a third series was published two to five days before the public scoping meetings. A Spanish version of the advertisement was published in a Spanish-language newspaper (El Nuevo Heraldo). Adjustments were made according to the publication frequency (e.g., daily, semi-weekly, weekly) of the newspapers. Comments were solicited during the scoping period from May 31 to July 15, 2019, from Federal, state, and local agencies; federally recognized tribes; non-governmental organizations; and interested persons on potential impacts on environmental resources and to help identify public concerns and local issues to be considered during the development of the EIS/OEIS.

As a result of comments received during public scoping conducted in 2019, the Navy added the Mobile, Alabama, area to the Study Area and as an additional location considered in the alternatives section for the EIS/OEIS. In compliance with NEPA, the Navy held an additional public scoping period from August 12, 2020, through September 11, 2020, to solicit comments from federal, state, and local agencies; federally recognized tribes; non-governmental organizations; and interested persons. Display advertisements were published three times in the regional newspaper in Mobile, Alabama (Mobile Press-Register), and the Navy sent out letters, postcards, emails, and a news release to notify the public agencies and other stakeholders of the reopened scoping period. Project information, including an updated fact sheet booklet and poster displays, were posted on the project website. All recipients of a stakeholder or tribal letter also received a copy of the fact sheet booklet. Due to federal and state guidance and measures in response to the coronavirus disease of 2019 (COVID-19), the Navy was unable to hold an in-person public scoping meeting in Mobile, Alabama. The public was able to submit questions about the project to info@CarrierDisposalEIS.com. The Navy designated the PSNS & IMF Congressional and Public Affairs Office to receive public questions. All questions were responded to in a timely manner. The public was also able to submit comments by mail or the project website during the 30-day scoping period. The Navy received 120 comments from the public during the 2019 public scoping phase and 34 comments during the 2020 public scoping phase. Of those, 1 comment was received from tribes, 4 from federal agencies, 10 from state and local agencies, 5 from NGOs, and 134 from the public. Appendix B (Public Involvement and Distribution) contains a brief description of the comments received during both scoping periods

The Navy has prepared this Draft EIS/OEIS to analyze the potential environmental impacts of alternatives that would meet the purpose of and need for the Proposed Action, and to allow the opportunity for public review and comment. The Draft EIS/OEIS 45-day public review period will begin with the publication of the Notice of Availability (NOA) in the Federal Register by the Environmental Protection Agency. The Navy will also publish in the Federal Register a NOA that will describe the Proposed Action, solicit public comments, provide the public comment period dates, and announce the local and regional library locations where the Draft EIS/OEIS copies will be available for review. In addition, the Draft EIS/OEIS will be available at www.carrierdisposaleis.com.

The Navy will also hold virtual public meetings to describe the environmental impacts of the Proposed Action and alternatives, and to receive comments on the Draft EIS/OEIS impact analyses. The Navy has assessed that virtual public meetings are the best format to meet statutory requirements under NEPA while mitigating COVID-19 risks. The Navy will consider comments received from the public comment period in the development of the Final EIS/OEIS. The Environmental Protection Agency will publish a NOA of the Final EIS/OEIS in the Federal Register to start the 30-day wait period and inform the public of the release of the Final EIS/OEIS. New substantive comments received during the 30-day wait period for the Final EIS/OEIS will be addressed in the ROD. The ROD will be prepared following the wait period. The ROD will state the decision made, identify alternatives considered, address new substantive comments received on the Final EIS/OEIS that were not previously addressed in the Draft EIS/OEIS, and address mitigation, if needed. Following the signing of the ROD, the Navy will publish a NOA of the ROD in the Federal Register.

1.8.1 Summary of Anticipated/Existing Issues or Concerns, Including Public Interest Issues, and Issues of Other Interested Parties

The following issues or concerns associated with the Proposed Action and alternatives were raised during the two scoping periods or are anticipated by the Navy:

- Public and Occupational Health and Safety and Radiation Exposure – Concern about qualification of workers at proposed commercial dismantlement locations. Concern about radiation exposure to workers dismantling the reactor plants and radiation exposure to the public. These concerns would be managed in accordance with established regulatory requirements and standards (see Section 3.1 [Public and Occupational Health and Safety] for details).
- Expended Materials – Concern associated with safety issues and environmental impacts of expended materials (waste) (see Section 3.2 [Hazardous and Radioactive Waste Management] for details).
- Tribal Impacts – Concern associated with impacts on tribal fishing and resources (see Section 3.3 [American Indian Tribal Resources and Treaty Rights] for details).
- Socioeconomics and Environmental Justice – Impacts on the local and regional economy relating to the scope and scale of work (see Section 3.4 [Socioeconomics and Environmental Justice] for details).
- Congressional Interest – Interest from Congressional Members regarding the potential economic gains or losses associated with the various alternatives. Congressional Members in the regions analyzed and House and Senate Defense Authorization and Appropriations Committees have also shown interest in the cost and scale of the disposal process (see Section 3.4 [Socioeconomics and Environmental Justice] for details).
- Air Quality and Greenhouse Gases/Climate Change – Impacts on air quality and greenhouse gas/climate change impacts during ship transport and dismantlement (see Section 3.6 [Air Quality] for details).

1.8.1.1 Anticipated/Existing Issues Associated with the No Action Alternative

- Aesthetics – Visual impacts on local communities near the long-term storage site (see Section 3.4 [Socioeconomics and Environmental Justice] for details).

- Socioeconomics – Impacts on commercial, recreational, and traditional fishing groups and individuals (see Section 3.4 [Socioeconomics and Environmental Justice] for details).
- Stewardship and Maintenance – Storage of an inactive nuclear-powered ship requiring maintenance, security, and preservation to maintain ship integrity could strain Navy financial resources (see Section 3.4 [Socioeconomics and Environmental Justice] for details).

1.8.1.2 Anticipated/Existing Issues Associated with Alternative 1 (Single Reactor Compartment Packages)

- Worker Occupational Radiation Exposure – Constructing eight single reactor compartment packages would result in more dismantlement and construction work in radiation areas compared to dual packages (see Section 3.1 [Public and Occupational Health and Safety] for details).
- Radiological Work – Issues may include radiation exposure to the work force and the public, the potential for release of low-level radioactive material from the dismantlement work at the industrial facility where the work is occurring, and the potential need for site remediation and release for general use after completion of work (see Section 3.1 [Public and Occupational Health and Safety, for details]).
- Cost of Project – Constructing single reactor compartment packages would cost more than constructing dual packages, take longer to execute, and potentially impact availability of PSNS & IMF infrastructure and workload resources (see Section 3.4 [Socioeconomics and Environmental Justice] for details).

1.8.1.3 Anticipated/Existing Issues Associated with Alternative 2 (Dual Reactor Compartment Packages)

- Reactor Compartment Package Shipment – Concern regarding impacts of transporting four dual reactor compartment packages that are larger and heavier than packages evaluated in the 1996 EIS and 2012 EA (see Chapter 3 [Affected Environment and Environmental Consequences] for all resources considered in detail).
- Radiological Work – Issues may include radiation exposure to the work force and the public, the potential for release of low-level radioactive material from the dismantlement work at the industrial facility where the work is occurring, and the potential need for site remediation and release for general use after completion of work (see Section 3.1 [Public and Occupational Health and Safety] for details).
- Infrastructure Improvements to Hanford Transport Route – Impacts of improvements on the route between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site required for transporting larger and heavier reactor compartment packages. Concern regarding potential impacts on cultural resources and American Indian tribal resources and treaty rights as a result of road improvements (see Section 3.3 [American Indian Tribal Resources and Treaty Rights] and Section 3.7 [Cultural Resources] for details).
- Infrastructure Modifications to the Port of Benton Barge Slip – Impacts of required upgrades to the Port of Benton barge slip to support a larger barge for transporting larger and heavier packages. The channel substrate to the south side of the barge slip would be altered through excavation, dredging and filling. As a result, the project would include habitat impacts within

this designated critical habitat area. Accordingly, the Navy would request consultation with NMFS and U.S. Fish and Wildlife Service for potential effects to critical habitat (see Section 3.5 [Biological Resources] for more details).

1.8.1.4 Anticipated/Existing Issues Associated with Alternative 3 (Commercial Dismantlement, Preferred Alternative)

- Transport of Radioactive Waste – Transportation is governed by applicable NRC, DOT, and DOE safety requirements. The size of radioactive waste shipments would need to be supported by existing infrastructure with minimal effort or impacts beyond normal shipping from the commercial facility. Any modifications to transportation routes would be temporary and consistent with normal transportation techniques (see Chapter 3 [Affected Environment and Environmental Consequences] for all resources considered in detail).
- Radiological Work – Concern regarding performing radiological work at locations where this type of work has not previously been performed. Issues may include radiation exposure to the work force and the public, the potential for release of low-level radioactive material from the dismantlement work at the industrial facility where the work is occurring, and the potential need for site remediation and release for general use after completion of work (see Section 3.1 [Public and Occupational Health and Safety] for details).

1.8.2 Cooperating and Coordinating Agencies

A cooperating agency is any agency, other than the lead agency, which has jurisdiction by law or special expertise concerning an environmental impact involved in a proposal. DOE is a cooperating agency on this EIS/OEIS.

The Navy will also consult and/or coordinate with other government agencies with regulatory authority or special expertise with respect to reasonable alternatives or significant environmental, cultural, social, or economic impacts associated with the action.

2 Description of Proposed Action and Alternatives

This chapter provides detailed information on the Proposed Action and alternatives analyzed in this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) prepared under the National Environmental Policy Act (NEPA) and Executive Order 12114.

2.1 Proposed Action

The Proposed Action of the United States (U.S.) Department of the Navy (Navy) is to dispose of ex-Enterprise, including its reactor plants. The nuclear fuel was removed from ex-Enterprise and shipped to the Department of Energy (DOE) Idaho National Laboratory in 2017. Ex-Enterprise is currently in waterborne storage at Newport News Shipbuilding in Newport News, Virginia. Disposal includes the following steps: (1) dismantling and recycling the non-radioactive remnant hull sections of the aircraft carrier at a government or authorized commercial facility in accordance with applicable federal, state, and local laws; and (2) removing and packaging reactor plant components for transportation and disposal as low-level radioactive waste (LLRW) to an authorized radioactive waste facility or facilities. The action proponent of the Navy is the Director, Naval Nuclear Propulsion Program (NNPP). DOE is a cooperating agency in the preparation of this EIS/OEIS as the regulatory authority for management and disposal of applicable wastes analyzed under this action.

2.2 Screening Criteria

Screening criteria were developed to identify reasonable alternatives based on the purpose of and need for the Proposed Action.

For an alternative to be considered reasonable, it must do the following:

- meet Office of the Chief of Naval Operations Instruction 4770.5J, *General Policy for the Inactivation, Retirement, and Disposition of U.S. Naval Vessels*, for inactive ships removed from the Naval Vessel Register; and
- reduce the use of public nuclear-powered ship maintenance infrastructure for dismantlement and disposal of non-radioactive portions of the ship to prioritize the limited public shipyard infrastructure and workforce for active fleet maintenance.

For an alternative to be considered reasonable, the location or facility in which partial or complete dismantlement is performed must also meet the following criteria:

- be located in the United States and work completed by U.S. citizens in accordance with U.S. regulation and policy derived from the Atomic Energy Act and Arms Export Control Act; and
- have no limitations for work with radioactive material that would prevent removal of radioactive material from ex-Enterprise and shipping LLRW and low-level mixed waste to an existing waste facility.

2.3 Alternatives Carried Forward for Analysis

The identification, consideration, and analysis of alternatives are critical components of NEPA and Executive Order 12114 processes and contribute to the goal of making informed decisions from an environmental standpoint while meeting the purpose and need. The Council on Environmental Quality requires and provides guidance on the development of alternatives. Decision makers are required to consider the environmental effects of the Proposed Action and a reasonable range of alternatives, including a No Action Alternative. Guidance further states an EIS must rigorously and objectively explore all reasonable alternatives for implementing the Proposed Action and, for alternatives eliminated from detailed study, briefly discuss the reasons for eliminating from further consideration. With the exception of the No Action Alternative, an alternative must meet the stated purpose and need for the Proposed Action in order to be reasonable.

A No Action Alternative, in which the ship is stored waterborne, and three reasonable action alternatives were carried forward for analysis. These alternatives are described in detail in Section 2.3.1 (No Action Alternative), Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), Section 2.3.3 (Alternative 2 – Dual Reactor Compartment Packages), and Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement). The activity components of these No Action and action alternatives are shown in Table 2-1. All action alternatives and locations analyzed meet the selection criteria due to the reasons listed below.

- include dismantlement and recycling as a disposal method for ex-Enterprise in accordance with Office of the Chief of Naval Operations Instruction 4770.5J
- reduce use of public nuclear-powered ship maintenance infrastructure for dismantlement and disposal of non-radioactive portions of the ship
  - Alternatives 1 and 2 (the reactor compartment packaging alternatives): include performing partial dismantlement efforts at a commercial ship dismantlement facility
  - Alternative 3 (Preferred Alternative): includes performing all dismantlement efforts at a commercial ship dismantlement facility
- partial or complete dismantlement work occurs in the United States
- partial or complete dismantlement work facilities have no limitations for work with radioactive material that would prevent removal of radioactive material from ex-Enterprise and shipping LLRW and low-level mixed waste to an existing disposal facility

Table 2-1: Activity Components per Alternative

Region of Influence (Based on Activity)	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Ex-Enterprise is stored waterborne at Newport News Shipbuilding in Newport News, Virginia	✓			
Tow ex-Enterprise from Newport News Shipbuilding to commercial dismantlement facility		✓	✓	✓
Partial dismantlement at commercial facility (includes in-water activities)		✓	✓	
Complete dismantlement at commercial facility				✓
Transport waste and recyclable materials from commercial dismantlement facility to an approved waste or recycling facility		✓	✓	✓
Ship ex-Enterprise propulsion space section via heavy-lift ship from commercial dismantlement facility to PSNS & IMF (following route around South America)		✓	✓	
Work at PSNS & IMF – Eight single reactor compartment packages (no in-water work)		✓		

Table 2-1: Activity Components per Alternative (continued)

Region of Influence (Based on Activity)	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
Work at PSNS & IMF – Four dual reactor compartment packages (no in-water work)			✓	
Port of Benton barge slip modifications			✓	
Road improvements between Port of Benton barge slip and Trench 94 at the DOE Hanford Site			✓	
Install rail system for reactor compartment packages in Trench 94 at the DOE Hanford Site		✓	✓	
Barge transport of reactor compartment packages from PSNS & IMF to Port of Benton barge slip		✓	✓	
Land transport of reactor compartment packages from Port of Benton barge slip to Trench 94 at the DOE Hanford Site		✓	✓	

Notes: DOE = Department of Energy; PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility

Alternatives 1 and 2 (the reactor compartment packaging alternatives) would involve partial dismantlement of the ship at a commercial dismantlement facility by removing non-radiologically controlled areas of the ship outside of the reactor plants. The remainder of the ship containing the reactor plants and radiologically controlled systems (the propulsion space section) would be transported by heavy-lift ship around South America to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) for the completion of recycling, construction of either eight (Alternative 1) or four (Alternative 2) reactor compartment packages, and shipment by barge and multiple-wheel, high-capacity transporter to the DOE Hanford Site in Richland, WA, for final disposal. Under Alternative 3 (Preferred Alternative), the Navy would contract with commercial industry (in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama) to dismantle ex-Enterprise, including its reactor plants, and dispose of the reactor plant components in several hundred shipments to an authorized LLRW site. All action alternatives would be required to follow all applicable federal, state and local environmental regulations. The Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; and Mobile, Alabama, locations are being evaluated as potential commercial dismantlement facilities based on market research performed by the Navy in this EIS/OEIS. Figure 2-1 shows the potential partial or complete dismantlement locations as well as the potential LLRW disposal facilities.

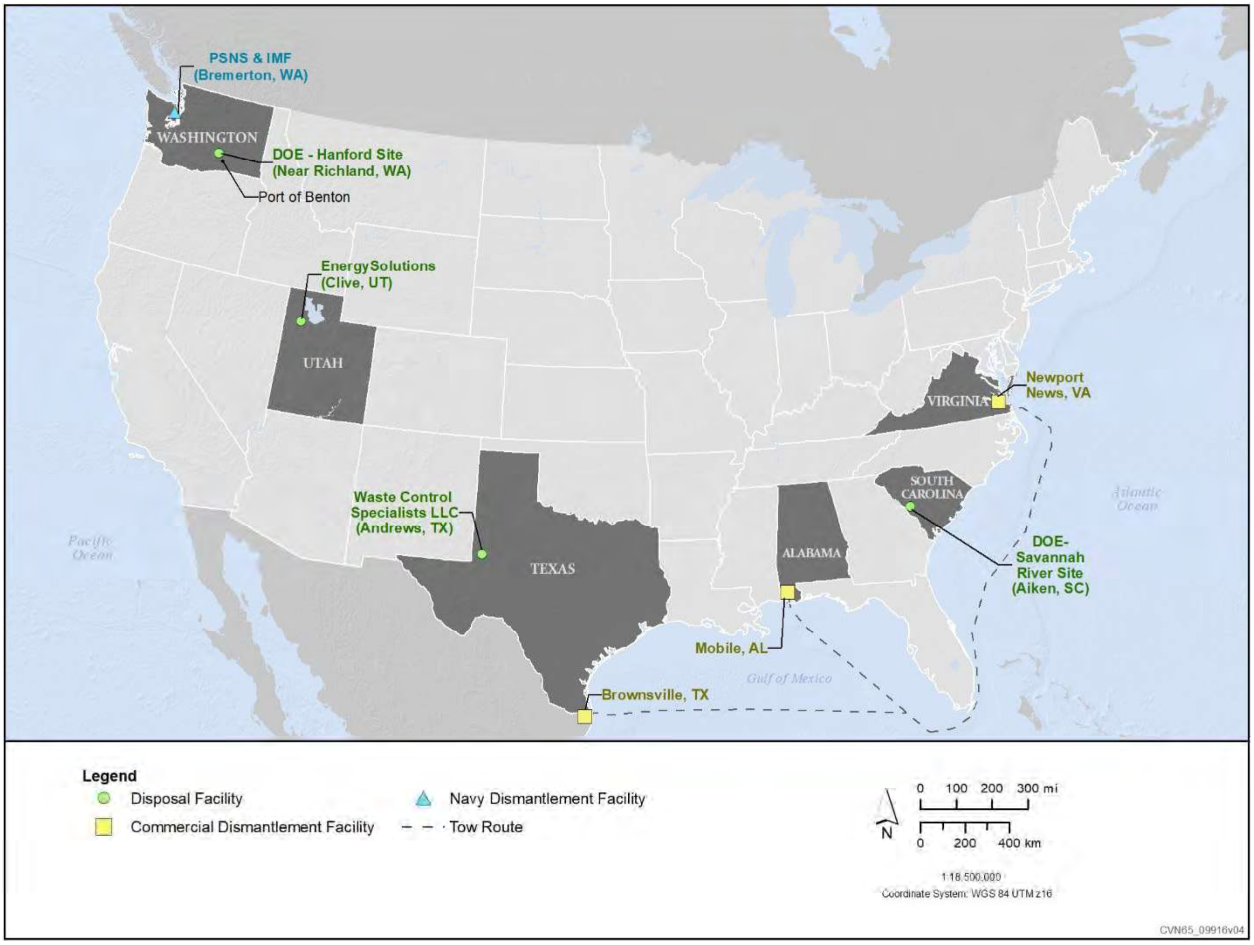


Figure 2-1: Potential LLRW Disposal Facilities and Tow Routes

Table 2-2 presents the anticipated duration and cost estimate for each alternative.

Table 2-2: Duration and Cost Estimate per Alternative

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (Preferred Alternative)
General Information	Long-term waterborne storage of ex-Enterprise (CVN 65)	Commercial partial dismantlement, (8) single reactor compartment packages, disposal at the DOE Hanford Site	Commercial partial dismantlement, (4) dual reactor compartment packages, disposal at the DOE Hanford Site	Complete commercial dismantlement, LLRW disposal at licensed LLRW waste site(s)
Navy Cost Estimate (2019 dollars – millions [M])	~$10 M per year	>$1,102 M–$1,358 M	$1,102 M–$1,358 M	$554 M–$696 M
Estimated Time for Disposal	Indefinite	>15 years (2025–2039+)	15 years (2025–2039)	5 years (2025–2029)

Notes: DOE = Department of Energy, LLRW = low-level radioactive waste

2.3.1 No Action Alternative

The Council on Environmental Quality regulations for implementing the NEPA require inclusion of a No Action Alternative and analysis of reasonable alternatives for comparison purposes to provide a clear basis for choice among options by the Record of Decision. Under the No Action Alternative, ex-Enterprise would not be dismantled or disposed of, but rather remain in waterborne storage for an indefinite time period at its current location in Newport News Shipbuilding in Newport News, Virginia (Figure 2-2). This would require periodic maintenance to ensure that storage continues in a safe and environmentally acceptable manner.

Ship preparations for storage would include installing fire and flood alarm systems, a corrosion prevention system (impressed current cathodic protection), and dehumidification systems. Storage facility staff would perform periodic inspections and maintenance of the ship while in storage, to include a detailed interior inspection annually, an underwater exterior inspection of the hull after every eight years in waterborne storage, and placing the ship in dry dock for inspection and repair after every 15 years in waterborne storage.

The No Action Alternative only delays the ultimate permanent disposal of ex-Enterprise, as dismantlement is required by Navy policy. Waterborne storage is not a permanent solution and is considered satisfactory only as an interim measure. Though expected to cost approximately $10 million per year for this alternative, maintenance and costs would increase as ex-Enterprise ages and the hull deteriorates, requiring repairs to ensure watertight integrity.

Figure 2-2: Current Location of ex-Enterprise in Newport News Shipbuilding in Newport News, Virginia

2.3.2 Alternative 1 – Single Reactor Compartment Packages

Alternative 1 is an extension of the reactor plant disposal program at PSNS & IMF, and is similar to the alternative discussed in the 2012 *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)* (Navy & DOE, 2012), hereafter referred to as the 2012 EA. This alternative would include towing ex-Enterprise to an authorized commercial dismantlement facility in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama, for partial dismantlement of ex-Enterprise, reducing the use of public nuclear-powered ship maintenance infrastructure from what was analyzed in the 2012 EA (see Figure 2-1). Partial dismantlement includes removing areas of the ship outside of reactor compartments, installing watertight bulkheads, and leaving a propulsion space section (about one-third of the original weight and length of the aircraft carrier) (Figure 2-3). Partial dismantlement is expected to take approximately 18 months.

The propulsion space section, which contains the eight defueled reactor plants, would then be transported to PSNS & IMF in Washington (Figure 2-4) around the southern tip of South America (Figure 2-5) by heavy-lift ship (instead of in-water tow) for processing and disposal. The heavy-lift ship would need to be semi-submersible so it can lower its deck below the level of the buoyant propulsion space section before emptying its ballast tank and rising back above water, with the propulsion space section on its deck.

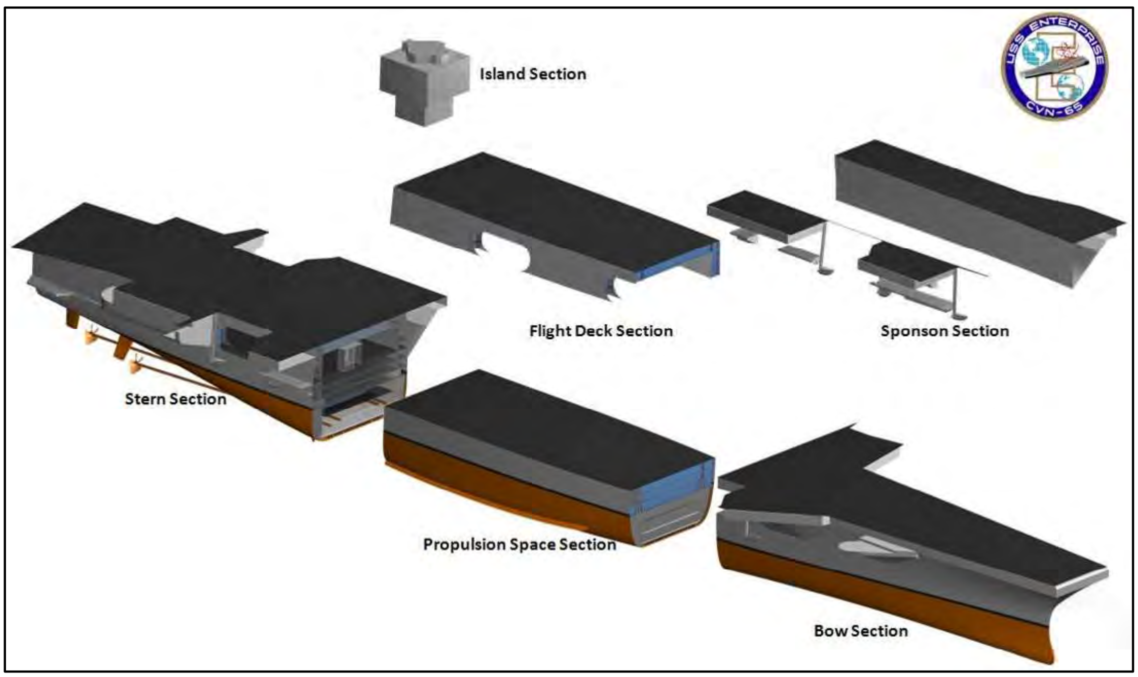


Figure 2-3: Sections of ex-Enterprise

Figure 2-4: Puget Sound Naval Shipyard & Intermediate Maintenance Facility in Bremerton, Washington

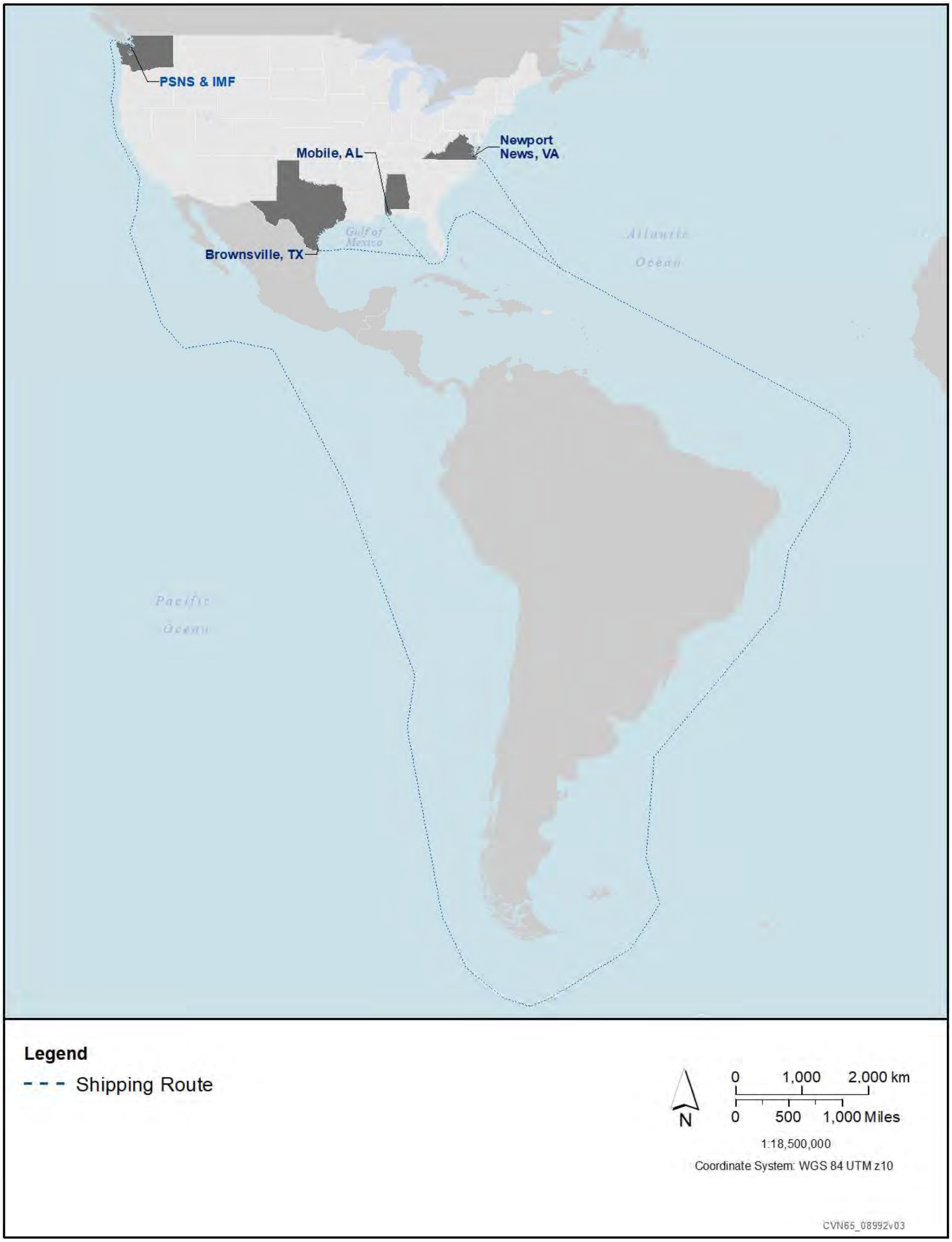


Figure 2-5: Proposed Heavy-Lift Ship Routes

Once at PSNS & IMF, qualified shipyard personnel would construct eight single reactor compartment packages for disposal at the DOE Hanford Site, following the established Navy program. Reactor compartment packages (Type B packages as defined by the Nuclear Regulatory Commission [NRC] in 10 Code of Federal Regulations [CFR] Part 71.4) are constructed from heavy steel, welded to meet stringent integrity requirements, and meet all applicable federal requirements for transportation of radiological material.

Reactor compartment packages built at PSNS & IMF would be transported by barge via the current program transport route to the Port of Benton barge slip in Richland, Washington, where each package would then be loaded onto a multiple-wheel, high-capacity transporter and hauled to Trench 94 at the DOE Hanford Site (Figure 2-6). This facility is designated for Navy use for sequestered burial of reactor compartment packages. For this alternative, there would be one reactor plant per package, for a total of eight single reactor compartment packages. Temporary docking aids may be required at PSNS & IMF, such as rubber bumpers and moored barges, as discussed in the 2012 EA. LLRW not contained in the reactor compartment packages would be disposed of according to PSNS & IMF and NNPP Waste Management Procedures, and state and federal waste regulations. Modifications to the barge slip or the transport route at the DOE Hanford Site would not be required under this alternative, as discussed in the 2012 EA.

2.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

The initial transport phase of Alternative 1 involves towing ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial locations for partial dismantlement. The final commercial location would be determined through a competitive bidding process following the completion of this EIS/OEIS. The three alternative locations are described below in Sections 2.3.2.1.1 through 2.3.2.1.3. Ex-Enterprise is non-operational (no propeller rotation or water intakes/discharges). The use of one or more assist tug boats would be required due to the size of the ship. Towing would be performed by a qualified contractor in accordance with requirements of Appendix H of the *U.S. Navy Towing Manual SI740-AA-MAM-010*, Rev 3, July 2002, as well as Naval Sea Systems Command Instruction 4740.12, *Towing and Preparation for Storage Specification for Inactivated Defueled Nuclear Powered Aircraft Carriers*. The contractor would be responsible for making all applicable notifications associated with towing activity and would adhere to all applicable safety requirements for towing ex-Enterprise. Commercial maritime pilots would be used for departures from and entries into ports. The towing contractor would prepare a towing plan and outline the procedures and guidelines for towing the unmanned ship.

2.3.2.1.1 Hampton Roads Metropolitan Area, Virginia

Alternative 1 could include the transport of ex-Enterprise within the Hampton Roads Metropolitan Area, Virginia (Figure 2-2) for partial dismantlement. The nuclear industry in the Hampton Roads Metropolitan Area has the capability to dismantle a ship of this size and would not require construction of any new facilities. Numerous government and commercial ships have been constructed and deactivated in this metropolitan area. Ship repairs and upgrades are routinely conducted and can support the partial dismantlement of ex-Enterprise, as well as scheduled and emergent maintenance work.

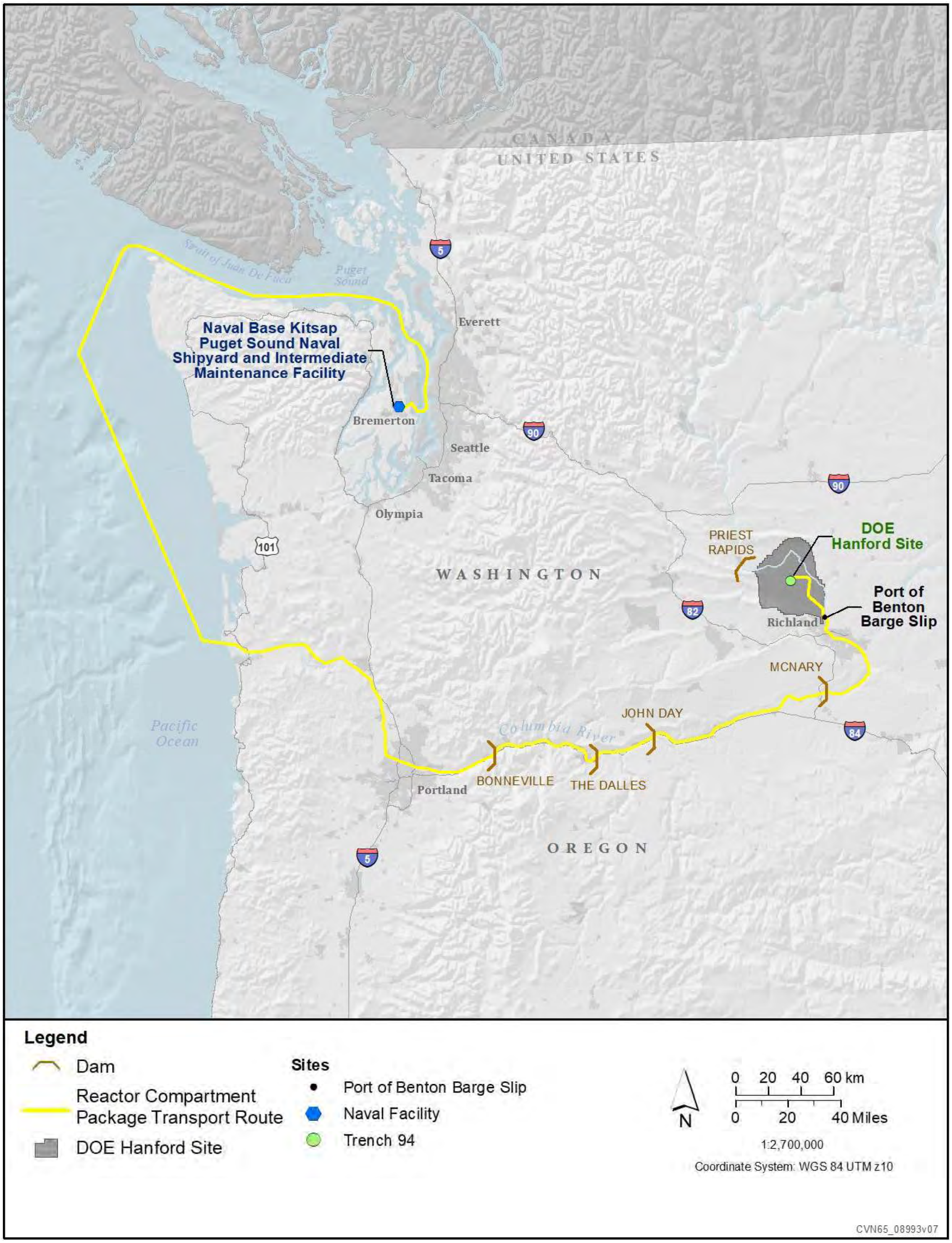


Figure 2-6: Reactor Compartment Package Transport Route

Newport News, Virginia, is the home of Newport News Shipbuilding, where naval radiological work is currently performed, and the aircraft carrier ex-Enterprise was constructed, serviced, and inactivated. Newport News Shipbuilding is a 550-acre facility located in the harbor on the southwest side of Newport News near the confluence of the James River and the Chesapeake Bay. Newport News also serves as a junction between the rails and the sea with the Newport News Marine Terminals located south of Newport News Shipbuilding. Newport News Shipbuilding is currently building Gerald R. Ford-Class aircraft carriers and performs refueling and complex overhaul work on other nuclear-powered ships. However, the specific facility for commercial dismantlement in the Hampton Roads Metropolitan Area, Virginia, has not been identified.

There are no navigational concerns for dismantling efforts performed in the Hampton Roads Metropolitan Area because the ship is currently docked at Newport News Shipbuilding and would only be moved to a new pier-side location with tugs if necessary. This metropolitan area requires no open-ocean towing, and major weather events would likely have minimal to no impact. Proposed towing within the Hampton Roads Metropolitan Area meets safety, navigation, and environmental requirements and other safeguards.

2.3.2.1.2 Brownsville, Texas

Alternative 1 could include towing ex-Enterprise from its current mooring location approximately 1,911 nautical miles (2,200 miles [mi.]) along the eastern seaboard, around the southern tip of Florida, across the Gulf of Mexico (see Figure 2-1) to the Brownsville Ship Channel (BSC) to Brownsville, Texas, for partial dismantling (Figure 2-7).

Brownsville, Texas, is located near the U.S.-Mexico border, where the Rio Grande River flows into the Gulf of Mexico. Ship dismantling facilities in the vicinity are located within the Port of Brownsville, which is in a man-made inlet south of South Padre Island. The Port of Brownsville connects to the Gulf of Mexico via Brazos Santiago Pass. The BSC (5 mi. section of the navigation channel) extends from the Port to the Laguna Madre. The remaining 12 mi. section of the channel was dredged through coastal prairie and passes adjacent to or through three salt marsh areas (Vadia Ancha, Bahia Grande, and San Martin Lake). The specific facility for commercial dismantlement in Brownsville has not been identified.

The Port of Brownsville is home to commercial ship recyclers that are capable of dismantling Navy conventionally powered aircraft carriers. Hundreds of vessels, including Maritime Administration (MARAD) and commercial ships, have been dismantled along the BSC. Dismantling and recycling activities currently occur under Navy and MARAD contracts. The BSC is routinely dredged. Commercial contractors in Brownsville are experienced with deconstructing large conventionally powered Navy ships.

Proposed towing would meet safety, navigation, and environmental requirements and other safeguards. Towing would occur in the open ocean and could be impacted by major weather events.

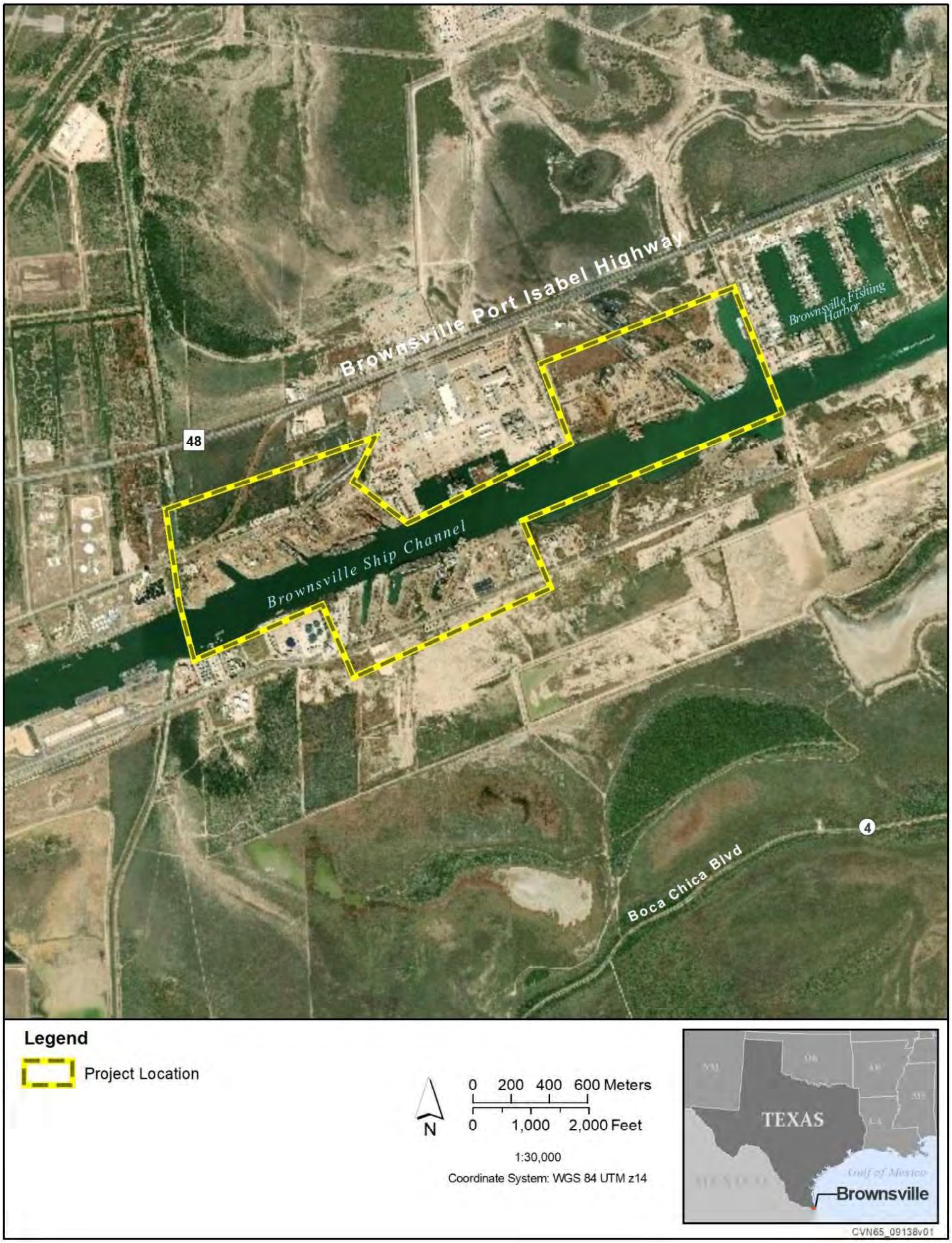


Figure 2-7: Brownsville, Texas

2.3.2.1.3 Mobile, Alabama

Alternative 1 could include towing of ex-Enterprise from its current mooring location approximately 1,830 nautical miles (2,106 mi.) along the eastern seaboard, around the southern tip of Florida, along the Florida and Alabama coastlines (see Figure 2-1) to Mobile, Alabama, for partial dismantling (Figure 2-8). Ship dismantling facilities in Mobile, Alabama, analyzed in this EIS/OEIS, are located where the Mobile River empties into Mobile Bay and the Gulf of Mexico. The port has public, deep-water terminals with direct access to 1,500 mi. of inland and intracoastal waterways serving the Great Lakes, the Ohio and Tennessee river valleys (via the Tennessee-Tombigbee Waterway), and the Gulf of Mexico. Mobile has commercial facilities that can dismantle a ship of this size and would not require construction of any new facilities. The specific facility for commercial dismantlement in Mobile, Alabama, has not been identified.

Proposed towing would meet safety, navigation, and environmental requirements, and other safeguards. Towing would occur in the open ocean and could be impacted by major weather events.

2.3.2.2 Partial Dismantlement at Commercial Dismantlement Facility

Under Alternative 1, partial dismantling actions would potentially take place at one of the three commercial dismantling locations discussed above. Dismantling, also called ship breaking or ship scrapping, is any methodical disassembly of the structure of a ship. Two methods of dismantling a ship are the afloat (moored) method and the dry dock method. Most ship dismantling is performed afloat in slips, which are dredged openings in the bank of the ship channel. Slips are generally 400–700 feet (ft.) long and 100–120 ft. wide at the entrance. A large winch at the head of the slip is used to drag the hull farther into the slip as work progresses. As material is removed from the ship, it becomes lighter and is pulled ashore. Booms are placed around the ship to help contain any spills of liquids and materials used in ships that may be damaging to the environment.

Once turned over for dismantlement, dismantling consists of removing mechanical, hydraulic, or electronic components that have potential market value for resale or reuse, then physically cutting the remainder of the hull to allow recycling of metals and other materials. During the preparation phase of dismantling, small articles and propellers are removed, which allows the hull to be pulled into shallow water where cutting usually takes place. As layers of the ship are cut, large reusable or recyclable components are removed as they become accessible.

When removed, ship machinery components are typically handled in what is commonly called the scrap yard. These components, which may be stripped of valuable materials or cut into smaller pieces, may contain or be contaminated with hazardous materials, including asbestos, polychlorinated biphenyls (PCBs), lead-based paints, oils, or fuels. Asbestos-containing material is removed from cut lines and compartments so that large sections of the ship can be removed. The engine rooms usually contain higher levels of asbestos and, therefore, take the longest for asbestos removal to be complete. Any accessible PCB-containing materials are removed, as well as any PCB-containing paint coatings from areas to be cut. Some PCB-containing materials may be left in place, only to be removed after the large piece is moved to shore. Following asbestos and PCB removal, if required, paint is removed from surfaces to be cut. Paint may have lead and other heavy metals in it, and would be removed and disposed of in accordance with applicable regulations.

Figure 2-8: Mobile, Alabama

The Navy complies with applicable U.S. Environmental Protection Agency (EPA) and Occupational Safety and Health Administration regulations and would ensure that a contractor selected to perform this work has the capability to dismantle ships in a manner that protects the environment and worker health and safety. Contractors are required to have a technical operational plan, an environmental management plan, and a safety and health management plan in place for their work. The facility selected by a contractor for dismantlement would meet all applicable requirements.

2.3.2.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste or Recycling Facility

Scrap metals, including steel, aluminum, copper, copper nickel alloy, and lesser amounts of other metals, are sorted by grade and composition and would be sold to remelting firms or to scrap metal brokers. Other materials that are not recycled, including hazardous materials and other wastes, are disposed of according to applicable local, state and federal laws and regulations.

2.3.2.4 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 1, the propulsion space section, which contains the eight defueled reactor plants, would be separated from the rest of ex-Enterprise and transported to PSNS & IMF by heavy-lift ship (instead of in-water tow). The heavy-lift ship would leave the commercial dismantlement facility, navigate around the southern tip of South America, and transit north to the U.S. West Coast, continuing up the coast to northwestern Washington and into the Strait of Juan de Fuca, then south through Puget Sound, ultimately arriving at PSNS & IMF (see Figure 2-5).

2.3.2.5 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

2.3.2.5.1 Liquid Removal

Once relocated to PSNS & IMF, some systems that were not drained during inactivation would be drained. Additional confirmatory drains would be performed in piping, tanks, and fluid system components remaining within the reactor compartment packages. Federal radiation exposure guidelines require radiological work be accomplished in a manner that keeps radiation exposure to workers and the public as low as reasonably achievable. The Navy would comply with NNPP standards for radiological controls. The following steps would be taken to remove radioactive liquids in the packages to the maximum extent practical while minimizing the exposure of workers to radiation. Liquids in piping systems external to the reactor compartment bulkheads would be removed by draining from existing valves at low points, dismantling piping systems, or an equivalent method. Liquids in piping systems internal to the reactor compartment bulkheads would be removed by draining from existing valves at low points. A non-biodegradable absorbent would be added to the primary shield water tanks to absorb any residual liquids in those locations. This draining methodology is in compliance with Washington Administrative Code 173-303.

Radioactive liquids from the reactor plant would be collected, stored, processed, and disposed of as discussed in Section 2.1.1 of the 1996 *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants*, hereinafter referred to as the 1996 EIS (Navy & DOE, 1996).

2.3.2.5.2 Radiation Exposure

Since its inception, the NNPP has emphasized the reduction of personnel exposure to radiation. The control of radiation exposure to shipyard workers is discussed in the annual report NT-10-2, *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and their Support Facilities* issued by the Navy (Navy, 2019). Radiation controls can include, but are not limited to, limited access, monitoring, shielding, use of personal protective equipment, and defined time/exposure limits. Section 4.1 of the 1996 EIS also provides applicable discussion on measures to limit and control radiation exposure (Navy & DOE, 1996).

The packaging of reactor compartments would involve draining fluid systems, cutting and sealing piping, removing components, and installing packaging and handling fixtures, similar to past reactor plant disposal operations. Sections 3.1 (Public and Occupational Health and Safety) and 3.2 (Hazardous and Radioactive Waste Management) analyze the potential impacts of radiation exposure from these operations.

2.3.2.5.3 Equipment Removal and Package Containment

Reactor compartment packaging at PSNS & IMF would require draining residual liquids in the piping systems, tanks, vessels, and other components of the reactor plants to the maximum extent practical; removing all temporary lead shielding installed in the reactor compartments; sealing radioactive systems; separating reactor compartments containing the reactor plants from the propulsion space section; and sealing the reactor compartments to provide high-integrity, fully welded steel reactor compartment packages. Remnant hull sections would be removed from the propulsion space section to facilitate reactor compartment packaging, as is currently done for various submarine and cruiser packages.

The process of removing equipment and material (including hazardous material) from ex-Enterprise during reactor compartment packaging would be similar to that described for cruisers in Section 2.1.1.3 of the 1996 EIS (Navy & DOE, 1996). Asbestos found in the insulation of pipes and other components, including the reactor plant, would be fully contained within the reactor compartment packages. Wool felt sound damping is considered to contain liquid PCB, and would be removed from the reactor compartments along with electrical equipment containing liquid PCBs, and disposed of under 40 CFR Part 761. Wool felt sound damping is also regulated under the Washington Administrative Code 173-303 for Resource Conservation and Recovery Act (RCRA) metals such as chromium. Ex-Enterprise reactor compartments are not expected to contain wool felt sound damping, but it would be removed if found. The remaining PCBs in reactor compartment packages are in a solid, non-leachable form (rubber, plastic, and paint) and are considered "PCB bulk product waste" under 40 CFR Part 761. Lead is found in reactor compartment packages, primarily as canned (inside a metal jacket) radiation shielding, ballast, and paint. If ballast lead is found exterior to the reactor compartment, it would be removed from the reactor compartment packages per agreement with Washington state. Permanently installed shielding lead would remain in the reactor compartment packages as shielding to protect workers, except for some shielding that must be removed to construct the package. All temporary lead shielding installed during inactivation would be removed. The remaining lead is regulated as a state-only dangerous waste under Washington state law (Washington State Legislature, 2020) but is not regulated as a hazardous waste under RCRA because lead used for shielding in LLRW disposal operations is not considered a waste by the EPA (Navy & DOE, 1996).

2.3.2.5.4 Construction of Eight Single Reactor Compartment Packages in Dry Dock

PSNS & IMF would construct eight single reactor compartment packages, approximately 36 ft. long, 40 ft. wide, and 47 ft. high, and weighing 1,651 tons (Figure 2-9). While the packages are being constructed, the propulsion space section would be on a combination of blocks and track-mounted cradles that are designed to support and move the reactor compartments away from each other and the propulsion space section. These packages would be surveyed prior to shipment to determine radiation levels. External surface radiation levels of the packages are expected to be less than 1 millirem per hour (mrem/hr) on contact, a fraction of the 200 mrem/hr allowed under 49 CFR Part 173. This estimate is based on the fact that the highest contact radiation readings on cruiser reactor compartment packages were less than 1 mrem/hr and based on a comparison between ex-Enterprise and cruiser reactor compartment packages.

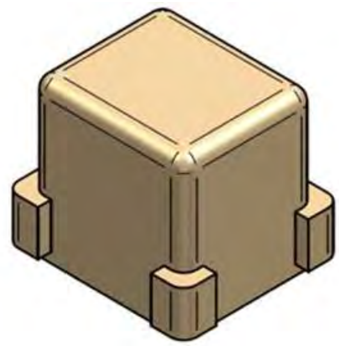


Figure 2-9: Alternative 1: Single Reactor Compartment Package

Ex-Enterprise would be dismantled around the reactor compartments to allow for separation and packaging. The remainder of the propulsion space section (remnant hull) would be dismantled and reusable metals recycled to allow the separated reactor compartment packages to be moved onto transport barges. At the end of this process, only the packaged reactor compartments would remain in the dry dock. Dedicated material bridges would be used from the hull to the dry dock apron, as was done for cruisers in the 1996 EIS (Navy & DOE, 1996). Material would be removed from ex-Enterprise via these bridges for ultimate disposal. Services and material handling equipment used for the current program would be adapted for ex-Enterprise, in sufficient quantity and capacity for the material removed. A six- to eight-year period in dry dock is estimated for completion of the metal/material processing required for reactor compartment packaging and remnant hull recycling of ex-Enterprise.

2.3.2.6 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

The DOE Hanford Site is located in southeastern Washington state, about 30 mi. east of Yakima and immediately north of Richland. Trench 94 is situated in 218-E-12B Low Level Burial Ground within the 200 East Area, near the center of the DOE Hanford Site in the Central Plateau region. Trench 94 is in an isolated area about 7 mi. from the Columbia River. Trench 94 contains various cruiser and submarine reactor compartment packages. The 1996 EIS analyzed the placement of up to 220 reactor compartment packages at Trench 94. The 2012 EA includes ex-Enterprise within this 220 package total.
Section 3.7.2.1.3 of the 2012 EA includes additional discussion. Figure 2-10 is an aerial photograph of Trench 94 taken in October 2021, showing that Trench 94 is approximately 1,600 ft. by 350 ft. As of 2021 the current trench configuration consists of 55 reactor compartment packages placed on concrete column foundations and 83 packages placed on the concrete ground level support system. Ex-Enterprise reactor compartment packages would fit within the trench floor footprint and are well within the 220 total packages analyzed. PSNS & IMF began placing reactor compartment packages on the ground level support system in fall of 1996. This substantially reduced the trench floor space occupied by each

package since they could be spaced closer together. On the ground level support system, the reactor compartment packages are a minimum of 2 ft. apart. The transport support fixtures extend beyond the packages, but are not considered part of the package and can be removed if necessary to allow access and placement of adjacent packages. PSNS & IMF would use a concrete rail support system to place the reactor compartment packages in Trench 94.

Additional rail structures would be added within Trench 94 to support the single reactor compartment packages, requiring limited excavation of the trench floor. It is expected the existing Trench 94 ramp would be used for transport of the reactor compartment packages. The current ramp provides sufficient area for a transporter to position the package for offload onto the rail support system.

2.3.2.7 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

The Navy has specially modified, reinforced, ocean-going transport barges for transporting cruiser and submarine reactor compartment packages. Support bulkheads were installed to carry the load in the center of the barge. Additional watertight bulkheads provide a greater number of tanks than are typically used for an ocean cargo barge to provide added stability in the unlikely event the barge is damaged by an accident. The barges meet both U.S. Coast Guard intact and damaged (one tank flooded) upright stability requirements (46 CFR Parts 151 and 172) and Navy stability requirements, which require stability with two adjacent flooded tanks under storm wind and wave conditions. The barges are maintained to both Navy and commercial standards and are regularly inspected by the American Bureau of Shipping and the U.S. Coast Guard. The same strict criteria would be used for the transport barges for ex-Enterprise reactor compartment packages.

After the eight reactor compartment packages are constructed and the remainder of the ship removed from dry dock, the dry dock would be flooded, partially submerging the packages to allow a transport barge into the dock for loading. After moving the barge into place, the dry dock would be drained. The packages would be raised with hydraulic jacks to the level of the barge deck. The hydraulic jacks would be supported by concrete keel blocks or other suitable blocking, steel plates, and timbers. These materials would also be used to provide a base for the track to move the packages horizontally onto the barge deck. Raising the packages would be accomplished in small increments, with blocks and shims placed under the packages as they are raised to support them in case of a loss of hydraulic jacking pressure. The reactor compartment packages would be moved onto the barge using track-mounted high capacity rollers. When in place, the packages would be welded to the steel barge deck.

Figure 2-10: Various Cruiser and Submarine Reactor Compartment Packages in Trench 94 at the DOE Hanford Site, October 2021

The barge would be towed from PSNS & IMF using a large ocean-going tug certified by the American Bureau of Shipping. River tugs would be used on the Columbia River (Figure 2-11). Qualified pilots would navigate all restricted waterways in Puget Sound, when crossing the Columbia River bar, and on the Columbia River. Shipments would be scheduled to avoid the less favorable Pacific Ocean winter weather.

Figure 2-11: Example of Transport Barge with Cruiser Reactor Compartment Package

The transport route would be the same as used for various cruiser and submarine reactor compartment packages (see Figure 2-6). The waterborne transport route for the reactor compartment packages from PSNS & IMF would follow the normal shipping lanes in Sinclair Inlet, through Rich Passage, past Restoration Point, and northerly through Puget Sound. The route is then westerly through the Strait of Juan de Fuca (staying south of the inbound Vessel Traffic System lane when transiting out of the Strait of Juan de Fuca to remain in U.S. waters), around Cape Flattery, south along the Washington coast (outside of the Olympic Coast National Marine Sanctuary Area to be Avoided) to the mouth of the Columbia River. The route then goes up the Columbia River, following the shipping channel used for the regular transport of commercial cargo. The river route passes through the navigation locks at Bonneville Dam, the Dalles Dam, John Day Dam, and McNary Dam to the barge slip located in north Richland, Washington, at river mile 342.8 (Navy & DOE, 1996). The time from PSNS & IMF departure to arrival at the barge slip would be approximately three days. Prior to transporting the reactor compartment packages to the DOE Hanford Site, PSNS & IMF would coordinate with McNary Dam and Priest Rapids Dam to raise or lower the level of the reservoir to a level at which the barge can be placed in the slip and offloaded. After offloading operations are complete, the reservoir would return to normal operational levels.

Upon arrival at the Port of Benton barge slip, the barge would be placed in the slip. Water would be added to the barge compartments in a controlled sequence to ground the barge firmly on the gravel slip bottom. Once grounded, the deck of the barge would be against and level with the top of the sill at the landward (west) end of the slip. The slip bottom would be prepared to receive the barge under required permits from the U.S. Army Corps of Engineers (USACE) and the Washington State Department of Fish and Wildlife.

The welds holding the reactor compartment packages to the barge would be cut, and the packages would be jacked up and placed upon four steel columns. Jacking would be in small increments with safety cribbing blocks and shims temporarily placed under the load to support the package if hydraulic jack pressure were lost. A transport vehicle would then be driven onto the barge and under the packages. Multiple-wheel, high-capacity transporters specially designed for heavy loads would be used. The packages would be attached to the transport vehicle using welded attachments. The time required to offload the packages from the barge would be 24–36 hours from the time the barge is docked.

2.3.2.8 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

The land transport route currently used for the various cruiser and submarine reactor compartment packages would also be used for ex-Enterprise (Figure 2-12). The route would begin at the Port of Benton barge slip south of the DOE Hanford Site on the west bank of the Columbia River.

The transport route consists of the gravel access ramp at the Port of Benton barge slip and a short section of C Avenue and continues northwest on a 1 mi. (1.6 kilometers [km]) gravel road through the DOE Office of Science land. The route intersects the DOE Hanford Site boundary at Route 4 South, south of the 300 Area and continues north and northwest for approximately 12 mi. (19 km) along Route 4 South, a well-maintained, four-lane, paved highway, to the Wye Barricade Bypass. One-half the width of the highway would be needed to transport the reactor compartment packages along Route 4 South, except for three areas where the entire width of the pavement would be needed to maneuver around traffic lights. From the Wye Barricade Bypass, the transport route continues north for approximately 6 mi. (10 km) to the old Hanford Townsite on Route 2 South. The transport route then turns west on Route 11A for about 6 mi. (10 km) to Canton Avenue and follows a transition into Trench 94 at the DOE Hanford Site.

Multiple-wheel, high-capacity transporters used to haul reactor compartment packages are of modular construction (Figure 2-13). Modules are typically bolted together end to end and side to side to provide an adequate number of wheels to carry the intended load and keep the load per tire to levels the road can accept. For reactor compartment packages considered in this EIS/OEIS, transporter modules would be assembled to provide enough wheels to properly distribute the load.

The time to transport a package between the Port of Benton barge slip and the Wye Barricade Bypass along the transport route would be approximately four to six hours. This section of the highway is open to the public and would be closed with a rolling road closure. Transport arrangements would be made for the safety of other drivers. For example, transport would be scheduled on a weekend to avoid heavy use of the roadway, travel could be restricted to one side of the four-lane highway, or pilot cars could be used to provide safe escort around the package on the southbound lane for bypass.

Beyond the Wye Barricade Bypass the roadway could be closed to general traffic for the four-to-six-hour transit from the Wye Barricade Bypass to the 200 East Area along Route 2 South and Route 11A. Traffic could be routed from the Wye Barricade Bypass along Route 4 South into the 200 Area East.

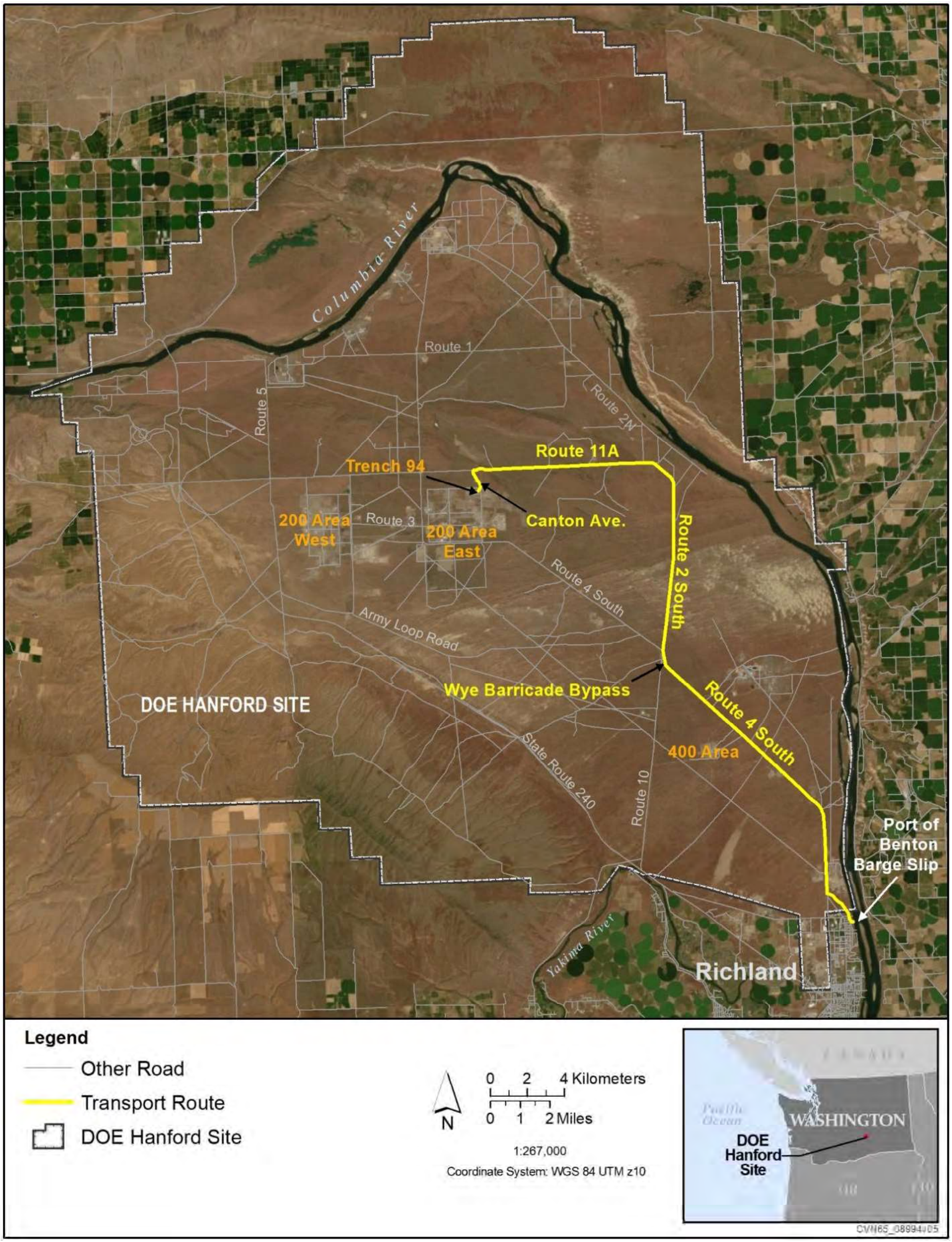


Figure 2-12: Reactor Compartment Package Transport Route

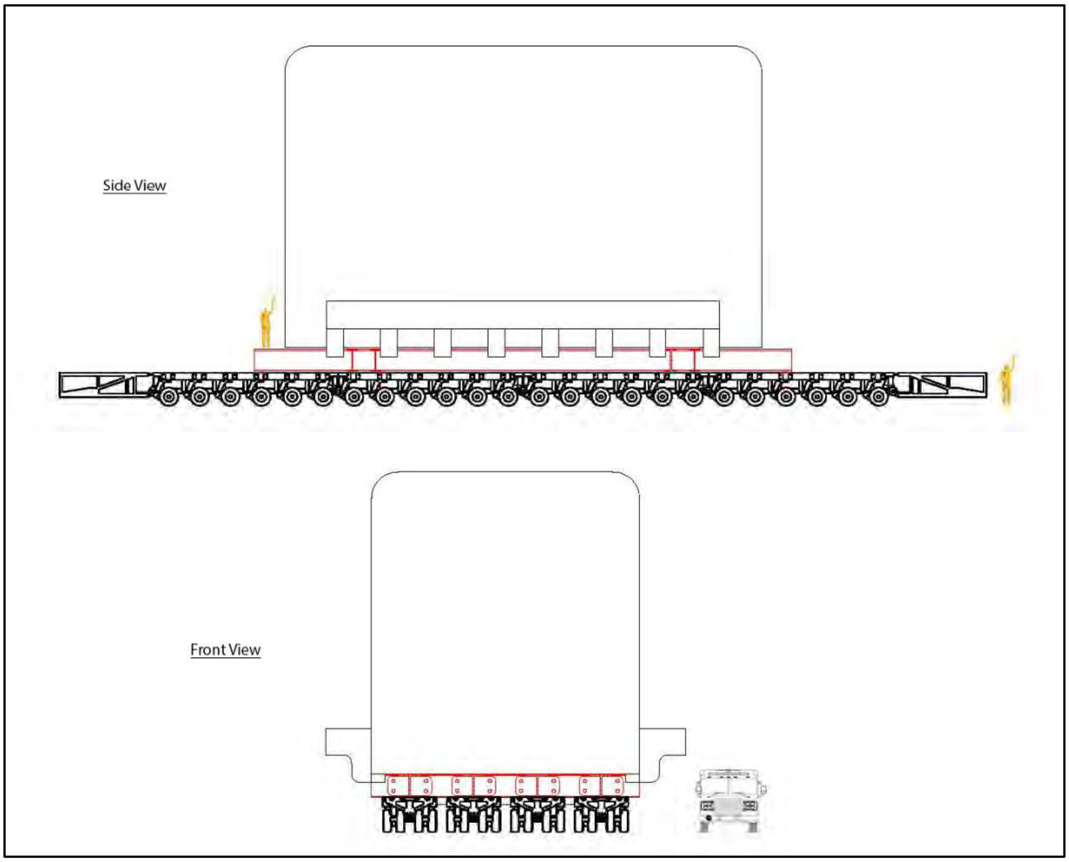


Figure 2-13: Example of a Multiple-Wheel, High-Capacity Transporter with ex-Enterprise Dual Reactor Compartment Package

2.3.3 Alternative 2 – Dual Reactor Compartment Packages

Alternative 2, similar to Alternative 1, would include the partial dismantlement of ex-Enterprise at an authorized ship dismantlement facility by removing areas of the ship outside the reactor compartments. The remainder of the ship containing the reactor compartments would then be transported to PSNS & IMF to prepare reactor compartment packages for disposal at Trench 94 at the DOE Hanford Site. However, under Alternative 2, the Navy would construct and dispose of four dual reactor compartment packages, instead of eight single reactor compartment packages, at Trench 94 at the DOE Hanford Site. Construction of the larger and heavier packages would require approximately five years in dry dock (a reduction of one to three years compared to Alternative 1).

2.3.3.1 Tow ex-Enterprise from Newport News Shipbuilding in Newport News, Virginia, to Commercial Dismantlement Facility

Transportation would be similar to Alternative 1, where ex-Enterprise would be towed to one of three commercial locations for partial dismantlement and separation of the propulsion space section for transport to PSNS & IMF.

2.3.3.2 Partial Dismantlement at Commercial Dismantlement Facility

Partial dismantlement would be the same as described under Alternative 1.

2.3.3.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste or Recycling Facility

The transport of waste and recyclable materials from partial dismantlement would be the same as described under Alternative 1.

2.3.3.4 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Shipment of the propulsion space section to PSNS & IMF would be by heavy-lift ship, as described under Alternative 1.

2.3.3.5 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

2.3.3.5.1 Liquid Removal

As described for Alternative 1, once relocated to PSNS & IMF, remaining piping, tanks, and fluid system components within the reactor compartment packages would be drained to the maximum extent practical.

2.3.3.5.2 Radiation Exposure

Since its inception, the NNPP has emphasized the reduction of personnel exposure to radiation. The control of radiation exposure to shipyard workers is discussed in the annual report NT-10-2, *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and their Support Facilities*, issued by the Navy (Navy, 2019). Radiation controls can include, but are not limited to, limited access, monitoring, shielding, use of personal protective equipment, and defined time/exposure limits. Section 4.1 of the 1996 EIS also provides applicable discussion on measures to limit and control radiation exposure (Navy & DOE, 1996).

The packaging of reactor compartments would involve draining fluid systems, cutting and sealing piping, removing components, and installing packaging and handling fixtures, similar to past reactor plant disposal operations. Alternative 2 would follow the same processes as Alternative 1 and, with proficiency, a reduction in exposure is also expected as a result of not having to separate individual reactor compartments. Sections 3.1 (Public and Occupational Health and Safety) and 3.2 (Hazardous and Radioactive Waste Management) analyze the potential impacts of radiation exposure from these operations.

2.3.3.5.3 Construction of Four Dual Reactor Compartment Packages in Dry Dock

Unlike Alternative 1, the four conjoined pairs of reactor compartments would not be separated, which would result in the construction and transport of four dual reactor compartment packages (about 71 ft. long, 40 ft. wide, 47 ft. high, and 3,304-ton weight) (Figure 2-14). These four dual reactor compartment packages would be significantly larger and heavier than the eight single reactor compartment packages of Alternative 1 (about 36 ft. long, 40 ft. wide, 47 ft. high, and 1,651-ton weight). Construction of the larger and heavier packages would require approximately five years in dry dock (a reduction of one to three years compared to Alternative 1).

Figure 2-14: Alternative 2: Dual Reactor Compartment Package

2.3.3.6 Port of Benton Barge Slip Modifications

Alternative 2 would require infrastructure modifications to the Port of Benton barge slip and the transport route at the DOE Hanford Site due to the heavier weight and larger size of the dual reactor compartment packages. Modifications would involve excavation to allow for the widening of the barge slip (in-water work) and inland pile driving and concrete work. The exact method of modification cannot be determined this early in the planning process. Multiple types of heavy equipment, such as hydraulic excavators, pile drivers, cranes, and dump trucks would be expected. Modifications are expected to remove approximately 2,625 cubic yards of material and place 71 cubic yards of material in the water.

The current slip would be expanded to accommodate the barge required for the dual reactor compartment packages (Figure 2-15). The slip would be widened 18 ft., making the new slip 80 ft. wide, and extended by 15 ft. in length, making the new length 165 ft. The widening would require the removal of the south jetty. To minimize settling of the substrate, 3 ft. of soil under the area where the south jetty currently stands would be removed and backfilled with gravel to benefit juvenile salmonids.

A 70-foot sheet pile wall would be tied into the south edge of the current slip face. This wall would be constructed of approximately 11 sheet piles driven with a vibratory hammer 50–65 ft. into the soil with 0–15 ft. above the riverbed. The sheet piles would be vibrated into the ground before removing the jetty. Vibrating the piles in place before jetty removal would substantially reduce impacts on salmonids in the river by dissipating the energy into the ground before affecting the water.

The existing slip headwall would be strengthened to handle the increased weight of the larger loads. Construction would include 24 landside pipe piles, 30 inches in diameter, spaced 10 ft. apart with a concrete slab on top, which would be placed to strengthen the headwall. The new slab would be level with the existing sill cap and soil anchor slabs. Additional widening of the road would not be needed.

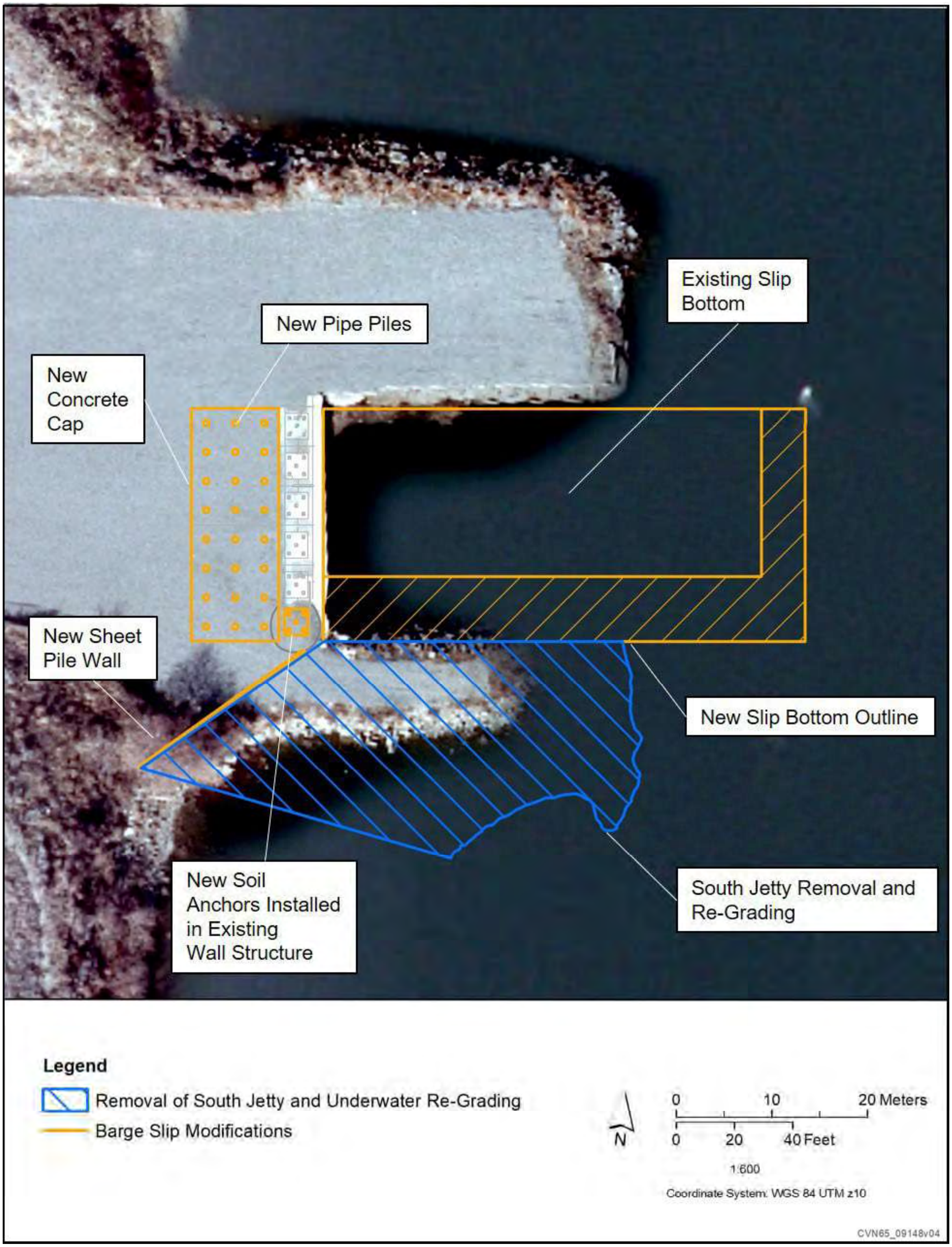


Figure 2-15: Port of Benton Barge Slip Modifications

2.3.3.7 Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

The Navy would use DOE road systems to transport reactor compartment packages from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site, similar to Alternative 1 (see Figure 2-12). Current packages range between 1,000 and 1,680 tons. Improvements are analyzed at up to 11 locations on the transport route (Figure 2-16) to support dual reactor compartment packages that could weigh up to 3,304 tons and be carried by larger transporters.

Table 2-3 lists the proposed improvements to the route, and Figure 2-16, Figure 2-17, Figure 2-18, and Figure 2-19 present the locations of the proposed improvements.

Table 2-3: Proposed Route Improvements

Location	Description
1	Fill to reduce vertical curve and side-slope
2	Fill on both sides of road for gradual vertical curve transition
3	Cut hill to reduce vertical curve
4	Cut hill to reduce vertical curve Modify transition to Route 4 South by filling along east side of the Route 4 South shoulder
5	Modify transition to Route 4 South by filling along north side of the Route 4 South shoulder
6	Modify transition to Route 2 South by cutting along the east side of the Route 2 South shoulder
7	Fill dip in road, pave median
8	Adjust side-slope transition by filling southbound lanes, paving
9	Adjust side-slope transition on both sides of railroad Reduce side-slope of curve by filling eastbound lanes or cutting westbound lanes Reduce side-slope of curve by filling westbound lanes or cutting, paving eastbound lanes
10	Adjust side-slope and vertical curve transition by filling shoulder and possibly southbound lanes Fill for gradual vertical curve transition, paving
11	Cut and fill for gradual vertical curve transition

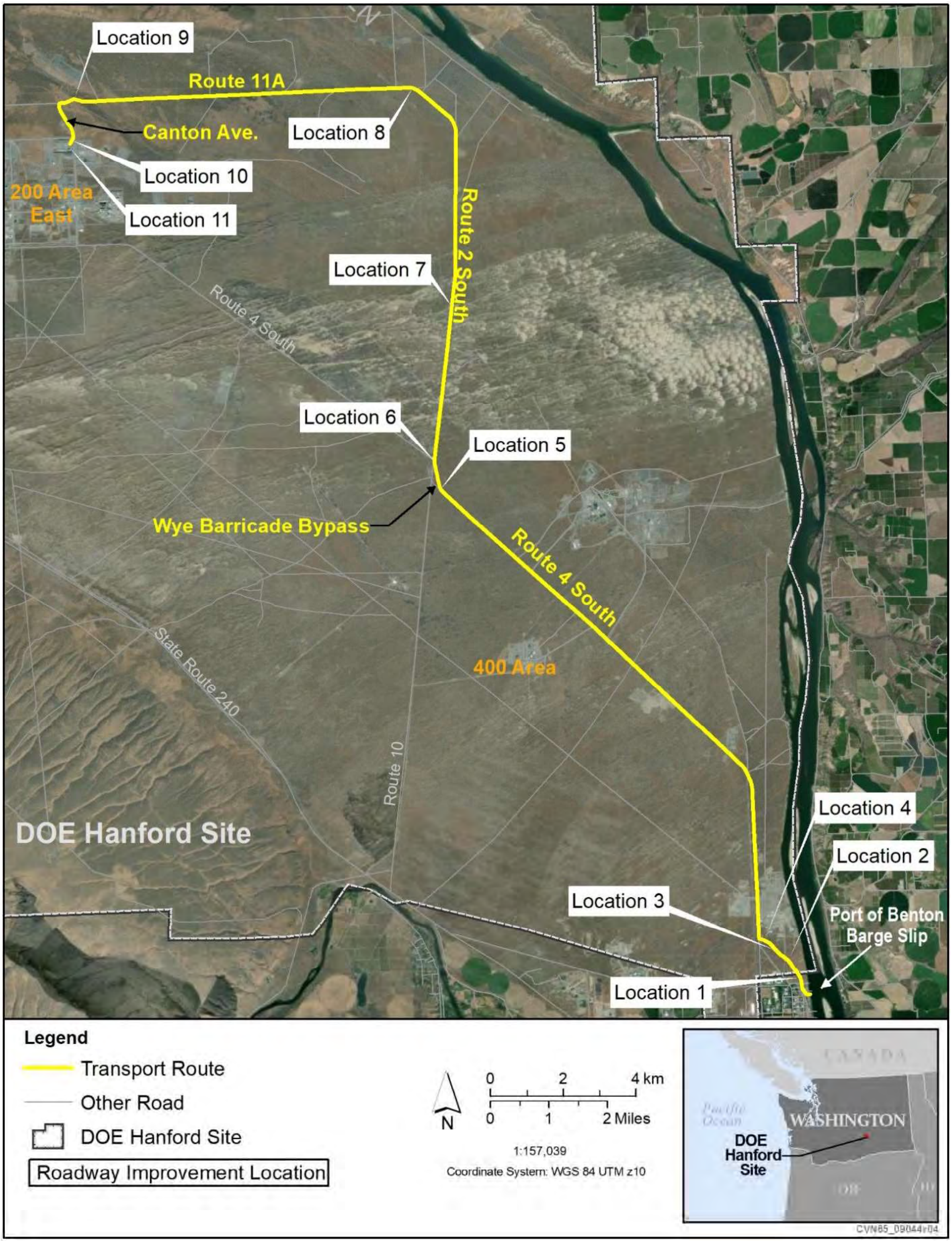


Figure 2-16: Navy Transport Route and Approximate Locations of Proposed Improvements

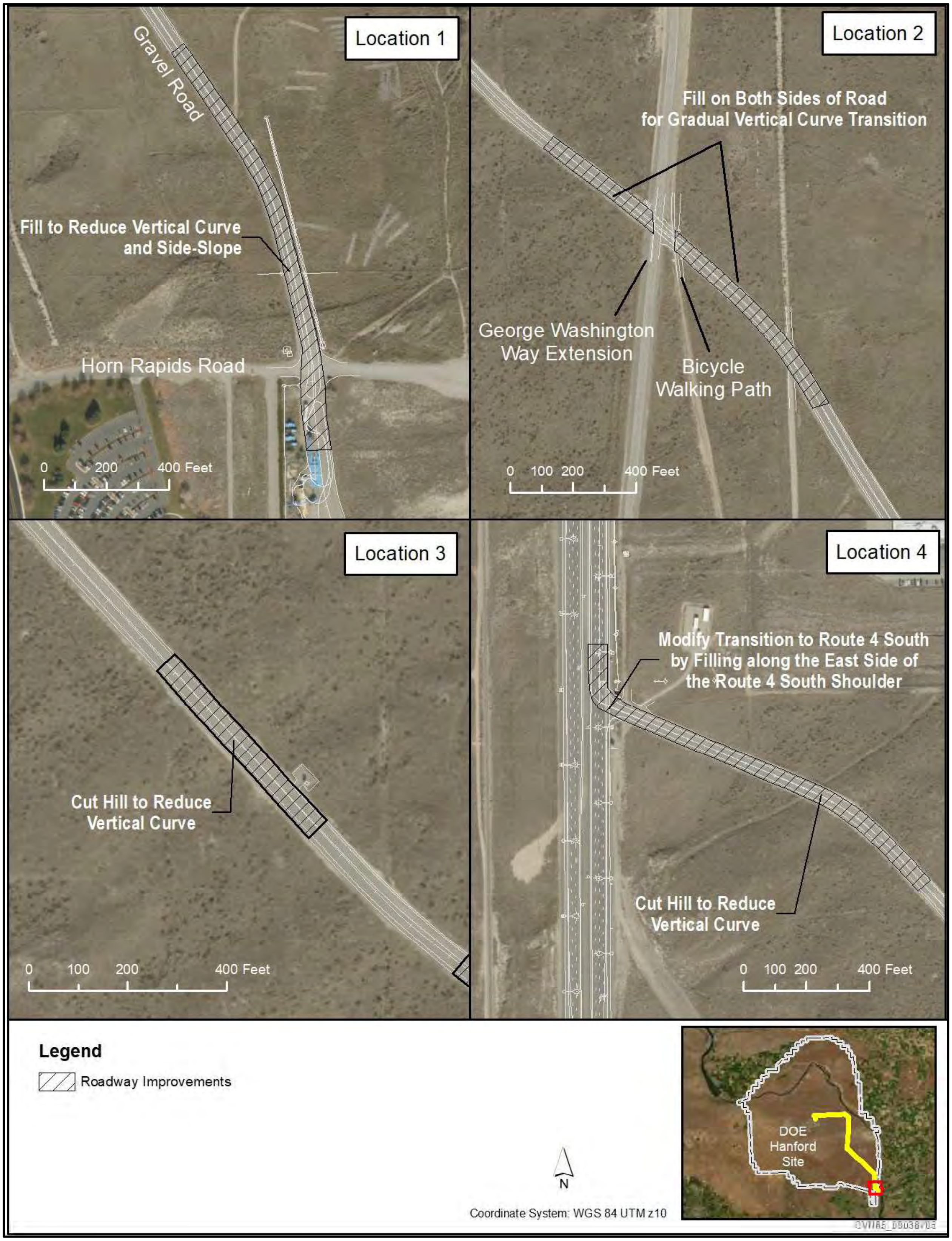


Figure 2-17: Road Improvements 1–4

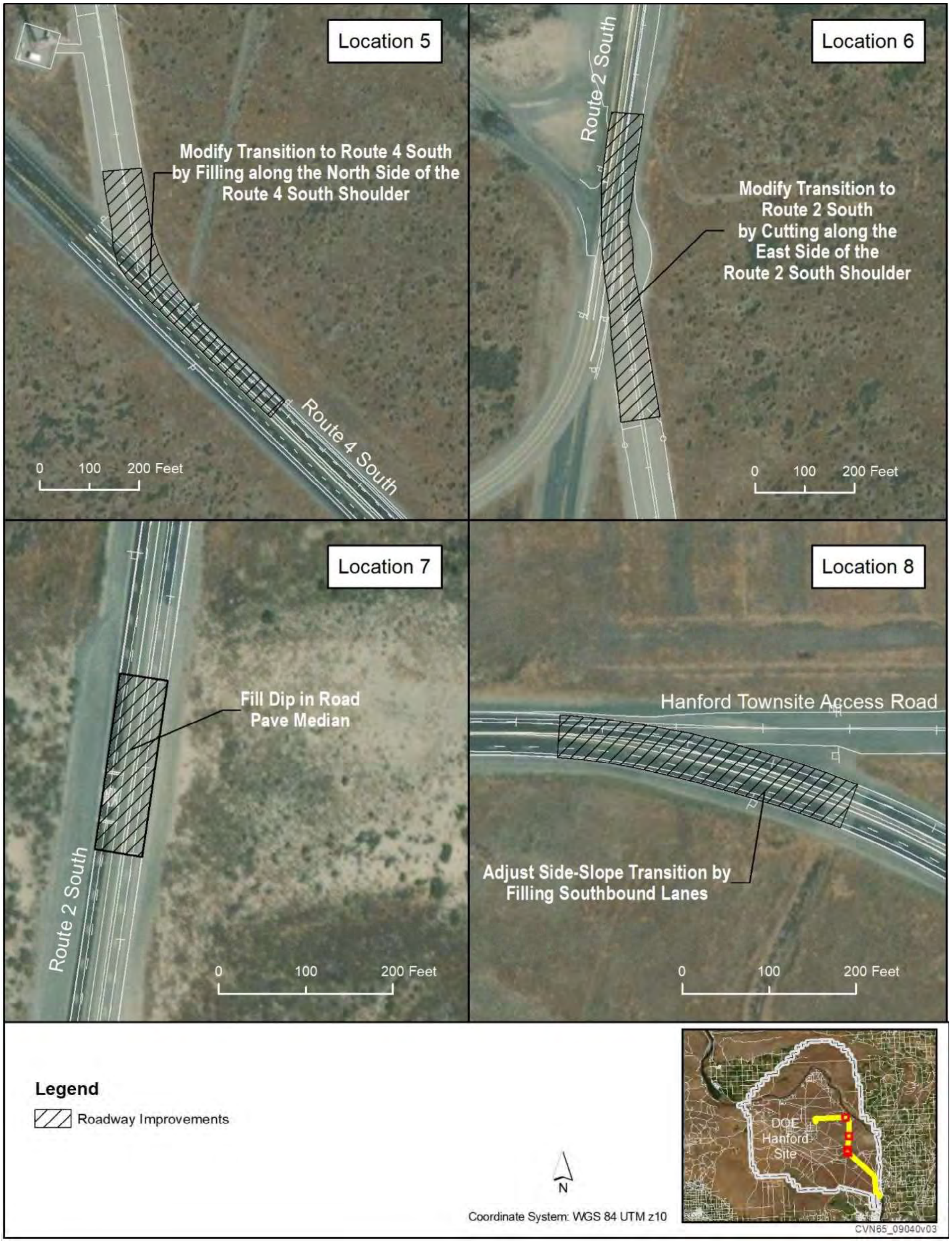


Figure 2-18: Road Improvements 5–8

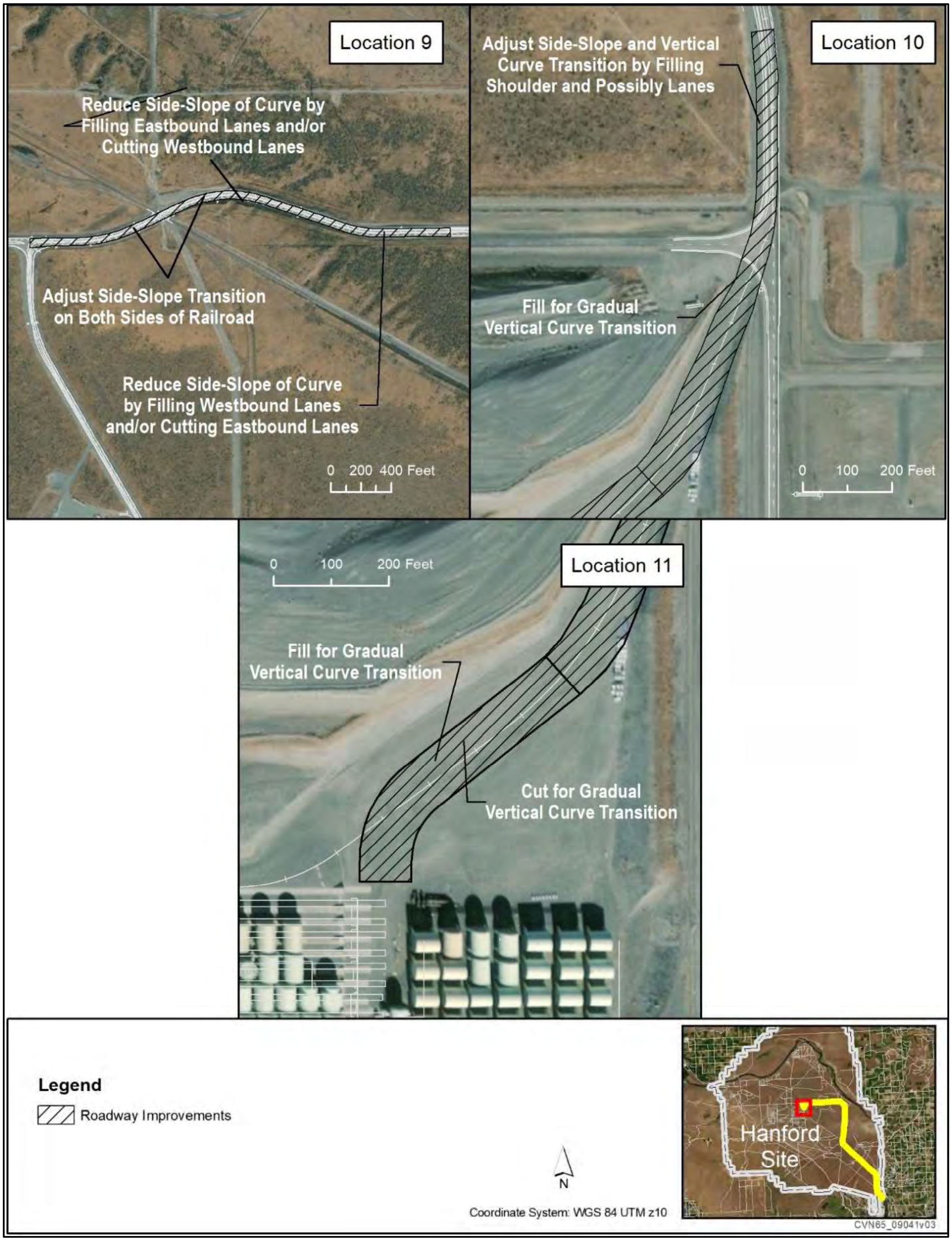


Figure 2-19: Road Improvements 9–11

2.3.3.8 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

Under Alternative 2, the rail system installation in Trench 94 at the DOE Hanford Site would be the same as described for Alternative 1.

2.3.3.9 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

The four dual reactor compartment packages would be transported by a newly constructed barge capable of handling the larger dual reactor compartment packages via the transport route (see Figure 2-6) from PSNS & IMF to the Port of Benton barge slip at Richland, Washington, similar to Alternative 1 and using the same number of tug boats per shipment.

2.3.3.10 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

From the Port of Benton barge slip, each dual reactor compartment package would be loaded onto a multi-wheel, high-capacity transporter capable of handling the larger dual reactor compartment package for transfer to Trench 94 at the DOE Hanford Site, as described in Alternative 1.

2.3.4 Alternative 3 (Preferred Alternative) – Commercial Dismantlement

Alternative 3 (Preferred Alternative) includes towing ex-Enterprise to an authorized commercial (ship dismantlement facility and complete dismantlement of the ship by an authorized commercial ship dismantlement contractor, including cutting apart the eight defueled reactor plants into segments for packaging in several hundred small containers that meet applicable NRC, Department of Transportation (DOT), and DOE transportation requirements for subsequent disposal at either a DOE, NRC, or NRC agreement state commercial LLRW facility. These facilities are described in Section 2.3.4.2 (Alternative 3 [Preferred Alternative] Disposal of Low-Level Radioactive Waste and Hazardous Waste). The reasonable and feasible commercial dismantlement locations for this EIS/OEIS include Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; and Mobile, Alabama. For the purpose of this analysis, it is assumed all commercial dismantlement activities would take place at the same facility as described for the reactor compartment packaging alternatives. The specific facility for commercial dismantlement has not been identified. Non-radioactive portions of the ship would be recycled or disposed of in accordance with applicable local, state, and federal laws.

Alternative 3 (Preferred Alternative) is modeled after successful and ongoing conventional Navy aircraft carrier dismantlement (by contract at commercial facilities), successful and ongoing commercial nuclear power plant decommissioning by contract with nuclear services companies, and the successful dismantlement of a U.S. Army barge (STURGIS) containing a defueled nuclear reactor by contract with nuclear services companies at commercial facilities (USACE, 2014). Several civilian, land-based, nuclear power plants, which are larger than Navy aircraft carrier reactor plants, have successfully been dismantled and disposed of by the commercial nuclear services industry. Navy conventionally powered aircraft carriers similar in size to ex-Enterprise are currently being dismantled in Brownsville, Texas. Since the 2012 EA, four such Navy conventionally powered aircraft carriers have been dismantled. A partnership between commercial ventures located at a facility that can dismantle conventional carriers is envisioned for this alternative.

Ex-Enterprise would be towed to one of three commercial locations (Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama) for dismantlement. Dismantlement includes disassembly of the eight defueled reactor plants for packaging into several hundred small containers that meet applicable NRC, DOT, and DOE transportation requirements for disposal at a DOE or authorized NRC or agreement state commercial LLRW facility.

Dismantlement would be managed under a Navy contract process. Under Alternative 3 (Preferred Alternative), the contractor would prepare reactor plant dismantlement and disposal planning documents associated with areas such as radiological controls, radiation safety, and environmental protection to conform with NRC standards. The Navy envisions that the contractor would be held to the standards prescribed by the NRC for the accomplishment of radiological work described in these plans. The adherence of the dismantlement contractor to NRC safety standards would be required under their contract with the Navy, and the Navy envisions contractually invoking NRC standards and obtaining NRC oversight via an interagency support agreement to accomplish the dismantlement of ex-Enterprise. The Navy would retain regulatory authority and contractually support use of the NRC requirements. The NRC would review project planning and engineering documents, conduct oversight of project execution, and provide the Navy recommendations for enforcement with the Navy's dismantlement contractor.

While, as discussed above, the Navy envisions using NRC standards and oversight to accomplish the dismantlement of ex-Enterprise under this alternative, the Navy could also use the established NNPP requirements for performing radiological work. These requirements meet or exceed the requirements of the corresponding NRC requirements.

2.3.4.1 Complete Dismantlement of ex-Enterprise at a Commercial Dismantlement Facility

Alternative 3 (Preferred Alternative) assesses the complete dismantlement of ex-Enterprise at one of three locations described above. The Navy would place a contract to dismantle ex-Enterprise at a commercial facility, and the Navy envisions implementing the NRC decommissioning process for radioactive material licensees described in the NRC Consolidated Decommissioning Guidance (NUREG-1757) with direct support from the NRC.

Alternative 3 (Preferred Alternative) would generate radioactive waste, hazardous waste, and recyclable material. Waste disposal and transportation operations are discussed in Section 3.2 (Hazardous and Radioactive Waste Management), Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives), and Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants).

Alternative 3 (Preferred Alternative) includes disassembly of the eight defueled reactor plants for packaging into several hundred small containers that meet DOT requirements for subsequent disposal at either a DOE, NRC, or NRC agreement State commercial LLRW facility. The reactor plants would be cut into segments that can fit in typical shipping containers (8 ft. high, 8 ft. wide, 40 ft. long, and with a 55,000 pound [27.5 ton] maximum weight) or transported via other shipping methods (Figure 2-20).

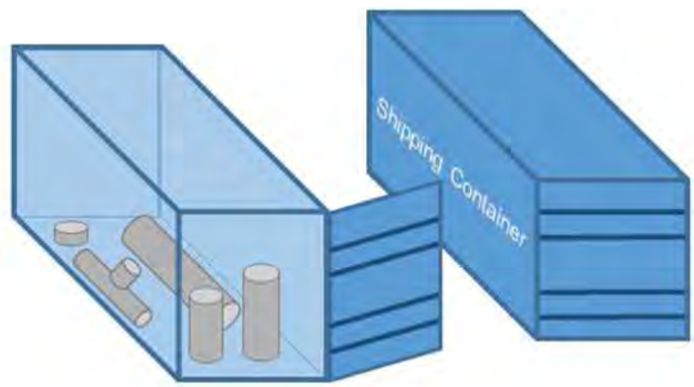


Figure 2-20: Alternative 3 (Preferred Alternative): Commercial Dismantlement Waste Shipping Options

Under Alternative 3 (Preferred Alternative) occupational exposures to radiation and radioactive materials would be managed within all regulatory limits (10 CFR Part 20.1201). Detailed analysis is presented in Section 3.1 (Public and Occupational Health and Safety).

As discussed in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Defueled Reactor Plants), dismantlement of all eight defueled reactor plants is conservatively estimated to result in up to 440 LLRW shipments of large components and container express (CONEX) boxes (or similar-sized packages) of radioactive material being shipped by barge, rail, or truck to one or more waste facilities for disposal, as summarized below:

- Reactor Vessels: 8 shipments (Type B Packages)
- Reactor Plant Components (large): up to 80 shipments
- Reactor Plant Components (small): up to 352 CONEX boxes

Transportation routes to each of the three potential radioactive disposal sites are dependent on the origin and transportation mode. Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Defueled Reactor Plants) shows the route and the distance in miles using each type of transportation mode (barge, rail, or truck) for that route. There could be up to five potential routes and modes of transport that the LLRW could follow from each commercial dismantlement facility. Routes used in the analyses of resources vary based on the resource being analyzed. See each specific section of Chapter 3 (Affected Environment and Environmental Consequences) for details on how transportation routes were chosen for each analysis.

As provided in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Defueled Reactor Plants), radiation dose to the public from transportation of radioactive waste is estimated to be low, and to be considerably below average background levels of radiation in the environment.

2.3.4.2 Alternative 3 (Preferred Alternative) Disposal of Low-Level Radioactive Waste and Hazardous Waste

The Navy estimates that dismantlement of all eight reactor plants under Alternative 3 (Preferred Alternative) would conservatively result in up to 440 shipments of large components and CONEX boxes or similarly sized packages of LLRW being shipped by barge, rail, or truck to one or more waste facilities for disposal. Dismantlement activities would also generate a small number of additional shipments of

LLRW incidental to disposal of the reactor plants, which would consist of material such as piping, tooling, and personal protective equipment. These additional wastes are similar to the small amounts of LLRW that are generated incidental to construction of reactor compartment packages and are disposed of at established waste disposal sites. Dismantlement waste shipments would also include hazardous materials, asbestos-containing materials, and PCB bulk waste, as is typical for the dismantlement of Navy ships. All shipments would meet applicable NRC, DOT, and DOE shipping requirements.

Suitable LLRW, hazardous waste, and radioactive PCB waste disposal facilities are available for wastes produced during commercial dismantlement of ex-Enterprise (see Figure 2-1). State-licensed or DOE LLRW disposal facilities in the United States that currently accept waste generated, consistent with their waste acceptance criteria, by the dismantlement facilities being considered include the following:

- *Waste Control Specialists LLC (Andrews, Texas)*: A privately owned facility licensed to accept NRC Radioactive Class A, B, and C waste and federal waste (federal waste, including from the Navy, is sourced from DOE material under the Atomic Energy Act). This facility accepts waste from Texas-NRC Compact agreement states (Texas and Vermont) in addition to other states upon approval of a waste import permit. This facility also accepts mixed hazardous and radioactive PCB waste.
- *EnergySolutions (Clive, Utah)*: Utah is part of the Northwest Compact on LLRW Management, but EnergySolutions is allowed to accept NRC Class A waste from unaffiliated states per the Third Amended Resolution and Order of the Northwest Interstate Compact. This facility also accepts mixed hazardous and radioactive PCB waste.
- *DOE-Savannah River Site (Aiken, South Carolina)*: This DOE-owned facility accepts mostly radioactive waste generated on site, but is able to accept any level of radioactive waste. This facility also accepts radioactive PCB waste.

Non-radioactive wastes, including hazardous and PCB wastes, would be disposed of according to applicable federal, state, and municipal regulations.

2.4 Preferred Alternative

Alternative 3 (Commercial Dismantlement) is the Preferred Alternative for the following reasons:

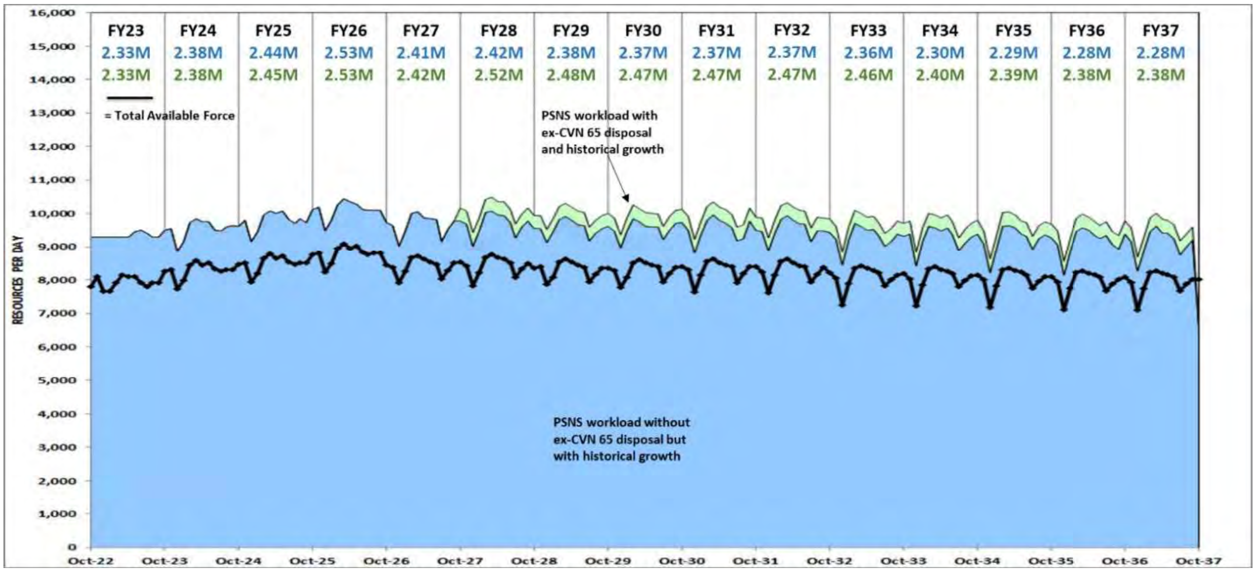
The Navy has a strong operational focus in the Pacific region, and the work PSNS & IMF performs in support of the operational nuclear fleet only increases in importance. As a result of growing workload due to a higher fleet operational tempo and capacity shortages across all Navy public shipyards, PSNS & IMF is challenged to execute their current and projected workload with their existing facilities. Furthermore, the Government Accountability Office (GAO) reported that the Navy needs capabilities for workloads such as battle damage repair, which would be in addition to the already challenging workload (GAO, 2021). The United States could not achieve its national security objectives without PSNS & IMF. Leveraging options to perform ex-Enterprise disposal at commercial facilities is advantageous to the Navy and allows PSNS & IMF to prioritize the limited public shipyard infrastructure and workforce for active fleet maintenance.

The workforce of Navy public shipyards has been under tremendous pressure to execute their primary mission of maintaining the operational fleet. Commercial dismantlement of ex-Enterprise would allow the Navy to keep the specially trained and qualified PSNS & IMF workforce focused on high-priority fleet maintenance work and the submarine inactivations and reactor compartment package work that are already part of the PSNS & IMF workload. Since the 2012 Environmental Assessment, PSNS & IMF workload associated with active Navy nuclear-powered ships has increased.

Figure 2-21 provides the updated PSNS & IMF workload from Fiscal Year (FY) 22 to FY31 with a comparison to workload that does not include ex-Enterprise reactor compartment package work based on future availability schedules (as they are known today plus historical average growth realized as the shipyard workload progresses across the Future Years Defense Plan vs. the total available work force). This average growth model is supported by the GAO-18-523 report, as well as expenditures since the last update was provided. An overlay of the expected PSNS & IMF workload over the same period with ex-Enterprise reactor compartment package preparation is also shown in green. Whether or not PSNS & IMF is assigned ex-Enterprise reactor compartment package availability, the historic growth model in the workload shows that PSNS & IMF would be executing at a level that already exceeds the sustainable capacity of the existing workforce for the greater part of the upcoming decade. Removal of ex-Enterprise allows PSNS & IMF to continue executing its already heavy workload that includes Nimitz-Class, Ohio-Class, and Seawolf-Class maintenance, as well as Ohio-Class inactivations, Los Angeles-Class inactivations, and reactor compartment package work. Additionally PSNS & IMF workload is expanding into Gerald R. Ford-Class and Virginia-Class maintenance, in alignment with the Navy and the nation’s national security mission through focus on active Fleet maintenance. Consequently, removal of ex-Enterprise from the PSNS & IMF workload would not result in any decrease in workforce at PSNS & IMF.

- The FY28/FY29 spike in workload shown in Figure 2-21 is based on current estimates for overlapping CVN docking with back-to-back CVN pier-side availabilities, including first of class CVN 79 FY28 PIA (Planned Incremental Availability), as well as overlapping Ohio-Class inactivations.
- The FY30–32 spike includes overlapping CVN availabilities that are outside the Future Years Defense Plan, and are expected to adjust in schedule to support shipyard capacity.
- Workload picture aligns with GAO-18-523 report recognition that future year workload grows above known work by 15 percent or more. Workload from FY27 through FY32 includes anticipated growth based on this report.

The Navy is continually seeking ways to minimize costs and ensure that all work is completed in the most environmentally safe and cost-effective manner possible. Based on information about the known PSNS & IMF workload, the reactor compartment packaging alternatives would schedule the earliest completion of ex-Enterprise disposal during 2030–2040. Commercial dismantlement is estimated to be completed sooner and at a lower cost. Table 2-2 provides this comparison.



Note: MDs = Mandays; The anticipated MDs for each fiscal year without ex-Enterprise reactor compartment packages are shown in blue, while the anticipated MDs with ex-Enterprise reactor compartment packages are shown in green.

Figure 2-21: PSNS & IMF Workload FY22–FY37

2.5 Alternatives Considered but Not Carried Forward for Detailed Analysis

In accordance with Office of the Chief of Naval Operations Instruction 4770.5J, *General Policy for the Inactivation, Retirement, and Disposition of U.S. Naval Vessels*, dismantling is the only method approved for the disposition of nuclear-powered ships stricken from the Naval Vessel Register and is required to be accomplished in the United States or its territories in accordance with existing laws and regulations. Any non-dismantling or non-United States alternatives were eliminated from analysis as they would not follow this policy.

The Navy methods to reduce the inactive ship inventory include the following:

- interagency transfers to the MARAD, U.S. Coast Guard, National Ocean and Atmospheric Administration, or other U.S. federal agencies
- donations for memorial and museum use as static public displays
- foreign military transfers
- dismantling and recycling
- fleet training exercises
- experimental use, including weapons effectiveness testing
- transfers to U.S. states, territories, or other political subdivisions thereof for use as artificial reefs

Navy policy, as described by Office of the Chief of Naval Operations Instruction 4770.5J, which is reflective of federal statutes, is to dismantle and recycle nuclear-powered ships and submarines stricken from the Naval Vessel Register. All other alternatives discussed above are not viable for disposal of ex-Enterprise and were eliminated and not carried forward for further analysis. In addition, the Navy did not carry forward alternatives that use solely government facilities in order to prioritize the limited public shipyard infrastructure and workforce for active fleet maintenance.

2.6 Best Management Practices Included in Proposed Action

This section presents an overview by alternative of the best management practices (BMPs) that are incorporated into the Proposed Action in this document. BMPs are existing policies, practices, and measures that the Navy would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are (1) existing requirements for the Proposed Action; (2) ongoing, regularly occurring practices; or (3) not unique to this Proposed Action. In other words, the BMPs identified in this document are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the NEPA environmental review process for the Proposed Action.

BMPs include actions required by federal or state law or regulation. The recognition of the general management measures prevents unnecessarily evaluating impacts that are unlikely to occur.

2.6.1 Alternative 1

The following sections discuss applicable regulations for management, packaging, transport, and disposal of reactor compartment packages. PSNS & IMF operates under a number of permits that allow it to conduct work including ship repair, reactor compartment packaging, and hull recycle. Transport of reactor compartment packages to Trench 94 at the DOE Hanford Site is supported by standing permits for underwater maintenance work at the Port of Benton barge slip. These permits currently include an USACE Nationwide Permit #3 authorization (ref: NWS-2005-1384), issued October 16, 2017, and a Hydraulic Project Approval (No. 2021-3-13+02) from the Washington State Department of Fish and Wildlife, issued June 22, 2021. Renewals and modifications would be sought as needed to support ongoing reactor compartment disposal. The use of Trench 94 at the DOE Hanford Site is supported by an ongoing permit process between DOE and the Washington State Department of Ecology (ECY).

2.6.1.1 Shipyard Preparations Prior to Transport

The applicable regulations for the reactor compartment packaging at PSNS & IMF include the Clean Air Act, Clean Water Act, Toxic Substances Control Act (TSCA), and RCRA. The Puget Sound Clean Air Agency (PSCAA) has regulatory authority for the Clean Air Act. The EPA has Clean Water Act and TSCA regulatory authority. The ECY has RCRA regulatory authority.

PSNS & IMF has an Air Operating Permit (No. 21177), issued by PSCAA, for the Controlled Industrial Area of PSNS & IMF, issued in December 2003. This permit expired in December 2008 but has been extended administratively to date.

PSNS & IMF has a National Pollutant Discharge Elimination System Permit issued by EPA under Section 402 of the Clean Water Act (no. WA-000206-2). This permit expired April 1999 but has been extended administratively by EPA to date. PSNS & IMF also has a State Waste Discharge permit (No. ST000374) issued by ECY in November 2011 and has been extended administratively to date.

PSNS & IMF has a permit issued by the ECY for operation of a facility to store Dangerous and Mixed Waste (No. WA2 17002 3418).

Renewals, extensions, and modifications as needed would be sought to support ongoing operations at PSNS & IMF.

2.6.1.2 Conditions of Transport to Department of Energy Hanford Site

Transportation would meet the requirements specified in 10 CFR Part 71 (Packaging and Transportation of Radioactive Materials) and 49 CFR Parts 171-179 (Hazardous Material Regulations). The requirements of 10 CFR Part 71 involve evaluating the reactor compartment package containment structure under criteria representative of both normal conditions of transport and a hypothetical accident scenario, including the following:

- free drop striking the surface in a position for which maximum damage is expected
- puncture
- temperature influences
- external pressure (reduced and increased)
- water spray
- vibration conditions
- fire (1,475 degrees for a half-hour)
- submergence (at least 50 ft.)

These requirements are also implemented by 49 CFR Part 173.

An engineering analysis of the reactor compartment package design would be performed to assess the performance under the conditions discussed above. The analysis results would then be compared with the specific requirements listed in 10 CFR Part 71.51. The package design based on this analysis would ensure 10 CFR Part 71 requirements are met. Actual physical testing of reactor compartment packages would be impractical due to weight and size considerations and is not required by 10 CFR Part 71.

Section 2.1.5.2 of the 1996 EIS provides an analysis of the effect on reactor compartment packages of the conditions of 10 CFR Part 71 discussed above (Navy & DOE, 1996). Ex-Enterprise reactor compartment packages proposed under Alternative 1 would be of similar size and shape to ex-Long Beach reactor compartment packages, and the analysis and conclusions from the 1996 EIS would apply to ex-Enterprise reactor compartment packages as well (Navy & DOE, 1996). In summary, all packages would maintain their integrity of containment for the conditions analyzed (e.g., free drop, puncture test, high temperature, external pressure, water spray, vibration, fire, and submergence).

2.6.1.3 Disposal at Department of Energy Hanford Site

Land disposal at Trench 94 at the DOE Hanford Site is regulated by state and federal agencies. DOE manages the disposal of the radioactive material contained in the reactor compartment packages under DOE Order 435.1, Chg 2, Radioactive Waste Management (DOE, 2021) . The ECY regulates the reactor compartment packages as a state-only dangerous waste under Washington Administrative Code 173-303, Dangerous Waste Regulations due to the quantity of permanent lead shielding present. Trench 94 operates under the interim status standards of Washington Administrative Code 173-303- 400. DOE and the ECY are engaged in a process to develop and issue a final permit for areas used for dangerous waste disposal at the DOE Hanford Site, including Trench 94.

PCBs are found on Navy ships, commonly in wool felt sound damping, electrical cable rubber, and paint. Wool felt sound damping and electrical equipment containing liquid PCBs would be removed and disposed of under 40 CFR Part 761. Wool felt sound damping is also typically regulated under Washington Administrative Code 173-303 for metals such as chromium. Ex-Enterprise reactor compartments are not expected to contain the wool felt sound damping, but this material would be removed if found. The remaining PCBs in the reactor compartment packages would be in a solid, non-leachable form such as in rubber, plastic, and paint, and are considered "PCB bulk product waste" under 40 CFR Part 761. "PCB bulk product waste" of the types found in reactor compartment packages may be disposed of in solid waste (municipal) landfills.

Asbestos insulation is commonly found in older ships. Asbestos is regulated in the work place, in removal operations, and in the environment. Asbestos would be properly contained to meet local (Benton Clean Air Agency) and federal (40 CFR Part 61) requirements.

Sections 173-303-280 through 173-303-395 of the Washington Administrative Code describe state requirements for facilities which store, treat, or dispose of dangerous waste and which must be permitted by the state. The disposal of reactor compartment packages at Trench 94 at the DOE Hanford Site would be regulated under these sections.

2.6.2 Alternative 2

Under Alternative 2, the regulations for management, packaging, transport, and disposal of ex-Enterprise reactor compartment packages would be the same as Alternative 1.

Best management practices for Port of Benton barge slip modifications include the following:

- DOE would be notified prior to start of work that could affect sensitive research equipment located near the Port of Benton barge slip and the transport route. DOE requires notice to implement standard practices for mitigating vibratory effects on the equipment.
- Staging areas for the Port of Benton barge slip modifications would be located in existing developed areas immediately west of the slip headwall, within the existing access road, and the existing gravel parking area approximately 200 yards uphill to the west of the slip. This area is currently used for general operations equipment staging at the barge slip.
- Sheet piles would be placed with a vibratory hammer before the removal of the jetty to reduce the pressure wave to insignificant levels.
- Other in-water work would be done within the in-water work window to minimize impacts on migrating salmonids.
- The contractor would not pollute water with any substance defined as a dangerous or hazardous, or a regulated substance by federal, state, and local laws and regulations.
- Fueling and lubrication of equipment and motor vehicles would be performed primarily at the staging area. If these actions must be done on site, they would be conducted in a manner that affords the maximum protection against spills. If any material is spilled, the contractor would immediately remove the material and restore the area to the condition that existed prior to the spill. Section 3.2.3.3 (Alternative 2: Dual Reactor Compartment Packages) has additional detail.
- Special measures would be taken to prevent chemicals, fuels, oils, grease, bituminous paint, and waste washings from entering public lands and specifically Columbia River water.
- Construction waste would be collected at the site and disposed of at proper sites away from the river.
- Turbidity fences would be used to confine all turbidity within the aquatic construction area.
- The area under the excavated south jetty would be covered with gravel to benefit juvenile salmonids.

Transport route improvements would be designed and constructed in accordance with the geotechnical report for the Proposed Action and applicable building and grading codes. Special measures would be implemented in accordance with the stormwater pollution prevention plan. For improvement locations

#1–4, the Navy would coordinate with the DOE Pacific Northwest Site Office and Pacific Northwest National Laboratory prior to work on the haul road and identify any mitigation measures. The following best management practices were identified to reduce impacts on biological resources:

- avoid undisturbed habitats adjacent to the project area
- keep vehicles and heavy machinery within the non-vegetated road prism at all times, including during the staging of materials, equipment, and machinery; if laydown areas are required, they must be identified before work begins and included in the ecological compliance review
- use vehicle and equipment cleaning stations to minimize the introduction and spread of weeds during construction; clean vehicles and equipment before entering and as soon as possible after leaving each work area

Additionally, during Port of Benton barge slip or road modification work, the contractor would enforce the following actions to control fugitive dust:

- use water suppressants
- minimize activity during periods of high winds
- use covered chutes, covered containers, or collection control equipment when handling, transferring, or storing dusty material
- keep paved surfaces clean
- restrict access or limit vehicle speeds on unpaved areas to 15 miles per hour
- limit the amount graded at any one time

All construction waste, debris, and dredged material would become property of the contractor. The materials would be handled, transported, and disposed of offsite at an appropriate facility in accordance with all federal, state, and local laws and requirements.

2.6.3 Alternative 3 (Preferred Alternative)

The following sections discuss the applicable regulations for management, packaging, transport, and disposal of radiologically controlled material.

2.6.3.1 Normal Conditions of Transport

Waste transportation and other aspects of the proposed dismantlement would be conducted in accordance with applicable NRC, DOT, and DOE regulations. State agencies may also require shippers of hazardous radioactive materials to register with state agencies. For some hazardous and oversized shipments, shippers must coordinate with local agencies, including law enforcement, emergency services, fire departments, and others as requested by county or municipal authorities. Commercial dismantlement of the ship would result in about 440 CONEX boxes or similar-sized packages of LLRW (e.g. piping, components) being shipped for disposal by barge, rail, or truck to one or more of the following authorized low-level radioactive waste facilities: EnergySolutions in Clive, Utah; the DOE Savannah River Site near Aiken, South Carolina; and Waste Control Specialists in Andrews, Texas. The eight reactor vessels would require shipment as Type B packages per 49 CFR Part 173.431, including packaging design and construction to meet stringent integrity requirements. Table 2-4 provides estimated numbers and types of LLRW shipments as part of Alternative 3 (Preferred Alternative).

Table 2-4: Shipments

Mode	Shipment Type	Total Number of Shipments	Size[1] (feet)
Alternative 3 (Preferred Alternative)[2]			
Commercial Dismantlement	Reactor Vessel	8	15 D x 21 L
Commercial Dismantlement	Other Large Reactor Plant Components	80	Max. 10 D x 25 L
Commercial Dismantlement	Remainder of Reactor Compartment in CONEX boxes	352	8 W x 8 H x 40 L
Alternative 1 (for comparison)			
Reactor Compartment Package to the DOE Hanford Site	Single Reactor Compartment Package	8	39.8 W x 46.6 H x 35.5 L
Alternative 2 (for comparison)			
Reactor Compartment Package to the DOE Hanford Site	Dual Reactor Compartment Package	4	39.8 W x 46.6 H x 71.0 L

[1]Package sizes are those used for the analysis and are approximate.
[2]For Alternative 3 (Preferred Alternative), 55 packages contain the material for one reactor compartment.
Notes: CONEX = container express, D = Depth, H = Height, hr = hour, L = Length,
mrem = millirem (rem = Roentgen equivalent man), W = Width

2.6.3.2 Disposal

With regards to the disposal of the reactor plants, waste facilities are limited on the type of waste they can accept based on their site license and their waste acceptance criteria. For example, the EnergySolutions waste site in Utah can only accept Class A waste. Waste classifications are established by the NRC (10 CFR Part 61.55) and are applicable to waste to be disposed of in an NRC or agreement state licensed facility. Class A waste is the lowest non-exempt waste class, is allowed the lowest levels of specific long-lived radionuclides (listed in Tables 1 and 2 of 10 CFR Part 61.55), and is required to meet only the specific characteristics set forth by the NRC. Class B waste may contain higher levels of radioactivity for the specific long-lived radionuclides, but must also meet more rigorous requirements on waste form to ensure stability after land disposal. Class C waste may contain even higher levels of radioactivity for specific long-lived radionuclides, must meet more rigorous requirements on waste form, and must be protected against inadvertent intrusion.

Waste Control Specialists Federal Waste Facility in Texas can accept Class A, Class B, Class C, and mixed low-level waste. DOE sites have limits based on site-specific conditions. Appendix D of the 1996 EIS discusses application of the NRC classification system and DOE classification system to the internal structure of the reactor vessels of the ship classes being disposed of, noting that the structures would be acceptable for land disposal using assumptions appropriate for disposal within the sealed reactor vessels and within the sealed reactor compartment packages at the DOE Hanford Site. For Alternative 3 (Preferred Alternative), the containment provided by a sealed ex-Enterprise reactor vessel in a Type B package during transit conditions would be equivalent to the reactor compartment package, and it would be appropriate to use the reactor vessel internal structure cylindrical volume to assign a waste disposal classification. Regardless of the use of cylindrical volume or smaller structure volume, it is expected that ex-Enterprise reactor vessels (and internal structure) would be disposed of as a Class C waste under the NRC regulations (or DOE Category 3 for the DOE Savannah River Site option) (Section 3.2.1.2.1.1 [Federal Radioactive Waste Regulations] provides additional discussion).

3 Affected Environment and Environmental Consequences

This chapter describes the United States (U.S.) Department of the Navy (Navy) approach to analysis, existing environmental conditions, as well as the analysis of resources potentially impacted by the Proposed Action described in Chapter 2 (Description of Proposed Action and Alternatives).

3.1 Public and Occupational Health and Safety

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes public health and safety, including occupational safety associated with the Proposed Action and alternatives. The analysis includes potential effects related to hazardous work, hazardous materials, and radioactive materials during ex-Enterprise disposal operations.

While the U.S. Navy has removed all of the nuclear fuel, low-level radioactive, hazardous, and mixed radioactive and hazardous materials remain onboard the ship, and exposure to these materials during dismantlement needs to be assessed for potential effects on workers and the public. This section of the EIS/OEIS addresses potential effects from exposure to these materials. Section 3.2 (Hazardous and Radioactive Waste Management) describes waste management and disposal actions.

3.1.1 Methodology

3.1.1.1 Region of Influence

For all alternatives, the Region of Influence (ROI) includes the population of Navy and contractor workers at government facilities; contractors and Navy oversight personnel at commercial dismantlement facilities; Navy workers and contractors associated with other projects at these facilities; and local residents. For dismantlement operations at commercial dismantlement facilities, it is anticipated that a portion of the dismantlement contractor workforce would temporarily relocate to the ROI. During transportation activities, the ROI includes both transportation workers and the public along land and water transportation routes. Under the No Action Alternative, the ROI would include Newport News Shipbuilding in Newport News, Virginia and the surrounding area. If the No Action Alternative is selected, ex-Enterprise would remain in its current location.

Under Alternatives 1 and 2 (the reactor compartment packaging alternatives), the ROI of the Proposed Action would include the public along waste transportation routes as well as communities immediately surrounding Newport News, Virginia; commercial dismantlement facilities in Virginia, Texas, and Alabama; Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington; the Port of Benton barge slip and the U.S. Department of Energy (DOE) Hanford Site in Richland, Washington. Water routes include ex-Enterprise tow from Newport News, Virginia, to a commercial dismantlement facility; the heavy-lift shipping route for transportation of the propulsion space section from the commercial dismantlement facility location to PSNS & IMF; and the barge route for the reactor compartment packages from PSNS & IMF to the barge slip. The ROI for the reactor compartment packaging alternatives also includes the road transport from the barge slip to Trench 94 at the DOE Hanford Site for land disposal.

For the reactor compartment packaging alternatives, the transportation routes for ex-Enterprise and the propulsion space section are summarized in Table 3.1-1. The No Action Alternative does not involve a tow and is not addressed in Table 3.1-1.

Table 3.1-1: Water Transportation Routes from Newport News, Virginia

Location of Complete or Partial Commercial Dismantlement	For Alternatives 1, 2, and 3		For Alternatives 1 and 2 only	
	Tow Route from Newport News, VA	Tow Distance to Commercial Dismantlement Location (nm) [1]	Heavy-lift Ship Route to PSNS & IMF via the Strait of Magellan	Heavy-lift Ship Route Distance to PSNS & IMF (nm)[1]
Hampton Roads Metropolitan Area, VA	Local tow	Local tow	South along the eastern U.S. coast, through the Caribbean Sea, around South America, and north to PSNS & IMF	13,846
Brownsville, TX	South along the eastern U.S. coast, around Florida, and across the Gulf of Mexico	1,911	East through the Gulf of Mexico, through the Caribbean Sea, around South America, and north to PSNS & IMF	14,487
Mobile, AL	South along the eastern U.S. coast, around Florida, and north through the Gulf of Mexico	1,830	South through the Gulf of Mexico, through the Caribbean Sea, around South America, and north to PSNS & IMF	14,214

[1]https://sea-distances.org/

Notes: AL = Alabama, nm = nautical mile, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, TX = Texas, U.S. = United States, VA = Virginia

For Alternative 3 (Preferred Alternative), the ROIs for the commercial dismantlement facilities in Virginia, Texas, and Alabama are the same as those described for the reactor compartment packaging alternatives. However, for Alternative 3 (Preferred Alternative), there would be no heavy-lift ship movement of the propulsion space section to PSNS & IMF or dismantlement work at PSNS & IMF. The tow routes and distances for Alternative 3 (Preferred Alternative) are provided in Table 3.1-1. For purposes of assessing transportation-related health and safety impacts under Alternative 3 (Preferred Alternative) and to analyze the longest/bounding distance, all low-level radioactive waste (LLRW) is assumed to be shipped from the commercial dismantlement facility to Utah for disposal. The risks associated with truck transportation are considered the most heavily impacted by route distance and populations along the routes, both of which are maximized on routes to Utah. By comparison, disposal locations in Texas and South Carolina are shorter distances from each of the commercial dismantlement sites considered. Use of these longer routes, as representative of LLRW disposal, would bound the public exposure risk without having to consider factors that could have lesser effects on results, such as road conditions, state regulation, and number of bridges or tunnels. Additionally, the industry standard radioactive materials transportation risk model, RADTRAN, does not consider these factors in incident-free or accident scenarios. While rail transport is a viable and economically feasible transportation method for large volumes of waste over land, including radioactive waste, rail transport presents a lower public safety concern than trucking. Similarly, barge transportation would have a lower public health and safety impact but is only a viable transportation option to the DOE Savannah River Site (SRS) located along the Savannah River near Aiken, South Carolina. Therefore, this EIS/OEIS considered the impacts from truck transport for the over-land transport of waste as bounding any public health and safety effects (Table 3.1-2).

Table 3.1-2: Truck Transportation of LLRW from Commercial Dismantlement Locations to Disposal Locations Available Under Alternative 3 (Preferred Alternative)

Origin	Newport News, Virginia		
Destination	EnergySolutions (UT)	WCS (TX)	SRS (SC)
Approximate route miles	2,323	1,806	545
Number of states traveled through	10	8	3
States traveled through	VA, WV, KY, IN, IL, MO, IA, NE, WY, UT	VA, NC, SC, GA, AL, MS, LA, TX	VA, NC, SC
Approximate total persons within a 1-mile-wide corridor [1]	2,761,464	2,940,262	776,991
Origin	**Brownsville, Texas**		
Destination	EnergySolutions (UT)	WCS (TX)	SRS (SC)
Approximate route miles	2,461	729	1,913
Number of states traveled through	4	1	6
States traveled through	TX, NM, CO, UT	TX	TX, LA, MS, AL, GA, SC
Approximate total persons within a 1-mile-wide corridor [1]	3,357,319	908,108	2,725,600
Origin	**Mobile, Alabama**		
Destination	EnergySolutions (UT)	WCS (TX)	SRS (SC)
Approximate route miles	2,309	819	496
Number of states traveled through	7	4	3
States traveled through	AL, MS, LA, TX, NM, CO, UT	AL, MS, LA, TX	AL, GA, SC
Approximate total persons within a 1-mile-wide corridor[1]	3,119,511	1,468,674	923,975

[1]Population estimates are provided for comparative analysis and were derived from the RouteInfo model output from WebTRAGIS analysis. This analysis was in addition to the Radiological Transportation Analysis provided in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants).

Notes: AL = Alabama, CO = Colorado, GA = Georgia, IA = Iowa, IN = Indiana, IL = Illinois, KY = Kentucky, LA = Louisiana, MO = Missouri, MS = Mississippi, NC = North Carolina, NE = Nebraska, NM = New Mexico, SC = South Carolina, SRS = Savannah River Site, TBD = to be determined, TX = Texas, UT = Utah, VA = Virginia, WCS = Waste Control Specialists, LLC, WV = West Virginia, WY = Wyoming

3.1.1.2 Regulatory Framework

The Proposed Action and alternatives would meet all applicable federal, state, and local health and safety requirements. Navy, Naval Nuclear Propulsion Program (NNPP), and/or Nuclear Regulatory Commission (NRC) health and safety management practices would also be invoked consistent with ongoing industrial work under those authorities.

Private shipyards such as Newport News Shipbuilding, public shipyards such as PSNS & IMF, and commercial ship dismantlement facilities meet applicable health and safety requirements of Occupational Health and Safety Act (29 United States Code [U.S.C.] Section 651 et seq.). For the No

Action Alternative and the reactor compartment packaging alternatives, radiological work would be conducted under NNPP standards and regulations under the Atomic Energy Act (42 U.S.C. Section 2011 et seq.)

For Alternative 3 (Preferred Alternative), the Navy envisions contractually invoking NRC standards and obtaining NRC oversight via an interagency support agreement to accomplish the dismantlement of ex-Enterprise. The Navy would retain regulatory authority and contractually support use of the NRC requirements. The NRC would review project planning and engineering documents, conduct oversight of project execution, and provide the Navy recommendations for enforcement with the dismantlement contractor. The reactor plants and other LLRW from the ship would be packaged and disposed of as LLRW in accordance with applicable local, state, and federal laws. Non-radiological hazards, including occupational safety and health, Resource Conservation and Recovery Act hazardous materials, polychlorinated biphenyls (PCBs), and asbestos containing materials (ACM), would be regulated in the same manner that these hazards are regulated in conventionally-powered ship dismantlement and recycling. Navy conventionally powered aircraft carriers similar in size to ex-Enterprise are currently being dismantled in Brownsville, Texas. Since the *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)* (Navy & DOE, 2012) (hereinafter referred to as the 2012 EA), four such Navy conventionally powered aircraft carriers have been dismantled. A partnership between commercial ventures located at a facility that can dismantle conventional carriers is envisioned for this alternative. Ex-Enterprise would be towed to one of three commercial locations (the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama) for dismantlement. Dismantlement includes disassembly of the eight defueled reactor plants for packaging into several hundred small containers that meet applicable NRC, U.S. Department of Transportation (DOT), and DOE transportation requirements for disposal at a DOE or authorized NRC) agreement state commercial LLRW facility. Non-radioactive portions of the ship would be recycled or disposed of in accordance with applicable, local, state, and federal laws.

While the Navy envisions using NRC standards and oversight to accomplish the dismantlement of ex-Enterprise under this alternative, the Navy could also use established NNPP requirements for performing radiological work.

3.1.1.3 Relevant Federal Regulations and Best Management Practices for Protecting Health and Safety

3.1.1.3.1 U.S. Occupational Safety and Health Act of 1970 (29 United States Code Section 651 et seq.)

The Occupational Safety and Health Act establishes standards for safe and healthful working conditions in places of employment throughout the United States. This act is administered and enforced by the Occupational Safety and Health Administration (OSHA), a U.S. Department of Labor agency. Section 4(b)(1) of this act exempts DOE and its contractors from the occupational safety requirements of OSHA. The regulations and standards governing general industry are provided in 29 Code of Federal Regulations (CFR) Part 1910. For ship repair, shipbuilding, and shipbreaking, regulations and standards are provided in 29 CFR Part 1915. The DOE and NNPP have established their own occupational safety and health programs for facilities and activities authorized pursuant to the Atomic Energy Act as provided in 42 U.S.C. Section 2201. The standards under these programs are generally consistent with those prescribed by OSHA.

3.1.1.3.1.1 29 CFR Parts 1910.15 and 1915 – Occupational Safety and Health Standards for Shipyard Employment

29 CFR Part 1915 applies to all ship repairing, shipbuilding, and shipbreaking employments and related employments. It is amplified by 29 CFR Part 1910.15 (a), which "adopt[s] and extend[s] established safety and health standards for Shipyard employment," making clear that those involved in shipyard-type employment must "protect the employment and places of employment of each of his employees." Part 1915 also includes standards for exposures to toxic and hazardous substances (Subpart Z) such as asbestos (Part 1915.1001), lead (Part 1915.1025), chromium (VI) (Part 1915.1026), and others.

3.1.1.3.1.2 Department of Defense

U.S. Department of Defense Instruction 6055.01, Department of Defense Safety and Occupational Health Program, provides policy and outlines responsibilities for the implementation of the total Navy Safety and Occupational Health Program. The Navy program encompasses all safety disciplines such as aviation safety, weapons and explosives safety, off-duty safety, traffic safety, and occupational safety and health. The Chief of Naval Operations Instruction (OPNAVINST) 5100.23, *Navy Safety and Occupational Health Program Manual*, covers the implementation of the Occupational Safety and Health Program. Towing operations for Alternatives 1, 2, and 3 would be performed in accordance with established instructions as referenced in the Navy Towing Manual (Navy, 2002) and Naval Sea Systems Command Instruction (NAVSEAINST) 4740.12 (Navy, 2012).

3.1.1.3.2 Atomic Energy Act (42 United States Code Section 2011 et seq.)

3.1.1.3.2.1 Naval Nuclear Propulsion Program

As described in Section 3.1.1.2 (Regulatory Framework), the NNPP has responsibility for all matters pertaining to naval nuclear propulsion, from design through disposal, including prescribing and enforcing standards and regulations for the control of radiation and radioactivity associated with naval nuclear propulsion activities as they affect the environment and the safety and health of workers, operators, and the general public. NNPP procedures for protection of people and the environment meet or exceed all applicable federal, state, and local environmental, health, and safety laws and regulations. Additional information on NNPP policy and limits on radiation exposures is provided in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives).

3.1.1.3.2.2 Department of Energy

DOE Worker Safety and Health Program (10 CFR Part 851) supports line management and contractors through the development and dissemination of policy, guidance, and technical expertise to assist in implementation of the policies. These programs and resources assist in recognizing and responding to safety and health concerns, focus on value-added activities, and conserve Departmental resources. Requirements for DOE Federal Employees Occupational Safety and Health program are contained in DOE Orders 440.1B and 341.1A, and DOE Order 442.1B.

3.1.1.3.2.3 U.S. Nuclear Regulatory Commission

For radiological work conducted by a commercial company under Alternative 3 (Preferred Alternative), the Navy envisions contractually invoking NRC regulatory requirements consistent with requirements normally invoked on the commercial radiological dismantlement industry for this type of work. The Navy would retain regulatory authority and contractually support use of the NRC requirements. The NRC would review project planning and engineering documents, conduct oversight of project execution, and provide the Navy recommendations for enforcement with the dismantlement contractor. Additionally, dismantlement of ex-Enterprise under Alternative 3 (Preferred Alternative) would be conducted in compliance with NRC regulations for radionuclide air emissions consistent with NRC and U.S. Environmental Protection Agency (EPA) agreements (NRC Reg Guide 4.20, 2012).

3.1.1.3.3 U.S. Environmental Protection Agency

The EPA has the responsibility for establishing generally applicable standards for the protection of human health and the environment from pollutants, including radioactive and hazardous materials. EPA standards set protective limits for pollutants in soil, water, and air. The Clean Air Act requires the EPA to regulate airborne emissions of hazardous air pollutants. Standards known as the National Emission Standards for Hazardous Air Pollutants dictate specific regulatory limits for source categories that are known or suspected to cause cancer or other serious health effects, including radioactive materials and asbestos. This Clean Air Act authority to regulate airborne radionuclides is in addition to Atomic Energy Act regulatory authority.

3.1.1.3.3.1 40 Code of Federal Regulations Part 61 – National Emission Standards for Hazardous Air Pollutants

40 CFR Part 61 is an EPA standard that is applicable within the United States to the emissions of hazardous air pollutants produced by corporations, institutions, and agencies at all levels of government.

40 Code of Federal Regulations Part 61, Subpart H – National Emission Standards for Emission of Radionuclides other than Radon from Department of Energy Facilities

40 CFR Part 61, Subpart H, protects the public and the environment from radionuclide emissions other than radon from the DOE facilities. It sets a limit on the emission of radionuclides so that no member of the public would receive an effective dose equivalent of more than 10 millirem (mrem) per year. This would apply to waste transport and disposal activities at the DOE Hanford Site associated with the reactor compartment packaging alternatives and the disposal of radioactive wastes at the DOE SRS under Alternative 3 (Preferred Alternative).

40 Code of Federal Regulations Part 61, Subpart I – National Emission Standards for Radionuclide Emissions from Federal Facilities other than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H

40 CFR Part 61, Subpart I protects the public and the environment from radionuclide emissions released from federal facilities that are not regulated elsewhere. Subpart I would be applicable under the reactor compartment packaging alternatives as the dismantlement work involving radioactive materials would be performed at a federal facility and not under an NRC license. This would not be applicable to Alternative 3 (Preferred Alternative) because dismantlement activities involving radioactive materials would be conducted at a commercial facility.

40 Code of Federal Regulations Part 61, Subpart M – National Emission Standards for Asbestos

40 CFR Part 61, Subpart M requires a thorough asbestos inspection where the demolition or renovation operation occurs, and work practice standards that control asbestos emissions. Work practices often involve removing all ACM, adequately wetting all regulated ACM, sealing the material in leak-tight containers, and disposing of the asbestos-containing waste material as expediently as practicable.

3.1.1.3.3.2 40 Code of Federal Regulations Part 300 – National Oil and Hazardous Substances Pollution Contingency Plan

The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan, is the plan of the federal government for responding to both oil spills and hazardous substance releases to protect human health and the environment. This plan is the result of efforts to develop a national response capability and promote coordination among the hierarchy of responders and contingency plans. 40 CFR Part 300.110 establishes the National Response Team and its roles and responsibilities in the National Response system. This includes planning and coordinating responses, providing guidance to Regional Response Teams, coordinating a national program of preparedness planning and response, and facilitating research in support of response activities. The EPA serves as the lead agency within the National Response Team.

3.1.1.4 Approach to Analysis

This EIS/OEIS evaluates the potential public and occupational health and safety impacts resulting from the Proposed Action and alternatives. The following sections evaluate public exposure to radiation offsite, dismantlement and decommissioning health and safety impacts on workers, and health and safety effects associated with radioactive waste transport under the three alternatives. Additional information on the effects of hazardous materials and hazardous waste, including radioactive and low-level mixed waste, is provided in Section 3.2 (Hazardous and Radioactive Waste Management) of this EIS/OEIS.

3.1.2 Affected Environment

The Proposed Action and alternatives would be completed by trained workers. Workers would be adequately trained to ensure work is conducted in a manner to protect the safety for workers and the public, to handle and process hazardous or radioactive materials in accordance with established regulatory requirements, and to minimize effects on the regional population.

Under the No Action Alternative, ex-Enterprise would remain at its current location in Newport News, Virginia in waterborne storage. The affected environment associated with its current location in Virginia includes Navy and contractor personnel working to prepare ex-Enterprise for movement from Newport News, Virginia. Under each action alternative, ex-Enterprise would be towed from its current location to a separate commercial dismantlement location near Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama (see Table 3.1-1). The affected environment associated with its current location in Virginia includes Navy and contractor personnel working to maintain the ship in its current waterborne storage and to prepare ex-Enterprise for movement from Newport News, Virginia. Towing of unmanned, defueled, nuclear-powered ships is governed by the Navy Towing Manual (Navy, 2002) and NAVSEAINST 4740.12 (Navy, 2012).

Where the Navy does not have jurisdiction within individual ports, the U.S. Coast Guard and the Port Authority (or similar office) maintain health and safety and emergency response plans for the port area. They are often responsible for inspecting commercial ships for compliance with federal laws and regulations; responding to oil spills and hazardous material releases into the marine environment; enforcing safety and security zones; and investigating marine accidents such as collisions, groundings, and fires. Ship movements in port areas, including ships under tow or under control of the Port Pilots, must comply with these regulations.

Under the reactor compartment packaging alternatives, the propulsion space section would be separated from ex-Enterprise at a commercial dismantlement facility in Virginia, Texas, or Alabama and would be transported to PSNS & IMF via heavy-lift ship. The propulsion space section from ex-Enterprise is about one-third of the original weight and size of the ship and is approximately 376 feet (ft.) long and 28,000 long tons displacement. Ex-Enterprise is 1,041 ft. long, 133 ft. wide at the water line (Naval Vessel Register, 2017). The current displacement of ex-Enterprise is about 75,000 long tons. The potential heavy-lift ship transportation routes are described in Table 3.1-1.

At PSNS & IMF, all operations are governed by the Navy Safety and Occupational Health program and OPNAVINST 5100.23G, *Navy Safety and Occupational Health Program Manual*. PSNS & IMF personnel are trained in the hazards applicable to their work and how to minimize these hazards. Personnel are routinely monitored for exposure to certain hazards (e.g., high noise levels, lead, and asbestos) and then placed into medical surveillance programs for the applicable physical or chemical hazard. Section 3.2 (Hazardous and Radioactive Waste Management) of this EIS/OEIS provides additional discussion on management of hazardous materials encountered with ex-Enterprise. Contractors at Navy and commercial sites would be subject to OSHA health and safety regulations.

The reactor compartment packaging alternatives would also involve transportation of the reactor compartment packages from PSNS & IMF by water to the Port of Benton barge slip and then by road to Trench 94 at the DOE Hanford Site. The waterborne transport route (Figure 2-6) for the reactor compartment packages from PSNS & IMF would follow the normal shipping lanes in Sinclair Inlet, through Rich Passage, past Restoration Point, and northerly through Puget Sound. The route is then westerly through the Strait of Juan de Fuca (staying south of the inbound Vessel Traffic System lane when transiting out of the Strait of Juan de Fuca to remain in U.S. waters), around Cape Flattery, south along the Washington coast (staying outside the Area to be Avoided of the Olympic Coast National Marine Sanctuary) to the mouth of the Columbia River. The route then goes up the Columbia River, following the shipping channel used for the regular transport of commercial cargo. The river route passes through the navigation locks at Bonneville, the Dalles Dam, John Day, and McNary dams to the barge slip located in north Richland, Washington, at river mile 342.8 (Navy & DOE, 1996).

The Navy uses the DOE Hanford Site road systems to transport decommissioned, defueled reactor compartment packages from the Port of Benton barge slip to Trench 94 in the 200-East Area. Under Alternative 1, single reactor compartment packages would be transported from the barge slip to Trench 94 at the DOE Hanford Site using the same process used for the current program (Navy & DOE, 2012). The route begins at the barge slip and enters the DOE property at Horn Rapids Road. Once on the DOE Hanford Site, the route covers about 26 miles (mi.) to the disposal site (Navy & DOE, 1996).

Road and Port of Benton barge slip modification work would be required to accommodate the larger dual reactor compartment packages under Alternative 2. Construction of a concrete rail support system in Trench 94 at the DOE Hanford Site would be required for both reactor compartment packaging alternatives. DOE *Worker Safety and Health Program* (10 CFR Part 851) provides the requirements for DOE contractor safety and health programs. The *Worker Safety and Health Program* establishes the framework for DOE contractors' non-radiological worker safety and health programs. To accomplish its objective, the program establishes management responsibilities, rights of workers, required safety and health standards, and training for the hazards of their jobs, as well as how to control the hazards. Additionally, federal employees are protected under the Occupational Safety and Health programs of Federal Employees, which are mandated by 29 CFR Part 1960, Section 19 of OSHA, and Executive Order

12196. Requirements of DOE Occupational Safety and Health program for Federal Employees are contained in DOE Orders 440.1B and 341.1A, and DOE Order 442.1B.

Under Alternative 3 (Preferred Alternative), the affected environment includes contractors and the public associated with the initial tow routes described in Table 3.1-1, the project location, and waste transportation routes. The affected environment in each of the potential dismantlement locations in Virginia, Texas, and Alabama include contractors and Navy personnel at the commercial dismantlement facilities, and the communities surrounding the facilities. Contractors would be subject to OSHA health and safety regulations as well as applicable NRC regulations incorporated into the contract. The Navy estimates that dismantlement of all eight reactor plants under Alternative 3 (Preferred Alternative) would conservatively result in up to 440 shipments of large components and container express (CONEX) boxes or similarly sized packages of low-level radioactive waste being shipped by barge, rail, or truck to one or more waste facilities for disposal. Dismantlement activities would also generate a small number of additional shipments of LLRW incidental to disposal of the reactor plants, which would consist of material such as piping, tooling, and personal protective equipment. These additional wastes are similar to the small amounts of LLRW that are generated incidental to construction of reactor compartment packages and are disposed of at established waste disposal sites. Dismantlement waste shipments would also include hazardous materials, ACM, and PCB bulk waste, as is typical for the dismantlement of Navy ships.

The trucking routes from each location to EnergySolutions, Waste Control Specialists, LLC (WCS), and SRS are summarized in Table 3.1-2.

3.1.3 Environmental Consequences

The Proposed Action and alternatives, other than the No Action Alternative, have similar environmental consequences regarding health and safety. Work at commercial dismantlement facilities in Virginia, Texas, and Alabama would be governed by the same federal and similar state regulations to ensure minimal impacts on health and safety. The reactor compartment packaging alternatives require additional dismantlement operations at PSNS & IMF, which is governed by federal and state environmental, health, and safety regulations as well as Navy regulations. Potential impacts of the No Action Alternative and those that are common to Alternatives 1, 2, and 3 that may affect the public or the environment are discussed in this section. A general discussion of radiation and radiation exposures and an evaluation of exposures associated with the reactor plant disposal alternatives is provided in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives).

3.1.3.1 No Action Alternative

3.1.3.1.1 Ex-Enterprise Is Stored in Newport News, Virginia

The No Action Alternative involves continued long-term waterborne protective storage of the entire ex-Enterprise for an indefinite period of time at Newport News Shipbuilding in Newport News, Virginia. Under the No Action Alternative, ex-Enterprise would require periodic maintenance to ensure that storage continues in a safe and environmentally responsible manner. Newport News Shipbuilding currently performs reactor plant work on Navy ships. Ex-Enterprise was constructed, serviced, and decommissioned at Newport News Shipbuilding.

Ship preparations for storage would include installing fire and flood alarm systems, a corrosion prevention system (impressed current cathodic protection), and dehumidification systems. Storage facility staff would perform periodic inspections and maintenance of the ship while in storage, to include a detailed interior inspection annually, an underwater exterior inspection of the hull every eight years, and placing the ship in dry dock for inspection and repair every 15 years. Releases of hazardous or radioactive materials to the environment as a result of the No Action Alternative are not expected. Additionally, there would be no risk of highway accidents or radiation doses associated with the transport of radioactive materials under the No Action Alternative.

With current environmental, health, and safety procedures in place governing Navy contract work at Newport News Shipbuilding, the impacts of the No Action Alternative would be minimal. This alternative is not addressed in further detail.

3.1.3.2 Alternative 1: Single Reactor Compartment Packages

3.1.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Alternative 1 includes towing ex-Enterprise to a location where partial dismantlement would occur at one of the three locations in Alabama, Texas, or Virginia. The tow action of unmanned, defueled, nuclear-powered ships is governed by the methods and procedures described in the Navy Towing Manual (Navy, 2002) and NAVSEAINST 4740.12 (Navy, 2012). Compliance with these and other applicable maritime regulations governing safety would ensure that the tow is executed in a manner designed to have minimal impact on public and occupational health and safety.

The National Institute for Occupational Safety and Health (NIOSH) reports on the hazards of tug and tow boats, barges, container ships, bulk cargo ships, and ferry and cruise passenger ships (NIOSH, 2020). NIOSH reports that physical hazards include noise levels, vibration, ultraviolet light exposure from sunlight, line handling, heavy lifting, slippery surfaces, steep ladders, and narrow passageways. The physical hazards can be exacerbated by severe weather conditions. Chemical hazards include exposures to chemical cargos, fuel, cleansers, and diesel exhaust. Biological hazards include transmission of contagious diseases between coworkers and travel-related infections. NIOSH also reports that psychosocial hazards remain a significant challenge for the workforce involved in maritime work. These hazards that can impact the health of the workers include social isolation, substance abuse, low job control/high demand, and harassment/bullying.

NIOSH reports that the U.S. Bureau of Labor Statistics recorded that there were approximately 67,000 workers in the U.S. water transportation industry in 2016 (NIOSH, 2020). Inland waterways represent approximately 26,000 workers, while deep sea, coastal, and Great Lakes water transportation represents approximately 36,000 workers. NIOSH also summarizes that from 2011 through 2017, there were 87 fatal injuries (18.4 per year per 100,000 workers) among marine transportation workers, nearly six times the rate of all U.S. workers. Studies show a high burden of fatalities due to cardiovascular conditions, work accidents, drownings (including from ship disasters), suicides, and workplace violence. In the same time period, approximately 11,000 nonfatal occupational injuries occurred.

Maritime transportation work has inherently more risk of injury than many land-based occupations. However, federal safety regulations are in place to mitigate the impacts and reduce work-related injuries and illnesses. The Proposed Action and alternatives would conform to existing maritime transportation operations and procedures designed to protect workers. Therefore, the occupational safety and health impacts from maritime transportation would be minimal.

Air pollutants would be generated from transport ships. However, emissions of air pollutants from these mobile sources would meet applicable requirements and therefore would have a minimal impact on public health within the areas surrounding the tow route.

For commercial ports, the U.S. Coast Guard and the Port Authority, or similar office, would also maintain health and safety plans as well as emergency response plans for the port area. The relevant authorities (e.g., U.S. Coast Guard) are responsible for inspecting commercial ships for compliance with federal laws and regulations; responding to oil spills and hazardous material releases into the marine environment; enforcing safety and security zones; and investigating marine casualties such as collisions, groundings, and fires. Ship movements in port areas, including ships under tow or under control of the port pilots, must comply with these regulations. As such, impacts on public health and safety would be minimal.

3.1.3.2.2 Partial Dismantlement at Commercial Dismantlement Facility (Includes In-Water Activities)

Partial dismantlement under Alternative 1 includes dividing the aircraft carrier into sections and constructing a separate propulsion space section that is about one-third of the original weight and size of the aircraft carrier. By utilizing a commercial facility to dismantle and recycle or dispose of the areas of the ship outside the propulsion space section, this alternative would result in only the propulsion space section being delivered to PSNS & IMF.

NIOSH describes the occupational hazards for shipyard workers (NIOSH, 2020). These hazards, which would be present at Navy and commercial facilities, include chemical hazards, such as exposure to asbestos, welding fumes, paints, solvents, and fuels. There are also physical hazards such as noise exposure, extreme temperatures, vibration, awkward body positions, and the risk of musculoskeletal injuries. Hot work, confined space entry, exposure to hazardous air, and elevated work all increase the risk of injury. Shipyard workers may work above water while a ship is docked, introducing a fall hazard that may lead to drowning. As provided in Section 3.1.1.2 (Regulatory Framework), OSHA regulates shipyard work under 29 CFR Part 1915, *Occupational Safety and Health Standards for Shipyard Employment*.

NIOSH also describes the chronic illnesses that can affect shipyard workers. Chronic illnesses, including respiratory illness caused by fume and smoke inhalation, and exposure to heavy metals such as lead, are of particular concern in shipyard workers. Excess cancer morbidity has been detected in several groups of shipyard workers, especially cancers of the respiratory system, with welders appearing at particular risk (NIOSH, 2020). Another study found an increased risk of leukemia in electricians and welders working in a naval shipyard (Stern et al., 1986).

NIOSH reports that 2017 Bureau of Labor Statistics provided that there were approximately 165,000 shipyard workers employed in the United States in 26 states (NIOSH, 2020). These statistics also showed that at least 45 fatalities occurred between 2011 and 2017 (about four per year per 100,000 workers). An estimated 61,600 nonfatal injuries/illnesses occurred during the same period (5,370 per year per 100,000 workers).

Federal safety regulations are in place to mitigate the impacts and reduce work-related injuries and illnesses. Because ex-Enterprise dismantlement scope of work is consistent with routine shipyard operations, the additional occupational safety and health impacts would be minimal. Additionally, actions would comply with a site-specific Radiation Protection Program in order to minimize all radiation exposures to both workers and the public.

As reported in NUREG-0586 (NRC, 2002), the most common non-fuel-related accidents that involve radioactive material during the dismantlement of commercial nuclear power plants are fires (20 total accidents from 12 different plants). A fire may be one of the more important accidents to consider for nuclear-powered ship disposal as well because of the large loading of combustible material, including

LLRW. A fire could result in the uncontrolled release of radioactive or other hazardous materials. Therefore, a robust fire protection program would be implemented to manage fire safety.

For limited activities necessary to construct the propulsion space section, dismantlement and disposal work would be conducted in accordance with NNPP requirements. The work would be completed by trained workers experienced in handling radioactive and hazardous materials in a manner to limit personnel and public exposures. Public exposure to hazardous emissions is expected to be significantly less than that of workers. Public exposure to radiation from this work at levels above pre-existing natural background sources is not expected. The public would be protected from the impact of the dismantlement activities and associated construction activities under Alternative 1 by Navy and contractor compliance with regulatory-required plans and permits and use of best management practices that minimize offsite impacts from air emissions, spills of hazardous materials, runoff, and noise.

Alternative 1 would not generate significant amounts of radioactive waste for transportation from the commercial dismantlement facilities. Non-radioactive hazardous and non-hazardous materials would be transported, treated, disposed of, or recycled at regional facilities in accordance with applicable local, state, and federal laws. Transportation would be in accordance with applicable regulations. Only properly licensed/permitted transporters would be used to transport the waste. Therefore, waste/recycle material generated from the partial dismantlement activities, and the transportation of the materials, is anticipated to have a minimal impact on public and occupational health and safety.

3.1.3.2.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 1, as described in Table 3.1-1, if partial dismantlement of ex-Enterprise takes place at the facility in Hampton Roads Metropolitan Area in Virginia, the heavy-lift ship route of the propulsion space section to PSNS & IMF in Bremerton, Washington, via the Strait of Magellan would be south along the eastern U.S. coast, through the Caribbean Sea, around South America, and north to PSNS & IMF for a total distance of 13,846 nautical miles (nm). If partial dismantlement of ex-Enterprise takes place at a facility in Brownsville, Texas, the heavy-lift ship route of the propulsion space section to PSNS & IMF in Bremerton, Washington, via the Strait of Magellan would be east through the Gulf of Mexico, through the Caribbean Sea, around South America, and north to PSNS & IMF for a total distance of 14,487 nm. If partial dismantlement of ex-Enterprise takes place at a facility in Mobile, Alabama, the heavy-lift ship route of the propulsion space section to PSNS & IMF in Bremerton, Washington, via the Strait of Magellan would be south through the Gulf of Mexico, through the Caribbean Sea, around South America, and north to PSNS & IMF for a total distance of 14,214 nm. While shipyard work and marine transport carry occupational risks that are higher than other occupations, the impacts of Alternative 1 on worker health and safety would be minimal.

As described in Section 3.1.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), maritime transportation work has inherently more risk of injury than many land-based occupations. However, federal safety regulations are in place to mitigate the impacts and reduce work-related injuries and illnesses. While not common in the maritime transportation industry, heavy-lift ship transportation of the propulsion space section would conform to existing maritime transportation operations and procedures designed to protect workers. Therefore, the occupational safety and health impacts from maritime transportation would be minimal.

Due to the location of ex-Enterprise and its reactor compartments within the ship, radiation doses away from the reactor compartments and on the exterior of the propulsion space section are expected to be negligible. Shipment of the propulsion space section would result in an insignificant radiation dose to crew members and members of the public and impacts on public and occupational health and safety would be minimal.

3.1.3.2.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

As described in Chapter 2 (Description of Proposed Action and Alternatives), Alternative 1 would involve dismantlement of the propulsion space section at PSNS & IMF, separation of reactor compartment pairs, and shipment of the eight single reactor compartment packages using the current Navy process. It could take approximately five years for dry dock activities, including the preparation of reactor compartment packages, to be completed (see Table 2-2). While shipyard work carries unique occupational risks as described in Section 3.1.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]), the impacts on public health and safety from Alternative 1 are considered minimal. Hazardous material exposure controls and radiological controls for work performed by the NNPP at PSNS & IMF and other Navy shipyards are stringently enforced. The NNPP conducted a risk evaluation of occupational radiation exposure from naval nuclear power plants and their associated facilities, including shipyards. The evaluation concluded that "risk from radiation exposure associated with naval nuclear propulsion plants is low compared to the risks normally accepted in industrial work and in daily life outside of work" (Navy, 2019b). Various aspects of the NNPP have been reviewed by other government agencies. For example, in 1983, NIOSH conducted an evaluation of the radiological controls program at Portsmouth Naval Shipyard. The conclusions NIOSH reached are listed below. While specific to Portsmouth Naval Shipyard, they could be considered representative of all shipyards in the NNPP.

- The external and internal doses received by NNPP personnel are low compared to current occupational exposure guidelines.
- The probability of unreported accidents/incidents or undocumented exposures is extremely small.
- The radiological controls employed are adequate to protect the worker from internal and external hazards.
- The impact of the radiological work at Portsmouth Naval Shipyard to the surrounding environment is minimal or negligible.
- Nuclear operations at Portsmouth Naval Shipyard are not contributing a significant radiation dose to the general public.

Non-radioactive hazardous waste would be disposed of at appropriately permitted regional disposal site(s). Non-radioactive and non-hazardous materials would be transported and recycled or disposed of at regional facilities in accordance with applicable local, state, and federal laws. Waste/recycle material generated from the partial dismantlement activities, and the transportation of the materials, is anticipated to have a minimal impact on public and occupational health and safety as waste is disposed per the PSNS & IMF Waste Management Plan.

To comply with all federal regulations for air quality, work at PSNS & IMF under the reactor compartment packaging alternatives would comply with PSNS & IMF air permit requirements and the regulations of Puget Sound Air Pollution Control Agency (requiring additional controls and more stringent regulations than federal requirements. Waste facilities utilized under the Proposed Action and alternatives, both federal and commercial, would also meet applicable federal and state regulations regarding the maintenance of air quality.

NNPP, in an annual report titled *Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear-Powered Ships and their Support Facilities* (Navy, 2019a), assessed the environmental effect of disposal of radioactive wastes originating from U.S. naval nuclear propulsion plants and their support facilities. This report confirms that procedures used by the Navy to control releases of radioactivity from U.S. naval nuclear-powered ships and their support facilities have not had an adverse effect on human health and the environment and that no member of the general public has received measurable radiation exposure as a result of operations of the NNPP. As such, impacts on public health and safety would be minimal.

The dry dock work involving preparation of the reactor compartment packages involves similar shipyard hazards as described in Section 3.1.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]).

The majority of the occupational radiation exposure would occur during preparation of the reactor compartment packages. As noted in the 2012 EA, the Navy estimates that the collective dose for Alternative 1 would be about 300 person-rem of collective radiation exposure (to the entire workforce involved) to prepare the eight ex-Enterprise reactor compartment packages (Navy & DOE, 2012). This collective dose is estimated over five years (0.12 additional potential latent cancer fatalities). The 1996 *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants*, estimated 25 rem of collective exposure among the shipyard workforce per cruiser reactor compartment package prepared, for a total of 400 rem of collective exposure for 16 cruiser reactor compartments (Navy & DOE, 1996). Ex-Enterprise reactor compartments are approximately 50 percent larger than the cruiser reactor compartments with additional radioactive material. Therefore, 37.5 person-rem of collective exposure is estimated among the shipyard workforce per ex-Enterprise reactor compartment package prepared, for a total of 300 rem of collective exposure for eight ex-Enterprise reactor compartments. The 300 rem collective dose estimated for ex-Enterprise would be across the work force such that an individual worker's exposure would be typically limited to 0.5 rem per year. History shows that actual exposure could be significantly lower than these estimates (Navy, 2019b), particularly as more reactor compartments are processed and process improvements are incorporated. Additionally, the expected dose and Navy requirements ensure the majority of the workforce would receive less than 0.5 rem per year (Navy & DOE, 2012). For comparison, the average annual radiation dose due to NNPP radioactivity (effective dose equivalent) to an individual Navy shipyard worker in 2018 was 0.016 rem (Navy, 2019b). For perspective, the NRC shows that the average American receives an average of about 0.31 rem per year from natural sources (cosmic, terrestrial, and internal sources) (NRC, 2017). As such, impacts on public health and safety would be minimal.

3.1.3.2.5 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

The construction of a concrete rail support system in Trench 94 would be required to accommodate the reactor compartment packages under Alternative 1. A description of the rail system is provided in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). Construction of the concrete rail support system in Trench 94 would require the management of hazardous materials such as solvents, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize the impact on human health. Furthermore, the construction of the concrete rail support system in Trench 94 at the DOE Hanford Site would be conducted in accordance with applicable DOE Orders and procedures regarding construction and occupational and public safety. As such, impacts on public health and safety would be minimal.

3.1.3.2.6 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Alternative 1 would involve transportation of the reactor compartment packages from PSNS & IMF by water to the Port of Benton barge slip and then by road to Trench 94 at the DOE Hanford Site. Under Alternative 1, reactor compartment packages would be transported from PSNS & IMF by water to the barge slip using the same process used for the current program (Navy & DOE, 2012) as described in Section 2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip).

Risks associated with water transport are discussed in Section 3.1.3.2.1 (Tow ex-Enterprise from Newport News, Virginia to Commercial Dismantlement Facility). Regarding radiation exposure during package transport, the Navy has calculated an average transport index of 2.2 (equal to 2.2 mrem per hour at 1 meter from the package exterior) for past reactor compartment packages, and ex-Enterprise packages would be expected to not exceed this average. Thus, radiation levels on the exterior of the reactor compartment packages for transport are expected to be negligible. Therefore, shipment would result in an insignificant radiation dose to crew members and the public.

Table D-3 in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants) of this EIS/OEIS presents the maximum reasonably foreseeable impact, expressed as dose and latent cancer fatalities, to the public and transport crews regarding radioactive waste transport for the Proposed Action and alternatives. This analysis considers the transportation of reactor compartment packages from PSNS & IMF to the DOE Hanford Site under the reactor compartment packaging alternatives. Further details are provided in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants). Table D-3 demonstrates that impacts on public health and safety are minimal.

3.1.3.2.7 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Under Alternative 1, reactor compartment packages would be transported from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site using the same process used for the current program (Navy & DOE, 2012) as described in Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). The route begins at the barge slip and enters the DOE property at Horn Rapids Road. Once on the DOE Hanford Site, the route covers about 26 mi. to the disposal site (Navy & DOE, 1996). Radiation exposure would be minimal for the same reasons as described in Section 3.1.3.2.6 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip), in that the expected dose outside the package would be low and the configuration of the transport vehicle would increase distance of personnel from the exterior of the package. Additionally, these materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize the impact to human health. As described in Section C.2.8 (Transportation of Radioactive Material) of Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives), radiation exposures during transportation would be minimal. Hazardous materials present during transportation would be managed and disposed of using applicable local, state, and federal regulations. Furthermore, the land transportation would be conducted in accordance with applicable NRC, DOT, and DOE regulations regarding transportation security and safety. As such, impacts on public health and safety would be minimal.

3.1.3.3 Alternative 2: Dual Reactor Compartment Packages

3.1.3.3.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Alternative 2 includes towing ex-Enterprise to a location where partial dismantlement would occur at one of three commercial facilities in Alabama, Texas, or Virginia, as described in Section 3.1.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility). Compliance with the Navy Towing Manual and other applicable maritime regulations governing safety would ensure that the tow is executed in a manner designed to have minimal impact on public and occupational health and safety.

3.1.3.3.2 Partial Dismantlement at Commercial Dismantlement Facility (Includes In-Water Activities)

Partial dismantlement under Alternative 2 includes dividing the aircraft carrier into sections and constructing a distinct propulsion space section that is about one-third of the original weight and size of the aircraft carrier, as described in Section 3.1.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]). As such, impacts on public health and safety would be minimal.

3.1.3.3.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 2, as described in Section 3.1.3.2.3 (Ship ex-Enterprise via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]) and Table 3.1-1, ex-Enterprise propulsion space section would be shipped via heavy-lift ship from the chosen commercial dismantlement facility to PSNS & IMF following a route around South America. As such, impacts on public health and safety would be minimal.

3.1.3.3.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

The impacts on public health and safety from occupational hazards and public exposures to radioactive materials under Alternative 2 are similar to those described in Section 3.1.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]). Therefore, the impacts on public health and safety from Alternative 2 are considered minimal. See Section 3.1.3.2.4 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]) for further evaluation.

As described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications), Alternative 2 would involve dismantlement of the propulsion space section at PSNS & IMF, separation of reactor compartment pairs, and shipment of the collective four dual reactor compartment packages using the current Navy process. The occupational dose for Alternative 2 would be lower than Alternative 1 as there would be less work associated with preparing four reactor compartment packages rather than eight. As noted previously, the Navy estimates that the collective occupational dose for Alternative 1 would be 300 person-rem across the workforce. Additionally, NNPP requirements manage worker exposure to 0.5 rem per year (Navy & DOE, 2012). Furthermore, the average annual radiation dose due to NNPP radioactivity (effective dose equivalent) to an individual Navy shipyard worker in 2018 was 0.016 rem (Navy, 2019b).

For perspective, the NRC shows that the average American receives an average of about 0.31 rem per year from natural sources (cosmic, terrestrial, and internal sources) (NRC, 2017). As such, impacts on public health and safety would be minimal. Additional information on radiation dose and cancer risk is provided in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives).

3.1.3.3.5 Port of Benton Barge Slip Modifications

Alternative 2 would require infrastructure modifications to the Port of Benton barge slip and the improvements to the transport route to the DOE Hanford Site because of the heavier weight and larger size of the dual reactor compartment packages as compared to the eight single reactor compartment packages in Alternative 1, as described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications). Infrastructure modifications would involve widening and lengthening the barge slip, inland pile driving, and concrete work. These activities add to the potential for occupational accidents and injuries. However, work would be conducted in accordance with applicable federal and state regulations regarding occupational health and safety and protection of the public. As such, impacts on public health and safety would be minimal.

3.1.3.3.6 Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

Road improvement work and the construction of a concrete rail support system in Trench 94 at the DOE Hanford Site would be required to accommodate the larger dual reactor compartment packages under Alternative 2, as described in Section 2.3.3.7 (Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site). Infrastructure improvements would involve construction of a concrete rail support system in Trench 94 at the DOE Hanford Site, and improvements of the transport route. These activities add to the potential for occupational accidents and injuries. However, work would be conducted in accordance with applicable DOE Orders and procedures as well as applicable federal and state regulations regarding occupational health and safety and protection of the public. As such, impacts on public health and safety would be minimal.

3.1.3.3.7 Install Rail System For Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

As described for Alternative 1 in Section 3.1.3.2.5 (Install Rail System For Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site), the construction of a concrete rail support system in Trench 94 would be required to accommodate the reactor compartment packages under Alternative 2. A description of the rail system is provided in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). Construction of the concrete rail support system in Trench 94 would require the management of hazardous materials such as solvents, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize the impact on human health. Furthermore, the construction of the concrete rail support system in Trench 94 at the DOE Hanford Site would be conducted in accordance with applicable DOE orders and procedures regarding construction and occupational and public safety. As such, impacts on public health and safety would be minimal.

3.1.3.3.8 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Under Alternative 2, the transportation route of the four dual reactor compartment packages from PSNS & IMF by water to the Port of Benton barge slip is described in Section 3.1.3.2.6 (Barge Transport of

Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip), similar to Alternative 1.

Risks associated with water transport are discussed in Section 3.1.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility). Regarding radiation exposure during package transport, radiation levels exterior to the packages would be consistent with those described in Section 3.1.3.2.6 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip). As such, impacts on public health and safety would be minimal.

3.1.3.3.9 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Similar to Alternative 1, under Alternative 2, reactor compartment packages would be transported from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site, using the same process used for the current program (Navy & DOE, 2012) as described in Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). The transport route is described in Section 3.1.3.2.7 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). As described in Section C.2.8 (Transportation of Radioactive Material) of Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives), radiation exposures during transportation would be minimal. Hazardous materials present during transportation would be managed and disposed of using applicable local, state, and federal regulations. Furthermore, the land transportation would be conducted in accordance with applicable NRC, DOT, and DOE regulations regarding transportation security and safety. As such, impacts on public health and safety would be minimal.

3.1.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

3.1.3.4.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Alternative 3 (Preferred Alternative) includes complete dismantlement at a commercial facility located in the general vicinity of Newport News Shipbuilding (with no open-water tow) or towing ex-Enterprise from Newport News Shipbuilding in Newport News, Virginia, to a location in either Alabama or Texas. The analysis and conclusions described in Section 3.1.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility) are also applicable to Alternative 3 (Preferred Alternative). Compliance with the Navy Towing Manual and other applicable maritime regulations governing safety would ensure that the tow is executed in a manner designed to have minimal impact on public and occupational health and safety.

3.1.3.4.2 Complete Dismantlement of ex-Enterprise at Commercial Facility (Includes In-Water Work)

Alternative 3 (Preferred Alternative) includes towing ex-Enterprise to a contracted ship dismantlement facility and the complete dismantlement of the ship by a ship dismantlement contractor. The dismantlement work is envisioned to be governed under Navy contract(s) and NRC regulations. Ex-Enterprise dismantlement would include standard commercial practices of cutting or disassembling reactor plants into segments that can be shipped as oversized components or sized to fit into typical LLRW shipping containers. LLRW would be packaged in accordance with applicable local, state, and federal laws.

Alternative 3 (Preferred Alternative) is modeled after successful and ongoing conventional Navy aircraft carrier dismantlement by contract at commercial facilities, successful and ongoing on-site commercial nuclear power plant decommissioning by contract with nuclear services companies, and successful dismantlement of a U.S. Army barge (STURGIS) containing a defueled nuclear reactor by contract with nuclear services companies at commercial facilities (USACE, 2014). It is anticipated that one or more qualified nuclear services companies would be responsible for removing the reactor plants and other radioactive materials, and would package and ship the radioactive materials to a commercial radioactive waste site in Utah or Texas or to the DOE SRS in South Carolina. Other commercial contractors could participate directly, or be subcontracted, to provide expertise on hazardous materials management and disposal, or other specialty services like crane operations and towing.

Under Alternative 3 (Preferred Alternative), the Navy would expect environmental consequences from radiological work by contractors at commercial facilities in each ROI to have similar effects as those documented at Navy facilities.

For Alternative 3 (Preferred Alternative), the Navy would place a contract to dismantle ex-Enterprise at a commercial facility, and the Navy envisions implementing the NRC decommissioning process for radioactive material licensees described in the NRC Consolidated Decommissioning Guidance (NUREG-1757) with direct support from the NRC.

For the purpose of estimating the collective dose for the commercial dismantlement of ex-Enterprise under Alternative 3 (Preferred Alternative), the workforce and project duration estimates were selected from the commercial dismantlement cost estimate (Chilton et al., 2019). The cost estimate assumes a three-year period. During this period of active dismantlement, the cost estimate also assumes that the main project staff would consist of 90 personnel. This would result in roughly 540,000 person-hours (90 personnel × 2,000 hours per year × 3 years). Multiplying person-hour by an estimated 1 mrem (0.001 rem) per hour average representative dose rate yields a collective dose of 540 person-rem over three years (0.22 additional potential latent cancer fatalities) for Alternative 3 (Preferred Alternative). As an example, the estimated dose on an annual basis for a work force of 90 personnel would be 2 rem per worker per year. Consistent with NRC guidance and requirements, worker doses are kept as low as reasonably achievable, and the estimated dose is less than half the occupational exposure limit of 5 rem per worker per year (10 CFR Part 20).

For comparison to the collective dose estimate for Alternative 3 (Preferred Alternative) described in the previous paragraph, Table 3.1-3 provides collective radiation doses (sum of the doses received for all monitored individuals) from dismantlement of the land-based prototype naval reactor plants; from the defueling and inactivation of ex-Enterprise at Newport News, Virginia; and from the dismantlement of two commercial nuclear power plants. Table 3.1-3 also provides hours worked on the projects, which can be divided into the collective doses to yield equivalent dose rates. Both the collective dose of 540 person-rem and the average dose rate of 1 mrem per hour for Alternative 3 (Preferred Alternative) are within range of the collective doses and average dose rates provided in Table 3.1-3. The nature of the work conducted in dismantling Prototype 1 (rows 1 and 2 in Table 3.1-3) most closely resembles the range of work that would be required for dismantling ex-Enterprise, and thus provides the best basis for comparison in estimating an average dose rate of 1 mrem/hr and total effort of several hundred thousand hours of labor. Additional information on radiation dose and cancer risk is provided in Appendix C (Radiological Evaluation of Reactor Plant Disposal Alternatives).

Table 3.1-3: Occupation Dose Rates from Comparable Projects

Project	Collective Dose (person-rem)	Hours Worked	Average Dose Rate (mrem/hour)
Navy Prototype 1[1]	8.02	6,200	1.3
Navy Prototype 1[2]	114	>330,000	<0.35
Navy Prototype 2[3]	40.6	14,069	2.9
Navy Prototype 3[4]	92.0	35,457	2.6
Ex-Enterprise defueling & inactivation[5]	134	180,000	0.74
Zion Nuclear Power Plant[6]	Approx. 400	Not Available	-
Maine Yankee[7]	Approx. 670	5.4 million	<0.5

[1]Reactor vessel removal and disposal only. The Navy Prototype 1 reactor was smaller than a single ex-Enterprise reactor, but it contained about one-and-one-half times the radioactivity at the time of dismantlement.
[2]Entire facility dismantlement. Hours worked are for direct craft labor only.
[3]Reactor vessel removal and disposal only. The Navy Prototype 2 reactor was smaller than a single ex-Enterprise reactor, but it contained about 10 times the radioactivity at the time of dismantlement.
[4]Reactor vessel removal and disposal only. The Navy Prototype 3 reactor was about the same size as a single ex-Enterprise reactor, but it contained about eight times the radioactivity at the time of dismantlement.
[5]For defueling all eight ex-Enterprise reactor plants.
[6]Total dose for dismantlement of two 1,000-megawatt commercial nuclear power plants; dose includes lower radiation general cleanup and building demolition work.
[7]Total dose for dismantlement of a single 900-megawatt commercial nuclear power plant containing, at the time of dismantlement, a total activity about 24 times the activity as ex-Enterprise; dose rate is reduced by inclusion of work hours for low radiation general cleanup and building demolition work.
Notes: rem = Roentgen equivalent man, NRC = Nuclear Regulatory Commission, mrem = millirem.

Much of the work under Alternative 3 involves conventional shipbreaking activities. Public and occupational safety impacts of Alternative 3 (Preferred Alternative) are therefore consistent with those described in Section 3.1.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]) for such activities. The NRC has also assessed the potential impacts of decommissioning activities on occupational health and safety for work involving decommissioning nuclear power plants (NRC, 2002). NRC concluded that occupational health and safety issues associated with physical, chemical, ergonomic, and biological hazards would be small.

As part of its analysis of generic occupational health and issues for decommissioning nuclear power plants, the NRC also examined accidents that could release radioactive material (NRC, 2002). The NRC concluded that the most common accident during dismantlement in a nuclear power plant was fire. The second-most common accidents were related to the handling of radioactive (non-fuel) material such as waste containers, filters, concrete rubble, LLRW, or larger items such as reactor pressure vessels or steam generators (13 accidents identified from five separate plants). The third-most common accidents were from explosions, which comprised 11 accidents from five separate plants. These accidents included explosion of liquid propane gas from heavy equipment and oxyacetylene explosions during dismantlement, which released high-efficiency particulate air filter contents. The fourth-most common accident was the release of liquid radioactive waste from storage tanks. While types of accidents should be considered as potential causes of accidental releases of radioactive materials during the dismantlement of ex-Enterprise, the NRC concluded that with mitigation procedures in place, the impacts of non-fuel-related radiological accidents from generic nuclear reactor decommissioning would be minimal (NRC, 2002).

The radiological releases from potential accidents associated with these activities may be detectable, although no such releases to the environment outside dismantlement facilities have occurred during the dismantlement of naval reactors to date. Work procedures are designed to minimize both the likelihood of an accident and the consequences of an accident, should one occur. Emergency plans and procedures would remain in place to protect health and safety (NRC, 2002).

3.1.3.4.3 Transport Low-Level Radioactive Waste from Commercial Dismantlement Facility to Approved Waste Disposal Facilities

Ex-Enterprise dismantlement would include standard commercial practices of cutting or disassembling reactor plants into segments that can be shipped as oversized components or sized to fit into typical LLRW shipping containers. The reactor plants and other LLRW would be packaged in accordance with applicable local, state, and federal laws.

The Navy estimates that dismantlement of all eight reactor plants under Alternative 3 (Preferred Alternative) would conservatively result in up to 440 shipments of large components and CONEX boxes or similarly sized packages of low-level radioactive waste being shipped by barge, rail, or truck to one or more waste facilities for disposal. Table D-3 in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants) of this EIS/OEIS presents the maximum reasonably foreseeable impact, expressed as dose and potential latent cancer fatalities, to the public and transport crews associated with radioactive waste transport for Alternative 3 (Preferred Alternative). Dismantlement activities would also generate a small number of additional shipments of LLRW incidental to disposal of the reactor plants, which would consist of material such as piping, tooling, and personal protective equipment. These additional wastes are similar to the small amounts of LLRW that are generated incidental to construction of reactor compartment packages and are disposed of at established waste disposal sites. Dismantlement waste shipments would also include hazardous materials, ACM, and PCB bulk waste, as is typical for the dismantlement of Navy ships. All shipments would meet applicable NRC, DOT, and DOE shipping requirements.

3.1.3.4.4 Dispose of Low-Level Radioactive Waste at Authorized Disposal Facilities

Under Alternative 3 (Preferred Alternative), it is anticipated that that LLRW would be disposed at WCS in Texas (accepts Classes A, B, and C waste), EnergySolutions in Utah (accepts only Class A waste), or to the DOE SRS in South Carolina.

For Alternative 3 (Preferred Alternative), it is expected that ex-Enterprise reactor vessels (along with their internal structures) would be disposed of as a Class C waste under the NRC regulations (or DOE Category 3 for disposal at the DOE SRS). Disposal options for the reactor vessels based on waste class would then include WCS in Texas and the DOE SRS in South Carolina.

Other large reactor plant components would be Class A waste. The disposal options for these wastes includes WCS in Texas, EnergySolutions in Utah, and the DOE SRS in South Carolina. Approximately 352 CONEX boxes of reactor plant components would also be Class A waste. Other miscellaneous radioactive waste shipments would be expected to be Class A waste. The disposal option of these wastes includes WCS, EnergySolutions*,* and the DOE SRS.

All waste would be disposed in accordance with NRC, state, or DOE regulations at licensed or permitted disposal facilities. Compliance with the regulations and license/permit requirements ensure impacts on public health and safety would be minimal.

3.1.4 Mitigation

No mitigation measures would be necessary under the Proposed Action and alternatives, including the No Action Alternative, as analysis concluded that the public and occupational health and safety impacts would be considered minimal.

3.1.5 Summary of Impacts and Conclusions

Table 3.1-4 summarizes the effects of the Proposed Action and alternatives on public and occupational health and safety.

Table 3.1-4: Summary of Impacts and Conclusions on Public and Occupational Health and Safety

Potential Impacts on Public Health and Safety	Alternatives			
	No Action	1	2	3
Impacts from long-term storage	○			
Impacts from towing to a commercial dismantlement facility		○	○	○
Impacts from dismantlement activities at a commercial dismantlement facility		○	○	○
Impacts from dismantlement activities at PSNS & IMF		○	○	
Impacts from Port of Benton barge slip and road modification work		○	○	
Impacts from shipping low-level radioactive waste		○	○	○

Notes: (1) Alternatives 1, 2, and 3 would be expected to have some impact that would be reduced as a result of project design changes, implementation of current or proposed best management practices, monitoring, or mitigation. (2) ○ = minimal impact; Blank = no impact/not applicable.

3.2 Hazardous and Radioactive Waste Management

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes hazardous and radioactive waste management and disposal activities associated with the Proposed Action and alternatives. Section 3.1 (Public and Occupational Health and Safety) of this EIS/OEIS addresses potential public and occupational health and safety effects from exposures to these materials during dismantlement operations and transportation. Waste from ex-Enterprise includes low-level radioactive waste (LLRW), non-radioactive regulated hazardous waste, low-level mixed waste (LLMW), and non-radioactive and non-hazardous waste. LLMW is waste that contains LLRW and hazardous waste. Non-radioactive waste streams, including hazardous waste, would be treated, disposed, or recycled within the general geographic region where dismantlement activities would take place. LLRW and LLMW waste would be managed as described in this section.

All spent nuclear fuel was removed from the eight ex-Enterprise reactor plants in 2017 and dispositioned in accordance with standing National Environmental Policy Act documents for spent fuel (59 Federal Register 79) and the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE, 1995). Radioactive waste generated from dismantlement under the Proposed Action and alternatives would be LLRW or LLMW. The radioactive waste removed from ex-Enterprise would be disposed of according to federal regulations and applicable state regulations at approved facilities. LLMW would be treated for its regulated hazardous waste components to meet land disposal requirements prior to disposal. Facilities available to the United States (U.S.) Department of the Navy (Navy) for disposal under each alternative of the Proposed Action are addressed in the following sections.

3.2.1 Methodology

3.2.1.1 Region of Influence

The Region of Influence (ROI) includes the population of workers within the region, including workers associated with other projects co-located at the same dismantlement facility, and the local residential population. The ROI also includes the locations of LLRW, non-radioactive hazardous, LLMW, and non-hazardous waste treatment or disposal facilities, including recycling facilities. Radioactive waste disposal facilities are located in/near Richland, Washington; Aiken, South Carolina; Clive, Utah; and Andrews, Texas. Locations of hazardous waste treatment and disposal facilities are discussed in Section 3.2.2.2 (Waste Facilities). Non-radioactive and non-hazardous waste disposal and recycling is assumed to take place within the local region of the dismantlement project. Transportation routes are included in the ROIs associated with public and occupational health and safety, as discussed in Section 3.1 (Public and Occupational Health and Safety).

Under Alternatives 1 and 2 (the reactor compartment packaging alternatives) the ROI of the Proposed Action would include the communities immediately surrounding the commercial dismantlement facilities in Virginia, Texas, or Alabama; Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington; the Port of Benton barge slip in Richland, Washington; and the DOE Hanford Site near Richland, Washington. The ROI for Virginia is the Hampton Roads Metropolitan Area, Virginia area. The ROI for Texas includes Brownsville, Texas, and the surrounding Cameron, Hidalgo, and Willacy counties. The ROI for Alabama includes Mobile and Baldwin counties. As described in Section 2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), the initial transport phase of the reactor compartment packaging alternatives involves towing ex-Enterprise from its current location in Newport News, Virginia, to one of three commercial locations for partial dismantlement. Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages) describes the routes for shipping the propulsion space section to PSNS & IMF by heavy-lift ship (see Figure 2-5). After reactor compartment packaging at PSNS & IMF, reactor compartment packages would be shipped to the barge slip (see Figure 2-6), and then land-based transportation would be used to move reactor compartment packages to Trench 94 at the DOE Hanford Site. There would also be regional transportation of waste and recycled materials from any commercial dismantlement location and PSNS & IMF.

The ROI for Alternative 3 (Preferred Alternative) is limited to that described for Virginia, Texas, and Alabama; the tow route from Newport News, Virginia, to the commercial dismantlement facility location; regional transportation of waste and recycled materials; and the transportation routes to available LLRW disposal facilities.

3.2.1.2 Regulatory Framework

3.2.1.2.1 Federal

The following sections provide the federal regulatory framework governing Alternatives 1, 2, and 3. Regulations that are also applicable to the No Action Alternative are noted.

3.2.1.2.1.1 Federal and State Radioactive Waste Regulations

Radioactive waste disposal during the dismantlement of ex-Enterprise would be regulated by the DOE, Nuclear Regulatory Commission (NRC), or NRC agreement state as applicable. Under these federal regulations, NRC is responsible for establishing regulations and guidelines for radioactive waste disposal for the commercial nuclear industry, while DOE maintains authority over its wastes. As the Naval Nuclear Propulsion Program (NNPP) does not operate any radioactive waste disposal sites, its radioactive wastes are disposed of at DOE or NRC/Agreement State-regulated radioactive waste disposal locations. Federal radioactive waste regulations would be applicable to Alternatives 1, 2, and 3 (Preferred Alternative) and the No Action Alternative. However, under the No Action Alternative, only small quantities of radioactive waste would be generated as a result of routine maintenance and surveillance operations.

3.2.1.2.1.2 U.S. Department of Energy

DOE regulates the disposal of the radioactive waste under DOE Order 435.1, Change 2, *Radioactive Waste Management* (DOE, 2021). Under the reactor compartment packaging alternatives, the Navy would dispose of ex-Enterprise reactor compartment packages in Trench 94 at the DOE Hanford Site. Trench 94 is owned and operated by DOE. Under the commercial dismantlement alternative, there is potential for using the DOE Savannah River Site (SRS), located near Aiken, South Carolina, for disposal of LLRW. At the DOE SRS, LLRW would be disposed of in the "E Area."

3.2.1.2.1.3 U.S. Nuclear Regulatory Commission

The NRC regulations (10 Code of Federal Regulations [CFR] Part 71) address special packaging requirements for transportation of radioactive materials. The three basic types of packages regulated by the NRC are strong tight containers, whose characteristics are not specified by regulation; and Type A and B packages, which must meet specific requirements in the regulations.

The Low Level Radioactive Waste Policy Amendments Act of 1985 (42 United States Code Section 2021b-j) establishes which commercial LLRW sites would be available for radioactive waste from ex-Enterprise. Commercial NRC or Agreement state licensed radioactive waste sites are not obligated to accept radioactive waste from the decommissioning of United States naval nuclear-powered ships but are not prohibited from doing so. As such, state compact waste sites may accept waste generated from disposal of ex-Enterprise. The proposed dismantlement alternatives are within states with compacts. The compact or state associated with the disposal sites must agree to import the waste for disposal when these wastes were generated elsewhere.

Radioactive waste classifications are established by the NRC (10 CFR Part 61.55). Class A waste, the lowest of the non-exempt waste classes, is allowed the lowest levels of specific long-lived radionuclides (listed in Tables 1 and 2 of 10 CFR Part 61.55), and is required to meet only the minimum characteristics set forth by the NRC. Class B waste may contain higher levels of radioactivity for the specific long-lived radionuclides but must also meet more rigorous requirements on waste form to ensure stability after land disposal. Class C waste may contain even higher levels of radioactivity for the specific long-lived radionuclides, must meet more rigorous requirements on waste form, and must be protected against inadvertent intrusion. Waste facilities are limited on the waste they can accept based on a facility's radioactive materials license and their Waste Acceptance Criteria. For example, the EnergySolutions waste facility in Utah, which is licensed by the Utah Department of Environmental Quality Division of Waste Management and Radiation Control, can only accept Class A waste. The Waste Control Specialists, LLC (WCS) Federal Waste Facility in Texas was designed, permitted, and constructed for disposal of Class A, B, and C LLRW and LLMW. The WCS Federal Waste Facility is licensed by the Texas Commission on Environmental Quality.

Under Alternative 3 (Preferred Alternative), dismantlement would be managed under a Navy contract process. Under this alternative, the contractor would prepare reactor plant dismantlement and disposal planning documents to conform with NRC standards for waste disposal and shipping. The Navy envisions contractually invoking NRC standards and obtaining NRC oversight via an interagency support agreement. The Navy would retain regulatory authority and contractually support use of the NRC requirements. The NRC would review project planning and engineering documents, conduct oversight of project execution, and provide the Navy recommendations for Navy enforcement with the dismantlement contractor.

3.2.1.2.1.4 U.S. Department of Transportation

The U.S. Department of Transportation (DOT) regulates the transportation of hazardous materials, including radioactive materials in 49 CFR, subpart B, chapter 1, subchapter C, *Hazardous Material Regulations* (49 CFR Parts 171 through 180). Subpart I, *Class 7 (Radioactive) Materials*, of subchapter C (49 CFR Parts 173.401-173.477) specifically addresses the transportation of radioactive materials. DOT regulations cover all aspects of radioactive materials transportation, including packaging, shipper and carrier responsibilities, documentation, and all levels of radioactive material from exempt quantities to very high levels. Hazardous materials are defined in 49 CFR Part 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR Part 172.101), and materials that meet the defining criteria for hazard classes and divisions" in 49 CFR Part 173. The transportation of radioactive and hazardous materials and waste is analyzed in Section 3.1 (Public and Occupational Health and Safety).

3.2.1.2.1.5 Resource Conservation and Recovery Act of 1976 (Public Law 94-5800), as Amended by the Hazardous and Solid Waste Amendments

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) of 1976 in 42 United States Code Section 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid waste, which because of its quality, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to an increase in mortality or increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." The regulations governing hazardous waste identification, classification, generation, management, and disposal are found in 40 CFR Parts 260 through 273.

Washington, Virginia, Texas, and Alabama have been granted authority to implement the RCRA including additional parts of the RCRA program that the Environmental Protection Agency (EPA) promulgated, such as corrective action and land disposal restrictions. State RCRA program requirements must be at least as stringent as federal requirements.

3.2.1.2.1.6 Toxic Substances Control Act of 1976 (Public Law 49-469; 40 Code of Federal Regulations, Subchapter R)

The Toxic Substances Control Act (TSCA) authorizes the EPA to obtain data from industry on health and environmental effects of chemical substances and mixtures. If unreasonable risk or injury may occur, EPA may regulate, limit, or prohibit manufacture, processing, chemical distribution, use, and disposal of such chemicals and mixtures. Under Subpart R, Part 761 regulates the in-commerce use, disposal, storage, and making of polychlorinated biphenyl (PCB) and PCB items. The ex-Enterprise reactor compartment packages would be considered PCB bulk product waste for the presence of non-leachable PCBs within solid materials such as rubber, paint, and plastics under this regulation. Under Subpart R, Part 763 regulates asbestos waste. Ex-Enterprise reactor compartment packages contain asbestos in insulation materials.

3.2.1.2.1.7 Environmental Protection Agency Solid Waste Regulations (40 Code of Federal Regulations Parts 240-280)

40 CFR Parts 239 through 259 contain the regulations for solid waste including, but not limited to, guidelines for thermal processing of solid wastes, solid waste used as fuel, storage and collection of commercial solid waste, and source separation for materials recovery.

3.2.1.2.2 State Regulations

3.2.1.2.2.1 Washington

Washington regulations would apply to the reactor compartment packaging alternatives during the dismantlement of the propulsion space section and preparation of the reactor compartment packages that would be disposed of at the DOE Hanford Site.

Washington Department of Ecology Hazardous Waste Management Regulations: Washington Administrative Code (WAC) Chapter 173–303

These regulations set standards for the safe management of dangerous wastes and designate those solid wastes that are dangerous or extremely hazardous to the public health and environment. Under WAC Chapter 173–303, lead remaining in place in the reactor compartment package as radiation shielding is regulated as a state-only dangerous waste. This shielding lead is not regulated as a hazardous waste under RCRA because the lead is used for shielding in LLRW disposal operations and would be fulfilling its intended use. Lead removed from ex-Enterprise but not used for shielding in disposal packages is regulated under RCRA. Other materials removed during ex-Enterprise dismantlement could also be regulated under WAC Chapter 173-303 for RCRA metals such as chromium.

Washington Regulations for the Transportation of Hazardous Materials: Revised Code of Washington Chapter 46.48

The Revised Code of Washington Section 46.48.170, *State patrol authority—Rules and regulations*, states the Washington state patrol has the authority to adopt and enforce the regulations promulgated by the DOT in 49 CFR Parts 100 through 199, *Transportation of Hazardous Materials*. These regulations apply to motor carriers offering, accepting, storing, or transporting hazardous materials and to persons that inspect, certify, test, or repair cargo tank motor vehicles.

Washington Wastes Containing PCBs Regulations: WAC Chapter 173–303

Wastes that are not regulated by the EPA under 40 CFR Part 761.60 (TSCA) may be regulated under the WAC Chapter 173–303, Dangerous Waste Regulations, depending on the waste content and form. In general, the kinds of practices that are subject to WAC Chapter 173–303 include discarding insulating or cooling fluids and rinsate, including discharging these substances to air, land, or water, and burning these substances; salvaging, scrapping, or rebuilding transformers, capacitors, or bushings; or disposal of soils, rags, absorbents, or other materials contaminated with PCB during the salvaging or rebuilding of transformers, capacitors, or bushings (Washington State Department of Ecology, 2010). PCBs in the reactor compartment packages are in a solid, non-leachable form such as in rubber, plastic and paint, and are considered PCB bulk product waste under 40 CFR Part 761 and would not be regulated under WAC Chapter 173–303.

3.2.1.2.2.2 Virginia

Applicable Virginia Department of Environmental Quality (VDEQ) regulations for the management and disposal of hazardous materials and wastes are listed below.

VDEQ Hazardous Waste Management Regulations: 9 Virginia Administrative Code (VAC) 20-60

Hazardous waste in Virginia is regulated under RCRA Subtitle C. Businesses and other facilities in Virginia are also required to comply with hazardous waste regulations prescribed in 9 VAC 20-60, which closely follow the federal standards established under RCRA. Facilities that store, treat, and dispose of hazardous wastes require a permit from VDEQ.

VDEQ Regulations for the Transportation of Hazardous Materials: 9 VAC 20-110

The purpose of the Virginia hazardous material transportation regulations is to regulate the transportation of hazardous materials, to maintain a register of shippers, and monitor the transportation of hazardous radioactive materials requiring advance notification in Virginia. Notwithstanding the limitations contained in 49 CFR Part 171.1(a)(3), the Virginia hazardous material transportation regulations apply to any person who transports hazardous materials or hazardous radioactive materials or offers such materials for shipment.

VDEQ Asbestos-Containing Waste Materials Regulations: 9 VAC 20-81-620

The asbestos-containing waste materials (ACM) regulations in 9 VAC 20-81-620 regulate the management of all ACM generated by asbestos mills, by manufacturing, fabricating, and spraying operations, and regulated ACM as defined by 40 CFR Part 61, Subpart M, as amended. It is generated in the course of demolition and renovation of installations, structures or buildings, or other waste-generating activities. In order for ACM to be accepted at the disposal site, materials must meet the transporting and packaging requirements for ACM waste according to 40 CFR Part 61, Subpart M.

VDEQ Wastes Containing PCBs Regulations: 9 VAC 20-81-630

Solid wastes containing PCB concentrations between 1 part per million (ppm) and 50 ppm are restricted to disposal in sanitary landfills or industrial waste landfills with leachate collection, liners, and appropriate groundwater monitoring under this regulation. Additionally, PCB bulk product wastes with concentrations above 50 ppm may be approved for disposal on a case-by-case basis. Submissions prepared for the director of VDEQ are reviewed and their decision would include a description of the PCB waste indicating the material proposed for disposal and how the federal regulations under 40 CFR Part 761.62 apply to the material.

3.2.1.2.2.3 Texas

Applicable Texas Department of Environmental Quality (TDEQ) regulations for the management and disposal of hazardous materials and wastes are listed below.

TDEQ Industrial Solid and Municipal Hazardous Waste Regulations: 30 Texas Administrative Code (TAC) 335

The purpose of 30 TAC 335 and specifically Subchapter B, Hazardous Waste Management General Provisions, is to implement a state hazardous waste program which controls hazardous waste defined by 40 CFR Part 261 from point of generation to ultimate disposal. Additionally, 30 TAC 335 Subchapter C, Standards Applicable to Generators of Hazardous Waste, establishes standards for generators of hazardous waste.

TDEQ Regulations for the Transportation of Hazardous Materials: 30 TAC 335, Subchapter D

This subchapter establishes standards for transporters transporting hazardous waste to off-site storage, processing, or disposal facilities.

TDEQ Asbestos-Containing Waste Materials Regulations: 30 TAC 330.171 and .172

Regulated ACM may be disposed of at a Type I or Type I arid exempt municipal solid waste (MSW) landfill in Texas in accordance with 30 TAC 330.171(c)(3). Non-regulated ACM is material containing less than 1 percent asbestos or non-friable ACM not identified as regulated. Non-regulated ACM may be disposed of at any Texas MSW landfill provided the facility is authorized to accept the waste in accordance with 30 TAC 330.171(c)(4).

TDEQ Regulations for Wastes Containing PCBs: 30 TAC 330.15 and 30 TAC 335.508

In Texas, PCB wastes, as defined under 40 CFR Part 761, are prohibited from disposal in any MSW facility by 30 TAC 330.15(e) unless authorized by the EPA and the MSW facility permit. Media contaminated by a material containing greater than or equal to 50 ppm total PCBs and wastes containing greater than or equal to 50 ppm PCBs shall be classified as a Class 1 waste.

3.2.1.2.2.4 Alabama

Applicable Alabama Department of Environmental Management (ADEM) regulations for the management and disposal of hazardous materials and wastes are listed below.

ADEM Hazardous Waste Management Regulations: Administrative Code 335-14-3

Administrative Code 335-14-3 establishes standards for generators of hazardous waste as defined in 335-14-1-.02 and generators of other waste destined for disposal at commercial hazardous waste disposal facilities located in Alabama.

ADEM Regulations for the Transportation of Hazardous Materials: Administrative Code 335-14-4

Administrative Code 335-14-4 establishes standards which apply to persons transporting hazardous waste in Alabama if the transportation requires a manifest under Chapter 335-14-3. A transporter must not transport hazardous wastes without having received an EPA identification number from the EPA or the authorized state in which the base of operations is located.

ADEM Asbestos-Containing Waste Materials Regulations: Administrative Code 335-13-4-.26(2)

Any person who generates, processes, treats, or disposes of friable asbestos shall comply with Administrative Code 335-13-4-.26(2). Friable asbestos must be disposed of in a facility permitted by ADEM. The friable asbestos must arrive at the disposal location in properly labeled, leak-tight containers as determined by the ADEM Air Division.

ADEM Wastes Containing PCBs Regulations

Alabama follows federal regulations for handling, marking, treating, storing, and disposing of PCBs and PCB items under 40 CFR Part 761. In addition, Alabama requires preapproval of PCB wastes regulated under the TSCA that are to be disposed of at commercial hazardous waste facilities in the state.

3.2.1.2.3 Radioactive Waste

Dismantlement of ex-Enterprise would generate LLRW in various forms, including the reactor vessels contained in reactor compartment packages under the reactor compartment packaging alternatives, high-activity materials from dismantled reactor vessels under Alternative 3 (Preferred Alternative), low-activity wastes such as piping and reactor system components, and very low-activity materials such as used personal protective equipment. LLRW not disposed of at either the DOE Hanford Site or the DOE SRS would be disposed of according to NRC regulations in 10 CFR Part 61.55, Waste Classification. This regulation defines waste as Class A, Class B, Class C, or Greater Than Class C. Class A waste has the fewest disposal restrictions. Class B waste must meet more rigorous requirements to ensure waste stability after disposal. Class C waste must also meet the rigorous requirements of Class B waste to ensure waste stability after disposal, and the disposal facility must meet additional requirements to protect against inadvertent intrusion. The waste class is based on the activity concentration limits of certain radionuclides. For waste containing mixtures of radionuclides, the total concentration and waste classification is determined by the sum of fractions rule described in 10 CFR Part 61.55(a)(7).

Under the reactor compartment packaging alternatives, the reactor compartment packages would be disposed of at the DOE Hanford Site. LLRW generated that was not associated with volume encompassed by the reactor compartment package would be disposed of consistent with applicable DOE, NRC, or NRC agreement state waste disposal regulations, as currently performed for the established reactor compartment disposal program. Work from ex-Enterprise propulsion space section dismantling and recycling efforts would be within the scope of typical work performed at PSNS & IMF.

The DOE sites have radioactive waste disposal limits based on site-specific conditions. Appendix D of the 1996 *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants* (hereinafter referred to as the 1996 EIS) (Navy & DOE,

1996) discusses application of the NRC classification system and DOE classification system to the internal structure of the reactor vessels of the ship classes being disposed of, noting that the structures would be NRC Class C or DOE Hanford Category 3. NRC Class C and DOE Hanford Category 3 limits are intended to be functionally equivalent in defining a waste suitable for land disposal.

Under Alternative 3 (Preferred Alternative), it is anticipated that LLRW would be disposed at WCS in Texas (accepts Classes A, B, and C waste), EnergySolutions in Utah (accepts only Class A waste), or to the DOE SRS in South Carolina.

For Alternative 3 (Preferred Alternative), it is envisioned that ex-Enterprise reactor vessels (along with their internal structures) would be disposed of as a Class C waste under the NRC regulations (or DOE Category 3 for disposal at the DOE SRS). Disposal options for the reactor vessels based on waste class would then include WCS in Texas and the DOE SRS in South Carolina.

Other large reactor plant components would be Class A waste. The disposal option of these wastes includes WCS in Texas, EnergySolutions in Utah, and the DOE SRS in South Carolina. Approximately 352 container express (CONEX) boxes of reactor plant components would also be Class A waste. Other miscellaneous radioactive waste shipments would be expected to be Class A waste. The disposal option of these wastes includes WCS, EnergySolutions*,* and the DOE SRS.

All waste is envisioned to be disposed in accordance with NRC, state, or DOE regulations at licensed or permitted disposal facilities. Compliance with the regulations and license/permit requirements ensure impacts on public and occupational health and safety would be minimal.

3.2.1.3 Best Management Practices

The Navy has developed and implemented a program of total ship recycling to safely dispose of decommissioned nuclear-powered ships. The program for total ship recycling was developed directly from experience gained in dismantling submarine missile compartments. The development of procedures for demilitarization and handling of hazardous materials also evolved from this experience. Following a review of options for disposal of the remainder of the ships, the Navy instituted a total ship recycling program in 1991.

Under the reactor compartment packaging alternatives, all work involving hazardous and radioactive materials at PSNS & IMF would be carried out by trained personnel using appropriate personal protective equipment in accordance with NNPP requirements. Hazardous materials would be properly disposed of in accordance with the current PSNS & IMF waste management procedures (WMPs). The WMPs direct proper disposal of hazardous materials in compliance with applicable federal, state, and local regulations.

For work conducted by a commercial company under Alternative 3 (Preferred Alternative), the Navy would use NRC regulatory requirements for radiological controls, consistent with the requirements normally invoked on the commercial radiological dismantlement industry for this type of work. The Navy envisions implementing the NRC decommissioning process for radioactive material licensees described in the NRC Consolidated Decommissioning Guidance (Nuclear Regulatory Guide-1757) with support from the NRC. The Navy would retain regulatory authority and enforce NRC requirements via contract with the dismantlement contractor.

For each of the alternatives, radioactive waste packaging and shipping would meet applicable NRC, DOE, and DOT regulatory requirements. 10 CFR Part 20 contains the radiation protection standards issued by the NRC. The provisions of 10 CFR Part 20 control the receipt, possession, use, transfer, and disposal of licensed material by any licensee in such a manner that the total dose to an individual does not exceed the standards for protection against radiation prescribed in the regulations in this part. Under this regulation, radiological work is to be accomplished in a manner that keeps radiation exposure to workers and the public as low as reasonably achievable.

According to the NRC, about 3 million packages of radioactive materials are shipped each year in the United States, either by highway, rail, or water (NRC, 2017). Regulating the safety of radioactive material shipments is the joint responsibility of the NRC and DOT. The NRC establishes requirements for the design and manufacture of packages for radioactive materials under 10 CFR Part 71, *Packaging and Transportation of Radioactive Material*, and 10 CFR Part 73, *Physical Protection of Plants and Materials*. The DOT regulates the shipments while they are in transit under 49 CFR Parts 171 through 180, which govern the packaging and shipping of radioactive materials. DOE also has shared regulatory authority over transportation of radioactive materials on the DOE sites.

3.2.1.4 Approach to Analysis

This EIS/OEIS evaluates the potential environmental impacts from radioactive and non-radioactive hazardous materials and wastes resulting from the proposed dismantlement and disposal of ex-Enterprise under three alternatives for the Proposed Action and a No Action Alternative. The following sections evaluate the radioactive and non-radioactive hazardous materials and wastes contained in ex-Enterprise, the available disposal options for each dismantlement location, and the environmental effects associated with transport of radioactive and non-radioactive hazardous materials and wastes.

The potential environmental consequences related to occupational and public exposure to radioactive materials and exposure to toxic and hazardous materials such as ACM, PCBs, lead, and chromates are discussed in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2.2.1 (Navy and Commercial Shipyards). The measures that would be employed to protect site workers are also protective of the public and the environment.

3.2.2 Affected Environment

This section provides an overview of the facilities and WMPs, including administrative controls, at Navy and commercial shipyards. This section also describes the treatment or disposal facilities that would receive waste from the Proposed Action and alternatives.

3.2.2.1 Navy and Commercial Shipyards

Navy and commercial shipyards routinely manage hazardous materials from ship repair, decommissioning, and ship recycling work. ACM, elemental lead, lead-based paint (LBP), PCBs, and other non-radioactive hazardous materials are onboard nearly all ships that are constructed, maintained, or dismantled at Navy or commercial shipyards. These shipyards have existing state or federal permits and regulator-approved procedures for managing hazardous materials and hazardous waste. However, several commercial shipyards that are envisioned to perform ex-Enterprise dismantlement do not currently perform radiological work. The following describes the typical dismantlement process at Navy and commercial shipyards.

When removed from the ship, materials and equipment would typically be transferred to an on-site scrap yard located on or near the Navy or commercial shipyard facility. This material and equipment, which may be cut into smaller pieces or stripped of valuable materials, may contain or be contaminated with hazardous materials, including ACM, PCBs, LBP, oils, and fuels. Scrap metals, including steel, aluminum, copper, copper-nickel alloy, and lesser amounts of other metals, may be sorted by grade and composition and sold to re-melting firms or to scrap metal brokers. Other materials that are not recycled, including hazardous materials and other wastes, would be disposed of according to applicable local, state, and federal laws and regulations.

For all dismantlement alternatives at Navy or commercial shipyard facilities, personnel would sort, segregate, and decontaminate waste. The useful materials would be recycled; the non-hazardous wastes would be properly disposed of; and the remaining LLRW, LLMW, and hazardous wastes would be sent to authorized treatment or disposal facilities.

Abatement of hazardous materials inside and outside the ex-Enterprise reactor plant spaces must be accomplished prior to dismantlement. Specific materials requiring abatement include asbestos lagging, chromated water, soundproofing material contaminated with PCBs, and LBP and other coatings that are present along cut lines for torches and grinders. The reactor compartments contain lead shielding, which would not be removed prior to disposal of the reactor compartment packages under the reactor compartment packaging alternatives but could be removed under Alternative 3 (Preferred Alternative).

Table 3.2-1 provides volume estimates for hazardous wastes from dismantlement of ex-Enterprise. Based on estimates scaled off of waste volumes generated during the dismantlement of the ex-Forrestal conventionally powered aircraft carrier, the Navy estimates that a total of 8,813 tons of hazardous materials would be removed from ex-Enterprise during dismantlement. The Navy also estimates that 3,291 tons of this volume would come from the propulsion space section. The components of this waste would include primarily asbestos and PCB wastes.

Table 3.2-1: Hazardous Waste Estimates

Hazardous Waste	Ex-Forrestal	Alternatives 1 and 2		Alternative 3 (Preferred Alternative)
		Ex-Enterprise (CVN 65) (commercial site)	Propulsion Space Section (PSNS & IMF)	Ex-Enterprise (CVN 65) (commercial site)
Displacement (long tons)[1]	57,402	75,000 (initial)	28,000	75,000
PCB Wastes[2] (tons)[3]	6,742	5,520	3,289	8,809
Asbestos Only (tons)	2	1	1	2
Other Hazardous Waste (tons)	2	1	1	2
Total Hazardous Waste (tons)	**6,746**	**5,522**	**3,291**	**8,813**
Non-hazardous Scrap[4] (tons)	57,545	47,117	28,070	75,187

[1]1 long ton = 2,240 pounds
[2]Includes liquids, bulk product waste (including contaminated asbestos), and paints that may also contain toxic metals (e.g., lead)
[3]1 ton = 2,000 pounds
[4]Steel and non-ferrous scrap
Notes: PCB = Polychlorinated biphenyl, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility

The following sections describe hazardous materials commonly found during dismantling operations at Navy and commercial shipyards.

3.2.2.1.1 Asbestos

Repair and ship hull recycle operations routinely encounter and handle ACM. ACM is found throughout Navy ships in insulating materials on piping systems, in electrical cables, and on ship structures.

Asbestos exposure can lead to asbestos-related diseases including asbestosis, pleural plaques, lung cancer, and mesothelioma. As discussed in the 2012 *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)*, asbestos is regulated in the workplace, in removal operations, and in the environment (Navy & DOE, 2012). Federal environmental regulations for asbestos work are provided in 40 CFR Part 61. Sealed containments, sealed worker suits (with air-fed hoods), and water damping/wiping are examples of methods employed to contain asbestos and protect workers and the environment. Under the reactor compartment packaging alternatives, an estimated 1 ton of ACM would be generated at the commercial dismantlement facility and 1 ton of ACM would be transferred to PSNS & IMF in the propulsion space section (see Table 3.2-1). Therefore, 1 ton of ACM waste would be generated at PSNS & IMF. The Navy estimates that a total of up to 2 tons of ACM waste would be generated at the commercial dismantlement facility from dismantlement of ex-Enterprise under Alternative 3 (Preferred Alternative) (see Table 3.2-1).

3.2.2.1.2 Polychlorinated Biphenyls

PCBs are commonly found shipboard in wool felt sound damping, electrical cable rubber, and paint. Wool felt sound damping and electrical equipment containing liquid PCBs are removed and disposed of under 40 CFR Part 761. Ex-Enterprise is not expected to contain the wool felt sound damping. Wool felt sound damping is regulated under the WAC 173-303 for RCRA metals such as chromium. The remaining PCBs are in a solid, non-leachable form such as in rubber, plastic, and paint, and are considered PCB bulk product waste under 40 CFR Part 761. PCB bulk product waste may be disposed of in MSW landfills (Navy & DOE, 2012). The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as chloracne and rashes.

The Navy estimates that a total of up to 8,809 tons of PCB waste (liquid, bulk product waste, and paints) would be generated at the commercial dismantlement facility under Alternative 3 (Preferred Alternative) (see Table 3.2-1). Under the reactor compartment packaging alternatives, an estimated 5,520 tons of PCB waste would be generated at the commercial dismantlement facility and 3,289 tons of PCB waste would be transferred to PSNS & IMF in the propulsion space section (see Table 3.2-1). Therefore, 3,289 tons of PCB waste would be generated at PSNS & IMF. The reactor compartment packages would be considered PCB bulk product waste under federal law (40 CFR Part 761) for the presence of non-leachable PCBs within solid materials such as rubber, paint, and plastics.

3.2.2.1.3 Lead

Lead is found in the form of lead ballasts, canned (inside a metal jacket) radiation shielding in Navy reactor compartment packages, and in LBP. Dismantlement and reactor compartment packaging work under Alternatives 1, 2, and 3 would involve lead removal and potential lead exposures. The most extensively studied health outcomes of lead exposures are neurological, renal, cardiovascular, hematological, immunological, reproductive, and developmental effects. Under the reactor compartment packaging alternatives, permanently installed shielding lead would remain in the reactor compartment packages while ballast lead would be removed from the reactor compartment packages per agreement with the state of Washington. The lead in the reactor compartment packages is regulated as a state-only dangerous waste under Washington state law but is not regulated as a hazardous waste under RCRA because lead used for shielding in LLRW disposal operations is not considered a waste by the EPA. The disposal site for reactor compartment packages, Trench 94 at the DOE Hanford Site, operates under the interim status standards of WAC 173-303-400 (Navy & DOE, 2012). Under the reactor compartment packaging alternatives, lead and LBP waste removed at the commercial dismantlement facility would be managed under state and federal handling, storage, and recycle/disposal guidelines and regulations. Under Alternative 3 (Preferred Alternative), all lead, including radiation shielding from the propulsion space section, and LBP waste would also be managed under state and federal handling, storage, and recycle/disposal guidelines and regulations. Lead that is also LLRW must be decontaminated prior to recycling or treated (i.e., encapsulated) to meet land disposal requirements of the LLRW facility.

3.2.2.1.4 Radioactive Potassium Chromate

Under Alternatives 1, 2, and 3, radioactive potassium chromate solution would be removed from Navy reactor compartments, filtered to reduce radioactivity, and would possibly be reused in other Navy nuclear-powered ships. If the potassium chromate is not filtered and recycled, it must be managed as a LLMW. LLMW must be treated and disposed of in accordance with applicable federal and state regulations. Chromate salts, such as potassium chromate, are corrosive and produce cellular damage to tissue. Ingestion may produce inflammation of the digestive tract, nausea, vomiting and abdominal pain. Chromates cause kidney damage and blood cell damage.

Waste processing of ex-Enterprise radioactive potassium chromate solution removed from the reactor compartments would occur at PSNS & IMF under the reactor compartment packaging alternatives and at the commercial dismantlement facility or an off-site waste treatment facility under Alternative 3 (Preferred Alternative). Processing is expected to involve evaporation to reduce volume, reduction of hexavalent chromium to trivalent chromium, and solidification of the residual liquid as LLRW. Regardless of the specific process ultimately used, it would be expected to result in an end product for disposal that meets Land Disposal Restrictions in accordance with RCRA regulations. The waste would be characterized and designated consistent with state and federal regulations (Navy & DOE, 2012).

3.2.2.1.5 Mixed Waste

Under Alternatives 1, 2, and 3, LLMW would require treatment in accordance with appropriate treatment standards before disposal. Similarly, radioactive PCB waste would require storage until sufficient treatment or disposal capacity became available. LLMW generated under Alternatives 1, 2, and 3 could include solid materials (e.g., a piece of lead), a solid with a hazardous material tightly bound within its matrix as part of the formulation (e.g., PCB in paint chips, rubber gaskets, or insulation), sound damping felt (containing PCBs), or solidified liquid (e.g., processed potassium chromate solution). These wastes would be appropriately managed by permitted hazardous waste treatment and disposal facilities, and, as such, would not result in unauthorized exposures to workers or unpermitted releases to the environment (Navy & DOE, 1996).

3.2.2.2 Waste Facilities

Non-radioactive hazardous materials as described in Section 3.2.2.1 (Navy and Commercial Shipyards) would be part of waste streams generated under all three action alternatives, and at all dismantlement locations. Under the reactor compartment packaging alternatives, hazardous wastes located outside the propulsion space section would be disposed of regionally at authorized hazardous waste disposal facilities. Hazardous and radioactive materials in the propulsion space section would be disposed of according to PSNS & IMF WMPs. For Alternative 3 (Preferred Alternative), the entire ship and all of its radioactive and hazardous waste would require disposal locations that accept waste generated from the commercial dismantlement facility.

3.2.2.2.1 Washington

Under the reactor compartment packaging alternatives, ex-Enterprise would be partially dismantled at a location outside the state of Washington (in one of the three states discussed in the following sections) and the propulsion space section would be dismantled at PSNS & IMF. PSNS & IMF routinely manages hazardous and radioactive materials from ship repair, reactor compartment packaging, and ship recycle work. LLRW, LLMW, and hazardous wastes generated during dismantlement of the propulsion space section and preparation of the reactor compartment packages would be disposed of according to PSNS & IMF WMPs. The reactor compartment packages would be disposed of in Trench 94 at the DOE Hanford Site in Richland, Washington.

Under the reactor compartment packaging alternatives, four large tanks external to the reactor compartments could be removed at PSNS & IMF and shipped whole to US Ecology Washington, an LLRW disposal facility located near Richland, Washington, using a similar water-to-land transportation route as the reactor compartment package. Whole tank dimensions are too large for normal rail and truck shipment and would be shipped by barge via the Port of Benton barge slip. If barged, the shipment would be completed in the manner similar to reactor compartments (Navy & DOE, 2012). Under Alternative 3 (Preferred Alternative), these tanks would be managed like other LLRW and would be cut up in segments to fit into standard road or rail shipping containers. See Section 2.3 (Alternatives Carried Forward for Analysis) for complete descriptions of waste transport and disposal under the reactor compartment packaging alternatives.

3.2.2.2.2 Virginia

Hampton Roads Metropolitan Area, Virginia, could host the commercial dismantlement facility under the reactor compartment packaging alternatives or the complete dismantlement of ex-Enterprise under Alternative 3 (Preferred Alternative). In all cases, materials would be removed, packaged, stored, and transported in accordance with local, state, and federal standards and regulations.

Rules for solid waste containing PCBs with concentrations of 50 ppm or more in Virginia are the same as the federal regulations under 40 CFR Part 761. These rules include waste screening to detect and prevent the disposal of PCBs and other hazardous wastes at MSW landfills under 40 CFR Part 258.20. Under 9 VAC 20-81-630, solid wastes containing PCB concentrations between 1 ppm and 50 ppm are restricted to disposal in sanitary landfills with leachate collection, liners, and appropriate groundwater monitoring. PCB bulk product wastes with concentrations above 50 ppm may be approved for disposal by VDEQ on a case-by-case basis. No chemical waste facilities or waste incinerators in Virginia routinely accept PCB wastes above 50 ppm.

For any ACM to be accepted at a disposal site in Virginia, transportation and packaging requirements (e.g., waste properly bagged and sealed) must be met. All ACM generated in a manufacturing, fabricating, or spraying operation, and all regulated ACM generated in a demolition or renovation operation must be disposed of in a special purpose landfill or in a designated area of a sanitary landfill. Category I and Category II non-friable ACM may be disposed of in a landfill applying daily soil cover, providing that the operator is notified, and the landfill permit specifically authorizes acceptance of the waste (Virginia Department of Environmental Quality, 2020).

There are no in-state hazardous waste disposal options in Virginia or neighboring states (EPA, 2017b, 2017d, 2017e). There are, however, hazardous waste treatment and storage facilities in Virginia (EPA, 2017d). Disposal options for LLRW generated from complete dismantlement of ex-Enterprise in Virginia include the DOE SRS in South Carolina, EnergySolutions in Clive, Utah (accepts only Class A waste), and WCS located west of Andrews, Texas (accepts Classes A, B, and C waste).

3.2.2.2.3 Texas

Brownsville, Texas could also host the partial dismantlement of ex-Enterprise under the reactor compartment packaging alternatives or the complete commercial dismantlement under Alternative 3 (Preferred Alternative). The contract for commercial dismantlement would require a plan for hazardous waste disposal according to applicable local, state, and federal regulations.

The Navy has verified there are sites available in Texas that can manage the anticipated amount of hazardous waste from dismantlement of ex-Enterprise. US Ecology Texas, a hazardous waste treatment and disposal facility located in Robstown, Texas, is located less than 200 mi. from Brownsville, Texas, and is equipped to handle mixed media/debris/devices, inorganic/organic liquids, organic solids, and bulk PCB remediation waste. In 2017, US Ecology Texas disposed of approximately 42,000 tons of waste (EPA, 2017c). WCS, located west of Andrews, Texas, also accepts some forms of hazardous wastes, including PCB wastes. Two additional facilities in Texas accept PCB waste for disposal.

Texas follows federal regulations for handling, marking, treating, storing, and disposing of PCB wastes under 40 CFR Part 761 and regulated disposal of ACM in 30 TAC 330. Regulated (friable) ACM may be disposed of at a Type I or Type I arid exempt MSW landfill in accordance with 30 TAC 330.171(c)(3). Non-regulated (non-friable) ACM may be disposed of at any MSW landfill, provided the facility is authorized to accept the waste in accordance with 30 TAC 330.171(c)(4).

Disposal options for LLRW generated from complete dismantlement of ex-Enterprise in Texas include the DOE SRS in South Carolina, EnergySolutions in Clive, Utah (accepts only Class A waste), and WCS located west of Andrews, Texas (accepts Classes A, B, and C waste).

3.2.2.2.4 Alabama

Mobile, Alabama, could also host the partial dismantlement of ex-Enterprise under the reactor compartment packaging alternatives or the complete commercial dismantlement under Alternative 3 (Preferred Alternative). The contract for commercial dismantlement would require a plan for hazardous waste disposal according to applicable local, state, and federal regulations.

The Navy has verified there is at least one site available in Alabama that can manage the anticipated amount of hazardous waste from dismantlement of ex-Enterprise. This site is Chemical Waste Management, which operates a hazardous waste facility located in Emelle, Alabama, approximately 180 mi. from Mobile. This facility is equipped to handle mixed media/debris/devices, inorganic/organic liquids, and organic solids. In 2017, Chemical Waste Management disposed of more than 103,000 tons of hazardous waste (EPA, 2017a).

Alabama follows federal regulations for handling, marking, treating, storing, and disposing of PCB wastes under 40 CFR Part 761. Chemical Waste Management in Emelle, Alabama, is the only waste facility in Alabama that accepts PCB waste (EPA, 2019).

ACM may be disposed of in any permitted landfill in Alabama with written approval from ADEM, following the special waste provisions found in ADEM regulations at ADEM Administrative Code 335-13-4-.26(2) (Alabama Department of Environmental Management, 2008).

There are no in-state LLRW disposal options in Alabama or neighboring states. Disposal options for LLRW generated from complete dismantlement of ex-Enterprise in Alabama include DOE SRS, EnergySolutions in Clive, Utah (accepts only Class A waste), and WCS located west of Andrews, Texas (accepts Classes A, B, and C waste).

3.2.3 Environmental Consequences

Hazardous materials and hazardous waste associated with the dismantlement of nuclear-powered and conventional naval ships are well documented. Sections 2.3.2 and 2.3.3 describe the established Navy process of dismantling nuclear ships and potential modifications considered in the reactor compartment packaging alternatives, respectively (Navy, 2012a; Navy & DOE, 2012). During the preparation of these reactor compartment packages, remnant hull sections of the ship not containing the reactor plant would be removed and recycled under the existing PSNS & IMF program, as described in *U.S. Naval Nuclear-Powered Ship Inactivation, Disposal, and Recycling* (Navy, 2019b). The existing program deconstructs submarines to facilitate reactor compartment disposal as described in the 1996 EIS. Under Alternative 1, the eight remaining reactor compartment packages would be similar in size and weight to those evaluated under the 1996 EIS. This process would not require substantial changes to the infrastructure at PSNS & IMF, the Port of Benton barge slip, the transport road on the DOE Hanford Site, or Trench 94 at the DOE Hanford Site.

Partial dismantlement of ex-Enterprise in Virginia, Texas, or Alabama under the reactor compartment packaging alternatives would contain the reactor plants within a propulsion space section. Nearly all of the LLRW generated from dismantlement of the propulsion space section at PSNS & IMF would be associated with the reactor compartment packages. Hazardous waste generated at the commercial dismantlement location would be managed under hazardous waste management programs and permits prepared by the ship dismantlement contractor(s) in accordance with state and federal regulations.

LLRW and hazardous waste generated during PSNS & IMF reactor compartment packaging operations would be transported and disposed of in accordance with the existing PSNS & IMF WMP. All work involving hazardous materials would be carried out by trained workers using appropriate personal protective equipment per applicable Navy Occupational Safety and Health requirements. The WMP directs proper disposal of hazardous materials in compliance with applicable federal, state, and local regulations.

LLRW generated at the commercial dismantlement location under Alternative 3 (Preferred Alternative) would be managed per the contractor-developed dismantlement plan required by the Navy contract. The dismantlement plan would follow NRC regulations and be reviewed and approved by the Navy with NRC consultation. LLRW would be transported over highways, railways, or waterways from the dismantlement location to one or more disposal sites in accordance with applicable DOT, DOE, NRC, or NRC agreement state regulations. Transportation routes are discussed further in Section 3.1 (Public and Occupational Health and Safety) of this EIS/OEIS. Hazardous waste generated at the commercial dismantlement location would be managed under hazardous waste management programs and permits prepared by the ship dismantlement contractor(s) in accordance with state and federal regulations.

The following sections discuss the potential environmental consequences associated with the management and disposal of hazardous and radioactive wastes for Alternatives 1, 2, and 3, and the

No Action Alternative as described in Section 2.3 (Alternatives Carried Forward for Analysis). The potential environmental consequences related to occupational and public exposure to radioactive materials and exposure to toxic and hazardous materials such as ACM, PCBs, lead, and chromates are discussed in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2.2.1 (Navy and Commercial Shipyards). The measures that would be employed to protect site workers are also protective of the public and the environment.

3.2.3.1 No Action Alternative

3.2.3.1.1 Ex-Enterprise is Stored in Newport News, Virginia

The No Action Alternative consists of the long-term waterborne protective storage of the entire ex-Enterprise for an indefinite period of time at Newport News Shipbuilding, located in Newport News, Virginia. As described in Section 2.3.1 (No Action Alternative), storage facility staff would perform periodic inspections and maintenance of the ship while in storage, to ensure that storage continues in a safe and environmentally responsible manner. All hazardous materials would be contained by the hull, and all access would be controlled to limit exposure to hazardous materials. Therefore, the No Action Alternative would result in minimal impacts on personnel or the environment.

3.2.3.2 Alternative 1: Single Reactor Compartment Packages

3.2.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Alternative 1 includes partial non-radiological dismantlement at a commercial facility located in the Hampton Roads Metropolitan Area (with no open-water tow) or towing ex-Enterprise from Newport News Shipbuilding in Newport News, Virginia, to a location in either Alabama or Texas. The tow action of unmanned, defueled, nuclear-powered ships is governed by the methods and procedures described in the Navy Towing Manual (Navy, 2002) and Naval Sea Systems Command Instruction 4740.12 (Navy, 2012b).

Naval Sea Systems Command Instruction 4740.12 (Navy, 2012b) describes the activities that are required to tow and store defueled nuclear-powered ships. With respect to removal of hazardous materials, the following actions were taken:

- Flammable materials removed (e.g., paint, fuel, thinners)
- Lube oil systems drained and flushed
- Fuel tanks, including jet fuel tanks, drained and cleaned
- All compressed gas cylinders removed except those required for portable firefighting bottles
- All firefighting liquids removed except for portable fire extinguishers
- Batteries not needed for alarms and navigation lights removed
- All hazardous materials and asbestos removed from storerooms
- All mercury-containing equipment removed where practical
- Hydraulic systems, oil tanks, sanitary systems, etc. drained and cleaned at the time ex-Enterprise was inactivated

If necessary, prior to towing from Newport News Shipbuilding, the hull would be cleaned to remove potential invasive species. If this occurred, the process would not generate wastes regulated by the state of Virginia. Local movement of ex-Enterprise within the Hampton Roads Metropolitan Area may not require hull cleaning.

Tow ships contain fuels and oils. Responses to accidental release of these materials to the environment are covered by the EPA National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan. The National Contingency Plan is the blueprint of the federal government for responding to both oil spills and hazardous substance releases. EPA is the lead federal response agency for oil spills occurring in inland waters. The U.S. Coast Guard is the lead response agency for spills in coastal waters and deep-water ports. No other hazardous materials or hazardous wastes of significant volume would be encountered during towing actions.

Non-radioactive hazardous waste generated from preparation of ex-Enterprise for tow and hazardous waste generated onboard tow ships would be disposed of at appropriately permitted regional disposal site(s). Non-radioactive and non-hazardous materials would be transported and recycled or disposed at regional facilities in accordance with applicable local, state, and federal laws. As such, the impacts from the hazardous materials and hazardous waste from towing operations would result in minimal impacts on the environment.

In the extremely unlikely event of the sinking of ex-Enterprise in route from Newport News Shipbuilding to a commercial dismantlement facility, the defueled reactor plants containing radioactive and other hazardous materials could potentially be breached due to water pressure. The reactor vessel, components, and piping that contain radioactivity are designed to withstand high pressures and battle shock. These would continue to provide a barrier to the release of radioactivity. Additionally, the majority of the radioactivity is locked within the corrosion resistant alloys of the internal structure and not readily available for release and, therefore, radiological environmental impacts due to sinking ex-Enterprise would be negligible.

There would be no environmental consequences from a breached reactor compartment with regard to the non-radiological constituents. This is because nearly all the non-radiological constituents (e.g., PCBs, lead, chromium, iron) are in a solid (insoluble) state. In the unlikely event the potassium chromate solution is released to the environment, its concentration would be reduced by the surrounding water to negligible amounts. ACM could be disturbed in an accident, and portions of the disturbed ACM might mix with water entering through the breach. Any ACM that eventually escaped would be expected to eventually settle out of the water and become incorporated into the sediment (Navy & DOE, 1996). As such, the impacts from the sinking of ex-Enterprise during towing would result in minimal impacts on the environment.

3.2.3.2.2 Partial Dismantlement at Commercial Dismantlement Facility (Includes In-Water Activities)

For Alternative 1, contractors would sort, segregate, and decontaminate materials to limit the generation of hazardous waste to the extent practical. The useful materials would be recycled, the non-hazardous wastes would be properly disposed of, and the remaining hazardous wastes would be sent to authorized treatment or disposal facilities.

Abatement of hazardous materials must be accomplished prior to dismantlement activities. Specific materials requiring abatement include asbestos lagging, soundproofing material contaminated with PCBs, and LBP and other coatings that are present along cut lines for torches and grinders. Control would be required in approved planning documents to prevent the spread of hazardous materials outside work areas. Therefore, no significant release of airborne or liquid contamination is anticipated during dismantlement activities, and the impact on the environment is expected to be minimal. Additionally, reasonable safeguards would be put in place when storing or staging dismantled materials on barges or upland storage sites to ensure the materials or particulate matter from the materials do not enter coastal waters.

Under Alternative 1, the partial dismantlement of ex-Enterprise at a commercial dismantlement facility would generate 5,522 tons of hazardous waste (see Table 3.2-1). Management and disposal of hazardous waste from Alternative 1 would result in minimal impacts on the environment.

3.2.3.2.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

The waste and recyclable materials would be transported from the commercial dismantlement facility to an approved waste disposal or recycling facility.

Hazardous waste would be transported by truck, ship, or rail from the commercial dismantlement locations to approved disposal facilities. Only properly licensed/permitted transporters would be used to transport the waste; thus, the transport of waste would have a minimal impact on the environment.

3.2.3.2.4 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

As stated in Chapter 2 (Description of Proposed Action and Alternatives), under Alternative 1, the propulsion space section would be transported via heavy-lift ship to PSNS & IMF for construction of the reactor compartment packages.

As described above under Section 3.2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), the impacts from an accident resulting in the sinking of ex-Enterprise and its reactor compartments during a towing operation, and release of some hazardous materials, would result in minimal impacts on the environment. The same would be the case during transport of the propulsion space section via heavy-lift ship.

The heavy-lift ship contains fuels and oils. Responses to accidental release of these materials to the environment are covered by the National Contingency Plan. The evaluation of the impacts of accidental release of these materials from the heavy-lift ship is outside the scope of this EIS/OEIS.

3.2.3.2.5 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

Pier-side and dry dock work at PSNS & IMF would be conducted as part of Alternative 1, as described in Chapter 2 (Description of Proposed Action and Alternatives). Hazardous and radioactive material and waste management operations from dismantlement of the propulsion space system would be consistent with ongoing and regulated practices described in PSNS & IMF WMPs and disposal of the waste would not strain the existing capacity of available disposal sites. It could take approximately five years for dry dock activities to be completed (see Table 2-2).

The results of environmental monitoring and disposal of radioactive wastes generated at PSNS & IMF are summarized in an annual report titled *Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear-Powered Ships and their Support Facilities* (Navy, 2019a). This report assesses the environmental effect of disposal of radioactive wastes originating from U.S. naval nuclear propulsion plants and their support facilities. The report describes disposal of radioactive liquid, transportation and disposal of solid wastes, and monitoring of the environment to determine the effect of radioactive releases. The report concludes that radioactivity associated with U.S. naval nuclear-powered ships has had no discernible effect on the quality of the environment (Navy, 2019a). The addition of ex-Enterprise disposal operations would be performed consistent with these existing Navy practices.

The subsequent preparation of the reactor compartment packages from the propulsion space section at PSNS & IMF would generate 3,291 tons of hazardous waste (see Table 3.2-1). Alternative 1 would involve dismantlement of the propulsion space section at PSNS & IMF, separation of reactor compartment pairs, and shipment of the eight single reactor compartment packages using the current Navy process. Each single reactor compartment package would be about 36 feet (ft.) L x 40 ft. W x 47 ft. H and weigh 1,651 tons.

Disposal of the reactor compartment packages in Trench 94 at the DOE Hanford Site could be accomplished within the existing capacity of the disposal site. The exact volumes of LLRW, LLMW, and other hazardous waste that would be generated at PSNS & IMF is unknown (volume estimates are provided in Table 3.2-1). Processing or disposal of LLRW, LLMW, and hazardous waste generated outside the reactor compartment packages would follow the processes outlined in the PSNS & IMF waste management procedures. Based on past Navy vessel disposal operations and the decommissioning of commercial nuclear power plants and the STURGIS (USACE, 2014),[1] hazardous waste, LLMW, and LLRW quantities would not be anticipated to exceed the management and disposal capabilities of the involved facilities.

3.2.3.2.6 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

The construction of a concrete rail support system in Trench 94 at the DOE Hanford Site would be required in order to accommodate the reactor compartment packages under Alternative 1. A description of the rail system is provided in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). Construction of the concrete rail support system in Trench 94 at the DOE Hanford Site would require the management of hazardous materials such as solvents, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize exposures and releases to the environment, thus resulting in minimal impacts.

3.2.3.2.7 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

As described in Chapter 2 (Description of Proposed Action and Alternatives), under Alternative 1, transportation of the reactor compartment packages from PSNS & IMF would include water transportation to the Port of Benton barge slip and then by road to Trench 94 at the DOE Hanford Site. Under Alternative 1, reactor compartment packages would be transported from PSNS & IMF by water to the Port of Benton barge slip using the same process as the current program (Navy & DOE, 2012), as described in Section 2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip).

As described in Section 3.2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), the impacts from an accident resulting in the sinking of ex-Enterprise and its reactor compartments during a towing operation, and release of some hazardous materials, would result in minimal impacts on the environment. The same would be the case during transport of the reactor compartment packages from PSNS & IMF to the Port of Benton barge slip.

[1] USACE is an acronym for U.S. Army Corps of Engineers.

The barge transport would involve tow ships that contain fuels and oils. Accidental release of these materials to the environment is covered by the National Contingency Plan. The evaluation of the impacts of accidental release of these materials from tow ships is outside the scope of this EIS/OEIS.

3.2.3.2.8 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Under Alternative 1, the reactor compartment packages would be transported from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site using the same process used for the current program (Navy & DOE, 2012), as described in Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). The route begins at the barge slip and enters the DOE property at Horn Rapids Road. Once on the DOE Hanford Site, the route covers about 26 miles to the disposal site (Navy & DOE, 1996). Land transportation to Trench 94 would require the use of hydraulic fluids, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize exposures and releases to the environment, thus resulting in minimal impacts.

Under Alternative 1, single reactor compartment packages containing the internal structure and encompassing reactor vessel would be within the DOE Hanford Site Category 3 waste limits. For the DOE Hanford Site Category 3 waste disposal, each reactor vessel is contained within a reactor compartment package that has a 600- to 2,000-year expected containment life and also meets measures to protect against inadvertent intrusion. The reactor vessel itself, which approaches 6 inches in metal thickness, surrounds the internal structure and provides an additional long containment life of tens of thousands of years in the low corrosion environment in Trench 94 at the DOE Hanford Site. Additionally, the majority of the radioactivity is locked within the corrosion resistant alloys of the internal structure and not readily available for release upon access through the vessel. Therefore, as use, disposal, and transportation of single reactor compartment packages would be conducted in accordance with existing regulations and site-specific permit/license requirements, impacts from single reactor compartment package disposal would be minimal.

3.2.3.3 Alternative 2: Dual Reactor Compartment Packages

3.2.3.3.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

This aspect of Alternative 2 would be the same as Alternative 1, as described under Section 3.2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility).

3.2.3.3.2 Partial Dismantlement at Commercial Dismantlement Facility (Includes In-Water Activities)

This aspect of Alternative 2 would be the same as Alternative 1, as described under Section 3.2.3.2.2 (Partial Dismantlement at Commercial Dismantlement Facility [Includes In-Water Activities]).

3.2.3.3.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 2, the shipment of the propulsion space section to PSNS & IMF is identical to Alternative 1 and is described in in Section 3.2.3.2.4 (Ship ex-Enterprise via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]).

3.2.3.3.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

Under Alternative 2, pier-side and dry dock work would be similar to Alterative 1, as described under Section 3.2.3.2.5 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]).

As with Alternative 1, the subsequent preparation of the reactor compartment packages from the propulsion space section at PSNS & IMF would generate 3,291 tons of hazardous waste (see Table 3.2-1). Alternative 2 would result in four conjoined pairs of reactor compartments rather than eight single reactor compartments (Alternative 1). Thus, under Alternative 2, PSNS & IMF would transfer fewer, but heavier and larger reactor compartment packages (about 71 ft. L x 40 ft. W x 47 ft. H, and 3,304 tons) than the eight single reactor compartment packages of Alternative 1 (about 36 ft. L x 40 ft. W x 47 ft. H, and 1,651 tons).

Processing or disposal of LLRW, LLMW, and hazardous waste generated outside the reactor compartment packages under Alternative 2 would be the same as Alterative 1, as described under Section 3.2.3.2.5 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]).

3.2.3.3.5 Port of Benton Barge Slip Modifications

Modification and infrastructure improvements to the Port of Benton barge slip would be needed to support the larger dual reactor compartment packages, as described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications). Activities associated with construction could generate small volumes of hazardous wastes in the form of spilled fuel, hydraulic fluids, or lubricant from construction equipment. Any hazardous wastes generated as a result of these activities would be managed in accordance with applicable regulations and policies, thus resulting in minimal impacts.

3.2.3.3.6 Road Modifications Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

Road modification between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site would be needed to support the larger dual reactor compartment packages, as described in Section 2.3.3.7 (Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site). Activities associated with construction could generate small volumes of hazardous wastes in the form of spilled fuel, hydraulic fluids, or lubricant from construction equipment. Any hazardous wastes generated as a result of these activities would be managed in accordance with applicable regulations and policies, thus resulting in minimal impacts.

3.2.3.3.7 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

The construction of a concrete rail support system in Trench 94 at the DOE Hanford Site would be required to accommodate the larger dual reactor compartment packages under Alternative 2. A description of the rail system is provided in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). As detailed in Section 3.2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site), construction of the concrete rail support system in Trench 94 would require the management of hazardous materials such as solvents, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize exposures and releases to the environment, thus resulting in minimal impacts.

3.2.3.3.8 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Under Alternative 2, transportation of the four dual reactor compartment packages would follow the same route as the reactor compartment packages under Alternative 1, as described in Section 3.2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip).

As described in Section 3.2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), the impacts from the sinking of ex-Enterprise and its reactor compartments during a towing operation, and release of some hazardous materials, would result in minimal impacts on the environment. The same would be the case during transport of the reactor compartment packages from PSNS & IMF to the Port of Benton barge slip.

The barge transport would involve tow ships that contain fuels and oils. Accidental release of these materials to the environment are covered by the National Contingency Plan. The evaluation of the impacts of accidental release of these materials from tow ships is outside the scope of this EIS/OEIS.

3.2.3.3.9 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Under Alternative 2, the reactor compartment packages would be transported from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site using the same process used for the current program (Navy & DOE, 2012), as described in Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). A description of the route is described in Section 3.2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site). Land transportation to Trench 94 at the DOE Hanford Site would require the use of hydraulic fluids, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices to minimize exposures and releases to the environment, thus resulting in minimal impacts.

Under Alternative 2, dual reactor compartment packages containing the internal structures and encompassing reactors would be within the DOE Hanford Site Category 3 waste limits. For the DOE Hanford Site Category 3 waste disposal, each reactor vessel is contained within a reactor compartment package that has a 600- to 2,000-year expected containment life and also meets measures to protect against inadvertent intrusion. The reactor vessel itself, which approaches 6 inches in metal thickness, surrounds the internal structure and provides an additional long containment life of tens of thousands of years in the low corrosion environment in Trench 94 at the DOE Hanford Site. Additionally, the majority of the radioactivity is locked within the corrosion resistant alloys of the internal structure and not readily available for release upon access through the vessel. Therefore, as use, disposal, and transportation of dual reactor compartment packages would be conducted in accordance with existing regulations and site-specific permit/license requirements, impacts from dual reactor compartment package disposal would be minimal.

3.2.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

3.2.3.4.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Alternative 3 (Preferred Alternative) includes complete dismantlement at a commercial facility located in the Hampton Roads Metropolitan Area (with no open-water tow) or towing ex-Enterprise from Newport News Shipbuilding in Newport News, Virginia, to a location in either Alabama or Texas. The analysis and conclusions described in Section 3.2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility) are also applicable to Alternative 3 (Preferred Alternative), and would result in minimal impacts on the environment.

3.2.3.4.2 Complete Dismantlement of ex-Enterprise at Commercial Facility (Includes In Water Work)

Alternative 3 (Preferred Alternative) includes towing ex-Enterprise to a contracted ship dismantlement facility and complete dismantlement of the ship. Alternative 3 (Preferred Alternative) would require removing, packaging, and shipping all LLRW, LLMW, and hazardous wastes to licensed and permitted waste treatment or disposal facilities. The Navy would require the contractor(s) to prepare a complete Dismantlement Plan and Waste Management Plan that describe the processes and requirements for safe on-site management, off-site transportation, and disposal or treatment of LLRW, LLMW, and other hazardous wastes.

For Alternative 3 (Preferred Alternative), contractors would sort, segregate, and decontaminate materials to limit the generation of hazardous waste to the extent practical. The useful materials would be recycled, the non-hazardous wastes would be properly disposed of, and the remaining radioactive and hazardous wastes would be sent to authorized treatment or disposal facilities.

Reactor plants would be disassembled into segments that can be shipped as oversized components or sized to fit into typical LLRW shipping containers. LLRW would be packaged in accordance with applicable NRC and DOT requirements.

Under Alternative 3 (Preferred Alternative), hazardous wastes would be regulated by federal and state regulations, and disposal requirements would be regional. The total volume of hazardous waste generated under Alternative 3 (Preferred Alternative) is estimated at over 8,800 tons (see Table 3.2-1). The overall impacts from the management of hazardous materials, hazardous waste, and LLRW at a commercial dismantlement facility in Virginia, Texas, or Alabama are expected to be minimal, similar to those described under the reactor compartment packaging alternatives.

3.2.3.4.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

The Navy has determined that the eight reactor vessels with internal structure remaining would be Class C waste. Therefore, under Alternative 3 (Preferred Alternative), the reactor vessels could be disposed of at either the DOE SRS in South Carolina or at WCS in Texas. The other large reactor plant components (10 per reactor plant) would be Class A waste. The disposal options of these wastes include WCS, EnergySolutions, and the DOE SRS. Approximately 352 CONEX boxes of reactor plant components would be Class A waste. Other miscellaneous LLRW shipments would be expected to be Class A waste or potentially exempt waste materials. The disposal options of these wastes includes WCS in Texas, EnergySolutions in Utah*,* and the DOE SRS in South Carolina.

Under Alternative 3 (Preferred Alternative), hazardous waste and non-hazardous wastes, including recyclable metal, would be managed according to applicable federal, state, and local regulations and policies. Hazardous wastes would be regulated by federal and state regulations, and disposal requirements would be regional. The total volume of hazardous waste generated under Alternative 3 (Preferred Alternative) is estimated at over 8,800 tons (see Table 3.2-1). The remaining wastes and recyclable materials from ex-Enterprise would be managed within the local region to the extent practical.

The overall impacts from the management of hazardous materials, hazardous waste, LLMW, LLRW, and other waste and recyclable materials at a commercial dismantlement facility in Virginia, Texas, or Alabama are similar to those described under the reactor compartment packaging alternatives. Therefore, waste disposal and recycling would result in minimal impacts on the environment.

LLRW would be transported by truck, ship, or rail from the commercial dismantlement locations to approved disposal facilities in accordance with applicable DOT, DOE, NRC, or NRC agreement state regulations. Only properly licensed/permitted transporters would be used to transport the waste. The transportation of waste is expected to have minimal impacts on the environment.

As discussed in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants), dismantlement of all eight defueled reactor plants is conservatively estimated to result in up to 440 LLRW shipments of large components and CONEX boxes (or similar-sized packages) of radioactive material being shipped by barge, rail, or truck to one or more waste facilities for disposal, as summarized below:

- reactor vessels: 8 shipments
- reactor plant components (large): up to 80 shipments
- reactor plant components (small): up to 352 CONEX boxes

Dismantlement activities would also generate a small number of additional shipments of LLRW incidental to disposal of the reactor plants, which would consist of material such as piping, tooling, and personal protective equipment. These additional wastes are similar to the small amounts of LLRW that are generated incidental to construction of reactor compartment packages and are disposed of at established waste disposal sites. The disposal options of these wastes include WCS in Texas, EnergySolutions in Utah, and the DOE SRS in South Carolina.

3.2.3.4.4 Low-Level Radioactive Waste is Disposed at Appropriate Approved Disposal Facilities

Under Alternative 3 (Preferred Alternative), available commercial LLRW disposal options are determined by the classification of the waste as provided in 10 CFR Part 61.55 (Class A, B, C, or Greater than Class C). Commercial disposal options for LLRW generated at the various Alternative 3 (Preferred Alternative) locations include EnergySolutions in Clive, Utah (accepts only Class A waste) and WCS located west of Andrews, Texas (accepts Classes A, B, and C waste). EnergySolutions and WCS have some on-site capacities for treatment of LLMW. LLMW would be treated for its regulated hazardous waste components to meet land disposal requirements.

For Alternative 3 (Preferred Alternative), the dismantlement contractor(s) would likely ship each reactor vessel with internal structure remaining inside as a single unit, and the activity concentrations would be similar to those for single reactor compartment packages that would be used under the reactor compartment packaging alternatives. Each reactor vessel would be within the NRC Class C limits. Other LLRW would meet Class A limits. No waste is anticipated to exceed Class C limits.

Disposal requirements for NRC Class C wastes are similar to the DOE Hanford Site Category 3 requirements. For NRC Class C waste disposal under Alternative 3 (Preferred Alternative), each reactor component with internal structure remaining inside as a single unit would be disposed of in a manner that meets the physical form and stability requirements of 10 CFR Part 61.56 and also meets the additional measures to protect against inadvertent intrusion to exceed the 500-year containment life (10 CFR Part 61.52(a)(2)).

LLRW would be transported by truck, ship, or rail from the commercial dismantlement locations to approved disposal facilities in accordance with current applicable DOT, NRC, or DOE regulations governing transportation

Therefore, as waste packaging, disposal, and transportation would all be conducted in accordance with existing regulations and site-specific permit/license requirements, impacts from LLRW disposal would be minimal.

3.2.4 Mitigation

No mitigation measures would be necessary under the Proposed Action and Alternatives, including the No Action Alternative, as analysis concluded that the public and occupational health and safety impacts would be considered minimal.

3.2.5 Summary of Impacts and Conclusions

Table 3.2-2 summarizes the impacts of the Proposed Action and alternatives on hazardous and radioactive waste management.

Table 3.2-2: Summary of Impacts and Conclusions on Hazardous and Radioactive Waste Management

Potential Impacts on Hazardous and Radioactive Waste Management	Alternatives			
	No Action	1	2	3
Impacts from long-term storage	○			
Impacts from towing to a commercial dismantlement facility		○	○	○
Impacts from dismantlement activities at a commercial dismantlement facility		○	○	○
Impacts from dismantlement activities at PSNS & IMF		○	○	

Notes: (1) Alternatives 1, 2, and 3 would be expected to have some impact that would be reduced as a result of project design changes, implementation of current or proposed management practices, monitoring, or mitigation. (2) ○ = minimal impact; Blank = no impact/not applicable; PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility.

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3.3 American Indian Tribal Resources and Treaty Rights

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) analyzes potential impacts on American Indian tribal resources and treaty rights. Tribal resources and treaty rights of Pacific Northwest tribes specifically are analyzed for potential impacts on access of usual and accustomed (U&A) fishing and shellfish collecting grounds and stations; culturally significant vegetation and wildlife, including marine mammals; and water quality.

3.3.1 Methodology

Natural resources such as fish, shellfish, game, and plant foods are of primary importance to American Indian tribes, not only providing a livelihood but also defining their culture and tribal identity. American Indian tribes have rights because of inherent tribal sovereignty. Although not all tribes retain treaty rights to their traditional lands, many tribes in the Pacific Northwest retained specific rights to certain natural resources in their treaties negotiated with the United States (U.S.) Government.

This analysis is based on current analyses of biological resources as summarized in Section 3.5 (Biological Resources) of this EIS/OEIS, as well as in the U.S. Department of the Navy (Navy) and Department of Energy (DOE) 2012 *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65),* hereinafter referred to as the 2012 EA (Navy & DOE, 2012), and the *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants*, hereinafter referred to as the 1996 EIS (Navy & DOE, 1996). In addition, the Navy recently completed the *Final Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement, Northwest Training and Testing Activities* (Navy, 2020), which discusses tribal resources along the coast of Washington and within Puget Sound, including Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) and other Navy facilities.

Additional data will be acquired throughout the ongoing outreach process. The Navy is conducting notifications and outreach to identify tribal resources and treaty rights that may be impacted by this action.

3.3.1.1 Region of Influence

The Region of Influence (ROI) for tribal resources and treaty rights includes the following elements focused in the Pacific Northwest: (1) the shipping route of ex-Enterprise propulsion space section via heavy-lift ship from a commercial dismantlement facility to PSNS & IMF (following a route around South America); (2) areas within port and shipyard facilities at PSNS & IMF that may support dismantlement of ex-Enterprise; (3) Trench 94 rail system improvements at the DOE Hanford Site for disposal of reactor compartment packages; (4) barge transport of reactor compartment packages from PSNS & IMF to the Port of Benton barge slip; (5) the immediate vicinity and surrounding habitats of the barge slip, that may be subject to infrastructure improvements; and (6) land transport route requiring infrastructure improvements that may impact tribal resources between the barge slip and the DOE Hanford Site.

The following elements are not considered as part of the ROI for this analysis: (1) the tow route from Newport News, Virginia, to the commercial dismantlement facility; (2) partial dismantlement at a commercial dismantlement facility; and (3) transport of waste and recyclable materials from the commercial dismantlement facility to an approved waste disposal or recycling facility. There are no American Indian lands that would be impacted by the tow route, commercial dismantlement facilities, or waste disposal and recycling facilities; and the Navy's outreach and research efforts have not identified treaty rights or protected tribal resources concerns to date. In addition, these elements (towing, commercial dismantlement, construction of reactor compartment packages, and transport of waste and recyclable materials) represent routine Navy operations that follow applicable federal, state, and local regulations and guidance.

3.3.1.2 Regulatory Framework

Articles of the U.S. Constitution authorize U.S. Presidents to enter into treaties with American Indian tribes, subject to Senate confirmation, or ratification, of the treaty. According to the U.S. Bureau of Indian Affairs (BIA), from 1778 to 1871, relations of the United States with individual American Indian tribes were conducted largely through the treaty-making process (BIA, 2020). Treaties are the "supreme law of the land" and the foundation upon which federal Indian law and the federal Indian trust relationship are based (BIA, 2020). The federal Indian trust responsibility is a legally enforceable fiduciary obligation for the United States to protect tribal treaty rights, lands, assets, and resources, and to carry out federal laws that apply to American Indian and Alaska Native tribes and villages, regardless of whether a tribe has reserved treaty rights or not.

"Treaty tribes" refers to those tribes who negotiated a treaty with the federal government that was subsequently ratified by the U.S. Senate. In the Pacific Northwest, beginning in the 1850s, many American Indian tribes entered into treaties with the federal government, under which they relinquished their right to most of their territory (ceded lands) in exchange for monetary payments and other guarantees, such as use of their aboriginal fishing, hunting, gathering, and pasturing areas throughout their ceded lands. "Reserved tribal treaty rights" refer to continued access and harvest of natural resources on Indian reservations, and off-reservation "open and unclaimed" lands in common with other citizens. Most treaties negotiated in the Pacific Northwest specifically acknowledged the retained tribal right to fish at off-reservation U&A fishing grounds.

"Federally recognized tribes" are those tribes who received federal recognition status through treaties, acts of Congress, presidential Executive Orders (EOs), federal court decisions, or other federal administrative actions and procedures (e.g., Federal Acknowledgement Process [25 Code of Federal Regulations Part 83]) (BIA, 2020). Not every federally recognized tribe has a reservation, and not all tribes received or retained federal recognition. Several tribes who were not treaty signers, whose treaties were terminated, whose populations had been greatly reduced, or whose federal recognition was later rescinded, continue to petition for federal recognition.

The Department of Defense (DoD) American Indian and Alaska Native Policy, and as amended in 1999, established DoD policy for interactions with federally recognized tribes. DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes,* implements that policy (latest version September 24, 2018). As defined in DoD Instruction 4710.02, "protected tribal resources" refers to "natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by or reserved by or for Indian tribes through treaties, statutes, judicial decisions, or executive orders (EOs), including tribal trust resources." "Tribal trust resources," defined as "Indian lands or treaty rights to certain resources," include plants, animals, and locations associated with fishing, hunting, and gathering activities (Navy & DOE, 2012). Also as defined in DoD Instruction 4710.02, "Indian lands" are "Any lands to which the title is either held in trust by the United States for the benefit of any Indian tribe or Indian, or held by an Indian tribe or Indian subject to restrictions by the United States against alienation."

The Navy policy for consultation with federally recognized American Indian tribes was established in 1999 and updated in 2019, Secretary of the Navy Instruction 11010.14B, *Department of the Navy Policy* *for Consultation with Federally Recognized Indian Tribes, Alaska Native Tribal Entities, and Native Hawaiian Organizations*. This instruction implements DoD policy within the Navy and encourages ongoing consultations and communications (Navy & DOE, 2012). Commander, Navy Region Northwest Instruction 11010.14A, *Policy for Consultation with Federally-Recognized American Indian and Alaska Native Tribes* (first established in 2009, latest revision May 10, 2021), sets forth policy, procedures, and responsibilities for consultations with federally recognized American Indian and Alaska Native tribes in the Navy Region Northwest area of responsibility. The Navy must consult with tribes whenever proposing an action that may have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands. Installations meet with tribes in their area, including tribes historically or culturally affiliated with the lands managed by the installation, regardless of whether they have treaty rights or not.

DOE Order 144.1, U.S. *Department of Energy American Indian & Alaska Native Tribal Government Policy*, commits DOE to consult with tribal governments to ensure tribal rights and concerns are considered prior to DOE taking actions, making decisions, or implementing programs that may affect tribes.

EOs requiring consultation with tribes include EO 13175, *Consultation and Coordination with Indian Tribal Governments*; the Presidential Memorandum dated November 5, 2009, emphasizing agency needs to comply with EO 13175; EO 13007, *Indian Sacred Sites*; and the presidential memorandum dated April 29, 1994, *Government-to-Government Relations with Native American Governments*.

3.3.1.3 Best Management Procedures

Best management practices include policies, practices, and measures that would be implemented to minimize impacts associated with the Proposed Action and alternatives. The federal government engages in government-to-government consultation with federally recognized tribes regarding traditional resources, treaty rights, and other concerns, in recognition of tribal sovereignty. As part of the EIS scoping process, the Navy has initiated contact with tribes who may have interest in the Proposed Action. The Navy will continue to gather information and notify tribes as part of the EIS process and their routine government-to-government meetings. Consultation will be determined as tribes decline to participate or request to consult with the Navy about the Proposed Action.

3.3.1.4 Approach to Analysis

In considering impacts on American Indian tribal resources and treaty rights, this analysis considers the potential for the Proposed Action and alternatives to impede tribal access to U&A fishing grounds and to affect biological resources with traditional value, or their habitat (e.g., anadromous fish species that migrate through salt water such as salmon, steelhead, lamprey, eel, and sturgeon; shellfish; and other wildlife including marine mammals that are part of subsistence and ceremonial activities of tribes) or water quality. As U&A fishing grounds are associated specifically with the Pacific Northwest, the approach considers tribal concerns previously expressed to the Navy as part of other actions in the Pacific Northwest, including the 2012 EA (Navy & DOE, 2012) and the Final Northwest Training and Testing Supplemental Environmental Impact Statement/OEIS (Navy, 2020), as well as any potential concerns expressed to the Navy as part of the public involvement process and scoping for this EIS/OEIS.

3.3.2 Affected Environment

In the 1850s, the United States negotiated treaties with a number of tribes in the Pacific Northwest. These tribes ceded lands to the United States while reserving certain rights for themselves, including the right to take fish and shellfish at their off-reservation traditional fishing grounds and to hunt and gather roots and berries on their traditional lands (Bernholz & Weiner, 2008).

Descendants continue to exercise these rights as part of a tribal lifestyle. In the Pacific Northwest, tribal treaty rights are co-managed by tribes along with the states and federal government. Court cases have reaffirmed the rights of Indian tribes to obtain resources in off-reservation U&A fishing grounds and stations (*Sohappy v. Smith*/*U.S. v. Oregon* [Belloni Decision], 1969; *U.S. v. Washington*, 384 F. Supp. 312 [Boldt Decision], 1974). Tribes are entitled to half the harvestable surplus fish in the Columbia River regulated under *U.S. v. Oregon* (Columbia River Tribes Inter-Tribal Fisheries Commission, 2020). The Boldt Decision defined U&A fishing grounds and outlined the geography of U&A grounds of 14 treaty tribes in Washington (Boldt Decision, 332–33). The ruling in the subsequent Shellfish Case (*U.S. v. Washington*, 873 F. Supp. 1422 [Rafeedie Decision], 1994) determined that shellfish are to be considered the same as fish under the treaties. The courts have interpreted the expressed treaty rights to include conservation of the resources and a right of habitat (Bernholz & Weiner, 2008). In response to these rulings, most treaty tribes in the Pacific Northwest organized intertribal commissions who continue to actively and collectively manage and protect their tribal treaty resources and rights.

The following federally recognized Pacific Northwest tribes have traditional resources or treaty rights considered in the Pacific Northwest ROI for this analysis:

- Confederated Tribes and Bands of the Umatilla Indian Reservation
- Confederated Tribes of the Chehalis Reservation
- Confederated Tribes of Grand Ronde
- Confederated Tribes of Siletz Indians
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Confederated Tribes and Bands of the Yakama Nation
- Cowlitz Indian Tribe
- Hoh Tribe
- Jamestown S'Klallam Tribe
- Lower Elwha Tribal Community
- Lummi Nation
- Makah Indian Tribe
- Nez Perce Tribe
- Port Gamble S'Klallam Tribe
- Quileute Indian Nation
- Quinault Indian Nation
- Shoalwater Bay Tribe
- Skokomish Tribal Nation
- Suquamish Indian Tribe of the Port Madison Reservation
- Swinomish Indian Tribal Community

In 2012, the Navy invited Pacific Northwest tribes with treaty rights in the ROI to evaluate the draft analysis in the 2012 EA (Navy & DOE, 2012). The Suquamish Indian Tribe expressed concern for potential bottom scour during docking at PSNS & IMF, which could affect fish habitat (Navy & DOE, 2012). The Navy determined there would be no significant effects or major impacts on tribal resources and treaty rights resulting from the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise (Navy & DOE, 2012).

As part of initial outreach for this EIS/OEIS, in 2019 the Navy sent notifications to all tribes in the general vicinity of the various project elements. The Suquamish Indian Tribe responded through a letter submitted in the public involvement process that they have an interest in participating in development of this EIS/OEIS. The Navy engages with the Suquamish Indian Tribe to discuss projects at PSNS & IMF.

3.3.2.1 Western Washington Coast and Columbia River

Under separate treaties signed between 1854 and 1856, much of the land along the Western Washington coast, along the Columbia River between the mouth and the Port of Benton barge slip, and within the DOE Hanford Site was ceded to the United States by regional American Indian tribes. These treaties include the Treaties of Medicine Creek, Neah Bay, Point Elliott, and Point No Point; Quinault Treaty; Treaty with the Confederated Tribes of the Willamette Valley; Middle Columbia River Treaty; Walla Walla Treaty; Yakama Treaty; and Nez Perce Treaty. Under most of these treaties, tribes specifically retained their rights to fish, hunt, and gather roots and berries and to pasture horses and cattle on open and unclaimed lands (Bernholz & Weiner, 2008). Tribal fishing rights are recognized on rivers within the ceded lands, including the Columbia River. There are other federally recognized tribes, such as the Cowlitz Tribe and Shoalwater Bay Tribe, who did not sign treaties but who have other rights and interests in managing tribal resources such as fish and fish habitat.

Currently, several treaty tribes in western Washington collectively form the Northwest Indian Fisheries Commission, which is committed to management of interconnected natural resources and treaty rights (Northwest Treaty Tribes, 2020). Tribes also individually manage their resources and treaty rights. Tribal marine resource gathering areas include traditional fishing grounds; whaling areas; and seaweed-, mussel-, abalone-, and clam-gathering grounds, some of which extend beyond 12 nautical miles (Navy, 2020). Many marine species are culturally significant to the tribes of coastal Washington and Oregon and are harvested for ceremonial, subsistence, and commercial purposes (Navy, 2020). These activities may be used to pass down traditional knowledge and cultural history to younger generations. The availability and health of marine resources and supporting habitats are therefore a concern for regional tribes.

Federal lands have been acquired and improved to provide access to U&A fishing grounds along the Columbia River (Columbia River Treaty Fishing Access Pub. L. No. 100-581, 102 Stat. 2944, 1988). A zone for exclusive treaty Indian commercial fishing extends along a 147-mile stretch of the Columbia River between Bonneville and McNary dams, approximately 50 river miles downstream from the Port of Benton barge slip. Within this zone, four treaty tribes (the Confederated Tribes of the Umatilla Indian Reservation [CTUIR], Confederated Tribes of Warm Springs, Confederated Tribes and Bands of the Yakama Nation [Yakama Nation], and Nez Perce Tribe) collectively manage fishery resources and protect their reserved treaty rights as part of the Columbia River Inter-Tribal Fish Commission (Columbia River Tribes Inter-Tribal Fisheries Commission, 2020). Individual tribes are also reintroducing fish and enhancing habitat along the Mid-Columbia River to support their treaty rights (Washington Department of Fish and Wildlife, 2020).

3.3.2.2 Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet

Since preparation of the 2012 EA, which determined there would be no significant effects or major impacts on tribal resources and treaty rights resulting from the disposal of naval reactor plants from ex-Enterprise at PSNS & IMF (Navy & DOE, 2012), certain tribes in Puget Sound have expressed concerns regarding the potential of Navy activities to impede access to adjudicated treaty U&A fishing grounds and/or to damage tribal fishing gear (Navy, 2020). PSNS & IMF and Sinclair Inlet lie within the U&A fishing grounds of the Suquamish Indian Tribe. The Suquamish Indian Tribe has a right to take a percentage of fish that pass through their U&A areas and has a salmon fishery at Gorst Creek, at the upper reaches of Sinclair Inlet. The Suquamish Indian Tribe fishes for hatchery salmon in Sinclair Inlet as these fish return to Gorst Creek. The Tribe is concerned about potential impacts on fish, shellfish, and their habitat (Suquamish Tribe, 2021).

3.3.2.3 Port of Benton Barge Slip

The Port of Benton barge slip is on Lake Wallula, which is the Columbia River impoundment created by McNary Dam, and is on the west shoreline at river mile 342.8 (see Figure 2-15). The element of the alternatives associated with barge slip improvements includes aquatic habitats of the Columbia River, considered in this analysis to extend from a half mile upstream of the barge slip, a half mile across the river, and a half mile downstream of the barge slip. The barge slip is on lands ceded to the United States by ancestral tribes and bands of the CTUIR. Descendants continue to rely on the water and access lands to hunt, fish, collect plants and other resources, and to pray. Tribal priorities encourage protection of traditional use areas and tribal resources (Stapp, 2013), as well as shoreline and fish management (Washington Department of Fish and Wildlife, 2020).

3.3.2.4 Land Transport Route from the Port of Benton to Final Disposal Location at the Department of Energy Hanford Site

The land transport route commences on Port of Benton land as it departs the Port of Benton barge slip. The Navy uses DOE road systems to transport reactor compartment packages from the Port of Benton barge slip to Trench 94 in the 200 East Area of the DOE Hanford Site. The land transport route from the barge slip initially crosses the DOE Pacific Northwest National Laboratory (PNNL), which is managed by the DOE Pacific Northwest Site Office (PNSO). After crossing PNNL, the land transport route continues on to the DOE Hanford Site, managed by DOE-Richland, to the final disposal location at Trench 94.

The DOE sites are along the Columbia River on lands ceded to the U.S. Government by ancestral tribes and bands of the Yakama Nation and CTUIR and near lands ceded by the Nez Perce Tribe and others who traditionally used the area and who exercise their treaty rights at the DOE Hanford Site. In addition, the Wanapum Band are a non-federally recognized tribe living adjacent to the DOE sites and DOE consults with the Wanapum for actions at the DOE Hanford Site. There are other Indian tribes in the area whose ceded lands did not include any portion of the DOE sites but who exercise their treaty rights along the Columbia River for fishing (e.g., Confederated Tribes of Warm Springs).

The Washane, or Seven Drums religion, which has ancient roots and had its start in the area where the DOE sites are now located, is still practiced by many people on the Yakama, Umatilla, Warm Springs (central Oregon), and Nez Perce Reservations. Native plant and animal foods, some of which can be found on the DOE sites, are used in ceremonies performed by tribal members (Navy & DOE, 1996). DOE ensures access is available to members of the Wanapum, Yakama Nation, CTUIR, Colville, and Nez Perce tribes to gather traditional resources and for practicing traditional cultural and religious ceremonies in accordance with tribal treaty rights, EOs, and DOE policy (Chatters, 1982; DOE, 2021).

DOE has set aside a Preservation Designated Area (PDA) along the Columbia River at the DOE PNNL Site for tribal use that is intended to enhance the quantity and quality of biological resources that are culturally significant to tribes (DOE, 2018). The PDA is considered a sacred site under EO 13007, as discussed in Section 3.7 (Cultural Resources). Tribal revegetation activities on the PDA include seed collection and planting of native plants. The land transportation route passes through the tribal PDA on the DOE PNNL Site for approximately 0.6 mile (1 kilometer) after it departs the Port of Benton barge slip.

3.3.3 Environmental Consequences

This analysis considers potential impacts of the Proposed Action and alternatives on American Indian tribal resources and treaty rights in Washington. Potential impacts are analyzed as they relate to impeding access to U&A fishing grounds, impacts on biological resources and their habitat (e.g., threatened and endangered species, essential fish habitat), and impacts on water quality through introduced contamination or debris in Washington only. For Alternative 3 (Preferred Alternative), the Navy is examining reasonably foreseeable impacts for commercial facilities on private land. Reserved treaty rights do not apply to commercial dismantlement facilities in Virginia, Texas, and Alabama. The Navy has conducted outreach to tribes in these areas, and no tribal issues have been identified to date.

3.3.3.1 No Action Alternative

As stated in Section 2.3.1 (No Action Alternative), the Navy would store the entire ex-Enterprise for an indefinite period of time at an existing shipyard in the Hampton Roads Metropolitan Area, Virginia. Storage in the existing shipyard is consistent with past and current uses at Newport News Shipbuilding. Navy outreach and research efforts have not identified Indian lands, treaty rights issues, or protected tribal resources of concern at the existing shipyards. As described in Chapter 2 (Description of Proposed Action and Alternatives) and Section 3.3.1.1 (Region of Influence), the storage of ex-Enterprise at an existing shipyard in Newport News, Virginia is consistent with past and current uses at Newport News Shipbuilding. Indefinite storage is accomplished using established processes and techniques and does not have the potential to significantly impact tribal treaty rights, protected tribal resources, or Indian lands. under the No Action Alternative.

3.3.3.2 Alternative 1: Single Reactor Compartment Packages

The major elements of Alternative 1 are described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages). As described in Chapter 2 (Description of Proposed Action and Alternatives) and Section 3.3.1.1 (Region of Influence), the tow of ex-Enterprise from Newport News, Virginia, to a commercial dismantlement facility; partial dismantlement at a commercial dismantlement facility; and transport of waste and recyclable materials from a commercial dismantlement facility to an approved waste disposal or recycling facility are not analyzed in detail in this section. These activities are accomplished using established processes and techniques and do not have the potential to significantly impact American Indian tribal treaty rights, protected tribal resources, or lands.

3.3.3.2.1 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Following ship dismantlement and recycling of elements of ex-Enterprise at a commercial dismantlement facility, the remaining propulsion space section with its eight reactor plants would be transported to PSNS & IMF at Bremerton, Washington, via heavy-lift ship, as described in Section 2.3.2.4 (Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement

Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]) and Figure 2-5.

Transit would occur within established shipping lanes and in compliance with all applicable regulations, and would not impede access to U&A fishing grounds. Although unlikely, loss of or damage to tribal fishing gear could result from transit of the propulsion space section via heavy-lift ship through U&A fishing grounds along the Washington coast and Puget Sound. However, tribal fishermen mark their gear in accordance with fishing regulations, and the Navy uses standard navigational practices to avoid potential interactions with fixed gear (Navy, 2020). As described in Section 3.5 (Biological Resources) transit activities would have minimal impacts on biological resources.

The Suquamish Indian Tribe has previously expressed concern for potential bottom scour during docking at PSNS & IMF, which could affect fish habitat (Navy & DOE, 2012). For the 2012 EA (Navy & DOE, 2012) as well as for the current EIS, the Navy has concluded that scour and propeller wash are not a concern at PSNS & IMF based on calculations of draft maximum, because the heavy-lift ship would unload the propulsion space section in deep water before entering Sinclair Inlet. The propulsion space section would have a smaller draft than current aircraft carriers and would be brought into port under tug. Alternative 1 would result in minimal impacts on biological resources and water quality with Navy use of best management practices.

The Navy has determined that impacts on tribal resources and treaty rights from relocation of the propulsion space section under Alternative 1 would be minimal. Navy Region Northwest regularly meets with local tribes and, if Alternative 1 is selected, the Navy would consult about impacts of this alternative on tribal resources and treaty rights.

3.3.3.2.2 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

As described in Section 2.3.2.5 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Dual Reactor Compartment Packages [No In-Water Work]), preparation for shipment from PSNS & IMF would involve liquid removal (draining of the piping, tubing, and fluid systems remaining in the reactor compartment package), equipment removal, and reactor compartment containment. These activities are considered normal pier-side and dry dock actions, with similar activities analyzed previously resulting in a less than significant impact on biological resources and water quality (Navy & DOE, 1996). Work performed at PSNS & IMF would follow typical past and ongoing shipyard work practices and would be in accordance with all agreements, permits, and regulations. Removal of liquid, equipment, and hazardous material, and preparation for shipment, would be done pier-side. The Navy has determined, based on the very low likelihood of exposure of biological resources to radiation and hazardous materials, that pier-side and dry dock work described in Section 2.3.2.5 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]) would have no significant impacts on biological resources and would not introduce contaminants into the water. The work would not impede access to U&A fishing grounds.

The Navy has determined that impacts on tribal resources and treaty rights as a result of pier-side and dry dock work and preparation for shipment under Alternative 1 would be minimal.

3.3.3.2.3 Install Rail System for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site

Trench 94 at the DOE Hanford Site is in an isolated area about 7 miles from the Columbia River that contains various cruiser and submarine reactor compartment packages. PSNS & IMF would construct additional rail structures that would be added within the existing area of Trench 94 to support the single reactor compartment packages, requiring limited excavation of the trench floor. The 1996 EIS analyzes the placement of up to 220 reactor compartment packages at Trench 94. The 2012 EA includes ex-Enterprise within this 220 package total. Trench 94 at the DOE Hanford Site is not a location currently used for tribal resource gathering; however, Trench 94 is within the DOE Hanford Site, which is accessed by tribes who continue to exercise their treaty rights, for example, for resource gathering and for spiritual practices. As the installation of additional rail structures would not change the use of Trench 94, and compliance with all applicable federal, state, and local environmental laws and regulations would apply, no significant impacts on water resources or to biological resources are anticipated. The Navy concludes that impacts on tribal resources and treaty rights as a result of a new rail system in Trench 94 at the DOE Hanford Site under Alternative 1 would be minimal.

3.3.3.2.4 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Transport of ex-Enterprise reactor compartment packages, as described in Section 2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip), would occur along the same route currently used for various submarine and cruiser packages. Transport of ex-Enterprise reactor compartment packages from PSNS & IMF to the Port of Benton barge slip in the city of Richland, Washington, would occur in established shipping lanes and be conducted in compliance with applicable regulations. Navy and DOE considered drafts of the shipping barges along this route previously and determined reactor compartment disposal packages would not pose a problem for shipping because the shallowest river depths were encountered near the barge slip, which could be controlled by river flow at downstream dams (Navy & DOE, 1996, pp. 3–7). Therefore, scour of sensitive habitat for tribal resources would not occur through barge transport. Barge transport does not impede tribal access to U&A fishing places. Barge transport could interfere with tribal fishing only if tribal fishers are using the shipping lanes in the Columbia River and only for the brief period for the barge to pass, as is typical for commercial shipping lanes and not unique to this action.

Under Alternative 1, the number of reactor compartment shipments per year from PSNS & IMF would be consistent with the current number of annual reactor compartment package shipments (Navy & DOE, 1996, 2012). The current water transport route of reactor compartment packages from PSNS & IMF to the Port of Benton barge slip and the disposal location on the DOE Hanford Site were previously analyzed, and the Navy determined that barge transport would have no significant impacts on biological resources, and would have no effect on Endangered Species Act-listed species that may occur along the barge transport route (Navy & DOE, 1996). As discussed in Section 3.5 (Biological Resources), although the barge route traverses through numerous habitat types and biomes, the Navy has assessed the stressors generated by a single barge transport of the reactor compartment packages to be discountable, as barge transport is a normal maritime activity. The Navy has based this determination on a history of transporting reactor compartment packages to the barge slip for final disposal at the DOE Hanford Site and compliance with environmental regulations that ensure safe transport.

Alternative 1 uses transport and dismantlement activities that have occurred in the past with little to no water resource impacts. Additionally, Alternative 1 does not propose to change the methodologies or the compliance with all applicable federal, state, and local environmental laws and regulations, and all current regulatory requirements would apply. Because of the historical lack of tribal resource or treaty right impacts, and no new activities under this alternative, the Navy concludes transport of the reactor compartment packages via water would have minimal impacts on tribal resources and treaty rights.

3.3.3.2.5 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Once a reactor compartment package is unloaded at the Port of Benton barge slip, it is transported overland to the DOE Hanford Site. See Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site) for complete description of overland transport for the reactor compartment packages (see Figure 2-12).

Under Alternative 1, the land transport route is the same as currently used for various submarine and cruiser packages. The time needed to transport a package between the Port of Benton barge slip and the Wye Barricade Bypass along the transport route would be approximately four to six hours. This section of the highway is open to the public and would be closed with a rolling road closure. The land transport route is currently accessed by tribal members exercising their tribal treaty rights for tribal resource gathering and other activities. As described in Section 3.5 (Biological Resources), impacts on biological resources would be minimal. The Navy concludes land transport to Trench 94 at the DOE Hanford Site would have minimal impacts on tribal resources and treaty rights.

Because each major element would have minimal impacts, the Navy has determined that implementation of Alternative 1 would have minimal impacts on American Indian tribal resources and treaty rights.

3.3.3.3 Alternative 2: Dual Reactor Compartment Packages

Under Alternative 2 – Dual Reactor Compartment Packages (described in Section 2.3.3) all elements of activity, up to and including transport of the propulsion space section, are the same as those under Alternative 1. The estimated amount of time for dismantlement and transport would differ from Alternative 1 due to the construction and shipment of four larger and heavier dual reactor compartment packages instead of eight single reactor compartment packages. Alternative 2 requires infrastructure modifications at the Port of Benton barge slip and the transport route at the DOE Hanford Site to facilitate transport of the larger and heavier dual reactor compartment packages as compared to Alternative 1.

The major elements of Alternative 2 are described below, along with their potential impacts on tribal resources and treaty rights. As described in Chapter 2 (Description of Proposed Action and Alternatives) and Section 3.3.1.1 (Region of Influence), the tow of ex-Enterprise from Newport News, Virginia, to a commercial dismantlement facility; partial dismantlement at a commercial dismantlement facility; and transport of waste and recyclable materials from a commercial dismantlement facility to an approved waste disposal or recycling facility are not analyzed in detail in this section. These activities are accomplished using established processes and techniques and do not have the potential to significantly impact tribal treaty rights, protected tribal resources, or Indian lands.

3.3.3.3.1 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

As with Alternative 1, following ship dismantlement and recycling of elements of ex-Enterprise at a commercial dismantlement facility, the remaining propulsion space section would be transported to PSNS & IMF at Bremerton, Washington, via heavy-lift ship as described in Section 2.3.3.4 (Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]) and Figure 2-5. Relocation of the propulsion space section would not impede access to U&A fishing grounds and bottom scour would not occur to impact fish habitat. The Navy has determined that impacts on tribal resources and treaty rights from relocation of the propulsion space section under Alternative 2 would be minimal.

3.3.3.3.2 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

As with Alternative 1, preparation for shipment from PSNS & IMF would involve liquid removal (draining of the piping, tubing, and fluid systems remaining in the reactor compartment package), equipment removal, and reactor compartment containment. Because there would be no significant impacts on biological resources and no introduction of contaminants into the water, the Navy has determined that impacts on tribal resources and treaty rights as a result of pier-side and dry dock work and preparation for shipment under Alternative 2 would be minimal.

3.3.3.3.3 Port of Benton Barge Slip Modifications

Port of Benton barge slip modifications (as described in Section 2.3.3.6, Port of Benton Barge Slip Modifications) would require infrastructure modifications to the barge slip due to the heavier weight and larger size of the dual reactor compartment packages. The current slip would be widened 18 ft., making the new slip 80 ft. wide, and extended by 15 ft. in length, making the new length 165 ft. The widening would require the removal of the south jetty. To minimize settling of the substrate, 3 ft. of soil under the area where the south jetty currently stands would be removed and backfilled with gravel to benefit juvenile salmonids. A 70 ft. sheet pile wall would be vibrated into the ground before removing the jetty, to substantially reduce impacts on salmonids in the river by dissipating the energy into the ground before affecting the water. The existing slip headwall would be strengthened to handle the increased weight of the larger loads. Construction would include 24 landside pipe piles, 30 inches in diameter, spaced 10 ft. apart with a concrete slab on top.

Port of Benton barge slip modifications may impede access to U&A fishing grounds while construction is underway if tribal fishermen use the surrounding area for fishing. Fish behavior may make them more difficult to catch during the season of construction. Tribal resources, including juvenile fish and their habitat, are susceptible to impacts from construction.

Temporary impacts on biological resources and water quality would occur as a result of Port of Benton barge slip modifications. Based on the protective measures to contain turbidity and to reduce the likelihood of chemical contamination into the Columbia River and the addition of favorable salmonid river bottom habitat following removal of the south jetty, the Navy has determined that in-water construction activities and associated water and sediment quality stressors would have some impacts on biological resources.

These impacts are described in detail in Section 3.5 (Biological Resources). Potential long-term impacts on biological resources would be beneficial with implementation of best management practices and adherence to existing regulations. Coordination with local tribes and timing of in-water work windows would help reduce potential impacts on tribal fishermen during important fish runs. Should Alternative 2 be selected, the Navy would consult with affected tribes about potential impacts associated with proposed improvements at the Port of Benton barge slip.

Based on current knowledge and communication with tribes, the Navy has determined that some impacts on American Indian tribal resources and treaty rights would occur under Alternative 2, but these would be reduced through implementation of best management practices. The Navy would re-evaluate this determination as necessary if tribes request additional communications.

3.3.3.3.4 Road Modifications Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

The Navy would use DOE road systems to transport reactor compartment packages from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site, similar to Alternative 1 (see Figure 2-12). Current packages range between 1,000 and 1,680 tons. Under Alternative 2 only, road modifications are analyzed at up to 11 locations on the transport route to support larger transporters required for transporting heavier packages (see Figure 2-16). Improvements such as cutting or filling to reduce the vertical curve, filling dips in roads, paving medians, filling low sides or cutting high sides to reduce side slope, and filling road shoulders to improve intersections would be made.

The transport route passes through the tribal PDA at the DOE PNNL Site, which was established for the purpose of enhancing culturally significant biological resources, for approximately 0.6 mile (1 kilometer). Tribal revegetation activities on the PDA include seed collection and planting of native, harvestable plants. The Navy would reduce the potential for impacts by restricting heavy machinery use to existing roads through the PDA. The only activities that would be permitted on the PDA would be within the non-vegetated road prism.

In addition, should Alternative 2 be selected, the Navy would consult with tribes regarding potential impacts on the PDA and invite a tribal monitor(s) to monitor road improvements through the PDA under this alternative. As detailed in Section 3.5 (Biological Resources), construction impacts (e.g., crushing of vegetation, compaction of soils, spreading of invasive species) from transport route upgrades on biological resources would be minimal. Upgrades to the land transportation route would not impede access to U&A fishing grounds, as they would occur on land away from U&A fishing grounds and would not result in closures to roads accessing these fishing grounds.

Based on current knowledge and communication with tribes, the Navy has determined that some impacts on American Indian tribal resources and treaty rights may occur from road improvements. However, as currently envisioned, road modifications would remain within the existing non-vegetated road prism and construction laydown areas would be established in previously disturbed areas to minimize potential impacts on tribal and ecological resources and treaty rights. Additional mitigation measures may include tribal monitor(s) of activities through the PDA. Should Alternative 2 be selected, the Navy would consult with tribes and coordinate with DOE and other parties as appropriate.

3.3.3.3.5 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

As with Alternative 1, the Navy concludes that impacts as a result of installing a new rail system in Trench 94 at the DOE Hanford Site would have minimal impacts on American Indian tribal resources and treaty rights.

3.3.3.3.6 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

The four dual reactor compartment packages would be transported by a newly constructed barge that is larger than the existing design, requiring infrastructure upgrades to the Port of Benton. This barge would be capable of handling the larger dual reactor compartment packages via the transport route (see Figure 2-6) from PSNS & IMF to the Port of Benton barge slip at Richland, Washington, similar to Alternative 1. The Navy concludes transport of the reactor compartment packages via water would have minimal impacts on tribal resources and treaty rights.

3.3.3.3.7 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

As with Alternative 1, the land transport route is the same as currently used for various submarine and cruiser packages. The land transport route is currently accessed by tribal members exercising their tribal treaty rights for tribal resource gathering and other activities, but only rolling road closures would occur for a period of hours. The Navy concludes land transport to Trench 94 at the DOE Hanford Site would have minimal impacts on tribal resources and treaty rights.

Because each major element would have either minimal impacts or some impacts, the Navy has determined that implementation of Alternative 2 would overall have some impacts on American Indian tribal resources and treaty rights, but these impacts would be reduced through implementation of best management practices.

3.3.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

Under Alternative 3 (Preferred Alternative) – Commercial Dismantlement (described in Section 2.3.4), the contracted dismantlement of ex-Enterprise would occur at an authorized commercial ship dismantlement facility in Virginia, Texas, or Alabama, including cutting apart the eight reactor plants into segments for packaging into several hundred small containers for subsequent disposal at a DOE and/or authorized commercial low-level radioactive waste facility. Navy outreach and research efforts have not identified Indian lands, treaty rights issues, or protected tribal resources of concern at the commercial dismantlement or waste disposal facilities. As described in Chapter 2 (Description of Proposed Action and Alternatives) and Section 3.3.1.1 (Region of Influence), the tow of ex-Enterprise from Newport News, Virginia, to a commercial dismantlement facility; partial dismantlement at a commercial dismantlement facility; and transport of waste and recyclable materials from a commercial dismantlement facility to an approved waste disposal or recycling facility are not analyzed in detail in this section. These activities are accomplished using established processes and techniques and do not have the potential to significantly impact tribal treaty rights, protected tribal resources, or Indian lands.

3.3.4 Mitigation

All activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. No mitigation measures are required because no major impacts requiring mitigation are reasonably foreseeable on treaty-reserved rights and tribal resources.

3.3.5 Summary of Impacts and Conclusions

Table 3.3-1 summarizes the impacts of the alternatives on American Indian tribal resources and treaty rights.

Table 3.3-1: Summary of Impacts and Conclusions on American Indian Tribal Resources and Treaty Rights

Potential Impacts on American Indian Tribal Resources and Treaty Rights	Alternatives			
	No Action	1	2	3
Activities that would impede access to Usual & Accustomed Fishing Areas		○	◑	
Impacts on biological resources with traditional value, or their habitat		○	◑	
Impacts on tribal resource gathering and other activities		○	○	
Bottom scour/propeller wash (impacts on fish habitat)				
Impacts on water quality		○	◑	

Notes: ◑ = Some impact but reduced as a result of project design changes, implementation of current or proposed management practices, monitoring, or mitigation; ○ = minimal impact; Blank = no impact/not applicable

3.4 Socioeconomics and Environmental Justice

This section of this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes potential impacts on socioeconomic and environmental justice conditions as a result of the Proposed Action and alternatives. Socioeconomics comprise the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth.

The United States (U.S.) Environmental Protection Agency (EPA) defines Environmental Justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA, 2011). Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), requires consideration of whether the Proposed Action and alternatives would disproportionately affect minority or low-income groups (59 Federal Register 7629 [1994]). EO 12898 requires that no minority or low-income population group should bear a disproportionate share of potential adverse environmental and socioeconomic impacts.

Socioeconomic and environmental justice data herein are presented at the city, county, regional, state, and national levels to analyze baseline socioeconomic conditions in the context of local, regional, state, and national trends. Data has been collected from the U.S. Census Bureau and previously published documents issued by federal, state, and local agencies.

3.4.1 Methodology

3.4.1.1 Region of Influence

The detailed Region of Influence (ROI) for socioeconomic and environmental justice analysis is defined and outlined in this EIS/OEIS as the independent cities and counties immediately surrounding the naval and commercial facilities where the transport, dismantlement, and disposal of ex-Enterprise may occur. The ROI includes locations in the states of Washington, Virginia, Texas, and Alabama, encompassing the following areas:

- The ROI for Washington includes the city of Bremerton and Kitsap County, in which Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) is located; the city of Pasco and Franklin County; as well as the city of Richland, city of Kennewick, and Benton County, where the Department of Energy (DOE) Hanford Site is located (Figure 3.4-1 and Figure 3.4-2).
- The ROI for Hampton Roads Metropolitan Area, Virginia, includes the independent cities (i.e., not included in a county) of Newport News, Norfolk, Hampton, Virginia Beach, Chesapeake, Portsmouth, Poquoson, Suffolk, and Williamsburg, as well as the counties of Isle of Wight, Surry, York, and James City (Figure 3.4-3).
- The ROI for Brownsville, Texas includes the city of Brownsville and the surrounding Cameron, Hidalgo, and Willacy counties (Figure 3.4-4).
- The ROI for Mobile, Alabama, includes the city of Mobile, and Mobile and Baldwin counties (Figure 3.4-5).

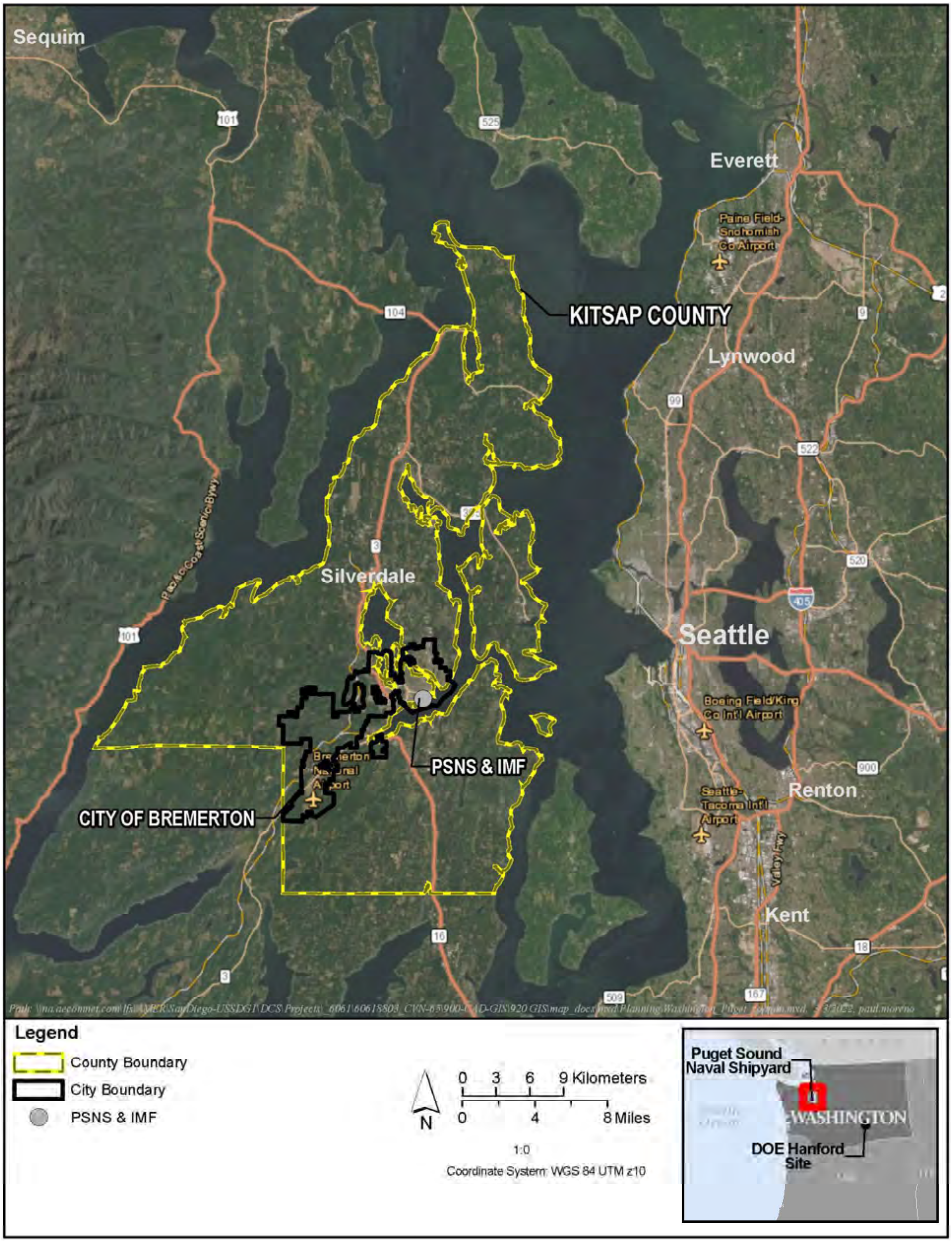


Figure 3.4-1: Washington Region of Influence – Puget Sound Naval Shipyard & Intermediate Maintenance Facility

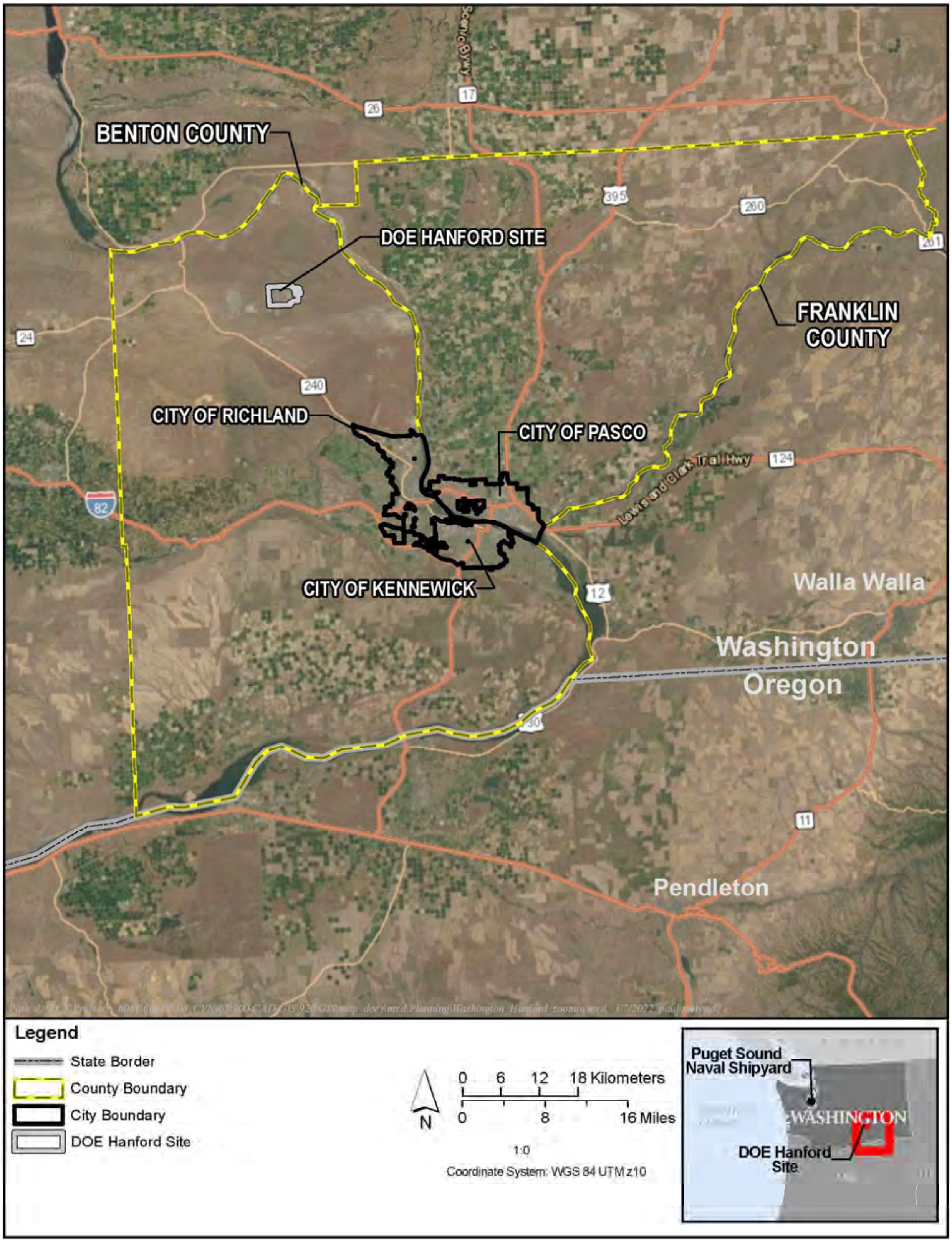


Figure 3.4-2: Washington Region of Influence – The DOE Hanford Site

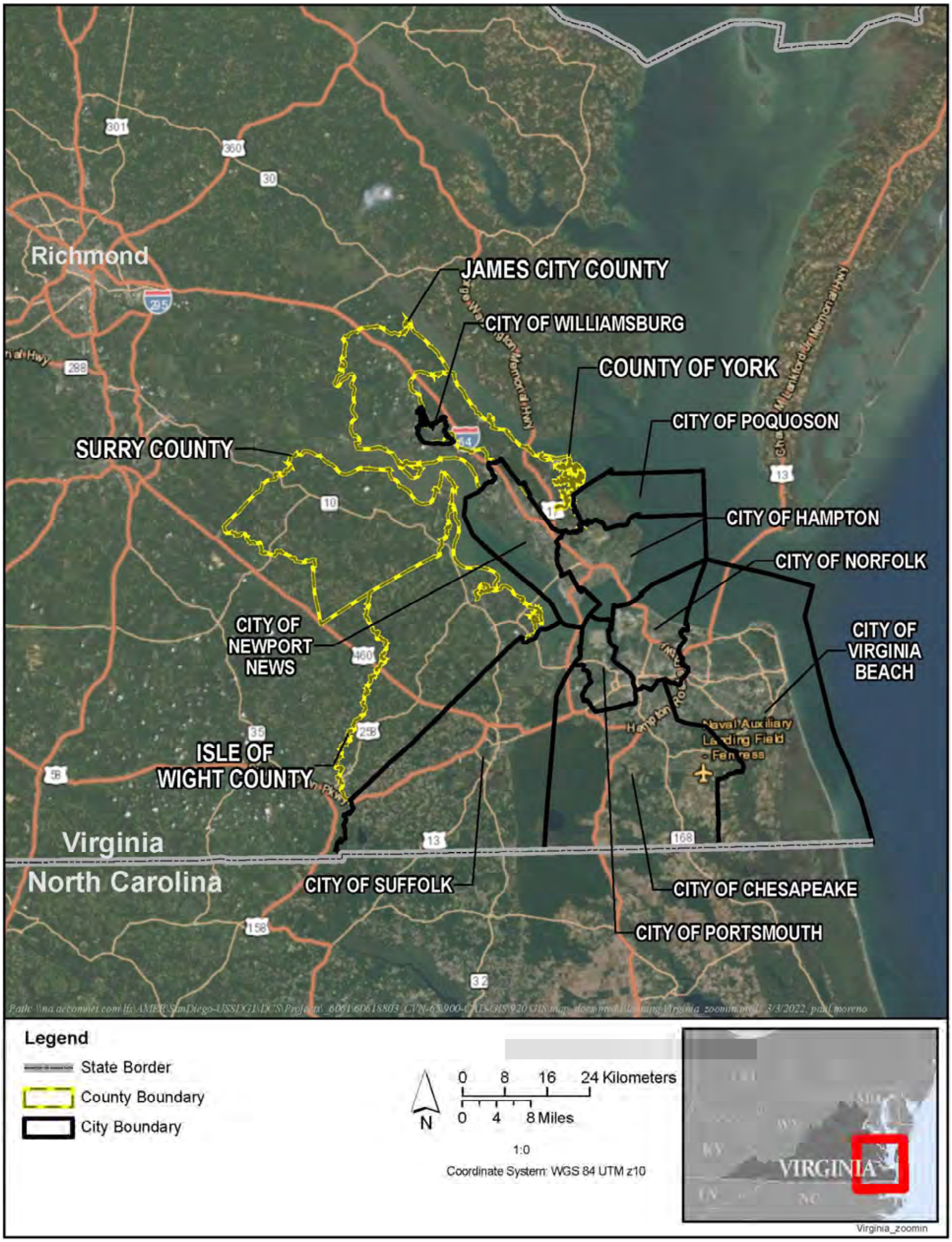


Figure 3.4-3: Virginia Region of Influence

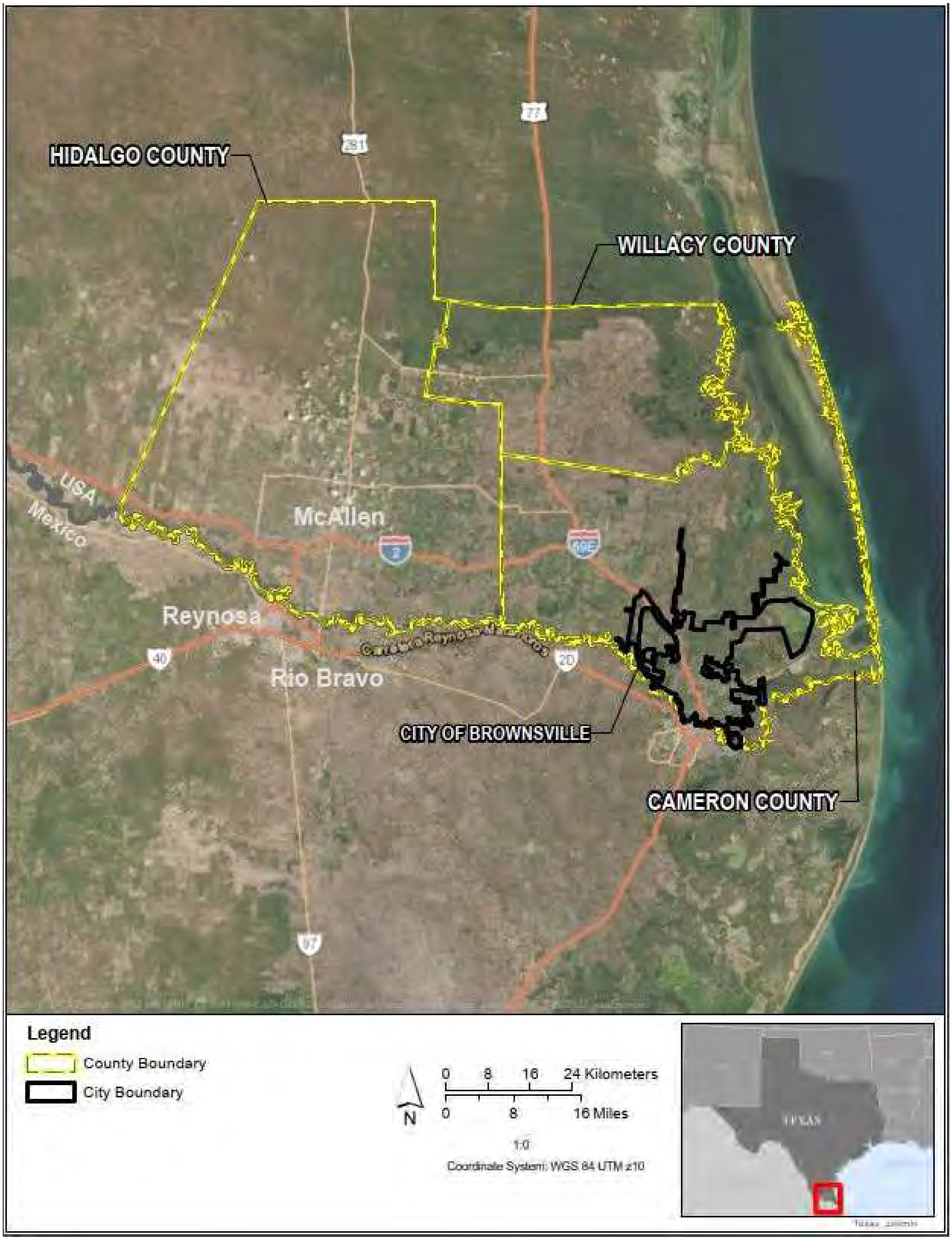


Figure 3.4-4: Texas Region of Influence

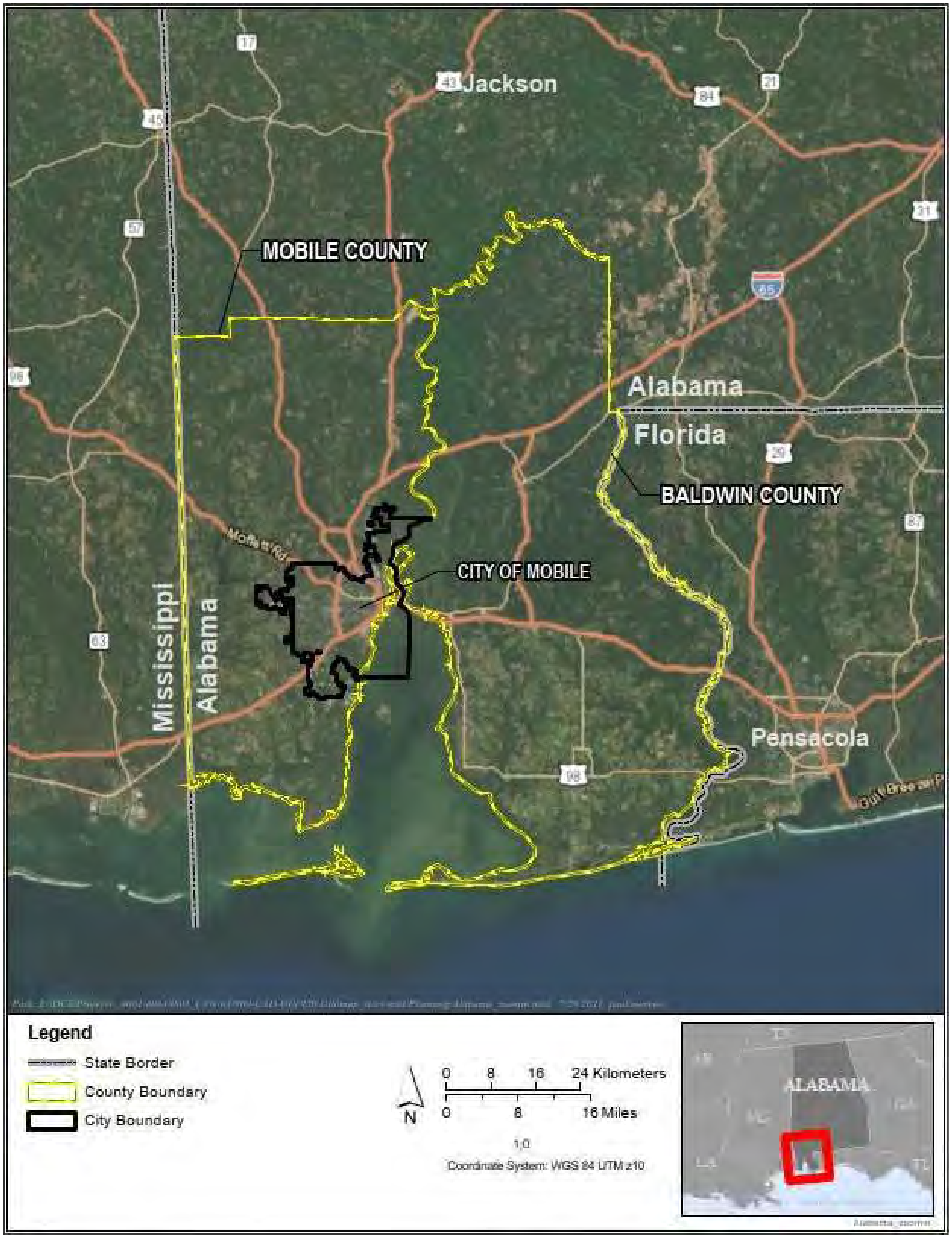


Figure 3.4-5: Alabama Region of Influence

3.4.1.2 Regulatory Framework

There are no federal or state regulations pertaining to socioeconomic impacts. Socioeconomic impacts are an element of National Environmental Policy Act documentation that must be addressed and mitigated, if warranted. No specific permits are anticipated under this discipline.

EO 13840, *Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States*, aims to improve interagency coordination for management of ocean, coastal, and Great Lakes waters to allow for productive and sustainable use of these resources. EO 13840 also aims to facilitate the economic growth of coastal communities and promote ocean industries, advance ocean science and technology, transport goods, expand recreational opportunities, harvest food, and enhance energy security. All activities associated with the dismantlement and disposal of ex-Enterprise would be consistent with this EO.

Potential impacts on community demographics and housing related to environmental justice populations are evaluated based on EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. EO 12898 requires consideration of whether the Proposed Action and alternatives would disproportionately affect minority or low-income groups. This EO requires that no minority or low-income population group should bear a disproportionate share of potential adverse environmental justice population and socioeconomic resources impacts resulting from major projects, in this case the transportation, dismantlement, and disposal of ex-Enterprise. Projects involving federal funding or approvals require an environmental justice evaluation as part of the environmental review. In addition to EO 12898, federal concerns for nondiscrimination under Title VI of the Civil Rights Act of 1964 are applicable under the environmental justice analysis. Each federal agency has developed a strategy to address environmental justice, with the Council on Environmental Quality (CEQ) responsible for oversight and coordination. The environmental justice analysis for the Proposed Action and alternatives follows the most updated versions of guidance and methodologies recommended in the CEQ Environmental Justice Guidelines under the National Environmental Policy Act.

3.4.1.3 Best Management Practices

Best management practices include policies, practices, and measures that would be implemented to minimize adverse socioeconomic resources and environmental justice population impacts associated with the Proposed Action and alternatives. Procedures and policies used by the U.S. Department of the Navy (Navy) to address disproportionately high and adverse health effects have been effective in protecting minority and low-income populations. For other best management practices related to human health and safety, please refer to Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management).

3.4.1.4 Approach to Analysis

Socioeconomic data provided in this section are presented at city, county, regional, state, and national levels to characterize baseline socioeconomic conditions in the context of local, regional, state, and national trends. The baseline for identifying the socioeconomic conditions was derived using relevant published information from sources that include federal and state government agencies and databases. Previous environmental studies were also reviewed. This data was used to identify potential impacts from the transportation, dismantlement, and disposal of ex-Enterprise on the human environment, including environmental justice populations, in the ROI described above.

In 2012, the Navy prepared the *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)* (Navy & DOE, 2012). The approach for this EIS/OEIS is based on socioeconomic and environmental justice concerns previously expressed to the Navy as part of other actions in the aforementioned 2012 Environmental Assessment (Navy & DOE, 2012).

Each of these socioeconomic resources provides data on an aspect of the human environment that involves economics (e.g., employment, income, or revenue) and social conditions (e.g., population, enjoyment and quality of life) associated with the human environment of the ROI.

The economic characteristics of the ROI are evaluated against the economic conditions of comparison geographies of the state in which the ROI is located as well as the nation. Socioeconomic changes related to direct expenditures in the local community are considered minimal if there is little or no impact on housing values, employment, or the population (either increases or decreases).

Environmental justice addresses the characteristics of low-income and minority populations for the scope of the environmental justice evaluation. The U.S. Census Bureau uses a set income threshold to determine who classifies as impoverished. When total income of a family or individual is less than the threshold, the family or individual is considered to be living in poverty. Individuals who self-identify as members of the following racial/ethnic groups are considered a minority population group: Black or African American, not of Hispanic or Latino origin; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Hispanic or Latino of any race; and Two or More Races, as defined by the U.S. Census Bureau. For the purposes of this analysis, an ROI was determined to have a meaningful minority population if the percentage of persons identified as minority in the ROI was greater than the comparison geography (CEQ, 1997). Low-income populations in an ROI are typically defined as communities that have (1) more than 50 percent low-income persons, or (2) the percentage of persons in households below the poverty level is significantly greater than in the geographical area chosen for comparative analysis. For both minority and low-income populations, the applicable ROI and the United States were used as comparison geographies. Potential impacts of the Proposed Action and alternatives are evaluated for the potential to disproportionately impact minority and/or low-income populations.

Due to the industrial nature of the existing commercial and Navy facilities, analysis of census data and data on other sensitive populations—concentrations of children, elderly, disabled, female-headed households, and transit-dependent populations—are not reasonably foreseeable. Activities associated with the Proposed Action and alternatives would be conducted at existing industrial facilities or within established transportation routes, away from sensitive populations, including children. Therefore, this EIS/OEIS does not address EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, in detail.

Non-radiological dismantlement activities at a commercial dismantlement facility under all action alternatives occur within existing shipyard capabilities and would adhere to existing federal, state, and local regulations. As such, these actions are not discussed further in this analysis.

3.4.2 Affected Environment

This section describes the socioeconomic resources and environmental justice populations associated with human activities and livelihoods in the ROI that could be affected by the Proposed Action and alternatives. In Virginia and Washington, similar work already occurs at the sites evaluated, including large ship maintenance, dismantlement activities, and radiological work. In these states, ex-Enterprise work would only be a small portion of the total ship work conducted. In Texas and Alabama, there are existing ship dismantlement industries and personnel, although neither location has an existing radiological work force and may require additional personnel and regulatory oversight.

3.4.2.1 Washington

As stated in Section 3.4.1.1 (Region of Influence), the ROI for Washington includes the city of Bremerton, and Kitsap County, Washington, in which PSNS & IMF is located, as well as the cities of Richland, Kennewick, and Pasco, and Benton and Franklin counties, where the DOE Hanford Site is located.

3.4.2.1.1 Population

Table 3.4-1 provides the population, as of 2019, for the cities and counties in the Washington ROI and the comparison geographies of the state of Washington and the United States. The ROI for Washington encompasses approximately 806,817 people, which is approximately 10.9 percent of the state population.

Table 3.4-1: Population for Washington Region of Influence

Geography	Population	Growth (2010–2019)
City of Bremerton	40,631	7.7%
City of Richland	56,399	17.4%
City of Pasco	72,899	21.9%
City of Kennewick	81,479	10.2%
Kitsap County	265,882	5.9%
Benton County	197,518	12.7%
Franklin County	92,009	17.7%
Washington ROI	806,817	11.4%
Washington	7,404,107	12.8%
United States	324,697,795	6.8%

Source: U.S. Census Bureau (2019)
Note: ROI = Region of Influence

All of the cities and counties in the ROI each experienced more growth than that of the United States during this time period. The cities of Richland, Pasco, and Kennewick, and Benton and Franklin counties also experienced more growth than the state of Washington as a whole.

3.4.2.1.2 Local Economy and Low-Income Populations

The Washington ROI has a total labor force of approximately 271,749 workers. Within the Kitsap County labor force, the largest non-farm employment as of 2020 was government; this sector accounts for a total of 33,200 jobs, 62 percent of which was federal government employment, in which a majority was civilian employees that repair, rebuild, and maintain the modern fleet of the Navy. Over 15,000 active military and approximately 20,000 federal employees continue to support the local economy of the county by their federal presence (Vleming, 2020). The leading industries in Kitsap County include educational services, health care, and social assistance; retail trade; professional, scientific, and management, and administrative and waste management services. One of the principal economic bases of the city of Bremerton is PSNS & IMF. Approximately 48.0 percent of jobs in the city of Bremerton were provided by government employment as of 2016 (City of Bremerton, 2016). The leading industries in city of Bremerton include educational services, health care, and social assistance; arts, entertainment, recreation, accommodation and food services; professional, scientific, and management, and administrative and waste management services. The main economic industries in the city of Richland and Benton County are professional, scientific, and management, and administrative and waste management services; health care and social assistance; and retail trade. Within Franklin County and the city of Pasco, the largest industries are educational services, health care, and social assistance; and agriculture, forestry, fishing and hunting, and mining. Educational services, health care, and social assistance; and retail trade are the largest industries in the city of Kennewick (U.S. Census Bureau, 2019). Table 3.4-2 provides data for the local economy in the Washington ROI and the comparison geographies, including median household income, employment rate, and poverty rate.

Table 3.4-2: Local Economy and Low-Income Populations for the Washington Region of Influence

Geography	Median Household Income	Employment Rate	Poverty Rate
City of Bremerton	$52,716	47.1%	16.5%
City of Richland	$77,686	61.8%	8.9%
City of Pasco	$62,775	64.1%	15.5%
City of Kennewick	$59,533	57.8%	15.5%
Kitsap County	$75,411	53.0%	8.7%
Benton County	$69,023	59.0%	11.9%
Franklin County	$63,584	61.7%	15.2%
Washington	$78,687	61.2%	10.8%
United States	$65,712	60.2%	13.4%

Source: U.S. Census Bureau (2019)

As shown in Table 3.4-2, the cities of Bremerton, Pasco, and Kennewick, and Franklin County have lower median household incomes than both comparison geographies. In contrast, Kitsap and Benton counties and the city of Richland have a median household income higher than the United States but lower than the state of Washington. The cities of Bremerton and Kennewick, Benton County, and Kitsap County have lower employment rates than the comparison geographies. The city of Pasco, Franklin County, and the city of Richland have employment rates higher than both of the comparison geographies. The city of Richland and Kitsap County have lower poverty rates than both comparison geographies, while Benton County has a lower poverty rate than the United States but a higher poverty rate than the state of Washington. The cities of Bremerton, Pasco, and Kennewick, and Franklin County have higher poverty rates than both comparison geographies.

3.4.2.1.3 Housing

Housing information for the Washington ROI and the comparison geographies is summarized in Table 3.4-3. The median property value in the cities of Pasco and Kennewick, and Franklin County, are lower than both the comparison geographies. The cities of Bremerton and Richland, and Kitsap and Benton counties, have higher median property values than the United States, but lower than the state of Washington (U.S. Census Bureau, 2019). The city of Bremerton has a lower homeownership rate than both of the comparison geographies, while the city of Kennewick has a lower homeownership rate than the United States but a higher rate than the state of Washington. The cities of Richland and Pasco, and Kitsap, Benton, and Franklin counties, have a higher homeownership rate than both of the comparison geographies (U.S. Census Bureau, 2019).

Table 3.4-3: Housing Information for Washington Region of Influence

Geography	Median Property Value	Homeownership Rate
City of Bremerton	$238,600	43.3%
City of Richland	$263,500	65.1%
City of Pasco	$199,400	69.2%
City of Kennewick	$215,500	63.3%
Kitsap County	$329,900	67.8%
Benton County	$235,800	68.8%
Franklin County	$202,400	68.5%
Washington	$339,000	63.0%
United States	$217,500	64.0%

Source: U.S. Census Bureau (2019)

3.4.2.1.4 Minority Populations

A summary of the ethnic and racial composition in the Washington ROI is presented in Table 3.4-4. As shown in the table, the city of Pasco and Franklin County have larger minority populations than the other ROI geographies, the state of Washington, and the United States. The largest minority groups in the city of Pasco and Franklin County are Hispanic or Latino and those that identify as Two or More Races, followed by Asian and Black or African American. The majority of the population in the cities of Bremerton, Richland, and Kennewick, and Kitsap and Benton counties identify as White (U.S. Census Bureau, 2019).

Table 3.4-4: Minority Populations in the Washington Region of Influence[1]

Geography	White Alone, Not Hispanic or Latino	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Hispanic or Latino of any Race	Two or More Races	Total Population
City of Bremerton	67.9%	6.2%	0.7%	5.8%	0.6%	11.1%	7.6%	40,631
City of Richland	78.0%	1.9%	0.5%	4.3%	0.0%	11.4%	3.7%	56,399
City of Pasco	38.1%	1.7%	0.3%	2.1%	0.2%	55.5%	2.1%	81,479
City of Kennewick	64.9%	1.8%	0.4%	2.4%	0.0%	26.9%	3.1%	84,347
Kitsap County	76.7%	2.6%	0.8%	4.7%	0.8%	7.8%	6.5%	265,882
Benton County	70.4%	1.4%	0.6%	2.5%	0.0%	21.7%	3.0%	197,518
Franklin County	40.4%	1.8%	0.3%	2.0%	0.2%	53.1%	2.0%	92,009
Washington	68.5%	3.7%	1.1%	8.5%	0.6%	12.7%	4.8%	7,404,107
United States	60.7%	12.3%	0.7%	5.5%	0.2%	18.0%	2.4%	324,697,759

[1]Percentages may not total 100% due to rounding.
Source: (U.S. Census Bureau, 2019)

3.4.2.2 Virginia

As stated in Section 3.4.1.1 (Region of Influence), the ROI for Virginia includes the independent cities of Newport News, Norfolk, Hampton, Virginia Beach, Chesapeake, Portsmouth, Poquoson, Suffolk, and Williamsburg, and the counties of Isle of Wight, Surry, York, and James City, collectively referred to as the Hampton Roads Metropolitan Area, Virginia.

3.4.2.2.1 Population

Table 3.4-5 provides the population, as of 2019, for the cities and counties in the Virginia ROI and the comparison geographies of the state of Virginia and the United States. The Virginia ROI contains approximately 1,647,753 people, which accounts for roughly 19.0 percent of the population of Virginia (U.S. Census Bureau, 2019).

Table 3.4-5: Population for Virginia Region of Influence

Geography	Total Population (people)	Growth (2010–2019)
City of Newport News	179,673	-1.2%
City of Norfolk	244,601	1.0%
City of Hampton	135,041	-2.9%
City of Virginia Beach	450,201	2.5%
City of Chesapeake	239,982	9.4%
City of Portsmouth	95,097	-1.7%
City of Poquoson	12,090	-0.1%
City of Suffolk	90,093	9.1%
City of Williamsburg	14,927	11.2%
Isle of Wight County	36,627	5.4%
Surry County	6,523	-7.3%
York County	67,982	4.8%
James City County	74,916	16.4%
Virginia ROI	1,647,753	3.2%
Virginia	8,454,463	7.8%
United States	324,697,795	6.8%

Source: U.S. Census Bureau (2019)
Note: ROI = Region of Influence

3.4.2.2.2 Local Economy and Low-Income Population

The Virginia ROI economy employs approximately 882,680 workers. Table 3.4-6 provides data on the local economy in the Virginia ROI and the comparison geographies, including median household income, employment rate, and poverty rate.

As shown in Table 3.4-6, the cities of Newport News, Norfolk, Hampton, Portsmouth, and Williamsburg, and Surry County have a lower median household income than the comparison geographies, while the city of Suffolk and Isle of Wight County have higher median household incomes than the United States but lower than the state of Virginia. The cities of Chesapeake, Virginia Beach, and Poquoson, and York and James City counties have higher median household incomes than both comparison geographies. All geographies within the Virginia ROI have a lower employment rate than the comparison geographies, with the exception of the city of Virginia Beach, which has the same employment rate as the state. The cities of Chesapeake, Portsmouth, Poquoson, and Suffolk, and Isle of Wright, Surry, York, and James City counties have lower poverty rates than both comparison geographies; while the cities of Newport News, Norfolk, Hampton, Virginia Beach, and Williamsburg, and Surry County have higher poverty rates than the comparison geographies.

Table 3.4-6: Local Economy and Low-Income Population for the Virginia Region of Influence

Geography	Median Household Income	Employment Rate	Poverty Rate
City of Newport News	$53,215	57.4%	15.3%
City of Norfolk	$51,590	52.2%	18.7%
City of Hampton	$56,287	56.5%	15.2%
City of Chesapeake	$78,640	59.0%	7.3%
City of Portsmouth	$52,175	55.2%	8.6%
City of Virginia Beach	$76,610	61.5%	16.8%
City of Poquoson	$97,118	58.5%	5.6%
City of Suffolk	$74,884	60.1%	10.4%
City of Williamsburg	$57,463	47.1%	20.7%
Isle of Wight County	$73,991	59.4%	10.5%
Surry County	$57,962	57.2%	15.9%
York County	$92,069	56.9%	4.9%
James City County	$87,678	55.0%	7.3%
Virginia	$76,456	61.5%	10.6%
United States	$65,712	60.2%	13.4%

Source: U.S. Census Bureau (2019)

The largest industries in Hampton are educational services, health care, and social assistance; retail trade; and arts, entertainment, recreation, accommodation, and food service (U.S. Census Bureau, 2019).

The local economy in the city of Chesapeake focuses on five target industries: logistics and supply chain management; defense and security technologies; advanced manufacturing; professional business services; and healthcare (Sperling's Best Places, 2020). The city of Chesapeake employs 111,227 workers.

The largest industries in the city of Portsmouth include educational services, health care, and social assistance; retail trade; and manufacturing. The city of Portsmouth’s overall economy employs 41,396 workers (U.S. Census Bureau, 2019).

The city of Virginia Beach economy employs 221,998 workers. The largest industries are educational services, health care, and social assistance; professional, scientific, and management, and administrative and waste management services; and retail trade (U.S. Census Bureau, 2019).

The city of Suffolk economy employs 42,459 workers. The largest industries are educational services, health care, and social assistance; manufacturing; professional, scientific, and management, and administrative and waste management services; and retail trade (U.S. Census Bureau, 2019).

The economy employs 6,394 people in the city of Williamsburg. The largest industries are educational services, health care, and social assistance; and arts, entertainment, recreation, accommodation and food services (U.S. Census Bureau, 2019).

The Isle of Wight County economy employs 17,799 workers. Isle of Wight County has a large industry focus in educational services, health care, and social assistance; manufacturing; and professional, scientific, and management, and administrative and waste management services (U.S. Census Bureau, 2019).

Surry County is the smallest county in the Virginia ROI. The largest industries are educational services, health care, and social assistance; manufacturing; and retail trade. The Surry County economy employs 3,151 workers (U.S. Census Bureau, 2019).

The York County economy employs 30,556 workers (U.S. Census Bureau, 2019). The largest industries in York County are educational services, health care, and social assistance; professional, scientific, and management, and administrative and waste management services; and public administration.

James City County economy employs 33,950 workers. The largest industries in James City County are educational services, health care, and social assistance; arts, entertainment, recreation, and accommodation and food services; and professional, scientific, and management, and administrative and waste management services (U.S. Census Bureau, 2019).

3.4.2.2.3 Housing

Table 3.4-7 provides housing information for the Virginia ROI and the comparison geographies of the state of Virginia and the United States, including median property value and homeownership rate. The cities of Newport News, Norfolk, Hampton, and Portsmouth, and Surry County have lower median property values than the comparison geographies, while the cities of Chesapeake, Virginia Beach, Poquoson, and Williamsburg have higher median property values than the comparison geographies. The city of Suffolk and Isle of Wright, York, and James City counties have higher median property values than the United States but lower median property values than the state of Virginia. The cities of Newport News, Norfolk, Hampton, Portsmouth, Virginia Beach, and Williamsburg have lower homeownership rates than both comparison geographies; while the cities of Chesapeake, Poquoson, and Suffolk, and Isle of Wright, Surry, York, and James City counties, have higher homeownership rates than the comparison geographies (U.S. Census Bureau, 2019).

Table 3.4-7: Housing Information for Virginia Region of Influence

Geography	Median Property Value	Homeownership Rate
City of Newport News	$194,000	48.9%
City of Norfolk	$206,700	43.4%
City of Hampton	$186,700	55.7%
City of Chesapeake	$273,700	71.4%
City of Portsmouth	$170,900	55.0%
City of Virginia Beach	$280,800	63.7%
City of Poquoson	$323,100	81.4%
City of Suffolk	$254,400	68.7%
City of Williamsburg	$306,000	49.3%
Isle of Wight County	$266,800	75.8%
Surry County	$197,800	74.3%
York County	$327,100	71.3%
James City County	$340,500	76.4%
Virginia	$273,100	66.3%
United States	$217,500	64.0%

Source: U.S. Census Bureau (2019)

3.4.2.2.4 Minority Populations

The ethnic and racial composition of the population of the Virginia ROI is summarized in Table 3.4-8. Within the Virginia ROI, the cities of Newport News, Norfolk, Hampton, Portsmouth and Suffolk, and Surry County all have greater minority populations than the comparison geographies. The cities of Virginia Beach, Chesapeake, Poquoson, and Williamsburg, and Isle of Wight, York, and James City counties are predominately White. Black or African American is the dominant minority population in the Virginia ROI, followed by Hispanic or Latino of Any Race (U.S. Census Bureau, 2019).

Table 3.4-8: Minority Populations in the Virginia Region of Influence[1]

Geography	White Alone, Not Hispanic or Latino	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Hispanic or Latino of any Race	Two or More Races	Total Population
City of Newport News	42.9%	40.0%	0.2%	3.2%	0.2%	9.0%	4.1%	179,673
City of Norfolk	43.4%	40.5%	0.3%	3.5%	0.0%	8.0%	3.9%	244,601
City of Hampton	38.2%	49.2%	0.4%	2.4%	0.1%	5.8%	3.6%	135,041
City of Virginia Beach	61.7%	18.4%	0.2%	6.6%	0.1%	8.2%	4.6%	450,201
City of Chesapeake	57.4%	29.3%	0.1%	3.1%	0.1%	6.2%	3.6%	239,982
City of Portsmouth	37.7%	52.2%	0.4%	1.4%	0.3%	4.5%	3.3%	95,097
City of Poquoson	91.4%	1.1%	0.1%	2.5%	0.0%	2.8%	2.1%	12,090
City of Suffolk	49.3%	41.0%	0.2%	1.9%	0.0%	4.4%	3.1%	90,093
City of Williamsburg	67.7%	15.0%	0.3%	6.5%	0.0%	7.1%	3.1%	14,927
Isle of Wight County	70.7%	22.2%	0.4%	0.9%	0.1%	3.1%	2.8%	36,627
Surry County	52.6%	44.4%	0.0%	0.2%	0.0%	0.6%	2.0%	6,523
York County	70.7%	12.8%	0.2%	5.5%	0.2%	6.4%	3.6%	67,982
James City County	75.6%	12.9%	0.1%	2.4%	0.0%	5.8%	2.9%	74,916
Virginia	61.8%	18.8%	0.2%	6.3%	0.1%	9.4%	3.1%	8,454,463
United States	60.7%	12.3%	0.7%	5.5%	0.2%	18.0%	2.4%	324,697,759

[1]Percentages may not total 100% due to rounding.
Source: U.S. Census Bureau (2019)

3.4.2.3 Texas

As stated in Section 3.4.1.1 (Region of Influence), the ROI in Texas includes the city of Brownsville, and Cameron, Hidalgo, and Willacy counties.

3.4.2.3.1 Population

Table 3.4-9 provides the population, as of 2019, for the cities and counties in the Texas ROI and the comparison geographies of the state of Texas and the United States. The Texas ROI contains over 1,480,701 people and approximately 5.0 percent of the total Texas population (U.S. Census Bureau, 2019).

Table 3.4-9: Population for Texas Region of Influence

Geography	Population	Growth (2010–2019)
City of Brownsville	182,271	7.5%
Cameron County	421,666	7.1%
Hidalgo County	855,176	16.0%
Willacy County	21,588	-0.8%
Texas ROI	1,480,701	6.9%
Texas	28,260,856	12.0%
United States	324,697,795	6.8%

Source: U.S. Census Bureau (2019)
Note: ROI = Region of Influence

3.4.2.3.2 Local Economy and Low-Income Population

The local economy in the Texas ROI employs approximately 532,905 people. The largest industries in the city of Brownsville and Cameron County are educational services, health care, and social assistance; retail trade; and arts, entertainment, recreation, and accommodation and food services. In Willacy County, the largest industries are educational services, health care, and social assistance; agriculture, forestry, fishing and hunting, and mining; and retail trade. Hidalgo County has the largest government force compared to the other geographies with approximately 56,000 workers. The largest industries are educational services, health care, and social assistance; retail trade; and arts, entertainment, recreation, and accommodation and food services (U.S. Census Bureau, 2019).

Table 3.4-10 provides data about the local economy in the Texas ROI and the comparison geographies. All of the geographies within the Texas ROI have lower median household incomes and employment rates than the comparison geographies. The poverty rate in the city of Brownsville, and Cameron and Hidalgo counties, are higher than the comparison geographies. The poverty rate in Willacy County is higher than the United States but lower than the state of Texas.

Table 3.4-10: Local Economy and Low-Income Population for the Texas Region of Influence

Geography	Median Household Income	Employment Rate	Poverty Rate
City of Brownsville	$38,588	52.9%	29.3%
Cameron County	$38,758	52.5%	28.9%
Hidalgo County	$40,014	54.3%	29.7%
Willacy County	$35,521	45.3%	27.0%
Texas	$64,034	61.7%	28.7%
United States	$65,712	60.2%	14.7%

Source: U.S. Census Bureau (2019)

3.4.2.3.3 Housing

Table 3.4-11 provides the median property values and homeownership rates for the Texas ROI and comparison geographies. All four geographies in the Texas ROI have lower median property values than the comparison geographies. Willacy, Cameron, and Hidalgo counties have higher homeownership rates than the comparison geographies, whereas the city of Brownsville has a lower homeownership rate than the comparison geographies (U.S. Census Bureau, 2019).

Table 3.4-11: Housing Information for Texas Region of Influence

Geography	Median Property Value	Homeownership Rate
City of Brownsville	$90,000	60.7%
Cameron County	$85,800	65.9%
Hidalgo County	$87,100	68.0%
Willacy County	$55,300	70.5%
Texas	$172,500	62.0%
United States	$217,500	64.0%

Source: U.S. Census Bureau (2019)

3.4.2.3.4 Minority Populations

The ethnic and racial composition of the Texas ROI and comparison geographies is shown in Table 3.4-12. As shown, Hispanic or Latino was the most prevalent ethnicity in the Texas ROI. The geographies within the Texas ROI have a substantially higher minority population than the comparison geographies, which are predominantly White (U.S. Census Bureau, 2019).

Table 3.4-12: Minority Populations in the Texas Region of Influence[1]

Geography	White Alone, Not Hispanic or Latino	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Hispanic or Latino of any Race	Two or More Races	Population
City of Brownsville	4.9%	0.4%	0.1%	0.6%	0.0%	94.0%	0.1%	182,271
Cameron County	8.9%	0.4%	0.1%	0.7%	0.0%	89.7%	0.2%	421,666
Hidalgo County	6.1%	0.4%	0.1%	0.9%	0.0%	92.2%	0.1%	855,176
Willacy County	11.2%	0.6%	0.0%	0.0%	0.0%	88.2%	0.0%	21,588
Texas	42.0%	11.8%	0.3%	4.7%	0.1%	39.3%	1.7%	28,260,856
United States	60.7%	12.3%	0.7%	5.5%	0.2%	18.0%	2.4%	324,697,759

[1]Percentages may not total 100% due to rounding.
Source: U.S. Census Bureau (2019)

3.4.2.4 Alabama

As stated in Section 3.4.1.1 (Region of Influence), the ROI in Alabama includes the city of Mobile, and Baldwin and Mobile counties.

3.4.2.4.1 Population

Table 3.4-13 provides the population, as of 2019, for the cities and counties in the Alabama ROI and the comparison geographies of the state of Alabama and the United States. The Alabama ROI contains approximately 817,376 people, which is approximately 16.8 percent of the total Alabama population.

Table 3.4-13: Population for Alabama Region of Influence

Geography	Population	Growth (2010–2019)
City of Mobile	190,432	-2.7%
Baldwin County	212,830	21.1%
Mobile County	414,114	1.3%
Alabama ROI	817,376	4.8%
Alabama	4,876,250	3.5%
United States	324,697,795	6.8%

Source: U.S. Census Bureau (2019)
Note: ROI = Region of Influence

3.4.2.4.2 Local Economy and Low-Income Population

The Alabama ROI has a labor force of approximately 285,592 workers. Within the manufacturing industry in the Mobile region, ship and boat building accounted for 25.0 percent of total manufacturing employment in 2019 with roughly 19,191 workers (Mobile Area Chamber of Commerce, 2019). The leading industries in the city of Mobile and Baldwin County are educational services, health care, and social assistance; retail trade; and arts, entertainment, recreation, and accommodation and food services. The leading industries in Mobile County are educational services, health care, and social assistance; manufacturing; and retail trade. Local economy data for the Alabama ROI and the comparison geographies are provided in Table 3.4-14, including median household income, employment rate, and poverty rate.

Table 3.4-14: Local Economy and Low-Income Population for the Alabama Region of Influence

Geography	Median Household Income	Employment Rate	Poverty Rate
City of Mobile	$42,321	53.7%	20.7%
Baldwin County	$58,320	55.2%	10.4%
Mobile County	$47,583	53.3%	18.8%
Alabama	$51,734	54.7%	16.7%
United States	$65,712	60.2%	13.4%

Source: U.S. Census Bureau (2019)

The median household incomes and employment rates in the city of Mobile and Mobile County are lower than comparison geographies. The median household income and employment rates in Baldwin County are higher than the state of Alabama, but lower than the United States. The city of Mobile and Mobile County have higher poverty rates than both the comparison geographies, whereas Baldwin County has a lower poverty rate than both the comparison geographies.

3.4.2.4.3 Housing

Table 3.4-15 presents housing data for the Alabama ROI and comparison geographies. Median property values are lower in the city of Mobile and Mobile County than comparison geographies. Baldwin County has a higher median property value than Alabama but lower than the United States. The homeownership rate in the city of Mobile is less than both comparison geographies, while the homeownership rate in Mobile County is higher than the United States but lower than the state of Alabama. The homeownership rate in Baldwin County is higher than the comparison geographies (U.S. Census Bureau, 2019).

Table 3.4-15: Housing Information for Alabama Region of Influence

Geography	Median Property Value	Homeownership Rate
City of Mobile	$123,600	53.2%
Baldwin County	$197,900	75.2%
Mobile County	$130,200	64.5%
Alabama	$142,700	68.8%
United States	$217,500	64.0%

Source: U.S. Census Bureau (2019)

3.4.2.4.4 Minority Populations

A summary of the ethnic and racial composition in the Alabama ROI is presented in Table 3.4-16. The city of Mobile has a higher minority population than the comparison geographies. The majority of the population in Baldwin and Mobile counties identifies as White, with Baldwin County having a substantially higher White population than Mobile County and the comparison geographies. The largest minority group in the Alabama ROI is Black or African American, followed by Hispanic or Latino (U.S Census Bureau, 2019).

Table 3.4-16: Minority Populations in the Alabama Region of Influence[1]

Geography	White Alone, Not Hispanic or Latino	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Hispanic or Latino of any Race	Two or More Races	Total Population
City of Mobile	41.8%	51.4%	0.2%	1.9%	0.0%	2.5%	1.9%	190,432
Baldwin County	83.1%	9.2%	0.7%	0.9%	0.0%	4.6%	1.5%	212,830
Mobile County	56.9%	35.5%	0.8%	1.9%	0.0%	2.9%	1.6%	414,114
Alabama	65.5%	26.5%	0.5%	1.3%	0.0%	4.3%	1.7%	4,876,250
United States	60.7%	12.3%	0.7%	5.5%	0.2%	18.0%	2.4%	324,697,759

[1]Percentages may not total 100% due to rounding.
Source: U.S. Census Bureau (2019)

3.4.3 Environmental Consequences

The analysis of impacts on socioeconomic resources and environmental justice populations is focused on the effects of the Proposed Action and alternatives on housing values, employment, population, minority populations, and income levels. The alternatives were evaluated based on the potential for and the degree to which the dismantlement activities could impact socioeconomic resources and environmental justice populations.

3.4.3.1 No Action Alternative

3.4.3.1.1 Ex-Enterprise Is Stored in Newport News, Virginia

As described in Section 2.3.1 (No Action Alternative), under the No Action Alternative, ex-Enterprise would be maintained in waterborne storage at Newport News Shipbuilding. The No Action Alternative would require some maintenance and inspection to ensure it is being stored in an environmentally safe manner. These activities would be in alignment with typical shipyard activities and would result in negligible effects above baseline conditions at the storage facility. In addition, the No Action Alternative would not meet the need to dismantle and dispose of ex-Enterprise and would not require federal funds to be spent on activities associated with dismantling or disposing of ex-Enterprise. Long-term storage of ex-Enterprise under the No Action Alternative is not likely to measurably improve or impact the socioeconomic and environmental justice condition of the Virginia ROI. Table 2-2 in Chapter 2 (Description of Proposed Action and Alternatives) provides more information outlining the cost of the No Action Alternative.

Work for the No Action Alternative would be minimal in comparison to typical activities performed at Newport News Shipbuilding. There are in-water hull inspections for hull integrity, and all preservation availabilities (e.g., paint, corrosion protection) have already been performed in dry dock. No Action Alternative work is typical work for Newport News Shipbuilding and is performed in accordance with all federal, local, and state regulations. Therefore, maintenance and storage of ex-Enterprise under the No Action Alternative is not likely to measurably improve or impact the human, economic, or environmental condition of the ROI, and no disproportionate impacts are anticipated on environmental justice populations as a result of the No Action Alternative.

3.4.3.2 Alternative 1: Single Reactor Compartment Packages

As stated in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages) and Section 3.4.1.4 (Approach to Analysis) above, partial dismantlement of ex-Enterprise at a commercial dismantlement facility is not analyzed in this section.

3.4.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), ex-Enterprise would be towed from its current storage location to a commercial dismantlement facility at one of three locations for partial dismantlement: Virginia, Texas, or Alabama. Impacts associated with towing operations would be minimized as a result of adherence to best management practices, including compliance with the *Navy Towing Manual SI740-AA-MAM-010*, Rev 3, July 2002. Additionally, towing operations would occur in open ocean or rivers, which would not come in contact with low-income or minority populations, impact the local economy or housing, or result in a change in population in the ROI. Therefore, no impacts on socioeconomic resources or disproportionate impact on environmental justice populations would occur.

3.4.3.2.2 Transport Waste and Recyclable Material from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), waste and recyclable material would be transported from the commercial dismantlement facility to an approved waste disposal or recycling facility. Transportation of wastes would adhere to applicable federal, state, and local regulations. Additional information is provided in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management) on the health and safety regulations. The workers required to transport the waste and recyclable materials from the commercial dismantlement facility already exist in the ROI; therefore, an increase in population would not occur as a result of this action. In turn, there would not be a strain on the existing housing in the area. This action would have a minor overall benefit to the local economy as it would provide additional work for the existing workforce. Although minority and low-income populations exist in the Virginia, Texas, and Alabama ROIs, adherence to applicable regulations and use of existing transport systems would result in minimal impacts on all populations, as discussed in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management). Therefore, there would not be a disproportionate impact on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.2.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), the remaining propulsion space section would be transported to PSNS & IMF via propulsion space section heavy-lift ship via established shipping lanes around the southern tip of South America and then up the west coast and into the Strait of Juan de Fuca and ultimately into PSNS & IMF (see Figure 2-5). Standard shipping operations detailed in Chapter 2 (Description of Proposed Action and Alternatives) would avoid contact with environmental justice populations, would not cause an increase or decrease in population or housing availability, and would not impact the local economy. Therefore, there would not be a disproportionate impact on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.2.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

Once relocated to PSNS & IMF, work detailed in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages) would occur consistent with established practices and requirements. Pier-side work at PSNS & IMF is not anticipated to generate impacts on the general populations or environmental justice populations. This work would be conducted by the existing local workforce and would not result in changes to the local population or housing market. The local economy may see a small benefit as a result of the work at PSNS & IMF. Therefore, impacts on socioeconomic resources associated with pier-side work at PSNS & IMF would be minimal. There would be no disproportionate impacts on environmental justice populations.

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), eight single reactor compartment packages would be prepared at PSNS & IMF for disposal in Trench 94 at the DOE Hanford Site. All work would comply with all applicable federal, state, and local regulations and would not be accessible by the general public. As discussed in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management), impacts on human and environmental health and safety as a result of this work would be minimal. Thus, potential impacts on the surrounding population are anticipated to be minimal. Significant changes in workforce at PSNS & IMF due to dismantlement of the propulsion space section and construction of ex-Enterprise and its reactor compartments are not expected as the work would occur within the fixed capacity of the shipyard given other ongoing repair work. Any change in workforce would be consistent with expected attrition through retirement and resignation, balanced by normal make-up hiring (Navy & DOE, 2012).

As no change in workforce is anticipated, there would be no change in the housing market or local economy. Preparation of eight single reactor compartment packages at PSNS & IMF is not anticipated to generate impacts on the general populations or environmental justice populations. This work would be conducted by the existing local workforce and would not result in changes to the local population or housing market. The local economy may see a small benefit as a result of the work at PSNS & IMF. Therefore, impacts on socioeconomic resources associated this work would be minimal. There would be no disproportionate impacts on environmental justice populations.

3.4.3.2.5 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), additional rail structures would be added within Trench 94 at the DOE Hanford Site to support the reactor compartment packages, requiring limited excavation of the trench floor.

Trench 94 at the DOE Hanford Site is in an isolated area about 7 miles from the Columbia River and contains various cruiser and submarine reactor compartment packages. The installation of the rail system for reactor compartment packages is within an existing facility, away from the general public and environmental justice populations, and would be conducted in accordance with existing federal, state, and local regulations. Installation of the rail system would be conducted by the existing workforce in the Washington ROI and therefore would not impact population or housing availability. Economic benefits to the area would be nominal. Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.2.6 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Alternative 1 would involve transportation of the reactor compartment packages from PSNS & IMF by water to the Port of Benton barge slip. The waterborne transport route for the reactor compartment packages from PSNS & IMF would follow normal shipping lanes through Puget Sound and south along the Washington coast to the mouth of the Columbia River. The route then goes up the Columbia River, following the shipping channel used for the regular transport of commercial cargo. The river route passes through the Washington ROI to the barge slip located in north Richland, Washington (Navy & DOE, 1996). The use of normal shipping lanes would keep the reactor compartment packages away from the general population as well as environmental justice populations. Transport of the reactor compartment packages would be conducted by the existing workforce and therefore would not change the population or housing availability in the Washington ROI, and economic benefits would be nominal. Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.2.7 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at Department of Energy Hanford Site

Reactor compartment packages would be transported from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site via multiple wheel high-capacity transporters using the same process used for the current program (Navy & DOE, 2012). Transport arrangements would be made for the safety of other drivers and would be scheduled on a weekend to avoid heavy use of the roadway. Travel would be restricted to one side of the four-lane highway, or pilot cars could be used to provide safe escort around the package on the southbound lane for bypass. Furthermore, land transportation would be conducted in accordance with applicable Nuclear Regulatory Commission (NRC), Department of Transportation (DOT), and DOE orders and procedures regarding transportation security and safety. Transport of the reactor compartment packages would be conducted by the existing workforce and therefore would not change the population or housing availability in the Washington ROI, and economic benefits would be nominal. Adherence to best management practices and regulations would reduce potential impacts on the general population and environmental justice populations. Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.3 Alternative 2: Dual Reactor Compartment Packages

As stated in Section 2.3.3 (Alternative 2 – Dual Reactor Compartment Packages) and Section 3.4.1.4 (Approach to Analysis) above, partial dismantlement of ex-Enterprise at a commercial dismantlement facility is not analyzed in this section.

3.4.3.3.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Under Alternative 2, tow activities would be the same as under Alternative 1, as described and analyzed in Section 3.4.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility). Therefore, no impacts on socioeconomic resources or disproportionate impacts on environmental justice populations would occur.

3.4.3.3.2 Transport Waste and Recyclable Material from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

Similar to Alternative 1, transportation of waste and recyclable material from partial dismantlement under Alternative 2 would be the same as described and analyzed for Alternative 1 in Section 3.4.3.2.2 (Transport Waste and Recyclable Material from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility). Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.3.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 2, activities associated with the shipment of ex-Enterprise via propulsion space section heavy-lift ship from one of the commercial dismantlement locations to PSNS & IMF would be the same as analyzed for Alternative 1 in Section 3.4.3.2.3 (Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]). Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.3.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

Pier-side and dry dock work under Alternative 2 would be similar to Alternative 1 in Section 3.4.3.2.4 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]). Under Alternative 2, the four conjoined pairs of reactor compartments would not be separated, which would result in the construction and transport of four dual reactor compartment packages. These four dual reactor compartment packages would be larger and heavier than the eight single reactor compartment packages of Alternative 1. The larger and heavier packages would require approximately five years in dry dock (a reduction of one to three years compared to Alternative 1). However, this work would be in alignment with similar work already performed at PSNS & IMF. All work would comply with all applicable federal, state, and local regulations and would not be accessible by the general public. As discussed in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management), impacts on human and environmental health and safety as a result of this work would be minimal. Thus, potential impacts on the surrounding population are anticipated to be minimal. Significant changes in workforce at PSNS & IMF due to dismantlement of the propulsion space section and construction of ex-Enterprise and its reactor compartments are not expected as the work would occur within the fixed capacity of the shipyard given other ongoing repair work. Any change in workforce would be consistent with expected attrition through retirement and resignation, balanced by normal make-up hiring (Navy & DOE, 2012).

As no change in workforce is anticipated, there would be no change in the housing market or local economy. Preparation of four dual reactor compartment packages (at PSNS & IMF) is not anticipated to generate impacts on the general populations or environmental justice populations. This work would be conducted by the existing local workforce and would not result in changes to the local population or housing market. The local economy may see a small benefit as a result of the work at PSNS & IMF. The construction of four dual reactor compartment packages (at PSNS & IMF) is anticipated to result in minimal impacts on socioeconomic resources and would not result in disproportionate impacts on environmental justice populations.

3.4.3.3.5 Port of Benton Barge Slip Modifications

Modifications to the Port of Benton barge slip would involve excavation to allow for the widening of the barge slip (in-water work) and inland pile driving and concrete work. Construction of the infrastructure modifications at the barge slip site would result in temporary work and could be accomplished by the existing workforce. Labor resources for barge slip modifications would be insignificant compared to the typical scale of civil construction for a city of this population. The dismantlement and disposal of ex-Enterprise would not permanently change the local population, economy, or housing market within the communities surrounding the barge slip. All work associated with the barge slip modifications would be conducted in accordance with applicable federal, state, and local regulations and best management practices. The work would also be conducted away from the general public. As such, impacts on the local community are anticipated to be minimal. Therefore, impacts associated with the barge slip modifications on socioeconomic resources are anticipated to be minimal, and no disproportionate impacts on environmental justice populations would occur.

3.4.3.3.6 Road Improvements Between Port of Benton Barge Slip and Trench 94 at Department of Energy Hanford Site

Due to the size and weight of the dual reactor compartment packages, Alternative 2 would require infrastructure improvements to the transport route at the DOE Hanford Site in the form of re-grading portions of the transport route. Road improvements between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site would be designed and constructed in accordance with the geotechnical report for the Proposed Action and applicable building and grading codes, and would follow best management practices set forth in Section 2.3.3 (Alternative 2 – Dual Reactor Compartment Packages). These best management practices are anticipated to minimize impacts on both people and the environment. As such, these road improvements are not anticipated to have impacts on the surrounding community. Further, all infrastructure upgrades are anticipated to be completed by the existing workforce in the Washington ROI, and therefore would not change the local population or housing market, but may have a nominal benefit on the economy. Therefore, impacts on socioeconomic resources are anticipated to be minimal, and no disproportionate impacts on environmental justice populations are anticipated to occur.

3.4.3.3.7 Install Rail System for Reactor Compartment Packages in Trench 94 at Department of Energy Hanford Site

Under Alternative 2, activities associated with the installation of a rail system in Trench 94 at the DOE Hanford Site would be the same as under Alternative 1, as described and analyzed in Section 3.4.3.2.5 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.3.8 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Under Alternative 2, activities associated with the barge transport of reactor compartment packages would be the same as under Alternative 1, as described and analyzed in Section 3.4.3.2.6 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip). Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.3.9 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at Department of Energy Hanford Site

Under Alternative 2, activities associated with the land transport of reactor compartment packages would be the same as under Alternative 1, as described and analyzed in Section 3.4.3.2.7 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at Department of Energy Hanford Site). Therefore, there would be no disproportionate impacts on environmental justice populations, and impacts on socioeconomic resources would be minimal.

3.4.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

3.4.3.4.1 Tow ex-Enterprise from Newport News, Virginia to Commercial Dismantlement Facility

Under Alternative 3 (Preferred Alternative), tow activities would be the same as under Alternative 1, as described and analyzed in Section 3.4.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility). Towing operations would occur in open ocean or rivers, which would not come in contact with low-income and minority populations, and would not impact the local population, economy, or housing. Therefore, no impacts on socioeconomic resources or disproportionate impacts on environmental justice populations would occur.

3.4.3.4.2 Complete Dismantlement of ex-Enterprise at Commercial Dismantlement Facility (Includes In-Water Work)

Once at the commercial dismantlement facility, the selected contractor would dispose of ex-Enterprise. Non-radiological work activities would be within the normal capabilities of the contractor. Radiological work activities would be performed by trained radiological service workers at the commercial dismantlement facility. This work could require the addition of radiological workers to the typical workforce in some locations. The Navy estimates that approximately 94 additional workers with experience in radiological dismantlement and disposal may be temporarily relocated to the commercial dismantlement facility in the Virginia, Texas, or Alabama ROIs to dismantle ex-Enterprise for approximately three to five years. While there is an established radiological services industry in Virginia, this analysis was based on the conservative assumption all radiological service workers would need to be added to the workforce as there is no way to quantify what number of workers used are from the Virginia ROI or another region. Compared to the overall population in each ROI, this increase in the number of workers would result in a less than 0.01 percent increase in the total population of the ROI. Thus, impacts on the population and housing markets would be negligible. The complete dismantlement of ex-Enterprise at a commercial dismantlement facility would indirectly have a small benefit to the local economy, through the temporary increase of approximately 94 workers to the Virginia, Texas, or Alabama ROI for a period of three to five years. The personnel involved in the dismantlement and disposal of ex-Enterprise would contribute to the local economy by increased workforce spending, which generates local business revenues and supports additional wages, sales, and taxes for the state, county, and local municipalities. The contribution to the local economy with the added workforce would be minor because the majority of the work would be conducted under current circumstances and with the existing workforce, with only a small increase in new, temporary workers to the Virginia, Texas, or Alabama ROI. Overall, impacts on socioeconomic resources would be minimal.

As shown in Sections 3.4.2.2 (Virginia), 3.4.2.3 (Texas), and 3.4.2.4 (Alabama), minority and low-income populations exist in the ROIs for Virginia, Texas, and Alabama; thus, environmental justice populations are considered present in the ROIs. Activities associated with the complete dismantlement of ex-Enterprise would take place in existing industrial complexes, away from the general public and environmental justice populations. All dismantlement activities would be conducted in compliance with applicable federal, state, and local laws and regulations. Aircraft carrier dismantling contracts include a clause that requires the contractor to comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. The commercial dismantlement facilities already conduct similar activities; therefore, potential impacts on the surrounding communities are not anticipated to change.

Although there are environmental justice populations in the Alternative 3 (Preferred Alternative) ROIs, impacts associated with the dismantlement and disposal of ex-Enterprise are anticipated to be minimal, with risks consistent with industrial work currently ongoing in those areas. Therefore, no disproportionate impacts on environmental justice populations would occur.

3.4.3.4.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

As described in Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement), waste and recyclable materials generated from the dismantlement of ex-Enterprise at the commercial dismantlement facility would be transported to an approved waste disposal or recycling facility. Waste transportation would be conducted in accordance with applicable regulations. As noted in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management), impacts on human and environmental health and safety would be minimal. As such, there would be no disproportionate impacts on environmental justice populations.

Transportation of waste and recyclable materials would be conducted by the existing workforce in the ROI; therefore, no changes to the existing population or the housing market would occur, and benefits to the local economy would be nominal. Therefore, impacts on socioeconomic resources would be minimal.

3.4.3.4.4 Low-Level Radioactive Waste Disposal at Appropriate Approved Disposal Facilities

As discussed in Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement), Section 3.1 (Public and Occupational Health and Safety), and Section 3.2 (Hazardous and Radioactive Waste Management), waste from ex-Enterprise would be disposed of at approved disposal facilities. Low-level radioactive waste would be disposed of at the existing DOE or commercial waste facilities in Texas, Utah, or South Carolina. As concluded in Section 3.1 (Public and Occupational Health and Safety) and Section 3.2 (Hazardous and Radioactive Waste Management), impacts on human and environmental health and safety would be minimal. Therefore, no disproportionate impacts on environmental justice populations would occur. Additionally, disposal would be conducted by the existing workforce at the disposal facility; therefore, no changes to the local population or housing market would occur, and negligible benefits to the local economy may occur. Thus, impacts on socioeconomic resources would be minimal.

3.4.4 Mitigation

All activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. If reasonably foreseeable impacts are determined to result, mitigation measures beyond best management practices would be developed and implemented. No mitigation measures are required under any of the alternatives, including the No Action Alternative, because no major impacts are reasonably foreseeable.

3.4.5 Summary of Impacts and Conclusions

Table 3.4-17 summarizes the impacts of the alternatives on socioeconomic resources and environmental justice resources.

Table 3.4-17: Summary of Impacts and Conclusions on Socioeconomic Resources and Environmental Justice Populations

Potential Impacts on Socioeconomic Resources	Alternatives			
	No Action	1	2	3
Impacts from transportation of ex-Enterprise		○	○	○
Impacts from dismantlement of ex-Enterprise		○	○	○
Impacts from disposal of ex-Enterprise		○	○	○
Potential Impacts on Environmental Justice Populations	**Alternatives**			
	No Action	**1**	**2**	**3**
Impacts from transportation of ex-Enterprise				
Impacts from dismantlement of ex-Enterprise				
Impacts from disposal of ex-Enterprise				

Note: ○ = minimal impact, Blank = no impact/not applicable

3.5 Biological Resources

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes biological resources, which consist of native and non-native plant and animal species and the habitats in which they occur, and results of analysis of environmental impacts associated with the Proposed Action and alternatives. Both resident and migratory biological resources associated with the Regions of Influence (ROI) are analyzed in this section. Section 3.5.1 (Methodology) defines the ROI and applicable regulatory framework for an assessment of potential impacts on biological resources. Section 3.5.2 (Affected Environment) describes the biological resources within the ROI and is followed by Section 3.5.3 (Environmental Consequences), which includes the analysis of potential impacts on biological resources under each alternative. Section 3.5.4 (Mitigation) describes actions undertaken by the United States (U.S.) Department of the Navy (Navy) to avoid, minimize, or mitigate impacts.

3.5.1 Methodology

3.5.1.1 Region of Influence

The ROI for biological resources includes the following elements:

- areas within port, shipyard, and commercial facilities that may support waterborne storage or dismantlement of ex-Enterprise
- potential tow routes for ex-Enterprise from the current mooring location at Newport News Shipbuilding, Virginia
- routes that may be used by a heavy-lift ship from a partial dismantlement location to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF)
- the immediate vicinity and surrounding habitats of the Port of Benton barge slip in Richland, Washington, that may be subject to infrastructure improvements
- land transportation routes that may be subject to infrastructure improvements between the Port of Benton barge slip and the Department of Energy (DOE) Hanford Site
- transportation routes to other potential waste facilities from locations analyzed for dismantlement activities.

3.5.1.2 Regulatory Framework

The Navy has identified a number of laws and regulations relevant to the Proposed Action and alternatives and potential impacts on biological resources. These frameworks and appropriate agency consultations are summarized below.

3.5.1.2.1 Endangered Species Act

The federal Endangered Species Act (ESA) (16 United States Code [U.S.C.] Sections 1531–1544) protects federally listed threatened and endangered plant and animal species. Species considered to be threatened include species that are likely to become endangered. Endangered is a listing classification for plant and animal species in danger of extinction throughout all or a major portion of their ranges.

The ESA authorizes the determination and listing of species as endangered and threatened and provides regulatory protection for listed species. Each federal agency, in consultation with and with the assistance of the Secretary of the Interior pursuant to section 7(a)(2) of the ESA, is required to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of such species. Federal agencies are to use the best scientific and commercial data available in meeting these requirements.

In the analysis for potential effects to ESA-listed species from the Proposed Action and alternatives, the Navy has presented effects of the action using definitions specified in the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) publication *Endangered Species Act Consultation Handbook: Procedures for Conducting Consultations and Conferences* (USFWS & NMFS, 1998). Terms used in the effects analysis are defined in 50 Code of Federal Regulations Part 402.17. Effects of the action are all consequences to listed species or critical habitat that are caused by reasonably foreseeable consequences of all of the alternatives, including the consequences of other activities that are caused by the Proposed Action and alternatives. “May affect” with respect to a species is the appropriate conclusion when an ESA-listed species might be exposed to a reasonably foreseeable consequence of the Proposed Action and alternatives and could respond to that exposure. For critical habitat, “may affect” is the appropriate conclusion if an essential physical or biological feature may be exposed. Discountable effects are those extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where an adverse effect would occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects.

As stated in Section 2.3 (Alternatives Carried Forward for Analysis), the Navy has identified Alternative 3 as the preferred alternative. Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement) describes the Navy’s preferred alternative and analyzes potential impacts on biological resources in Section 3.5.3.4 (Alternative 3 [Preferred Alternative]: Commercial Dismantlement). The Navy will consult with both NMFS and USFWS pursuant to section 7(a)(2) of the ESA for Alternative 3 (Preferred Alternative). Accordingly, conclusions of potential effects on ESA-listed species are presented in the Alternative 3 (Preferred Alternative) analysis.

3.5.1.2.2 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 prohibits, with certain exceptions, the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States.

The MMPA defines take as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal.” The MMPA further defines harassment by classifying levels of harassment—Level A and Level B harassment (16 U.S.C. Section 1362). Level A harassment occurs when “an action injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild.” Level B harassment occurs when “an action disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behavioral patterns are abandoned or significantly altered.” However, the MMPA allows, upon request, the incidental take of small numbers of marine mammals by U.S. citizens who engage in a specified activity, other than commercial fishing, within a specified geographic region.

Because of the extremely low likelihood of activities described in this EIS/OEIS to exceed thresholds required for consultation with NMFS under the MMPA, potential impacts on marine mammals in the context of the MMPA are not analyzed in detail in this section. Chapter 5 (Other Considerations Required by NEPA) includes a more detailed discussion of the MMPA in relation to protected species.

3.5.1.2.3 Migratory Bird Treaty Act

Over 1,000 species of birds are protected in the United States under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. Sections 703–712; Ch. 128; 13 July 1918; 40 Stat. 755 as amended (USFWS, 2020b)). A migratory bird is any species or family of birds that live or reproduce in or migrate across international borders at some point during their annual life cycle. The MBTA established federal responsibilities for the protection of nearly all species of birds, eggs, and nests (Maroun, 2018).

In 2006, the USFWS and U.S. Department of Defense (DoD) signed a Memorandum of Understanding (MOU) to promote conservation of migratory birds (USFWS, 2020b). The conservation of migratory bird populations by federal agencies is mandated by Executive Order (EO) 13186 (Federal Register [FR], August 30, 2006), *Responsibilities of Federal Agencies to Protect Migratory Birds*. In April 2007, further guidance was issued by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics on implementing the MOU to Promote the Conservation of Migratory Birds between the USFWS and DoD in accordance with EO 13186. This guidance covers all DoD-sponsored actions, including natural resources management, routine maintenance and construction, industrial activities, and hazardous waste cleanups.

Although military readiness activities are exempt from take provisions specified in the MBTA (as allowed under the 2003 National Defense Authorization Act), the Navy has determined that the Proposed Action and alternatives would not qualify as a military readiness activity defined in the 2014 DoD and USFWS MOU to promote the conservation of migratory birds (DoD & USFWS, 2014). The 2014 MOU does not address incidental take resulting from military readiness activities or active DoD airfield operations.

Recent administrative actions and court decisions are modifying the scope of the MBTA and the Department of Interior (DOI) mandate to enforce and administer the MBTA. In December 2017, the DOI issued its Solicitor’s Opinion, which clarified that otherwise lawful activity that results in an incidental take of a protected bird does not violate the MBTA (DOI, 2017). In February 2018, the Deputy Assistant Secretary of Defense memo clarified that DoD actions should continue current practices to minimize take of migratory birds (DoD, 2018). On January 7, 2021, there was a final ruling on the scope of the MBTA which raised concerns from the public and international treaty partners, as well as created legal challenges. On October 4, 2021, the final MBTA revocation of the January 7, 2021 ruling was published in the FR. The final MBTA revocation was effective December 3, 2021.

The Proposed Action would primarily take place in already developed sites. In the case of the Port of Benton barge slip modifications (Section 3.5.3.3.4, Port of Benton Barge Slip Modifications), the vast majority of the work is projected to take place outside the nesting time (beginning of April through mid-August). Additionally, the Port of Benton is also highly developed, with nearly all the vegetation already removed, and no nesting has been observed nearby. Because of the extremely low likelihood of activities described in this EIS/OEIS to exceed thresholds required for consultation with USFWS under the MBTA, potential impacts on migratory birds in the context of the MBTA are not analyzed in detail in this section.

3.5.1.2.4 Bald and Golden Eagle Protection Act

Bald and golden eagles are migratory birds that are protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. Section 668) in addition to the MBTA. The BGEPA states that no one, without a permit issued by the Secretary of the Interior, may take bald or golden eagles, including their parts, nests, or eggs. The BGEPA defines take as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The BGEPA further defines disturbance as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." As part of the literature review, the Navy has included bald and golden eagle nest locations and occurrences in project area descriptions in Section 3.5.2 (Affected Environment) and analyzed these locations for potential impacts in Section 3.5.3 (Environmental Consequences). The Navy identified two locations where bald eagles may be in proximity to activities described in this EIS/OEIS—PSNS & IMF and the Port of Benton barge slip, both in Washington state.

3.5.1.2.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act is the principal law governing marine fisheries in the United States. Federal agencies must consult with NMFS when their actions or activities may adversely affect habitat identified by federal regional fishery management councils or NMFS as Essential Fish Habitat (EFH). Congress defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. Section 1802[10]). Through consultations, NMFS may recommend ways federal agencies can avoid or minimize the adverse effects of their actions on the habitat of federally managed commercial and recreational fisheries.

Potential impacts of the Navy's Proposed Action and alternatives on EFH and federally managed fish species are summarized in Section 3.5.3 (Environmental Consequences). The Navy has identified in-water hull cleaning at the current ex-Enterprise mooring location and construction activities associated with the Port of Benton barge slip modification as the only activities that warrant consultation with NMFS for potential impacts on EFH. Potential impacts on EFH are discussed under the impacts assessment for in-water hull cleaning under all alternatives and for construction activities at the barge slip under Alternative 2. The Navy is consulting with NMFS pursuant to the Magnuson-Stevens Fishery Conservation and Management Act for Alternative 3 (Preferred Alternative).

3.5.1.2.6 Executive Orders for Invasive Species – Executive Order 13112 and 13751

In 1999, EO 13112 (*Invasive Species*) called upon the DoD and other federal departments and agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established. In 2016, EO 13751 (*Safeguarding the Nation from the Impacts of Invasive Species*) amended EO 13112 and directed actions to continue coordinated federal prevention and control efforts related to invasive species. This order incorporated considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species. Towing of inactive Navy ships has the potential to transport potentially invasive species between origin ports and destination ports (NMFS, 2019). Accordingly, the Navy would implement hull cleaning of ex-Enterprise as a mitigation measure at the current mooring location of ex-Enterprise (Newport News Shipbuilding, Virginia) to reduce the potential for transportation and introduction of potentially invasive species at towing destinations outside of the Hampton Roads Metropolitan Area. These locations include the shipyard facilities at the Port of Mobile, Alabama, or the Port of Brownsville, Texas. The potential to introduce invasive species during construction of the Port of Benton barge slip modifications and road improvements as part of Alternative 2 would be minimized by the best management practices described in Section 3.5.1.3 (Best Management Practices) to clean equipment before entering and leaving the job site.

3.5.1.3 Best Management Practices

This section addresses standard operating procedures and other measures that are part of existing agreements and permit requirements that minimize or avoid potential impacts on biological resources. Best management practices identified for towing and dismantlement of ex-Enterprise are sourced from terms and conditions of the 2019 NMFS Programmatic Biological Opinion entitled the *Programmatic Biological and Conference Opinion on the Towing of Inactive U.S. Navy Ships from their Existing Berths to Dismantling Facilities or other Inactive Ship Site* (NMFS, 2019). Other sources include Chief of Naval Operations Instruction 5090.1E, Naval Ships' Technical Manual (NSTM) guidance for hull maintenance, Integrated Natural Resources Management Plans (INRMP) that include best management practices at PSNS & IMF, Washington (Navy, 2016, 2018b), and planning documents produced by the DOE Richland Operations Office (DOE, 2017b, 2018a). The Navy identified several best management practices for the towing of inactive Navy ships. Applicable measures are summarized below:

- **Reduce the potential for nonindigenous species transport and establishment at destination ports**. In the 2019 NMFS Programmatic Biological Opinion, the Navy committed to implement mitigation measures to reduce the potential for species attached to an inactive ship's hull to be transported and introduced to areas outside of their natural range, and subsequently become established in the new location and potentially impact ESA-listed resources. The Navy plans to consult with NMFS and USFWS to assess potential effects on ESA-listed species from tow route scenarios under Alternative 3 (Preferred Alternative) that were not analyzed in the 2019 NMFS Programmatic Biological Opinion, and the Navy intends to commit to implement the same mitigation measures agreed to in the 2019 NMFS Programmatic Biological Opinion for reducing the risk of transporting non-indigenous biofouling species between origination and destination ports.
- **Ballast-water from inactive Navy ship operations**. Ballast water is required for towing inactive ships for list, trim, and stability purposes. When inactive ships are towed for transfer purposes to ports consisting of inactive fleet sites, ballast water would not be removed when the ship arrives at the destination port. Prior to towing the ship in the future, ballast water may be added, transferred between tanks, or removed. If any ballast water is removed, it would be sent offsite for treatment and disposal in accordance with all federal, state, and local laws and regulations. For inactive ships being towed for dismantlement, ballast water would be removed as part of the dismantlement process and is under the cognizance of the Navy contractor. As part of the dismantling process, the contractor would pump the ballast water ashore and send it for treatment and disposal in accordance with all federal, state, and local laws and regulations.
- **Reduce potential adverse effects of hull cleaning at origin ports**. In the 2019 NMFS Programmatic Biological Opinion, the Navy committed to use hull cleaning methods that minimize adverse effects on ESA-listed species found at the origination port. In-water hull maintenance of ex-Enterprise while stored at the current mooring location would be in accordance with the *Maintenance Manual for Inactive Nuclear Powered Ships and Nuclear Support Shops and Service Craft* (Navy, 1995). The Navy would conduct in-water hull cleaning during seasonal work windows to the maximum extent practicable. This avoidance and minimization measure is designed to minimize the potential impacts on ESA-listed species described in Section 3.5.2.1 (Virginia). In accordance with Uniform National Discharge Standards (85 FR 43456), the Navy would first give consideration to one of the dry docking mitigation measures. Dry docking would be the first method considered, though this method would only be

implemented if there is a sufficiently sized dry dock available during the required timeframe that is in close enough proximity to the origination port to preclude risk of invasive species transfer. In cases where the Navy determines dry docking is not practicable, the Navy would perform in-water hull cleaning using underwater hull cleaning methods and equipment as specified in NSTM chapter-081, "Waterborne Underwater Hull Cleaning of Navy Ships" (Navy, 2006). This manual provides a description of the various tools, such as diver-operated machines with rotating brushes, either multi-brush or single-brush fitted with different brush types depending on the machine and fouling conditions present. Additional detail on this measure is provided in Section 3.5.3 (Environmental Consequences) under discussions of in-water hull cleaning.

- **Reduce the potential of ship and tow line strike**. Navy ships operate in accordance with the navigation rules established by the U.S. Coast Guard. All ships operating on the water are required to follow the International Navigation Rules (Commandant Instruction M16672.2D). Navigation rules are formalized in the *Convention on the International Regulations for Preventing Collisions at Sea, 1972*. Applicable navigation requirements include, but are not limited to Rule 5 (Lookouts) and Rule 6 (Safe Speed):
    - Rule 5 requires that ships at all times maintain a proper lookout by all available means appropriate to the prevailing circumstances and conditions to be alert for collision risks.
    - Rule 6 requires that ships at all times proceed at a safe speed so that proper and effective action can be taken to avoid collision and so they can be stopped within a distance appropriate to the prevailing circumstances and conditions.

Best management practices applicable to the modifications to the Port of Benton barge slip are summarized below:

- **Project area in-water work window**. Seasonal restrictions on in-water construction within the Columbia River through the northern portion of the Lake of Wallula, which includes the Port of Benton barge slip, are in place to minimize potential impacts on upstream and downstream migrating salmonids. The Navy would use the most current version of the in-water work window for barge slip modifications at the Port of Benton. In 2020, NMFS issued a biological opinion for U.S. Army Corps of Engineers (USACE) and Bureau of Reclamation activities related to the continued operation and management of the Columbia River system (USACE, 2020). This document includes in-water work windows for routine scheduled maintenance (planned maintenance performed at regular intervals) and non-routine maintenance (maintenance that is planned but is not performed at regular intervals, such as unit overhauls, major structural modifications, or rehabilitations). In-water construction associated with modifications to the Port of Benton barge slip would be analogous to non-routine maintenance. Based on provisions in the NMFS 2020 biological opinion, if the Navy selects an alternative that includes modifications to the Port of Benton barge slip, the Navy anticipates that the in-water work window would occur between December 15 and February 28. The final work window for any in-water activities associated with modifications to the Port of Benton barge slip would be determined during consultation with NMFS and USFWS, and in conformance with applicable Washington Administrative Code (WAC) provisions for minimizing impacts on salmonid migrations.
- **Construction sequence and methods**. Section 3.5.3.3.4 (Port of Benton Barge Slip Modifications) provides a detailed discussion of construction activities. As standard practice, sheet piles would be placed on land with a vibratory hammer. Sheet piles would be placed before the removal of

the jetty to reduce the pressure wave, which would reduce the amount of sound entering the Columbia River channel.

- **Spill Prevention and Response**. Construction contracts would have environmental protection provisions included in scoping and contracting documents. These measures include provisions prohibiting release of substances defined as a dangerous or hazardous waste, or regulated substances defined by federal, state, and local laws and regulations. Fueling and lubrication of equipment and motor vehicles would occur primarily off site.
- **Turbidity fencing**. Turbidity fences would be used to confine all turbidity within the in-water construction area for the barge slip modifications.

Best management practices applicable to land transport route upgrades include:

- **Avoidance of undisturbed habitats adjacent to the land transport route**. Contractors would be required to keep vehicles and heavy machinery within the non-vegetated road prism. If laydown areas are required, they must be identified prior to the start of work and included in the ecological compliance review.
- **Minimizing introduction of invasive species**. Contractors would be required to use vehicle and equipment cleaning stations to minimize the introduction and spread of weeds during construction by cleaning vehicles and equipment prior to entering and as soon as possible after leaving each work area.
- **Revegetation of disturbed ground**. For any ground disturbance required for the land transport route between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site (see Section 3.5.3.3.5 [Road Modifications Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site]), revegetation of disturbed ground is included in the management of biological resources in accordance with the *Hanford Site Biological Resources Management Plan* (BRMP) (DOE, 2017b). The BRMP establishes biological resource values and priorities relative to the mitigation of impacts to vegetative species and habitats. The BRMP prescribes compensatory mitigation replacement ratios based on resource levels (Levels 0-5) and the size of the area affected. The *Hanford Site Revegetation Manual* guides revegetation efforts under the BRMP by providing general specifications for the design, timing, scheduling, plant and seed selection, and implementation of various types of revegetation actions (DOE, 2021).

3.5.1.4 Approach to Analysis

Figure 3.5-1 illustrates the steps the Navy followed in support of this EIS/OEIS to identify biological resources potentially impacted by the Proposed Action and alternatives, how each alternative may impact biological resources, what those impacts would be under each alternative, and measures that offset potential impacts. These steps are summarized below.

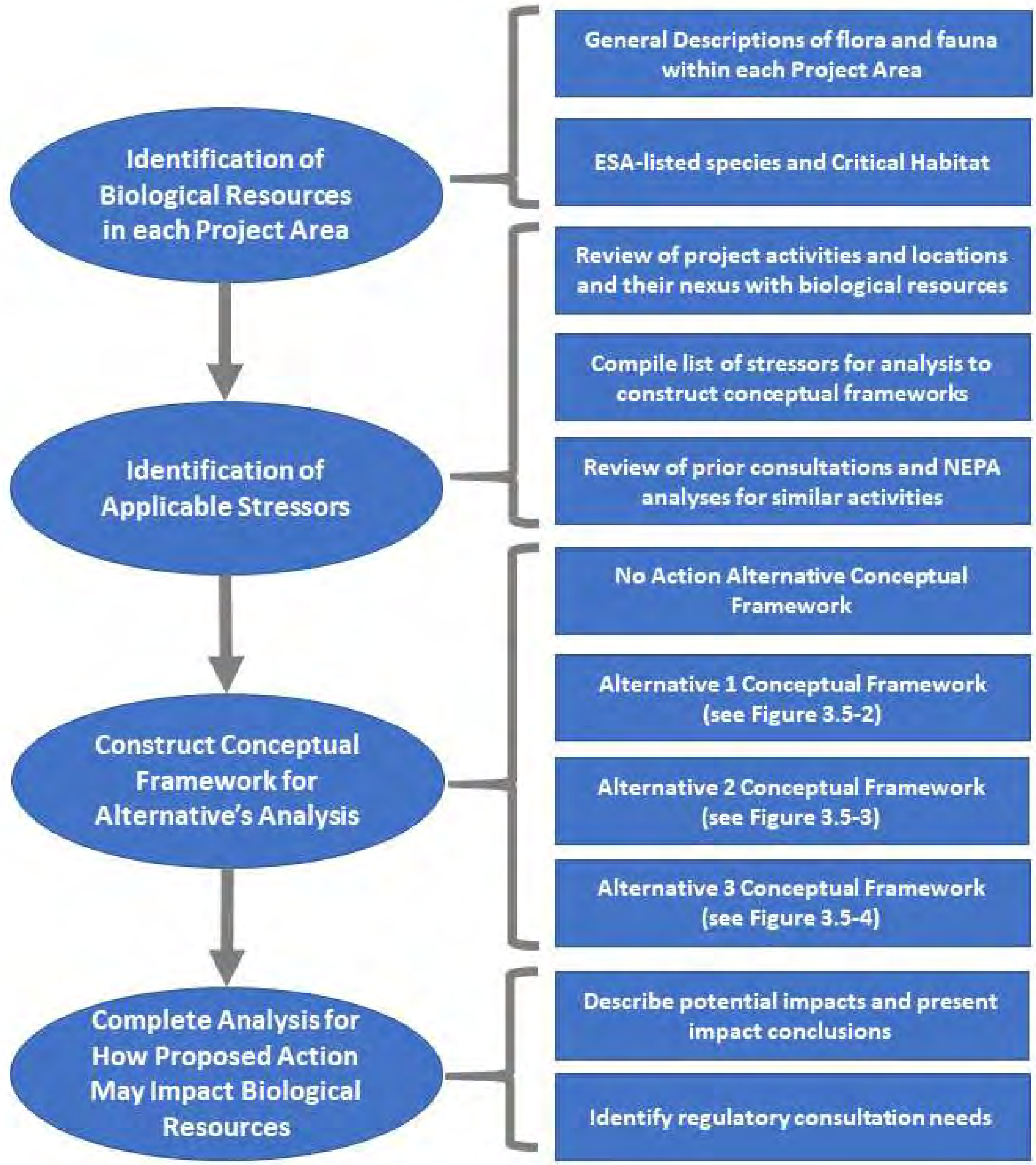


Figure 3.5-1: Step-Wise Approach to Analysis for Biological Resources

3.5.1.4.1 Identification of Biological Resources in Each Project Area

The Navy conducted a literature review to accurately describe biological resources potentially impacted by the Proposed Action and alternatives. In general, the biological resources identified were primarily freshwater and marine species and habitats, with consideration of species and habitats occurring on land where impacts may potentially occur. Information was sourced from available documentation relevant to each port location, transit route, and waste facility described in Section 2.1 (Proposed Action). Sources of information include NEPA documentation, INRMPs (relevant only to DoD-owned and managed properties) and other natural resource management plans, section 7 ESA consultation documentation from consultations between the Navy (and other federal agencies) and NMFS or USFWS, lists of species compiled by federal and state agencies, technical surveys for flora and fauna specific to potentially impacted areas, and other literature available through academic research institutions. These descriptions are included in Section 3.5.2 (Affected Environment).

3.5.1.4.2 Identification of Endangered Species Act-Listed Species and Critical Habitat Designations Potentially Impacted by the Proposed Action

Table 3.5-1 provides a list of all ESA-listed species that are known to occur or may potentially occur at specific project areas described in Section 3.5.2 (Affected Environment). ESA-listed species that likely occur along transportation routes (such as the tow routes proposed for ex-Enterprise to dismantlement ports, heavy-lift ship routes for propulsion space section transport, and the barge route from PSNS & IMF to the Port of Benton barge slip) are listed in Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes). Accordingly, the Navy will consult with USFWS and NMFS for species under their jurisdictions if the preferred alternative includes activities that may affect species at these locations.

Table 3.5-1: Threatened and Endangered Species and their Designated Critical Habitat at Project Facilities

Common Name (*Scientific Name*)[1,2]	Federal Status	Critical Habitat	Designated Critical Habitat at the Project Facility
PSNS & IMF, WASHINGTON[3]			
Chinook salmon Puget Sound ESU (*Oncorhynchus tshawytscha*)	T	**Yes**	**No.** PSNS & IMF site excluded from Chinook salmon critical habitat. (70 FR 52629)
Steelhead Puget Sound DPS (*Oncorhynchus mykiss*)	T	**Yes**	**No**. Critical habitat has not been designated in the vicinity of PSNS&IMF. (81 FR 9251)
Bull trout Coastal-Puget Sound DPS (*Salvelinus confluentus*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of PSNS & IMF. (75 FR 63898)
Bocaccio Puget Sound/Georgia Basin DPS (*Sebastes paucispinis*)	E	**Yes**	**No**. Critical habitat for rockfish has not been designated in the vicinity of PSNS & IMF. (79 FR 68041)
Yelloweye rockfish Puget Sound/Georgia Basin DPS (*Sebastes ruberrimus*)	T	**Yes**	
Killer whale Southern Resident DPS (*Orcinus orca*)	E	**Yes**	**No.** PSNS & IMF site excluded from killer whale Southern Resident DPS critical habitat. (71 FR 69054)
Humpback whale Central America DPS, Mexico DPS (*Megaptera novaeangliae*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of PSNS & IMF. (86 FR 21082)
	E	**Yes**	
Marbled murrelet (*Brachyramphus marmoratus*)	T	**Yes**	**No.** No critical habitat designation within the project area as the designations occur only in nesting habitat. (76 FR 61599)
PORT OF BENTON BARGE SLIP, WASHINGTON[4]			
Chinook salmon Upper Columbia River Spring-Run ESU (*Oncorhynchus tshawytscha*)	E	**Yes**	**Yes.** Overlaps with in-water portions of the Port of Benton barge slip project area. (70 FR 52629)
Steelhead Upper Columbia River DPS, Middle Columbia River DPS (*Oncorhynchus mykiss*)	T	**Yes**	
	T		
Bull trout Columbia River DPS (*Salvelinus confluentus*)	T	**Yes**	**Yes.** Overlaps with in-water portions of the Port of Benton barge slip project area. (75 FR 63898)

Table 3.5-1: Threatened and Endangered Species and their Designated Critical Habitat at Project Facilities (continued)

Common Name (*Scientific Name*)[1,2]	Federal Status	Critical Habitat	Designated Critical Habitat at the Project Facility
Hampton Roads Metropolitan Area[5]			
Atlantic sturgeon Chesapeake Bay DPS, New York Bight DPS, Carolina DPS, South Atlantic DPS, Gulf of Maine DPS (*Acipenser oxyrinchus oxyrinchus*)	E, T	**Yes**	**Yes**. Chesapeake Bay DPS overlaps with current mooring location and commercial shipyard facilities up the James River from Newport News Point. (82 FR 39160)
Shortnose sturgeon (*Acipenser brevirostrum*)	E	**No**	
Green sea turtle North Atlantic DPS (*Chelonia mydas*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of Hampton Roads Metropolitan Area. (63 FR 46693)
Kemp's ridley sea turtle (*Lepidochelys kempii*)	E	**No**	
Leatherback sea turtle (*Dermochelys coriacea*)	E	**Yes**	**No.** Critical habitat has not been designated in the vicinity of Hampton Roads Metropolitan Area. (44 FR 17710)
Loggerhead sea turtle Northwest Atlantic Ocean DPS (*Caretta caretta*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of Hampton Roads Metropolitan Area. (79 FR 39855)
PORT OF MOBILE, ALABAMA[6]			
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of the Port of Mobile and none in Mobile Bay. (68 FR 13369)
Alabama sturgeon (*Scaphirhynchus suttkusi*)	E	**Yes**	**No.** Critical habitat has not been designated in the vicinity of the Port of Mobile and none in Mobile Bay. (74 FR 26488)
Alabama red-bellied turtle (*Pseudemys alabamensis*)	E	**No**	
West Indian manatee (Florida subspecies) (*Trichechus manatus latirostris*)	E	**Yes**	**No**. Critical habitat has not been designated in the vicinity of the Port of Mobile and none in Mobile Bay. (42 FR 47840)
Green sea turtle North Atlantic DPS (*Chelonia mydas*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of the Port of Mobile and none in Mobile Bay. (63 FR 46693)
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	**Yes**	
Kemp's ridley sea turtle (*Lepidochelys kempii*)	E	**No**	

Table 3.5-1: Threatened and Endangered Species and their Designated Critical Habitat at Project Facilities (continued)

Common Name (*Scientific Name*)[1,2]	Federal Status	Critical Habitat	Designated Critical Habitat at the Project Facility
Leatherback sea turtle (*Dermochelys coriacea*)	E	**Yes**	**No.** Critical habitat has not been designated in the vicinity of the Port of Mobile and none in Mobile Bay. (44 FR 17710)
Loggerhead sea turtle Northwest Atlantic Ocean DPS (*Caretta caretta*)	T	**Yes**	**No.** The navigation entrance channel into Mobile Bay does not overlap with critical habitat. (79 FR 39855)
PORT OF BROWNSVILLE FACILITIES, TEXAS[7]			
Green sea turtle North Atlantic DPS (*Chelonia mydas*)	T	**Yes**	**No.** Critical habitat has not been designated in the vicinity of the Port of Brownsville or Brownsville Ship Channel. (63 FR 46693)

[1]A species with more than one DPS can have more than one ESA listing status, as individual DPSs can be either not listed under the ESA or can be listed as an endangered, threatened, or candidate species.

[2]ESU is a population of organisms that is considered distinct for purposes of conservation. As with DPSs, a species with more than one ESU can have more than one ESA listing status.

[3]Because of the routine activities of barge traffic into PSNS & IMF, normal dry dock operations within PSNS & IMF, and barge movements out of PSNS & IMF, these species are not analyzed in detail in this EIS/OEIS. Other species analyzed in the 2019 NMFS Programmatic Biological Opinion for PSNS & IMF (Hood Canal summer-run chum ESU, eulachon [Southern DPS], green sturgeon [Southern DPS], and leatherback sea turtle) may occur along the transportation routes (heavy-lift ship route to PSNS & IMF and the barge route from PSNS & IMF to the Columbia River) (see Appendix F [ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes]).

[4]Species noted here are analyzed only at the Port of Benton Barge Slip. Sockeye (Snake River ESU), Chinook (Snake River Spring/Summer-run ESU and Fall-run ESU), and steelhead (Snake River DPS) would be found in nearshore waters, up the Columbia River to the confluence with the Snake River. These species are known to occur upriver from the confluence, but there is no indication that they would reach the Port of Benton barge slip area.

[5]Hampton Roads Metropolitan Area includes the current mooring location of ex-Enterprise at Newport News Shipbuilding and commercial shipyard facilities that may be used for partial or complete dismantlement and in-water hull cleaning. All DPSs for the Atlantic sturgeon are listed as endangered with the exception of the Gulf of Maine DPS, which is threatened.

[6]Sea turtle species are analyzed for potential impacts along the tow route through Mobile Bay. Sea turtles are not expected to occur at the Port of Mobile. The Navy analyzed potential impacts on the Alabama sturgeon and Alabama red-bellied turtle and determined that these species' current ranges are outside the areas potentially impacted by towing ex-Enterprise through Mobile Bay to a commercial dismantlement facility within the Port of Mobile.

[7]The green sea turtle was analyzed in the 2019 NMFS Programmatic Biological Opinion for towing into and dismantlement at the Port of Brownsville. The Navy also analyzed the potential for impacts on the jaguarundi (*Puma yagouaroundi*), ocelot (*Leopardus pardalis*), West Indian manatee, and other sea turtle species and determined that they would not likely occur within the ship channel; therefore, towing of ex-Enterprise into the Brownsville Ship Channel would have no effect on these three ESA-listed species.

Notes: E = Endangered, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, T = Threatened, FR = Federal Register, ESU = Evolutionarily Significant Unit, DPS = Distinct Population Segment

3.5.1.4.3 Identification of Applicable Stressors for Analysis

Based on the literature review to describe the general biological environment at project areas and consultation documents submitted to NMFS and USFWS and supporting technical studies, the Navy was able to identify specific stressors within each alterative that may impact biological resources described in Section 3.5.2 (Affected Environment). The U.S. Environmental Protection Agency (EPA) defines stressors as any physical, chemical, or biological entity that can induce an adverse response, and defining stressors of a project as essential step to determine how the different project phases may impact biological resources (Crain et al., 2009; EPA, 2000). Stressors identified for analysis include the following:

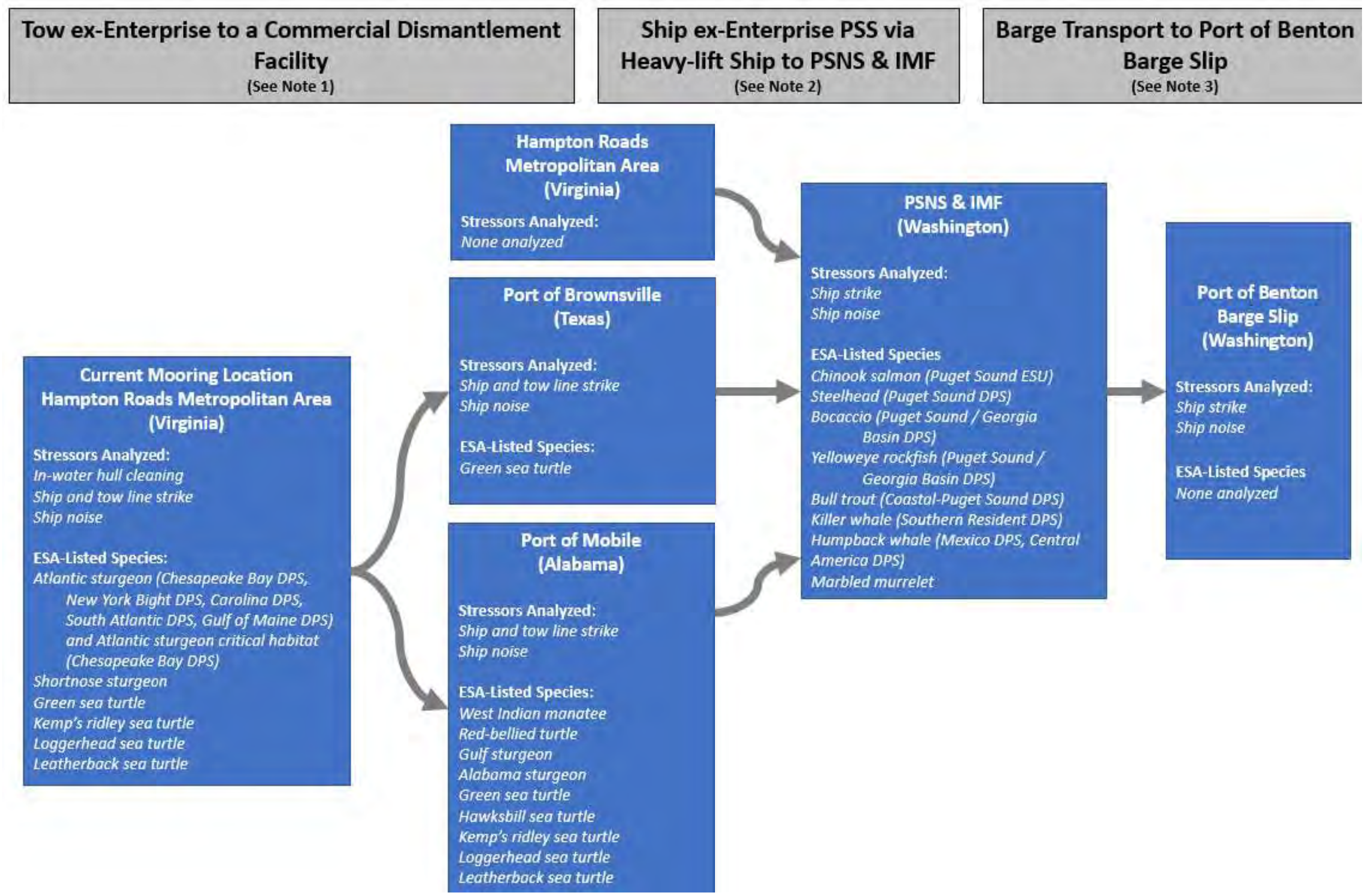
- stressors associated with in-water hull cleaning that potentially impact water and sediment quality at the current mooring location (Newport News Shipbuilding) or at a nearby facility within the Hampton Roads Metropolitan Area, including release of chemicals associated with antifouling paints and depression of dissolved oxygen (DO) from the decay of organic matter removed from the hull prior to towing
- stressors associated with ship strike and tow line strike, from towing of ex-Enterprise from the current mooring location to destination ports
- stressors associated with ship noise from ships in transit resulting from propulsion sounds as tug boats or heavy lift-ships transit through an area
- stressors associated with construction activities at the Port of Benton barge slip, Washington, including water and sediment quality impacts associated with barge slip and substrate modifications, as well as construction noise from on-land pile driving and in-water construction activities
- stressors associated with ground disturbance resulting from land transport route modifications from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site

3.5.1.4.4 Conceptual Frameworks for Analyzing Potential Impacts under Each Alternative

Once the Navy identified applicable stressors from different activities under each alternative described in Chapter 2 (Description of Proposed Action and Alternatives), the Navy constructed conceptual frameworks to analyze each alternative. The frameworks under each alternative follow the stepwise progression of ex-Enterprise from its current mooring location to either indefinite waterborne storage (as described under the No Action Alternative) or to final disposal of the ship and its reactor plants. These frameworks are used to guide each alternative analysis in Section 3.5.3 (Environmental Consequences). Figure 3.5-2, Figure 3.5-3, and Figure 3.5-4 provide the framework for analysis for each project phase for the action alternatives.

3.5.1.4.5 Determining the Appropriate Level of Detail for Analysis of each Project Component

The Navy analyzed each sequential component under each alternative (activities described under each alternative in Chapter 2 [Description of Proposed Action and Alternatives]) to determine the appropriate level of detail to assess potential impacts on biological resources. Accordingly, the level of detail under each project component differs. Project components discussed under each alternative in Chapter 2 that would have no discernable impact on biological resources (e.g., the transport of waste and recyclables from a dismantlement facility to an approved waste or recycle facility, disposal of waste and recyclables) are not analyzed. Project components shown in Figure 3.5-2, Figure 3.5-3, and Figure 3.5-4 are analyzed under each alternative to a level of detail appropriate for the magnitude of the potential impact on biological resources.

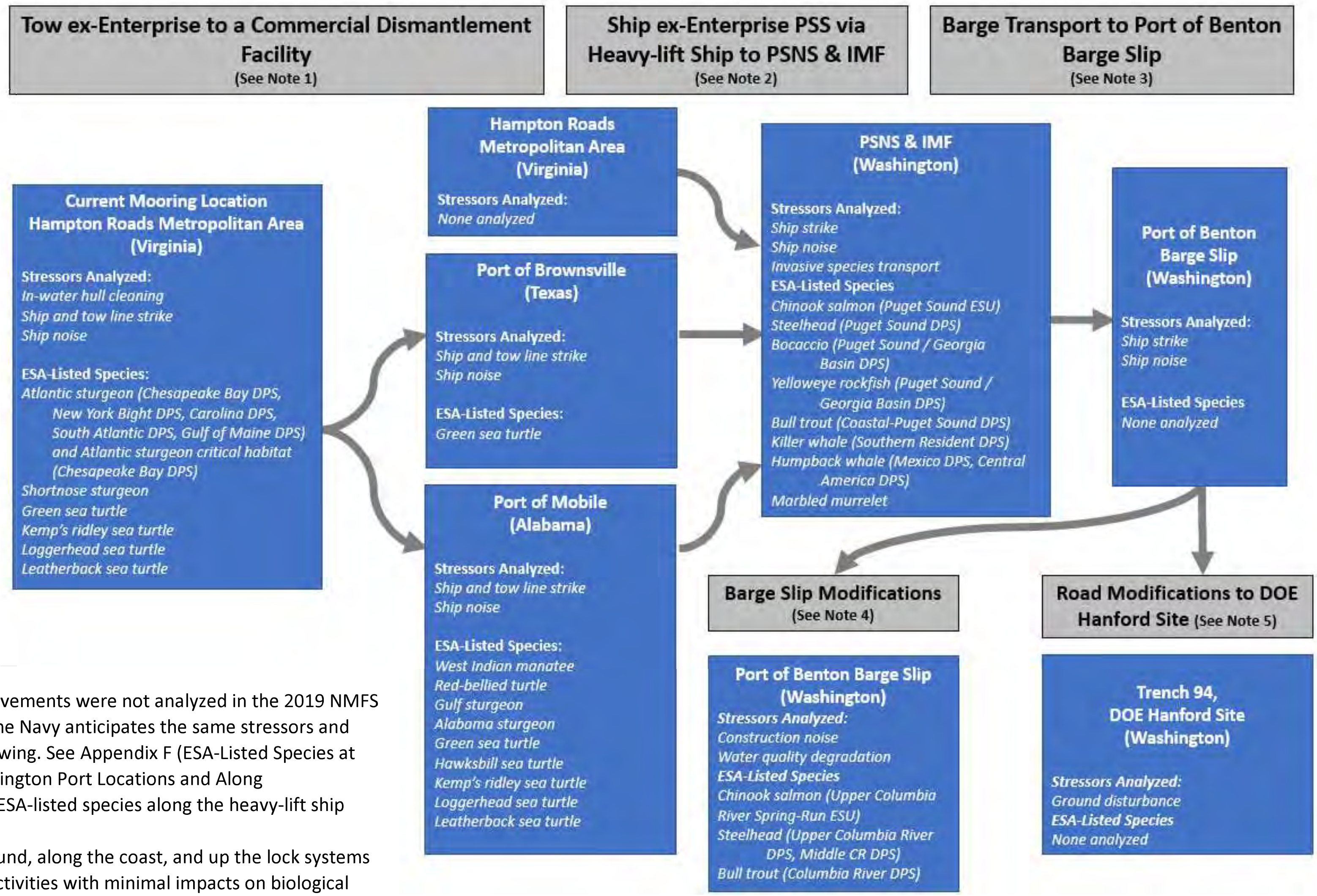


Note 1: The Navy would first give consideration to one of the dry docking mitigation methods, though this method would only be implemented if there is a sufficiently sized dry dock available during the required time frame that is close enough in proximity to the origination port to preclude risk of nonindigenous species transfer. See Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) for a list of ESA-listed species along the tow routes. ESA-listed species between the current mooring location and Port of Brownsville were analyzed in the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019). Port of Mobile was not included in 2019 consultation.

Note 2: Although heavy-lift ship movements were not analyzed in the 2019 NMFS Programmatic Biological Opinion, the Navy anticipates the same stressors and impacts as with the inactive ship towing. See Appendix F for a list of ESA-listed species along the heavy-lift ship routes.

Note 3: Barge traffic from Puget Sound, along the coast, and up the lock systems of the Columbia River are normal activities with minimal impacts on biological resources. See Appendix F for a list of ESA-listed species along the barge route between PSNS & IMF to the Port of Benton barge slip.

Figure 3.5-2: Conceptual Analysis Framework for Alternative 1

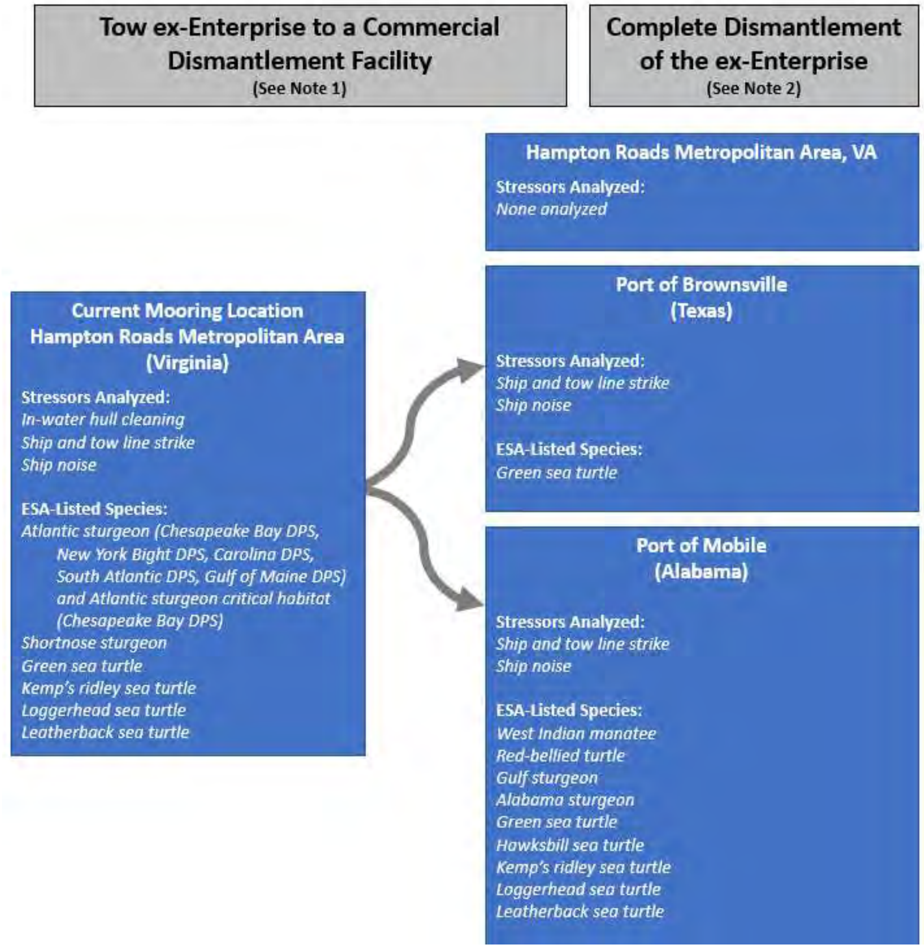


Note 1: The Navy would first give consideration to one of the dry docking mitigation methods, though this method would only be implemented if there is a sufficiently sized dry dock available during the required time frame that is close enough in proximity to the origination port to preclude risk of nonindigenous species transfer. See Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) for a list of ESA-listed species along the tow routes. ESA-listed species between the current mooring location and Port of Brownsville were analyzed in the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019).

Note 2: Although heavy-lift ship movements were not analyzed in the 2019 NMFS Programmatic Biological Opinion, the Navy anticipates the same stressors and impacts as with the inactive ship towing. See Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) for a list of ESA-listed species along the heavy-lift ship routes.

Note 3: Barge traffic from Puget Sound, along the coast, and up the lock systems of the Columbia River are normal activities with minimal impacts on biological resources. See Appendix F for a list of ESA-listed species along the barge route between PSNS & IMF to the Port of Benton barge slip.

Figure 3.5-3: Conceptual Analysis Framework for Alternative 2



Note 1: The Navy would first give consideration to one of the dry docking mitigation methods, though this method would only be implemented if there is a sufficiently sized dry dock available during the required time frame that is close enough in proximity to the origination port to preclude risk of nonindigenous species transfer. See Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) for a list of ESA-listed species along the tow routes. ESA-listed species between the current mooring location and Port of Brownsville were analyzed in the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019). Port of Mobile was not included in 2019 consultation.

Note 2: Complete dismantlement at a commercial dismantlement facility would occur at shipyard facilities and involve a limited amount of in-water work to dismantle ex-Enterprise.

Note 3: Port of Benton barge slip modifications would be necessary for larger reactor compartment packages. See Section 3.5.3.3.4.

Note 4: Infrastructure improvements along the land transport route would require some ground disturbance. There are no ESA-listed species along this route to the final disposal location at the DOE Hanford Site.

Figure 3.5-4: Conceptual Analysis Framework for Alternative 3 (Preferred Alternative)

3.5.2 Affected Environment

3.5.2.1 Virginia

The areas considered for analysis for potential impacts on biological resources within Virginia include commercial and shipyard locations within the Hampton Roads Metropolitan Area, which includes the lower portions of the James River, the Elizabeth River, and shipyard locations along the lower Chesapeake Bay. Newport News Shipbuilding, the current mooring location of ex-Enterprise, is within the Hampton Roads Metropolitan Area along the northern bank of the lower reach of the James River. As described in Chapter 2 (Description of Proposed Action and Alternatives) and shown in Figure 2-2, indefinite waterborne storage or dismantlement activities of ex-Enterprise would occur in heavily industrialized shipyard locations. Dismantlement activities or indefinite waterborne storage of ex-Enterprise would not require new infrastructure and would occur within the existing industrialized footprints at these facilities.

As part of the literature review to describe the affected environment for biological resources, the Navy reviewed previous NEPA documentation that assessed impacts along the James and Elizabeth Rivers adjacent to shipyard locations identified in Chapter 2 (Description of Proposed Action and Alternatives); State of Virginia Natural Heritage Database queries; and available literature describing the general ecology of the area.

Shorelines along the James River and lower Chesapeake Bay within the Hampton Roads Metropolitan Area are heavily modified and constructed, with large-scale development of the site dating back to 1880s. The submerged lands along the Hampton Roads Metropolitan Area have undergone extensive piling construction, dredging, and filling over the last century at Virginia shipyards (Pearman, 2020). Development of the Norfolk Naval Shipyard area on Naval Station Norfolk in Portsmouth, Virginia, began in the early 1900s with the onset of World War I, which initiated shoreline modifications, channel dredging and maintenance of portions of the Elizabeth River (Navy, 2016). The average salinity along the James River, which can fluctuate widely due to the proximity to freshwater inputs, averages around 18–21 parts per thousand (ppt) (NMFS, 2019). For context, the average ocean salinity is 35 ppt (NMFS, 2019).

Open-water habitat at the current mooring location and shipyard facilities within the Hampton Roads Metropolitan Area likely support seasonal occurrences of bay anchovy (*Anchoa mitchilli*), blueback herring (*Alosa aestivalis*), Atlantic croaker (*Micropogonias undulatus*), alewife herring (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*) (Navy, 2017). Adult spawning migrations of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) may pass through areas in the Hampton Roads Metropolitan Area vicinity. Accordingly, this ESA-listed species is described in more detail in the section below. Several species of gulls (*Larus* spp.), terns (*Sterna* spp.), ducks (*Anas* spp.), and geese (*Branta* spp.) are commonly observed in open-water habitats of these shipyards.

Information on the establishment of invasive species within the shipyard locations was sourced from the Virginia Invasive Species website. Invasive fish species of note include the northern snakehead (*Channa argus*), blue catfish (*Ictalurus furcatus*), and channel catfish (*Ictalurus punctatus*), which are predominantly freshwater fish found in major river systems and tributaries in Virginia. Invasive shellfish of concern within the Chesapeake Bay and contributing waters include the veined rappa whelk (*Rapana venosa*) (an invasive predator of indigenous shellfish and shellfish fisheries), the Chinese mitten crab (*Eriocheir sinensis*) (first identified in the Chesapeake Bay in 2006 followed by rapid spreading into lower portions of rivers), rusty crayfish (*Faxonius rusticus*) (a freshwater species known to be an aggressive invader in Virginian and West Virginian watersheds), and zebra mussels (*Dreissena polymorpha*) (first identified in northern Virginia in 2003). The invasive aquatic plant water hyacinth (*Eichhornia crassipes*) has been found in the James River with additional risk of invasion from giant salvinia (*Salvinia molesta*), water spinach (*Ipomoea aquatica*), and beach vitex (*Vitex rotundifolia*).

Atlantic Sturgeon (*Acipenser oxyrinchus*)

Status and Management. The Atlantic sturgeon population is comprised of five Distinct Population Segments (DPSs): the Carolina, South Atlantic, Chesapeake Bay, and New York Bight DPSs, which are listed as endangered, and the Gulf of Maine DPS, which is listed as threatened (77 FR 5880 and 77 FR 5913; February 6, 2012). Atlantic sturgeon in the project area of Newport News would most likely be part of the Chesapeake Bay DPS. The Chesapeake Bay DPS is comprised of Atlantic sturgeon that originate from rivers that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, Virginia. However, individuals from other DPSs, especially the Carolina and New York Bight DPSs, also could occur in this region (Hager, 2019). Critical habitat has been designated within several rivers throughout the sturgeon’s range (82 FR 39160; August 17, 2017), including the James River within the Newport News project area.

The Atlantic sturgeon is an anadromous fish, meaning they are born in fresh water, migrate into salt water where they grow and mature, then migrate back into fresh water as adults to spawn. They undergo these seasonal migrations between freshwater ecosystems where they spawn and shallow marine waters (33 to 164 feet [ft.] [10 to 50 meters {m}]) where they forage and grow (Hager, 2019). They are found along the entire U.S. East Coast. Atlantic sturgeon adults may undertake north-south seasonal migrations (Hager, 2019), and Rothermel et al. (2020) observed that Atlantic sturgeon along the mid-Atlantic coastal shelf tend to stay closer to shore in spring and summer and move to deeper waters in winter. During non-spawning years, adults may remain in marine waters year-round, although they may enter estuarine waters as well (Hager, 2019; Rothermel et al., 2020). Preferred habitat includes sand and gravel substrates (Stein et al., 2004b). This species was once found throughout Chesapeake Bay and its freshwater rivers, but it is now very rare. However, they inhabit both the main stem of the Chesapeake Bay and several of its riverine systems, including the James River.

Adult spawning runs are not completely understood. In rivers from Georgia to the Chesapeake Bay, spawning occurs during the late summer and fall. Atlantic sturgeon may migrate up into the Chesapeake Bay tributaries both in the spring and the fall to spawn (Balazik et al., 2012a; Rothermel et al., 2020), although recent research in the mid-Atlantic indicates that spawning regularly occurs in the fall with limited evidence of a spring spawn in some rivers (Kahn, 2019; Balazik et al., 2012a; Hager, 2019; Hager et al., 2014; Savoy & Pacileo, 2011). For the fall run, most spawning adults migrate upriver beginning in late July to August and return to the lower Chesapeake Bay and offshore waters by November (Balazik et al., 2012a; Hager, 2019; Hager et al., 2014).(Smith & Clugston, 1997)(Stein et al., 2004a)

Critical Habitat. Within Virginia, NMFS designated critical habitat on August 17, 2017, on the Rappahannock, York, Mattaponi, and James Rivers (82 FR 39160). Several commercial dismantlement facilities along Hampton Roads Metropolitan Area are included in the critical habitat designation (Figure 3.5-5).

Figure 3.5-5: Critical Habitat Designation for the Atlantic Sturgeon (Chesapeake Bay DPS) at Hampton Roads Metropolitan Area, Virginia

In designating critical habitat, NMFS identified the following primary biological features as essential to the conservation of the Atlantic sturgeon:

- hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder) in low salinity waters (i.e., 0–0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages
- aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development
- water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear) between the river mouth and spawning sites necessary to support (1) unimpeded movement of adults to and from spawning sites, (2) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary, and (3) staging, resting, or holding of subadults or spawning condition adults; water depths in main river channels must also be deep enough (e.g., at least 3.9 ft. [1.2 m]) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river
- water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (1) spawning; (2) annual and interannual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment (e.g., 55 to 79 degrees Fahrenheit [°F; 13 to 26 degrees Celsius (°C)] for spawning habitat and no more than 86 °F [30 °C] for juvenile rearing habitat, and 6 milligrams per liter or greater DO for juvenile rearing habitat)

The waters of the project area would provide some of these essential features supporting sturgeon in transit between the lower Chesapeake Bay and spawning grounds up the James River. However, Newport News Shipbuilding is located within the active port of Newport News, so the project area would not represent pristine river habitat, and obstructions such as piers would be present, although the port structures do not fully obstruct river passage.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. The distribution of Atlantic sturgeon is strongly associated with prey availability. Like all sturgeon, Atlantic sturgeon feed along the seafloor on invertebrates, such as crustaceans, worms, and mollusks, as well as bottom-dwelling fish, such as sand lance (*Ammodytes* spp.). Atlantic sturgeon may occur where suitable forage conditions (e.g., benthic invertebrates) and appropriate habitat (e.g., areas of sand or submerged aquatic vegetation) are present (Savoy & Pacileo, 2011; Stein et al., 2004b; Welsh et al., 2002). The Navy identified ESA-listed Atlantic sturgeon at the current mooring location at Newport News Shipbuilding. Although they may occur within the project area year-round, they would be most likely to be present during spring and fall as adults are migrating between the estuarine Chesapeake Bay and their spawning habitat within the James River. Subadults have been observed to stop and forage off of Naval Station Norfolk (located down river from Newport News), but adults transit through the lower James River without foraging (Hager, 2019).(Atlantic Sturgeon Status Review Team, 2007b) In summary, Atlantic sturgeon presence within the project areas is anticipated to be rare and intermittent.

Shortnose Sturgeon (*Acipenser brevirostrum*)

Status and Management. The shortnose sturgeon was listed as an endangered species under the Endangered Species Preservation Act on March 11, 1967 (32 FR 4001) and remained on the endangered species list with the enactment of the ESA in 1973. Shortnose sturgeon is an anadromous species that primarily inhabits rivers and estuaries. Shortnose sturgeon spawn in the coastal rivers along the East Coast of North America from the St. John River in Canada to the St. Johns River in Florida (Deslauriers & Kieffer, 2012; NMFS, 1998). Individual shortnose sturgeon spend most of the year in the lower reaches of their spawning rivers, only occasionally venturing out into the Chesapeake Bay (NMFS, 1998; Stein et al., 2004b; Welsh et al., 2002). In estuarine systems, juveniles and adults occupy areas with little or no current over a seafloor composed primarily of mud, sand, or cobble (NMFS, 1998; Stein et al., 2004b). Shortnose sturgeons are benthic feeders that prey upon crustaceans, mollusks, and insects (NMFS, 1998). Preferred prey is influenced by life stage. For example, juveniles prefer insect larvae and small crustaceans, while adults feed primarily on small mollusks (NMFS, 1998).

Critical Habitat. There is currently no critical habitat designated for the shortnose sturgeon.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. Shortnose sturgeon in the mid-Atlantic typically move upstream in the fall, overwinter in deeper waters of their river systems downstream of spawning habitat, and then spawn in the upper tributaries in spring (NMFS, 1998; Welsh et al., 2002). Spawning is known to occur in some river systems of the Chesapeake Bay, including the Potomac River (Balazik, 2017), but spawning has not been identified in the James River.

A fishery-dependent study from 1996 to 2000 expanded upon the knowledge about the movement of shortnose sturgeon within Chesapeake Bay and determined that the distribution of the population is centered in the upper Chesapeake Bay (e.g., lower Susquehanna River) (Welsh et al., 2002). In this study, movements of tagged fish confirmed that shortnose sturgeon utilize the Chesapeake & Delaware Canal to move between the Chesapeake and Delaware Bays (Welsh et al., 2002). Since the implementation of the sturgeon reward program in 1996, shortnose sturgeon have been reported in the upper Bay, from Kent Island to the mouth of the Susquehanna River and the Chesapeake & Delaware Canal, as well as farther south in the Potomac River (Balazik, 2017; NMFS, 1998). This reward program resulted in only one confirmed capture of a shortnose sturgeon in Virginia waters (Balazik, 2017). Shortnose sturgeon are reported only rarely in the lower Chesapeake Bay (Welsh et al., 2002), and the first shortnose sturgeon in the freshwater portions of the James River was reported most recently in 2016 (Balazik, 2017).

Green Sea Turtle (*Chelonia mydas*) – North Atlantic DPS

Status and Management. The green sea turtle is globally distributed and commonly inhabits nearshore and inshore waters, occurring throughout tropical, subtropical, and, to a lesser extent, temperate waters. NMFS and USFWS first listed the green sea turtle as endangered under the ESA on July 28, 1978 (43 FR 32800). In 2016, NMFS and USFWS reclassified the species into 11 DPSs (Seminoff et al., 2015)(81 FR 20057). The geographic areas that include these DPSs are (1) North Atlantic Ocean, (2) Mediterranean Sea, (3) South Atlantic Ocean, (4) Southwest Indian Ocean, (5) North Indian Ocean, (6) East Indian Ocean – West Pacific Ocean, (7) Central West Pacific Ocean, (8) Southwest Pacific Ocean, (9) Central South Pacific Ocean, (10) Central North Pacific Ocean, and (11) East Pacific Ocean. The North Atlantic DPS is listed as threatened.

The green sea turtle is distributed worldwide across tropical and subtropical coastal waters. After emerging from the nest, green turtle hatchlings swim to offshore areas where they float passively in major current systems; however, laboratory and modeling studies suggest that juvenile turtle dispersal trajectories might also be shaped by active swimming (Christiansen et al., 2016; Putman & Mansfield, 2015). Post-hatchling green turtles forage and develop in floating *Sargassum* habitats of the open ocean. At the juvenile stage (estimated at five to six years) they leave the open-ocean habitat and retreat to protected lagoons and open coastal areas that are rich in seagrass or marine algae (Bresett et al., 2006; National Oceanic and Atmospheric Administration, 2022) where they will spend most of their lives (National Oceanic and Atmospheric Administration, 2022). The optimal developmental habitats for late juveniles and foraging habitats for adults are warm, shallow waters (9.8–16 ft. [3–5 m] deep) with abundant submerged aquatic vegetation and close to near shore reefs or rocky areas (Holloway-Adkins, 2006; Seminoff et al., 2002).

Critical Habitat. On September 2, 1998, NMFS and USFWS designated critical habitat for green sea turtles in coastal waters around Culebra Island, Puerto Rico, from the mean high-water line seaward to 3 nautical miles (nm) to include the outlying Keys of Culebra (63 FR 46693); however, no project area or transportation route would be within designated critical habitat for the green sea turtle.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. Juvenile green turtles use estuaries along the Atlantic Coast, including the Chesapeake Bay, as summer developmental habitat. During the winter, the highest concentration of juvenile green turtles occurs just north of Cape Canaveral. Most green sea turtle sightings north of Florida are of juveniles and occur during late spring to early fall (Burke et al., 1992; Epperly et al., 1995; Lazell, 1980).

Green turtles occur within Chesapeake Bay during warmer months of the year, although they are less common than loggerhead or Kemp's ridley sea turtles (Barco et al., 2018). Since 2013, the Navy has been tagging turtles in Chesapeake Bay and other Virginia waters and tracking them via an acoustic array (Barco et al., 2018). In the 2017 tagging season, only a single, cold-stunned green sea turtle was identified and tagged (Barco et al., 2018). This green sea turtle was not detected on the Navy array, but it was detected on receivers in the Lynnhaven River watershed and the mouth of the James River (Barco et al., 2018). Between 2001 and 2013, 108 green sea turtles have stranded in Virginia (Barco & Swingle, 2014). Most green turtle strandings in Virginia waters occur in the summer and fall, and most strandings are juveniles (Barco & Swingle, 2014). One stranding occurred near Newport News, and several strandings have occurred in nearby Norfolk (Barco & Swingle, 2014).

<u>Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)</u>

Status and Management. The Kemp's ridley sea turtle was listed as an endangered species under the Endangered Species Preservation Act on December 2, 1970 (35 FR 18319) and remained on the endangered species list with the enactment of the ESA in 1973. Kemp's ridley sea turtles occur in the Gulf of Mexico and along the U.S. East Coast (NMFS & USFWS, 2015). Habitats frequently used in U.S. waters are warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters, where their preferred food, the blue crab (*Callinectes sapidus*), is abundant (Lutcavage & Musick, 1985; Seney & Musick, 2005; NMFS & USFWS, 2015).

Evidence suggests that post-hatchling and small juvenile Kemp's ridley sea turtles, similar to other sea turtle species, forage and develop in floating *Sargassum* habitats of the North Atlantic Ocean. Juveniles migrate to habitats along the Atlantic continental shelf from Florida to New England at around two years of age (Peña, 2006; NMFS & USFWS, 2015). Suitable developmental habitats are seagrass beds and mud bottoms in waters of less than 33 ft. (10 m) in depth and with sea surface temperatures between 72 and 90° F (22 and 32° C) (Coyne et al., 2000).

In the spring, as waters become warmer, Kemp's ridley turtles in the Atlantic travel as far north as Long Island Sound and even Nova Scotia (NMFS & USFWS, 2015). However, they are typically only present in these northern waters when temperatures are warm, as they are subject to cold-stunning if they remain in waters that drop below 50 °F (10 °C) (Robinson et al., 2020). When temperatures begin to drop, turtles in northern waters will migrate to either coastal waters off the southeast United States or oceanic waters of the Gulf Stream (Robinson et al., 2020). In tracking the southern migrations of tagged sea turtles released from Long Island Sound, Robinson et al. (2020) observed two migration patterns from Kemp's ridley turtles: (1) a southerly migration along the coast to Florida and North Carolina foraging areas; and (2) a southerly migration along the coast to North Carolina and then a shift into the Gulf Stream and out to offshore waters. Coastal migrations were within 62 miles (mi.) (100 km [kilometers]) of the coast and in waters less than 656 ft. (200 m) deep (Robinson et al., 2020). There have been occasional instances of nesting documented along the U.S. East Coast (NMFS & USFWS, 2015), but nesting is not expected to occur in the areas potentially affected by the Proposed Action and alternatives.

Critical Habitat. There is currently no critical habitat designated for Kemp's ridley sea turtles.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. Between 2001 and 2013, 519 Kemp's ridley sea turtles have stranded in Virginia, more than four times as many as any other sea turtle species except loggerhead turtles (which had 2,807 strandings during the same period) (Barco & Swingle, 2014). Kemp's ridley strandings have occurred in the lower Chesapeake Bay within the Hampton Roads Metropolitan Area in all seasons (Barco & Swingle, 2014). In May to September of 2017, roughly 30 Kemp's ridley sea turtles were caught and 21 were tagged as part of the Navy's turtle tagging and tracking efforts (Barco et al., 2018). Kemp's ridley turtles tagged in 2017 moved from release areas along the Virginia Beach oceanfront to river mouths (including the James River), inland bays, and flats in the mainstem Chesapeake Bay; a similar pattern was observed in previous years as well (Barco et al., 2018). Most of the sea turtle tag recordings occurred during spring and fall before the turtles migrated south. It was noted that, in the project area, tagged animals seemed to be foraging rather than transiting, based on their movements (Barco et al., 2018). In general, Kemp's ridleys seem to recruit to shallow inlets within the lower Chesapeake, likely to forage on blue crabs (Barco et al., 2018).

Leatherback Sea Turtle (*Dermochelys coriacea*)—Northwest Atlantic DPS

Status and Management. The leatherback sea turtles was listed as an endangered species under the Endangered Species Preservation Act on June 2, 1970 (35 FR 8491), and remained on the endangered species list with the enactment of the ESA in 1973. Although listed as endangered throughout its range, NMFS has recognized seven DPSs worldwide (NMFS & USFWS, 2020).

The leatherback turtle is the most widely distributed of all sea turtles, found from tropical to subpolar oceans from 71 °N to 47 °S (James et al., 2005; NMFS & USFWS, 2020). Adult leatherback turtles forage in temperate and subpolar regions in all oceans, and they migrate to tropical nesting beaches (Myers & Hays, 2006; NMFS & USFWS, 1992), although there is evidence of continued foraging in tropical latitudes as well (Myers & Hays, 2006). Leatherbacks have a wide nesting distribution, primarily on high-energy mainland beaches in tropical and, occasionally, subtropical latitudes (NMFS & USFWS, 2020), and to a lesser degree, on some islands.

Critical Habitat. NMFS designated critical habitat for the Northwest Atlantic DPS on January 26, 2012 (77 FR 4169), but it is not in the vicinity of the James River.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. Between 2001 and 2013, 92 leatherback sea turtles stranded in Virginia (Barco & Swingle, 2014), a relatively small number in comparison to the 2,807 loggerhead and 519 Kemp's ridley turtles that stranded during the same period. None of these strandings occurred at along the James River, and very few occurred beyond the mouth of the Chesapeake Bay (Barco & Swingle, 2014). Leatherback sea turtles may occur within the Hampton Roads Metropolitan Area, but they would be rare, especially in fall and winter.

Loggerhead Sea Turtle (*Caretta caretta*)—Northwest Atlantic Ocean DPS

Status and Management. NMFS listed the loggerhead sea turtle as endangered under the ESA on July 28, 1978 (43 FR 32800). On September 22, 2011, NMFS designated nine DPSs (76 FR 58868), five of which are listed as endangered and four of which are listed as threatened. Only the Northwest Atlantic Ocean DPS, which is listed as threatened, would be expected to occur within the Hampton Roads Metropolitan Area.

Loggerhead sea turtles inhabit all temperate and tropical regions of the Atlantic Ocean. They occur in U.S. waters (including the Gulf of Mexico and U.S. East Coast) in habitats ranging from coastal estuaries to far beyond the continental shelf (Guyer et al., 2015; Hopkins-Murphy et al., 2003; Roberts et al., 2005; USFWS, 2020a).

Many loggerhead hatchlings reside in the pelagic waters of the North Atlantic Gyre (USFWS, 2020a) where, as juveniles, they associate with mats of *Sargassum* for years before returning to nearshore areas (The State of the World's Sea Turtles, 2022; USFWS, 2020a). Loggerhead hatchlings float passively in major current systems; however, laboratory and modeling studies suggest that juvenile dispersal trajectories might also be shaped by active swimming (Christiansen et al., 2016). Some juveniles migrate between oceanic and nearshore habitats as turtles move seasonally from open-ocean current systems (winter) to nearshore foraging areas (summer) (Bolten, 2003; Conant et al., 2009; Mansfield, 2006).

Loggerhead sea turtles are primarily carnivorous in both open-ocean and nearshore habitats, although they also consume some plant matter (Bjorndal, 1997; Conant et al., 2009). They forage over a variety of benthic hard- and soft-bottom habitats, and they also capture prey throughout the water column (Bjorndal, 2003; USFWS, 2020a). Adult loggerheads feed on a variety of gelatinous prey (e.g., jellyfish) and bottom-dwelling animals, such as crabs, sea urchins, and sponges (Fukuoka et al., 2016; Pajuelo et al., 2016).

Critical Habitat. Critical habitat occurs throughout a large portion of the Atlantic Ocean and Gulf of Mexico (79 FR 39856), but there is no critical habitat in the vicinity of the James River.

Potential Occurrence within Hampton Roads Metropolitan Area Shipyard Locations. Although loggerhead sea turtles may be present off the southeast United States year-round, in the northeast and mid-Atlantic regions, they are seasonally present. Shoop and Kenney (1992) estimated that a minimum of 8,000 to 11,000 loggerheads are present in the northeastern U.S. continental shelf waters each summer, with the highest summer occurrence in waters over the mid-continental shelf, roughly from Delaware Bay to Hudson Canyon. Juveniles are frequently observed in developmental habitats, including coastal inlets, sounds, bays, estuaries, and lagoons with depths less than 328 ft (100 m) (Hopkins-Murphy et al., 2003; Turtle Expert Working Group, 1998). Long Island Sound, Cape Cod Bay, and Chesapeake Bay are the most frequently used juvenile developmental habitats along the northeastern U.S. continental shelf (Conant et al., 2009; Mansfield, 2006; Prescott, 2000; University of Delaware Sea Grant, 2000).

Essential Fish Habitat

EFH and Habitat Areas of Particular Concern (HAPC) designated within the Hampton Roads Metropolitan Area is under the jurisdiction of the Mid-Atlantic Fishery Management Council. However, EFH within the area has been designated for specific life stages of some species that are under the jurisdiction of the New England Fishery Management Council. In addition, NMFS has assumed the responsibility of designating EFH and HAPC for federally managed highly migratory species (e.g., tunas, billfish, swordfish, and sharks) in the U.S. waters of the Atlantic Ocean and the Gulf of Mexico, as these species are not restricted to the waters under the jurisdiction of any single Fishery Management Council. Within the Hampton Roads Metropolitan Area, the likelihood of encountering highly migratory species managed by NMFS is low, but EFH is designated within the Hampton Roads Metropolitan Area for some of these species.

EFH within the Hampton Roads Metropolitan Area (where in-water hull cleaning would occur) includes water column, bottom substrates such as soft sediments, and biogenic habitats such as submerged aquatic vegetation and oyster reefs. Federally managed fish species found in the Hampton Roads Metropolitan Area include sand tiger shark (*Carcharias taurus*), sandbar shark (*Carcharhinus plumbeus*), Atlantic herring (*Clupea harengus*), clearnose skate (*Raja eglanteria*), windowpane flounder (*Scophthalmus aquosus*), bluefish (*Pomatomus saltatrix*), Atlantic butterfish (*Peprilus triacanthus*), summer flounder (*Paralichthys dentatus*), and black sea bass (*Centropristis striata*). The Navy will consult with NMFS for potential impacts on EFH for activities described under Alternative 3 (Preferred Alternative).

3.5.2.2 Alabama

The areas considered for analysis for potential impacts on biological resources within Alabama include the location of the commercial facilities in Mobile, where dismantlement could occur. As described in Chapter 2 (Description of Proposed Action and Alternatives) and shown in Figure 2-8, dismantlement activities would occur in heavily industrialized portions along this corridor. Dismantlement activities would not require new infrastructure and would occur within the existing industrialized footprints of facilities within Mobile.

As part of the literature review to describe the affected environment for biological resources, the Navy reviewed previous NEPA documentation that assessed impacts within the Federal Mobile Harbor Navigation Channel; Alabama Natural Heritage Program queries for the Mobile River near port facilities; and available literature describing the general ecology of the area.

Mobile Bay is an estuary which serves as a transition zone where the freshwater from the rivers mix with the tidally influenced saltwater of the Gulf of Mexico. Mobile Bay is recognized as a major national estuary of the United States since 1995, with the designation as one of 28 National Estuary Programs established by the EPA. The outflow of the Mobile River into Mobile Bay has created the second-largest intact river delta system in the nation (Greening et al., 2018). The Mobile Bay and the Mobile-Tensaw River Delta supports a diverse set of fish and wildlife habitats, including bogs, bottomland hardwoods, freshwater and hardwood swamps, freshwater wetlands, maritime forests, pine savanna, submerged aquatic vegetation, tidal and brackish water marshes, and oyster reefs (Byrnes et al., 2017).

In contrast, commercial shipyard locations within the Port of Mobile and the Federal Mobile Harbor Navigation Channel are heavily industrialized and located near metropolitan Mobile (USACE, 2014). The submerged lands within the Port of Mobile vicinity have undergone extensive expansion, including pile construction, maintenance dredging, and shoreline stabilization and channelization since World War II, culminating in extensive river channeling and shipping network construction in the 1970s and early 1980s (Peachey, 2003).

In open-water habitats within the Federal Mobile Harbor Navigation Channel near commercial shipyard facilities, several species of macroinvertebrates likely occur, such as the following (DOT & Alabama Department of Transportation, 2019):

- blue and stone crabs (*Callinectes sapidus* and *Menippe adina*)
- crayfish (*Procambarus* spp.)
- various species of shrimp (*Penaeus aztecus*, *P. duorarum*, and *P. setiferus*)

Representative fish species likely include the following:

- blue and channel catfish (*Ictalurus furcatus* and *I. punctatus*)
- striped and largemouth bass (*Morone* spp.)
- sunfish (*Lepomis macrochirus*, *L. punctatus*, *L. microlophus*)
- Spanish mackerel (*Scomberomorus maculatus*)

Invasive aquatic species in the vicinity of shipyard locations are typical of the Gulf Coast and include the island apple snail (*Pomacea maculata*), Asian clam (*Corbicula fluminea*), and tilapia (*Oreochromis* spp.) (Alabama Natural Heritage Program, 2020).

The most proximate record of a bald eagle nest near the Port of Mobile is approximately 10 mi. away along Bay Minette Creek. Bald eagles would not be expected to forage within the Federal Mobile Harbor Navigation Channel adjacent to the commercial shipyard facilities (USACE, 2019). In addition, the bottlenose dolphin (*Tursiops truncatus*), a non-ESA listed marine mammal protected under the MMPA, is known to occur within the Federal Mobile Harbor Navigation Channel (Alabama Natural Heritage Program, 2020).

During a literature review of biological resources within the Port of Mobile project area, the Navy identified four ESA-listed species that have potential to occur within the Mobile River channel that runs through the Port of Mobile shipyard facilities. These species include the Alabama sturgeon (*Scaphirhynchus suttkusi*), Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), Alabama red-bellied turtle (*Pseudemys alabamensis*), and West Indian manatee (*Trichechus manatus latirostris*). The regulatory status, critical habitat designations, and potential occurrence of these species within the Port of Mobile project area are summarized below.

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Status and Management. The Gulf sturgeon is an anadromous species that occurs in bays, estuaries and rivers, and in the marine environment from Florida to Louisiana. NMFS listed the Gulf sturgeon as endangered under the ESA on September 30, 1991 (56 FR 49653). The fishery for the species has been closed since being listed. Bycatch (the unintentional catching of unintended species in commercial fisheries) along the Gulf coast was a major source of mortality (USFWS, 1995), and efforts to reduce bycatch include gear modifications for nearshore trawl fisheries (NMFS, 2010).

Critical Habitat. On Mach 19, 2003, NMFS designated critical habitat for Gulf sturgeon within and adjacent to the states of Louisiana, Mississippi, Alabama, and Florida (68 FR 13369). There is no critical habitat designated within the Mobile River channel through the Port of Mobile shipyard facilities or within the greater Mobile Bay area.

Potential Occurrence within the Port of Mobile and Transportation Route. Mobile Bay once supported the largest-ever commercial catch of Gulf sturgeon, reported in 1902 (Ross et al., 2009; USFWS & NMFS, 2009). Mobile River records from fishermen or scientific sampling have been few, limited to single individuals, and restricted to the lower river and estuary, with the last report in the early 1990s (USACE, 2019). With the loss of deep holes from maintenance dredging activities that serve as critical seasonal holding habitat, this species is likely extirpated from the extensively impounded, fragmented, and dredged Mobile River system (USACE, 2019).

<u>Alabama Sturgeon (*Scaphirhynchus suttkusi*)</u>

Status and Management. USFWS listed the Alabama sturgeon as endangered under the ESA on May 5, 2000 (65 FR 26438). This species once ranged within all major rivers in the Mobile Basin, including the Alabama, Tombigbee, Black Warrior, Coosa, Tallapoosa, and Cahaba River systems. Records are extremely rare—the last observed Alabama sturgeon was in 2009 (Stewart et al., 2012). This riverine species is currently believed to be restricted to the lower portions of the Cahaba and Alabama rivers in south Alabama (Kuhajda & Rider, 2016).

Critical Habitat. On June 2, 2009, USFWS designated critical habitat for the Alabama sturgeon within the river channels of the Alabama, Tallapoosa, and Cahaba Rivers (74 FR 26488). Critical habitat was not designated in the Mobile River; therefore, there is no critical habitat at Port of Alabama shipyard facilities.

Potential Occurrence within the Port of Mobile and Transportation Route. Because of the extensive dredging activities and reduced flow into the Mobile River from upstream lock and dam systems, the Alabama sturgeon is believed to be extirpated from the portions of the Mobile River that flow through shipyard facilities at the Port of Mobile. Therefore, it is highly unlikely that this species would be present within the project area.

<u>Alabama Red-bellied Turtle (*Pseudemys alabamensis*)</u>

Status and Management. On June 16, 1987, USFWS listed the Alabama red-bellied turtle as endangered under the ESA (52 FR 22939). Found almost exclusively in the Mobile-Tensaw Delta, the greatest threats to this species are loss or degradation of habitat, especially the loss and degradation of the submerged aquatic vegetation on which the turtle depends.

Critical Habitat. The USFWS has not designated critical habitat for this species.

Potential Occurrence within the Port of Mobile and Transportation Route. Alabama red-bellied turtles typically occur in broad, vegetated expanses of shallow water in the backwater areas of bays, in and along river channels, and less frequently in oxbow lakes. Snags and dense beds of submersed and emergent aquatic vegetation provide turtles with a substrate for cover, predator avoidance, food, and structure for basking and thermoregulation. Although regarded as a freshwater species, the occasional presence of barnacles on shells indicates that the turtle is tolerant, to some extent, of saline waters. In Alabama, the turtle occupies the freshwater of shallow side-channel coves along the main river channels draining into Mobile Bay, as well as smaller tributary streams and broad, shallow brackish bays surrounding Mobile Bay. Because shipyard locations within the Port of Mobile do not contain these shallow waters, soft bottoms, and submerged aquatic vegetation, any occurrence of this species within the project area would be considered extremely rare.

<u>**West Indian Manatee (*Trichechus manatus latirostris*)**</u>

Status and Management. On April 5, 2017, USFWS downlisted the West Indian manatee from endangered to threatened (82 FR 16668). West Indian manatees inhabit marine, brackish, and freshwater ecosystems in coastal and riverine habitats throughout their range. Their range includes the eastern United States, eastern Gulf of Mexico, Caribbean, and northern areas of South America. They inhabit waters off the coast of Florida throughout the year, but the rest of their range is seasonally restricted. West Indian manatees cannot tolerate temperatures 68° F (20° C) for extended periods of time, and during the winter months, their population is concentrated in the warmer waters around the Florida peninsula. During the summer months when the water temperatures are warmer, they have been sighted as far north as Massachusetts and as far west as Texas. They prefer nearshore habitats featuring underwater vegetation, like seagrass and eelgrass (Runge et al., 2015; USFWS, 2014). Although manatees have been found using waters as shallow as 1.3 ft (0.4 m), they typically utilize locations with access channels that are at least 3–7 ft (1–2 m) deep(Lefebvre et al., 2001; Runge et al., 2015).

The Florida subspecies is divided into four management units: the Upper St. Johns River (4 percent of the population), Atlantic Coast (46 percent), Southwest Florida (38 percent), and Northwest Florida (12 percent). The Northwest Florida management unit would be most likely to occur within Mobile Bay (Cloyed et al., 2021). Although individuals from the Southwest Florida management unit might occur rarely within Mobile Bay, individuals from the Atlantic populations rarely enter the Gulf of Mexico and would not be expected to occur in the Port of Alabama or within Mobile Bay (USFWS, 2014).

Critical Habitat. On September 22, 1977, USFWS designated critical habitat for the West Indian manatee along designated rivers, streams, and bays located on the east and west coast of Florida (42 FR 47840). No portion of the transportation routes for ex-Enterprise would traverse these areas. Therefore, no critical habitat designated for the West Indian manatee would occur within the tow route or at Port of Mobile shipyard facilities.

Potential Occurrence within the Port of Mobile and Transportation Route. Manatees are found in coastal marine, brackish, and freshwater habitats. They are typically found in seagrass beds, canals, creeks, embayments, and lagoons near the mouths of rivers and sloughs (Lefebvre et al., 2001). Habitat selection is influenced by food, water temperatures, and freshwater resources. This species is highly dependent on submerged aquatic vegetation (Laist et al., 2013; Runge et al., 2015). Within Mobile Bay, they are known to occur throughout the bay system that supports adequate foraging resources. Manatees are frequently reported in Dog River, a river emptying into Mobile Bay. A group of manatees were most recently sighted in Dog River in June 2018 (DOT & Alabama Department of Transportation, 2019). The mouth of Dog River is approximately 10 mi. south of shipyard facilities at the Port of Mobile. For more than a decade, Dauphin Island Sea Lab Alabama (2021) has reported dozens of manatee sightings in and around Mobile Bay each year. In recent years, there have been occasional confirmed reports of manatees remaining along the Mississippi-Alabama coast from mid-November to March, and (Cloyed et al., 2021) speculate that may be evidence of climate change-related range shifts. Because the portion of the Mobile River that passes through shipyards has a long history of dredging and shoreline modification, adequate habitat is not present in shipyard locations. Therefore, if a West Indian manatee were to occur within the project area, it would be extremely rare.

Green Sea Turtle (*Chelonia mydas*) – North Atlantic DPS

The green sea turtle was described previously in Section 3.5.2.1 (Virginia). There is no critical habitat for this species designated within the Port of Mobile shipyard facilities, Mobile Bay, and along the transportation routes to or from the Port of Mobile.

Potential Occurrence within the Port of Mobile and Transportation Route. In the northern Gulf of Mexico, green sea turtles prefer the coastal habitats of southern Texas (e.g., lagoons, channels, inlets, bays), including Texas' Laguna Madre (Renaud et al., 1995). As water temperatures rise from April to June, green sea turtle numbers increase in the continental shelf waters off Galveston Bay and in those waters associated with the continental shelf break northeast of Corpus Christi. However, green turtles occur in greater concentrations in the northeast Gulf of Mexico, from the eastern coast of Louisiana eastward (Louisiana Department of Wildlife and Fisheries, 2004). Green sea turtles are known to occur within Mobile Bay (Handley et al., 2013).

Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Status and Management. The hawksbill sea turtle was listed as an endangered species under the Endangered Species Preservation Act on June 2, 1970 (35 FR 8491) and remained on the endangered species list with the enactment of the ESA in 1973. Hawksbill sea turtles inhabit tropical and subtropical waters of the Atlantic Ocean. The hawksbill is the most tropical of the world's sea turtles, rarely occurring above 35 degrees North latitude (°N) or below 30 degrees South latitude (°S) (Seminoff et al., 2003). Hatchlings are believed to occupy open-ocean waters, associating themselves with surface algal mats (e.g., *Sargassum* mats) in the Atlantic Ocean (Seminoff et al., 2003; NMFS & USFWS, 2013; Witherington & Hirama, 2006). Juveniles leave the open-ocean habitat after three to 10 years and settle in coastal foraging areas, typically in coral reefs, but occasionally in seagrass beds, algal beds, mangrove bays, and creeks (Mortimer & Donnelly, 2008; NMFS & USFWS, 2013). As they mature into adults, hawksbills may move to deeper habitats and forage to depths greater than 295 ft (90 m). As adults, hawksbills are found in waters beyond the continental or insular shelf only when they are in transit between distant foraging and nesting grounds (Renaud et al., 1995; Shaver & Rubio, 2007; Shaver et al., 2005). Hawksbills nest on sandy beaches in tropical and subtropical latitudes (NMFS & USFWS, 2013).

Critical Habitat. Critical marine habitat was designated by NMFS on September 2, 1998, for the coastal waters surrounding Mona and Monito Islands, Puerto Rico (63 FR 46693). There is no critical habitat for this species designated within the Port of Mobile shipyard facilities, Mobile Bay, and along the transportation routes to or from the Port of Mobile.

Potential Occurrence within the Port of Mobile and Transportation Route. Nesting is not known to occur on U.S. beaches (Gunter, 1981; NMFS & USFWS, 2013) and would, therefore, not be expected near Mobile Bay. In the Gulf of Mexico, rare hawksbill turtle sightings occur in waters off the Florida Panhandle, Alabama, Mississippi, Louisiana, and Texas (Gunter, 1981; Rester & Condrey, 1996; Seminoff et al., 2003). These individuals are likely the early juveniles born on nesting beaches in Mexico that have drifted north with the dominant currents (NMFS & USFWS, 1993). Hawksbill turtles are more common in the southern Gulf of Mexico and into the Caribbean (NMFS & USFWS, 1993) and are not expected to occur within the project area.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

The Kemp's ridley sea turtle was described previously in Section 3.5.2.1 (Virginia). There is no critical habitat designated for this species.

Potential Occurrence within the Port of Mobile and Transportation Route. In the Gulf of Mexico, the Kemp's ridley occurs year round in coastal waters (Shaver et al., 2016), and some adults never leave the Gulf. The majority of the population nests (April through July) in the Gulf of Mexico, with highest nesting concentrations along a stretch of beaches from southern Texas to the Yucatán peninsula and lower concentrations from Alabama to Florida (NMFS & USFWS, 2015; Shaver et al., 2016). As Kemp's ridley sea turtles migrate from their Gulf of Mexico nesting beaches to their foraging grounds, they tend to remain within 12 mi. (20 km) of the coast in waters no deeper than 164 ft. (50 m) (NMFS & USFWS, 2015; Shaver et al., 2016). Foraging "hot spots" for females exist within the Gulf of Mexico from Texas through Mississippi, especially off Louisiana (NMFS & USFWS, 2015).

Kemp's ridley sea turtles are the most common turtles in the waters of Alabama (Raines, 2010). They are also known to nest on Alabama beaches, although nesting is more common elsewhere in the Gulf of Mexico (Guyer et al., 2015). Mobile Bay is an important foraging ground for Kemp's ridley sea turtles, especially juvenile turtles (Handley et al., 2013; Raines, 2010).

Leatherback Sea Turtle (*Dermochelys coriacea*)—Northwest Atlantic DPS

The leatherback sea turtle was described previously in Section 3.5.2.1 (Virginia). There is no critical habitat for this species designated within the Port of Mobile shipyard facilities, Mobile Bay, and along the transportation routes to or from the Port of Mobile.

Potential Occurrence within the Port of Mobile and Transportation Route. In the Gulf of Mexico, leatherback sea turtles regularly inhabit deep offshore waters, especially between Mississippi and DeSoto Canyon (off Alabama and the Florida panhandle) for feeding, resting, and migrating (Davis et al., 2000; Landry & Costa, 1999). Leatherback sea turtles also may occur in shallow waters on the continental shelf and have been observed feeding on dense aggregations of jellyfish in nearshore waters off the Florida Panhandle, the Mississippi River Delta, and the Texas coast (Collard, 1990).

Both stranded and foraging adult leatherback sea turtles have been observed in Alabama waters, although rarely (Guyer et al., 2015). There is a possibility of nesting on Alabama beaches, although nesting activity has not been confirmed within the state (Guyer et al., 2015). The National Centers for Environmental Information's (2014) *Gulf of Mexico Data Atlas* indicates that Mobile Bay's shores are only marginally suitable nesting habitat for leatherback sea turtles. Leatherbacks rarely occur within Mobile Bay.

Loggerhead Sea Turtle (*Caretta caretta*)—Northwest Atlantic Ocean DPS

The loggerhead sea turtle was described previously in Section 3.5.2.1 (Virginia). NMFS designated critical habitat (nearshore reproductive habitat) along Gulf coastal beaches near the mouth of Mobile Bay; however, the navigation channel for ship traffic into Mobile Bay does not overlap with the critical habitat designation.

Potential Occurrence within the Port of Mobile and Transportation Route. In the Gulf of Mexico, loggerhead sea turtles can be found during all seasons in both continental shelf and slope waters (Conant et al., 2009; Davis et al., 2000). Nesting is infrequent in this region, and juvenile loggerheads appear to primarily use the developmental habitats found in the northwestern Gulf, including coastal inlets, sounds, bays, estuaries, and lagoons with depths less than 328 ft. (100 m) (Bolten, 2003; Bowen et al., 1995; Musick & Limpus, 1997; Pitman, 1990; Zug et al., 1995). The occurrence of loggerhead sea turtles during winter is likely concentrated in the northeastern Gulf; in Alabama and Florida Panhandle shelf waters; and, to a lesser extent, in the deeper off-shelf waters from Texas to Florida. Loggerhead sea turtles are known to occur within Mobile Bay (Guyer et al., 2015; Handley et al., 2013).

3.5.2.3 Texas

The areas considered for analysis for potential impacts on biological resources within Texas include the location of the commercial facilities in the Port of Brownsville where commercial dismantlement could occur. As described in Chapter 2 (Description of Proposed Action and Alternatives) and shown in Figure 2-7, dismantlement activities would occur in heavily industrialized portions of the Port of Brownsville. Dismantlement activities would not require new infrastructure and would occur within the existing industrialized footprint of the Port of Brownsville.

As part of the literature review to describe the affected environment for biological resources, the Navy reviewed previous NEPA documentation that assessed impacts within the Brownsville Ship Channel; State of Texas Natural Diversity Database queries for the ship channel and Cameron County, Texas; and available literature describing the general ecology of the area.

The Brownsville Ship Channel is an artificial, man-made ship channel that was completed in 1936 and connects the Port of Brownsville to the Brazos Santiago Pass. It was subsequently dredged several more times becoming progressively deeper to accommodate larger ships. Dredged material from past activities has been placed along either side of the channel, effectively isolating many of its previous connections to the Laguna Madre, Bahia Grande, and South Bay (Shelton & Webb, 2009). As such, precipitation is the main source of freshwater input in the channel. As a result of the limited freshwater input and small tidal exchange from the Gulf of Mexico, the Brownsville Ship Channel has high salinity levels and experiences episodes of low DO due to its being a dead-end channel with little freshwater inflow, low velocities, and low tidal exchange (Kowalski et al., 2018). The salinity levels at the Port of Brownsville range between 34 and 37 ppt (NMFS, 2019). For context, the average ocean salinity is 35 ppt (Digiantonio et al., 2020).

Open-water habitat within the Brownsville Ship Channel adjacent to Port of Brownsville commercial facilities are consistently submerged, unlike wetlands or tidal flats where water levels are influenced by rainfall or tides. Typical bird species include osprey (*Pandion haliaetus*), herring gull (*Larus smithsonianus*), laughing gull (*Leucophaeus atricilla*), and brown pelican (*Pelecanus occidentalis*). There are no known nests of bald eagles within Cameron County, Texas, and any bald eagles within the project area would be considered transients and rare.

The Brownsville Ship Channel is considered a saltwater fishery by the Texas Parks and Wildlife Department (2019). Commercial fisheries in the area include eastern oysters as well as penaeid shrimp. For commercial shrimping purposes, the lower Laguna Madre, including the Brownsville Ship Channel, is considered a bait bay, where a boat licensed as a commercial bait shrimp boat is used inside waters of the state for taking bait shrimp for pay, barter, sale, or exchange. Specifically identified bait bay, including the Brownsville Ship Channel are not considered nursery areas that serve as major growth and development environments for post larval and juvenile shrimp (Texas Parks and Wildlife Department, 2019).

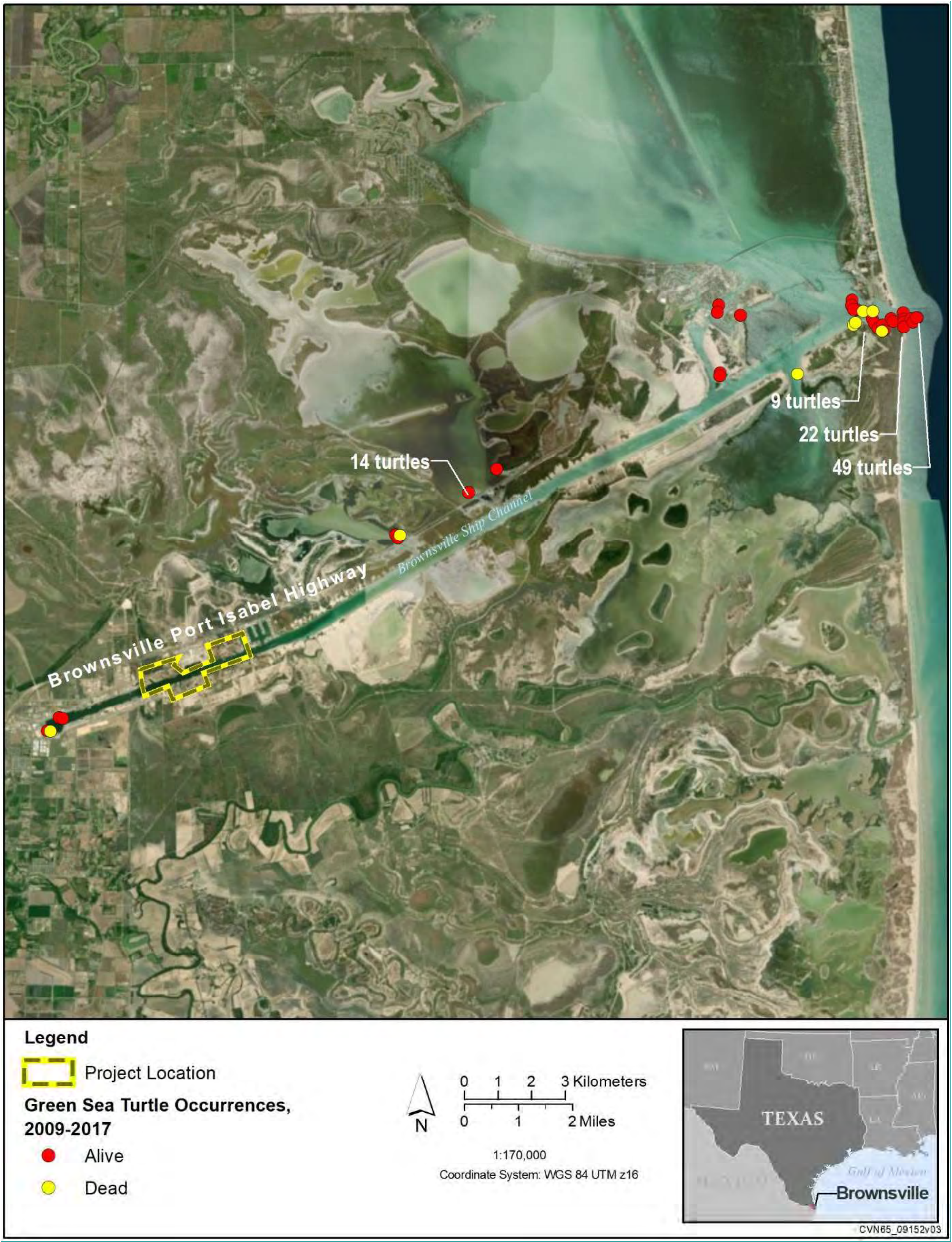
Invasive aquatic species are of a high concern in the state of Texas and the Texas Parks and Wildlife restricts the importation and possession of approximately 600 species of fishes, shellfishes, and aquatic plants. Boaters in the state are required by law to remove all harmful plants and animals from boats and trailers before leaving the vicinity of a lake, river, or bay. The two species of the greatest concern are zebra mussels and giant salvinia (NMFS, 2019).

Based on review of potential ESA-listed species within the Brownsville Ship Channel, the Navy determined that only the green sea turtle would have the potential to occur within the entry and exit routes of the ship channel. The Navy determined that other ESA-listed species, such as the jaguarundi, the ocelot, and the West Indian manatee would not occur within the ship channel, and therefore are not considered for analysis.

Green Sea Turtle (*Chelonia mydas*) – North Atlantic DPS

The green sea turtle was described previously in Section 3.5.2.1 (Virginia). There is no critical habitat for this species designated within the Port of Brownsville or Brownsville Ship Channel.

Potential Occurrence within the Brownsville Ship Channel. The green sea turtle (North Atlantic DPS) is known to occur within the Brownsville Ship Channel (Figure 3.5-6) (NMFS, 2019; Texas Natural Diversity Database, 2020). Figure 3.5-6 shows individual green sea turtles in and around the Brownsville Ship Channel, as reported in the 2019 NMFS Programmatic Biological Opinion. Because of the habitat and water quality conditions (e.g., high salinity and low DO levels) reported in the vicinity of the Port of Brownsville, occurrences of green sea turtles within the western portions of the Brownsville Ship Channel (where facilities are located) should be considered rare.



Note: Adapted from NMFS (2019)

Figure 3.5-6: Green Sea Turtle Occurrences Within the Brownsville Ship Channel, Texas

3.5.2.4 Washington

The areas considered for analysis of potential impacts on biological resources within Washington include PSNS & IMF, the transportation route from PSNS & IMF up the Columbia River to the Port of Benton barge slip, and the land transport route from the barge slip to the final disposal location at the DOE Hanford Site. The following sections describe the affected environment potentially impacted by proposed activities in these areas.

3.5.2.4.1 Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet

PSNS & IMF is located on Sinclair Inlet in Puget Sound, bordered on the west by the Bremerton Annex of Naval Base Kitsap, and on the north and east by the city of Bremerton, Washington. Although the area is heavily industrialized with a long history of ship building and maintenance dating back to 1891, the facility supports important biological resources within port facilities (Navy, 2018b).

In support of this EIS/OEIS, the Navy completed a literature review to accurately describe biological resources potentially affected by the proposed activities described in Chapter 2 (Description of Proposed Action and Alternatives). Primary sources of information used for this literature review for the vicinity of PSNS & IMF included online searches for published studies and technical reports on biological resources in the project area, online queries of regulatory databases such as the USFWS Environmental Conservation Online System, the most recent INRMP for Naval Base Kitsap (Navy, 2018b), and the most recent status reviews and recovery plans for ESA-listed species. The results of this literature review are summarized below:

In 2012, the Navy prepared an Environmental Assessment (EA), *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)*, for the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise. In this document, the Navy analyzed potential impacts on biological resources resulting from ex-Enterprise single reactor compartment packaging at PSNS & IMF (Navy & DOE, 2012).

In addition, the recent INRMP for Naval Base Kitsap provided descriptions of the general biotic environment.

Representative fish species that occur within PSNS & IMF include (but may not be limited to) the following (Navy, 2018b):

- English sole (*Parophrys vetulus*)
- rock sole (*Lepidopsetta bilineata*)
- lingcod (*Ophiodon elongatus*)
- starry flounder (*Platichthys stellatus*)
- Pacific tomcod (*Microgadus proximus*)
- shiner perch (*Cymatogaster aggregata*)
- pile perch (*Rhacochilus vacca*)
- Pacific herring (*Clupea pallasii*)

Depending on the time of the year, the nearshore littoral zone within the project area is generally dominated by shiner perch and juvenile salmon, with the open water dominated by juvenile salmon, forage fish, and threespine stickleback (*Gasterosteus aculeatus*). Some ESA-listed fishes have the potential to occur in the project area, such as the Southern DPS of green sturgeon (*Acipenser* *medirostris*) and the Southern DPS of Pacific eulachon (*Thaleichthys pacificus*), but their occurrence would be rare to infrequent. Pacific eulachon occur within Puget Sound, but are at very low abundance relative to coastal waters, and typically occupy very deep waters (74 FR 10857). With respect to green sturgeon distribution within the inland waters, two tagged southern DPS green sturgeon originating from San Pablo Bay were detected south of Whidbey Island in 2006 (Moser et al., 2021), one of which was detected over a two-year period in the area. However, from 2008 to 2019, no southern DPS green sturgeon were detected in central or south Puget Sound (Moser et al., 2021). Therefore, these species are not discussed further.

The industrial nature of PSNS & IMF limits the suitable habitat for bird species, though many species of birds can be seen in Sinclair Inlet at different times of the year (Navy, 2018b). Representative species of birds that can be seen in Sinclair Inlet include, but may not be limited to the following:

- scaup (*Aythya* spp.)
- ring-necked duck (*Aythya collaris*)
- Caspian tern (*Hydroprogne caspia*)
- surf scoter (*Melanitta perspicillata*)
- white-winged scoter (*Melanitta deglandi*)
- American wigeon (*Anas americana*)
- Canada goose (*Branta canadensis*)
- mallard (*Anas platyrhynchos*)
- common goldeneye (*Bucephala clangula*)
- merganser (*Mergus* spp.)
- bufflehead (*Bucephala albeola*)
- claucous-winged gull (*Larus glaucescens*)
- mew gull (*Larus canus*)
- western grebe (*Aechmophorus occidentalis*)
- double-crested cormorant (*Phalacrocorax auritus*)
- Pacific loon (*Gavia pacifica*)
- American coot (*Fulica americana*)
- pigeon guillemot (*Cepphus columba*)

Birds of prey include bald eagles (*Haliaeetus leucocephalus*) and ospreys. Currently, there is one bald eagle nest located at Navy Base Kitsap Bremerton (adjacent to PSNS & IMF), situated approximately 400 m from the shoreline.

Marine mammal species that have been observed in the vicinity of PSNS & IMF include the following (Navy, 2018b):

- Pacific harbor seal (*Phoca vitulina*)
- California sea lion (*Zalophus californianus*)
- gray whale (*Eschrichtius robustus*)
- Dall's porpoise (*Phocoenoides dalli*)

- harbor porpoise (*Phocoena phocoena*)
- Southern Resident killer whale (*Orcinus orca*)
- Steller sea lion (*Eumetopias jubatus*)
- Humpback whale (*Megaptera novaeangliae*)

California sea lions and harbor seals are known to utilize the Naval Base Kitsap Bremerton Port Security Barrier and, on rare occasions, use submarine hulls as haulouts.

Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) lists the ESA-listed species that are known to occur within PSNS & IMF project area. These species and their potential occurrence within PSNS & IMF are summarized below.

Chinook Salmon (*Oncorhynchus tshawytscha*) – Puget Sound ESU

Status and Management. The Puget Sound Chinook Salmon ESU was listed as threatened on March 24, 1999 (64 FR 14308), was reaffirmed on June 28, 2005 (70 FR 37160), and subsequently updated on April 14, 2014 (79 FR 20802). This ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia, and 26 artificial propagation (hatchery) programs (79 FR 20802). In 2016, NMFS issued a proposed rule to remove two and add two hatchery programs to this ESU (81 FR 72759). Thus, if the hatchery ruling is finalized as currently proposed, the total number of listed hatchery programs for this ESU would not change.

In response to the current threats facing this ESU, NMFS (2007) developed goals to recover Puget Sound Chinook salmon populations, those goals focus on abundance, productivity, spatial distribution and diversity at both the population and ESU levels. NMFS (2007) provides complete downlisting/delisting criteria for these recovery goals.

Critical Habitat. NMFS designated critical habitat for this ESU on September 2, 2005 (70 FR 52629), which includes Sinclair Inlet in the project area (Figure 3.5-7). Naval Base Kitsap, including PSNS & IMF are excluded from critical habitat designation because Naval Base Kitsap's Integrated Natural Resource Management Plan (INRMP) addresses Puget Sound Chinook habitat and contains measures that provide benefits to the ESU.

Potential Occurrence in the PSNS & IMF Project Area. The majority of Puget Sound Chinook salmon found in Sinclair Inlet are estimated to be of hatchery origin from facilities in Gorst Creek, with smaller numbers (approximately 10 percent) estimated to have naturally spawned in Sinclair Inlet area streams, and the remainder coming from other hatchery populations (City of Bremerton, 2012; Fresh et al., 2006). Juvenile Chinook likely use littoral habitats in Sinclair Inlet from early spring through early fall, with both hatchery and wild juveniles foraging along Sinclair shorelines during late spring and summer (Fresh et al., 2006).

Figure 3.5-7: Critical Habitat Designations for ESA-Listed Fishes Chinook Salmon and Steelhead Within Puget Sound Naval Shipyard and Intermediate Maintenance Facility

Steelhead (*Oncorhynchus mykiss*) – Puget Sound DPS

Status and Management. The Puget Sound steelhead DPS was listed as threatened on May 11, 2007 (72 FR 26722), and its status was updated on April 14, 2014 (79 FR 20802). This DPS includes naturally spawned steelhead originating below natural and manmade impassable barriers from rivers flowing into Puget Sound. This includes the Elwha River and rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia. No naturally spawning or hatchery-reared steelhead originate from the Gorst Creek watershed. In 2019, NMFS finalized the recovery plan for Puget Sound steelhead with a goal of providing guidance to recover the species to the point that it can be naturally self-sustaining over the long term (NMFS, 2020).

Critical Habitat. In 2016, NMFS designated critical habitat for Puget Sound steelhead DPS (81 FR 9251). Critical habitat includes approximately 2,031 mi. (3,269 km) of freshwater and estuarine habitat in Puget Sound. Critical habitat for this DPS does not occur in the project area (see Figure 3.5-7).

Potential Occurrence in the PSNS & IMF Project Area. Puget Sound steelhead likely swim through the project area to utilize Gorst and Blackjack Creek watersheds as refuge habitat (City of Bremerton, 2012; Fresh et al., 2006). The Washington Department of Fish and Wildlife (1994) identified that a small, distinct stock of naturally spawning Puget Sound steelhead utilize tributaries of Sinclair Inlet. In addition, a distinct stock of steelhead exists in the Sinclair Inlet based on the geographical isolation of the spawning population in tributaries (Washington Department of Fish and Wildlife, 1994).

Bull Trout (*Salvelinus confluentus*) – Coastal Puget Sound DPS

Status and Management. On June 10, 1999, USFWS listed all bull trout populations in the coterminous United States as threatened under the ESA (64 FR 58910). The Coastal-Puget Sound DPS of bull trout encompasses all Pacific Coast drainages within the United States north of the Columbia River in Washington, including those flowing into Puget Sound. This DPS is considered to contain the only anadromous forms (migrates up rivers to spawn) of bull trout in the United States. The 2015 Bull Trout Recovery Plan (USFWS, 2015a) provides a summary of the description and current status of bull trout within the six Recovery Units, as well as individual Recovery Unit implementation plans.

Critical Habitat. Critical habitat for this DPS was designated on October 18, 2010 (75 FR 63898). Critical habitat for this DPS does not occur in the project area.

Potential Occurrence in the PSNS & IMF Project Area. Even though ESA-listed bull trout do not utilize any of the drainages on the east side of Kitsap Peninsula due to a lack of suitable spawning habitat, this species could overwinter or forage in Sinclair Inlet (USFWS, 2015b) and could be found infrequently in the project area.

Bocaccio Rockfish (*Sebastes paucispinis*) – Puget Sound/Georgia Basin DPS

Status and Management. Bocaccio occupy the waters of the Pacific coast from California to Alaska. However, there appears to be little correspondence between age structure of bocaccio inside and outside of Puget Sound region, resulting in the determination of a unique Puget Sound/Georgia Basin DPS (75 FR 22276). The Puget Sound/Georgia Basin DPS of bocaccio was listed as endangered under the ESA on April 28, 2010 (75 FR 22276). Juvenile bocaccio have never been documented within Puget Sound, likely due to habitats that feature rock and macroalgae (kelp species) used by juvenile bocaccio along the coast are limited within central and south Puget (Palsson et al., 2009). NMFS published a recovery plan for the DPS in 2017 that outlines actions and research for the conservation and survival of bocaccio using the best available science (NMFS, 2017).

Critical Habitat. NMFS designated critical habitat for this DPS on November 13, 2014 (79 FR 68041). The specific areas in the final designation include 590.4 square miles (1,529 square km) of nearshore habitat and 414.1 square miles (1,072.5 square km) of deepwater habitat in Puget Sound/Georgia Basin. Critical habitat was not designated in the Sinclair Inlet (79 FR 68041).

Potential Occurrence in the PSNS & IMF Project Area. Potential Occurrence in the PSNS & IMF Project Area. Frierson et al. (2016b) found that the habitat (predominantly mud substrate) and depths within the Sinclair Inlet Naval Restricted Area were not consistent with known habitat associations of ESA-listed rockfish species. Similarly, rockfish surveys conducted by the Washington Department of Fish and Wildlife (WDFW) have indicated that some Puget Sound Navy installations may provide suitable habitat for juveniles, but not adults (Frierson et al., 2017a, 2017b, 2017c, 2017d; Frierson et al., 2016a; Frierson et al., 2018; Lowry et al., 2013).

<u>Yelloweye Rockfish (*Sebastes ruberrimus*) – Puget Sound/Georgia Basin DPS</u>

Status and Management. Yelloweye rockfish occupy the same waters as bocaccio (described above) and were listed as threatened on April 28, 2010 (75 FR 22276), which includes yelloweye rockfish throughout Puget Sound. Juveniles and sub-adults tend to be more common than adult fish in shallower water and are associated with rocky reefs, kelp canopies, and artificial structures. As yelloweye rockfish mature, they move to deeper water and increase in size, but usually exhibit strong site fidelity to rocky bottoms and outcrops. NMFS published a recovery plan for the DPS in 2017 that outlines actions and research for the conservation and survival of bocaccio using the best available science (NMFS, 2017).

Critical Habitat. Critical habitat was designated for this DPS on November 13, 2014 (79 FR 68041). The specific areas in the final designation include 414.1 square mi. (1,072.5 square km) of deepwater habitat in Puget Sound/Georgia Basin. Critical habitat was not designated in the Sinclair Inlet (79 FR 68041).

Potential Occurrence in the PSNS & IMF Project Area. As adult yelloweye rockfish occur in deep waters with high relief rock reef habitats and steep slopes (Palsson et al. 2009), they are not expected to be present in the project area due to a lack of suitable habitat. Rocky substrates are infrequent and patchy in distribution in North Puget Sound and the Georgia Strait, and are very rare in Puget Sound proper (waters east of Admiralty Inlet) (75 FR 22276). Larvae and pelagic juveniles can occur throughout the water column in Puget Sound, with juveniles being observed in deeper, offshore waters greater than 30 m. Due to the lack of deep water, high relief habitats, the only yelloweye rockfish lifestages with the potential to occur in the project area would be larvae and pelagic juveniles. However, due to limited adult female presence in central Puget Sound, and this species being dependent on adult females who livebear their young, the potential for early lifestages of yelloweye rockfish occurring in Sinclair Inlet is very low.

<u>Southern Resident Killer Whale (*Orcinus orca*)</u>

Status and Management. Southern Resident killer whales, a subpopulation of *Orcinus orca*, was designated as endangered by NMFS on November 18, 2005 (70 FR 69903). Factors that are thought to contribute to the decline of the Southern Resident killer whale population include prey availability, human-generated noise, vessel presence/harassment, and toxic chemical contamination.

Critical Habitat. On December 29, 2006, NMFS designated critical habitat for the Southern Resident killer whale DPS to include portions of the Haro Strait and waters around the San Juan Islands, portions of the Strait of Juan de Fuca, and portions of Puget Sound (71 FR 69054). NMFS identified three habitat features essential to the conservation of this DPS: (1) water quality to support growth and development;

(2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and (3) passage conditions to allow for migration, resting, and foraging. In 2021, NMFS revised the critical habitat portions outside of Puget Sound and specifically exempted PSNS & IMF from critical habitat (86 FR 41668).

Potential Occurrence in the PSNS & IMF Project Area. While both Southern Resident killer whales and transient killer whales are frequently sighted in the main basin of Puget Sound, their presence near Navy installations varies from not present at all to infrequent sightings, depending on the season (Olson & Osborne, 2017). The last confirmed sighting of a Southern Resident killer whale was in 1997 in Dyes Inlet (to the north of Sinclair Inlet) (NMFS, 2020).

Humpback Whale (*Megaptera novaeangliae*) – Mexico DPS and Central America DPS

Status and Management. On June 2, 1970, humpback whales were designated as endangered under the Endangered Species Conservation Act (35 FR 8491), and NMFS continued the endangered listing for the humpback whale once the ESA was signed into law in 1973. In 2016, NMFS published a final decision changing the status of humpback whales under the ESA (effective October 11, 2016) to list the Mexico DPS as endangered and the Central America DPS as threatened.

During the summer, humpback whales in the North Pacific migrate and feed over the continental shelf and along the coasts of the Pacific Rim, from Point Conception, California, to the Gulf of Alaska, Prince William Sound, and Kodiak Island. Humpback whales in the Strait of Juan de Fuca, Puget Sound, and other parts of the Salish Sea are increasing (Cascadia Research, 2017; Cogan, 2015).

Critical Habitat. NMFS designated critical habitat for the humpback whale Mexico DPS, Central America DPS, and Western North Pacific DPS on April 21, 2021 (79 FR 68041). Critical habitat for the humpback whale Mexico DPS has not been designated in the vicinity of Puget Sound (86 FR 21082).

Potential Occurrence in the PSNS & IMF Project Area. Humpback whales (Mexico DPS and Central America DPS) are considered rare visitors in the Sinclair Inlet near PSNS & IMF.

Marbled Murrelet (*Brachyramphus marmoratus*)

Status and Management. Marbled murrelets were listed as threatened under the ESA on October 1, 1992 (FR 57 45328). Marbled murrelets range from the Aleutian Archipelago in Alaska to central California. The majority of their lives are spent in the marine environment within 1.6 mi. of shore, where they feed primarily on small fish such as Pacific sand lance and Pacific herring. Marbled murrelets nest in inland forests, typically in old critical habitat growth forests.

Critical Habitat. On August 4, 2016, the USFWS issued its Final Rule establishing approximately 3,698,100 acres (1,397,000 hectares) of critical habitat in Washington, Oregon, and California (76 FR 61599). No critical habitat has been designated within the project area.

Potential Occurrence in the PSNS & IMF Project Area. Marbled murrelets forage in the nearshore waters of Puget Sound. The Navy supports survey and monitoring efforts for ESA-listed marbled murrelets and other protected wildlife species in the vicinity of Naval Base Kitsap Bremerton. Since 2013, WDFW has conducted at-sea surveys for marbled murrelets during fall to spring months in the vicinity of several Puget Sound installations including Naval Base Kitsap Bremerton. Murrelets have not been observed within the Inlet project area (Navy, 2018a).

3.5.2.4.2 Port of Benton Barge Slip

The Port of Benton barge slip is on the northern end of Lake Wallula, which is the Columbia River impoundment created by McNary Dam, and is located on the west shoreline of the Columbia River at river mile 342.8 (Figure 3.5-8).

Forty-six fish species are known to reside in or migrate through Upper Lake Wallula (DOE, 2017b). Of these species, Chinook salmon, sockeye salmon, coho salmon, steelhead, and bull trout use the river as a migration route to and from upstream spawning areas and are of the greatest economic importance. Adult and juvenile Pacific lamprey (*Entosphenus tridentatus*) also migrate through Upper Lake Wallula. In addition to fall Chinook salmon, other species of fish are culturally and recreationally important, such as white sturgeon (*Acipenser transmontanus*), small-mouth bass (*Micropterus dolomieu*), walleye (*Sander vitreus*), and mountain whitefish (*Prosopium williamsoni*) (DOE, 2017b).

Beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), and river otter (*Lontra canadensis*) occur in both riparian and aquatic habitats along the Columbia River. Although the location of the Port of Benton barge slip does not contain suitable cover for these mammals, they likely transit and possibly forage through the area (DOE, 2017b).

Aquatic invasive species along this reach of the Columbia River may include nonindigenous mollusks (red-rimmed melania [*Melanoides tuberculata*], faucet snail [*Bithynia tentaculata*], New Zealand mudsnail [*Potamopyrgus antipodarum*]), plants (Eurasian watermilfoil [*Myriophyllum spicatum*], flowering rush [*Butomus umbellatus*], and curly-leaf pondweed [*Potamogeton crispus*) (Upper Columbia Conservation Commission, 2021). Juvenile salmonids are also consumed by nonindigenous fishes, including walleye, smallmouth bass, and channel catfish. Both the Oregon and Washington Departments of Fish and Wildlife have removed size and bag limits for these species in their sport fishing regulations in an effort to reduce predation pressure on juvenile salmonids (USFWS, 2020).

ESA-listed species found in the vicinity of the project area include Chinook salmon (Upper Columbia River Spring-run ESU), steelhead (Upper Columbia River and Middle Columbia River DPS), and bull trout (Columbia River DPS) (USFWS, 2020b) (Figure 3.5-8). Additional details for each ESA-listed species in the project area are presented below.

Chinook Salmon (*Oncorhynchus tshawytscha*) – Upper Columbia River Spring-Run ESU

Status and Management. The Upper Columbia River spring-run Chinook salmon ESU was listed as endangered on March 24, 1999 (64 FR 14308); that status was reaffirmed on June 28, 2005 (70 FR 37160), and subsequently updated on April 14, 2014 (79 FR 20802). This ESU includes naturally spawned spring-run Chinook salmon originating from Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam (excluding the Okanogan River subbasin) as well as salmon from six artificial propagation programs (79 FR 20802). In 2007, NMFS finalized a recovery plan for this ESU to secure long-term persistence of viable populations of naturally produced spring Chinook distributed across their native range (NMFS, 2007). In 2016, NMFS issued a proposed rule to remove one and add one hatchery program to this ESU (81 FR 72759).

Designated Critical Habitat. NMFS designated critical habitat for this ESU on September 2, 2005 (70 FR 52630), which includes those areas that contain physical and biological features essential for the conservation of the species or that require special management considerations (70 FR 52630) (Figure 3.5-8).

Figure 3.5-8: Critical Habitat Designations Within the Port of Benton Barge Slip Project Area for ESA-Listed Fishes

Potential Occurrence in the Port of Benton Barge Slip Project Area. Juvenile spring-run Chinook may be present in the barge slip area during late spring (late April through July), using shallow vegetated habitat downstream of the barge slip for rearing and migration. However, vegetation and the near shore juvenile salmonid rearing habitat at the barge slip has been heavily impacted by previous management actions associated with the development of the existing barge slip, and riparian plant communities at the barge slip are sparsely distributed (Navy, 2019). In contrast, adults generally utilize deeper water in the main channel of the river during upstream migrations.

<u>Steelhead (*Oncorhynchus mykiss*) – Upper Columbia River DPS and Middle Columbia River DPS</u>

Status and Management. The Upper Columbia River steelhead DPS was listed as threatened on August 18, 1997 (62 FR 43937), and its status was reaffirmed on June 28, 2005 (70 FR 37160). The DPS was reclassified as a threatened species on August 24, 2009 (74 FR 42605), consistent with a recent court ruling and the status was subsequently updated on April 14, 2014 (79 FR 20802). The Middle Columbia River steelhead DPS was listed as threatened on March 25, 1999 (64 FR 14517), and its status was updated on January 5, 2006 (71 FR 834) and April 14, 2014 (79 FR 20802).

The Upper Columbia River steelhead DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in streams in the Columbia River basin upstream from the Yakima River, Washington, to the U.S.-Canada border, and progeny of six artificial propagation programs (79 FR 20802). The Middle Columbia River steelhead DPS includes all naturally spawned steelhead populations below natural and artificial impassable barriers in streams from above the Wind River, Washington; and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington, excluding steelhead from the Snake River basin (79 FR 20802), and progeny of seven artificial propagation programs (Hargrove et al., 2019).

Designated Critical Habitat. NMFS designated critical habitat for these DPSs on September 2, 2005 (70 FR 52630), which includes known physical and biological features (primary constituent elements or PCEs) within the occupied areas that are essential to the conservation of the species (70 FR 52630) (see Figure 3.5-8).

Potential Occurrence in the Port of Benton Barge Slip Project Area. As described above for Upper Columbia River spring-run Chinook, juvenile steelhead may be present in the project area during late spring (late April through July), using shallow vegetated habitat downstream of the barge slip for rearing and migration. However, aquatic vegetation and the nearshore juvenile salmonid rearing habitat at the barge slip has been heavily impacted by previous management actions associated with the development of the existing barge slip and riparian plant communities at the barge slip are sparsely distributed. Adult steelhead likely use other habitat in the vicinity of the project area such as the deeper channels during their upstream migration.

<u>Bull Trout (*Salvelinus confluentus*) – Columbia River DPS</u>

Status and Management. As with the Coastal Puget Sound DPS discussed previously in Section 3.5.2.4.1 (Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet), bull trout within the Columbia River DPS were listed as threatened in 1999 (64 FR 58910). A summary of the description and current status of bull trout within the six Recovery Units is provided in the Bull Trout Final Recovery Plan (USFWS, 2015a), as well as individual Recovery Unit implementation plans.

Bull trout are divided into five DPSs, with each DPS further divided into recovery units. Bull trout in the Port of Benton barge slip project area are within the Mid-Columbia River Recovery Unit (USFWS, 2015a), which is divided into the following four geographic regions:

- the Lower Mid-Columbia which includes all core areas that flow into the Columbia River below its confluence with the Snake River (i.e., the John Day, Umatilla, and Walla Walla basins)
- the Upper Mid-Columbia which includes all core areas that flow into the Columbia River above its confluence with the Snake River (i.e., the Yakima and all other basins north to the Canadian border)
- the Lower Snake which includes all core areas that flow into the Snake River between its confluence with the Columbia River and Hells Canyon Dam (i.e., the Clearwater, Tucannon, Asotin, Grande Ronde, and Imnaha basins)
- the Mid-Snake which includes all core areas in the Mid-Columbia Recovery Unit that flow into the Snake River above Hells Canyon Dam (i.e., the Powder basin; Pine, Indian and Wildhorse Creeks) (USFWS, 2015a)

Designated Critical Habitat. Critical habitat for this DPS was designated in 2005, which includes PCEs within the occupied areas that are essential to the conservation of the species (75 FR 63898). The barge slip area falls within the critical habitat for bull trout (USFWS, 2015a) (see Figure 3.5-8).

Potential Occurrence in the Port of Benton Barge Slip Project Area. Adult bull trout may be present near the project area and would primarily be found transiting through the project area in winter, moving from and returning to upper tributaries during migrations (Navy, 2019).

<u>Essential Fish Habitat</u>

EFH designated within the vicinity of the Port of Benton barge slip is under the jurisdiction of the Pacific Fishery Management Council. No HAPC were identified at this location. Designated EFH for Chinook and coho salmon is within the Columbia River channel portion that runs through this project area (Pacific Fishery Management Council, 2021). As described under Section 3.5.3.3 (Alternative 2: Dual Reactor Compartment Packages), in-water construction activities at the Port of Benton barge slip would only occur under Alternative 2. The Navy would consult with NMFS for potential impacts on EFH within the Port of Benton barge slip project area if the Navy selects Alternative 2 as its Preferred Alternative. Currently, the Navy has selected Alternative 3 as the Preferred Alternative. Potential impacts on the EFH present at the Port of Benton barge slip project area are described in Section 3.5.3.3.4 (Port of Benton Barge Slip Modifications).

3.5.2.4.3 Land Transport Route from the Port of Benton Barge Slip to Final Disposal Location at the Department of Energy Hanford Site

The Navy uses the DOE Hanford Site road systems to transport decommissioned, defueled reactor compartment packages from the Port of Benton barge slip to Trench 94 in the 200 East Area. Current packages range between 1,000 and 1,680 tons. The Navy may require upgrades at 11 locations on the transport route to support dual reactor compartment packages weighing up to 3,304 tons, as discussed in Section 2.3.3.7 (Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site) and shown in Figure 2-16.

As part of the literature review for potential biological resources within areas subject to road improvements, the Navy consulted the DOE Hanford Site Biological Resources Management Plan (DOE, 2017b). In 2018, the Navy completed an ecological review of the transport route in support of the road improvements (DOE, 2018b).

The proposed infrastructure improvements would stretch from the central to the southeast portions of the DOE Hanford Site and the adjacent DOE Office of Science site. The project is within the low-elevation Columbia Basin that covers the arid interior of eastern Washington, extending west to the Cascade Mountains, north to the Okanogan Valley, and south into portions of north-central Oregon. Prior to the early 1940s, the primary biological impacts on the DOE Hanford Site resulted from agricultural development, irrigation system construction, and grazing. The DOE Hanford Site, including undisturbed areas outside of the road corridor, contains some of the largest stands of undisturbed shrub-steppe remaining in the region. Shrub-steppe plant communities occurring on the DOE Hanford Site are typically characterized by shrub overstories interspersed with herbaceous grasses and small woody plants. Representative species include the following:

- species of sagebrush (*Artemisia* spp.)
- bitterbrush (*Purshia tridentata*)
- spiny hopsage (*Grayia spinosa*)
- rabbitbrush (*Ericameria nauseosa* or *Chrysothamnus viscidiflorus*)
- grayball sage (*Salvia dorii*)
- buckwheat (*Eriogonum* spp.)
- bluebunch wheatgrass (*Psuedoregnaria spicata*)
- Sandberg’s bluegrass (*Poa secunda*)
- needle-and-thread grass (*Hesperostipa comata*)

The areas adjacent to the proposed transportation route consist of a mosaic of plant community types ranging from industrial areas with scant vegetation and communities dominated by nonindigenous weedy species like cheatgrass to areas dominated by a mixture of nonindigenous species and early successional native species like Sandberg’s bluegrass and rabbitbrush, as well as mature communities with a native shrub overstory and either nonindigenous or indigenous grasses in the understory (DOE, 2018b).

Wildlife species anticipated to use or pass through these areas include the following:

- large animals such as Rocky Mountain elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*)
- predators such as coyote (*Canis latrans*) and badger (*Taxidea taxus*)
- small herbivores including northern pocket gopher (*Thomomys talpoides*), Nuttall’s cottontail rabbit (*Sylvagus nuttallii*), and black-tailed jackrabbits (*Lepus californicus*)

Representative bird species include western meadowlarks (*Sturnella neglecta*), horned larks (*Eremophila alpestris*), common raven (*Corvus corax*), loggerhead shrike (*Lanius ludovicianus*), white-crowned sparrow (*Zonotrichia leucophrys*), and sagebrush sparrow (*Artemisiospiza nevadensis*). Species of reptiles include the side-blotched lizard (*Uta stansburiana*), which occurs in most native upland habitats. It is the most abundant reptile species on the DOE Hanford Site and is likely present along the road corridor. Short-horned (*Phrynosoma douglassii*) and sagebrush lizards (*Sceloporus graciosus*) are also found on the DOE Hanford Site but occur infrequently. The most common snake species include gopher snake (*Pituophis melanoleucus*), yellow-bellied racer (*Coluber constrictor*), and western rattlesnake (*Crotalus viridis*).

The Navy also reviewed the latest available version of the *Bald Eagle Management Plan for the Hanford Site* (DOE, 2017a). This document identifies buffer zones for communal night roosts, perching and forage sites, and nest sites with restrictions on access and aircraft overflights. Bald eagles occupy the Hanford Reach and upper portions of Lake Wallula of the Columbia River primarily during the winter months. They arrive in mid-November to take advantage of the abundance of fall Chinook salmon carcasses that wash up along the Columbia River shoreline, islands, and various flats. The review of buffer restrictions and historic and current nest site locations found no overlap with the land transport route. There are no large trees for roosts, perching, or nesting in the vicinity of the Port of Benton barge slip or along the land transportation route. Bald eagles, however, could forage in the river channel near the barge slip. The closest known nest is 7 mi. downriver in the Yakima Delta and would not be impacted by the project.

There are no ESA-listed plant or animal species anticipated to occur within the road corridor or adjacent area. This has been substantiated through technical ecological studies in the area (DOE, 2018b), and life history information for special status species gathered from the resource management program at the DOE Hanford Site (DOE, 2017b).

3.5.3 Environmental Consequences

This section addresses the potential impacts on biological resources that may result from the activities described in Chapter 2 (Description of Proposed Action and Alternative). Section 3.5.1.4 (Approach to Analysis) describes the Navy's step-wise approach to assessing potential impacts of the Proposed Action and alternatives. Applicable stressors analyzed under each alternative include: (1) stressors associated with in-water hull cleaning, (2) stressors associated with ship strike and tow line strike, (3) stressors associated with ship noise, (4) stressors associated with construction activities at the Port of Benton barge slip, Washington, and (5) stressors associated with ground disturbance associated with the land transport route between the Port of Benton barge slip to Trench 94 at the DOE Hanford Site. To describe these potential impacts, each alternative was broken down into constituent activities that concern construction activities and transportation. By doing so, specific stressors for each alternative are identifiable, and subsequently analyzed potential impacts on habitats, biological processes, and for special status species. These stressors are discussed as applicable under each alternative below. Not all the stressors are applicable to each alternative. For example, only Alternative 2 considers infrastructure improvements.

3.5.3.1 No Action Alternative

As stated in Section 2.3.1 (No Action Alternative), if the Navy selected the No Action Alternative, ex-Enterprise would not be dismantled or disposed of, but rather remain in waterborne storage for an indefinite time period at its current location in Newport News, Virginia. Periodic maintenance would be required to ensure the safe long-term waterborne storage of ex-Enterprise in accordance with the *Maintenance Manual for Inactive Nuclear Powered Ships and Nuclear Support Shops and Service Craft* (Navy, 1995). Storage facility staff would perform periodic inspections and maintenance of the ship while in storage, to include a detailed interior inspection annually, an underwater exterior inspection of the hull after every eight years in waterborne storage, and placing the ship in dry dock for inspection and repair after every 15 years in waterborne storage.

Impacts on biological resources are not likely to occur because hull maintenance would occur within dry dock facilities. Dry dock maintenance avoids potential impacts on the in-water environment of the James River, including adult Atlantic sturgeon during spawning migrations up the James River (and designated critical habitat) and the seasonal occurrence of sea turtles within the Chesapeake Bay. As such, there would be no applicable stressors on biological resources resulting from indefinitely storing ex-Enterprise at its current mooring location.

3.5.3.2 Alternative 1: Single Reactor Compartment Packages

Alternative 1 is described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages). Major elements of Alternative 1 are described below, along with their potential impacts on biological resources. Figure 3.5-2 shows the conceptual framework for analyzing potential impacts resulting from Alternative 1.

3.5.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

As described in Section 2.3.2.1 (Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility), ex-Enterprise would be towed from its current location at Newport News Shipbuilding in Newport News, Virginia, to one of three commercial locations for partial dismantlement—commercial dismantlement facilities at the Hampton Roads Metropolitan Area, Virginia; the Port of Brownsville, Texas; or the Port of Mobile, Alabama. Towing would be performed by a qualified contractor in accordance with requirements of Appendix H of the *U.S. Navy Towing Manual SI740-AA-MAM-010*, Rev 3, July 2002, as well as Naval Sea Systems Command Instruction 4740.12, *Towing and Preparation for Storage Specification for Inactivated Defueled Nuclear Powered Aircraft Carriers*. The Navy identified in-water hull cleaning activities, ship and tow line strike, and ship noise as potential stressors resulting from initial transport activities. These stressors and potential impacts are analyzed for each project area.

In-Water Hull Cleaning

If the Navy awards a contract to a commercial shipyard facility in the Hampton Roads Metropolitan Area, Virginia, under Alternative 1, transport of ex-Enterprise would be limited to short-distance tows within the area by tug boats. This is a normal activity that would not introduce any additional stressors on biological resources, and in-water hull cleaning would not likely be required because of the short-distance tug operations between Newport News Shipbuilding to nearby shipyard facilities within the Hampton Roads Metropolitan Area.

If the Navy is required to clean the hull of ex-Enterprise prior to initial transport, and if the implementation of hull-cleaning mitigation measures within dry dock is not feasible, the Navy would conduct hull cleaning at the current mooring location in water (Newport News Shipbuilding, Virginia) or at a nearby facility within the Hampton Roads Metropolitan Area. This section analyzes the potential impacts of in-water hull cleaning (if required) based on different scenarios—(1) partial dismantlement of ex-Enterprise at a commercial dismantlement location at or near the current mooring location at Hampton Roads Metropolitan Area, and (2) partial dismantlement of ex-Enterprise at other destination ports (i.e., Port of Mobile, Port of Brownsville).

Ex-Enterprise would be cleaned prior to towing to the Port of Mobile or Port of Brownsville to prevent the spread of nonindigenous species. Because the origination port at Newport News Shipbuilding and the potential destination ports of Brownsville and Mobile are characterized by similar salinity levels, and ESA-listed species are present at the potential destination ports, hull cleaning of ex-Enterprise would be conducted prior to towing for these scenarios.

Risks to biological resources in these areas from in-water hull cleaning include potential increases in turbidity; potential release of copper, zinc, and other contaminants associated with anti-fouling paints;

and depression of DO from the decay of organic matter removed from the hull.[1] These potential risks are summarized below:

- **Turbidity**. In-water cleaning has the potential to increase turbidity levels of the surrounding water. There was only a slight statistical increase in turbidity associated with the hull cleaning of the USS ex-Independence, and levels of turbidity did not exceed water quality standards (Earley et al., 2017b). Similar results would be expected with the cleaning of ex-Enterprise, and any increases in turbidity would be expected to be minor and temporary. Potential effects to biological resources would be limited to momentary behavioral disturbance if an individual happens to co-occur with the single cleaning event and associated turbidity.
- **Release of Copper, Zinc, and Other Metals**. In-water hull cleaning involves the active removal of biofouling organisms and varying amounts of antifouling paint, which can increase localized environmental loading of copper and possibly other metals, such as zinc or lead (Earley et al., 2017a; Forbes, 1996). Copper is toxic to aquatic organisms (mainly dissolved copper due to its bioavailability), so unintended consequences may occur when paint containing copper is discharged as particulates into the water column (Earley et al., 2017a). The main environmental concerns regarding contamination from copper-based antifoulants include the following: (1) bioaccumulation, (2) ecotoxicological effects and subsequent changes to local ecology and biodiversity, and (3) effects on ecosystem function (i.e. microbial and geochemical processes that regulate the cycling, bioavailability, and fate of micro- and macronutrients) (Macleod & Eriksen, 2009). However, all these effects require relatively high concentrations of these metals. While in-water hull cleaning may actively release copper, zinc, and other metal particles over a short time frame, continuous passive leaching from ship hull paint is the primary contributor to ambient toxicity (Earley et al., 2017a). The cleaning of ex-Enterprise, therefore, may have a very minimal effect on metal concentrations in the surrounding waters given that the Hampton Roads Metropolitan Area contains numerous shipyard facilities with high numbers of vessels regularly present. Water quality monitoring associated with the cleaning of active Navy ships has shown elevated water column copper concentrations were limited to an area within 328 ft. (100 m) of the vessel and returned to ambient levels within one to three hours of cleaning (Naval Ocean Systems Center, 1981), so any effects would be highly localized and short lived. Additionally, a comparison of dissolved and particulate composition of copper in hull cleaning waste found 50–80 percent of the total copper to be particulate, and therefore, not bioavailable to organisms in the water column (Valkirs et al., 1994). Zinc levels measured after the cleaning of the ex-Independence were only slightly elevated and did not rise to the level of potential harmful effects to biological resources (Earley et al., 2017b). Accordingly, copper and other metals would not be expected to affect biological resources within the water column. Although effects on water quality may be minimal and short term, metals and other contaminants released during hull cleaning could remain in the sediment for years or decades. However, effects would be highly localized to the area immediately under the vessel during cleaning. A study of effects on sediment contamination was conducted during the hull cleaning of the USS ex-Independence. The study showed that total copper and zinc in the sediment had no statistically significant difference before and after cleaning (Johnston et al., 2018). In considering effects for the programmatic towing of inactive ships, NMFS acknowledged that there may be risk

[1] Underwater hull cleaning meets the requirements of the Clean Water Act under the Uniform Discharge Standards Phase II Batch Two Discharges.

from accumulation of metals over the course of several vessel cleanings, but the risk from a single vessel cleaning was low (NMFS, 2019). As no other inactive Navy ships are planned to be cleaned and towed from Newport News as part of Alternative 1, there is no risk of accumulation associated with the in-water hull cleaning under Alternative 1, and even if marine or aquatic animals were foraging in the vicinity of the shipyard, detrimental effects would not be expected to occur.

- **Dissolved Oxygen (DO)**. In addition to heavy metals, the active removal of biofouling organisms from a ship releases organic matter to the immediate aquatic environment. The decay of excess organic matter could result in increases of nutrients, primary productivity (e.g. plankton blooms), and associated decreases in DO. Any biofouling (e.g., algal growth, shellfish) removed from the ship during in-water hull cleaning would be expected to settle quickly to the seafloor. Some biofouling organisms would be expected to survive and reattach to seafloor substrates, whereas some may not survive and undergo biochemical decomposition that could potentially drive increases in nutrients and decreases in DO (Macleod & Eriksen, 2009; Valkirs et al., 1994). A portion of the released organic material would be consumed by other organisms, buffering the effect of organic material release. Based on the post-hull cleaning water quality reports of ex-Independence, the Navy would expect increased nutrient loading to be a short-term effect with levels returning to baseline within a few hours from cleaning. If DO levels are impacted, the impact would likely be short-term and limited to a small area below and immediately adjacent to ex-Enterprise.

For scenarios in which the Navy would implement mitigation measures (i.e., prior to towing to Brownsville or Mobile), the Navy, in accordance with Uniform National Discharge Standards (85 FR 43465), would first give consideration to one of the dry docking mitigation measures (e.g., dry docking long enough to allow species on the hull to “die-off” through desiccation or hull cleaning while the ship is in dry dock). Dry docking would be the first method considered, though this method would only be implemented if there is a sufficiently sized dry dock available during the required timeframe that is in close enough proximity to the origination port to preclude risk of invasive species transfer. In cases where the Navy determines dry docking is not practicable, the Navy would perform in-water hull cleaning (NMFS, 2019). In such cases, organisms and/or biofouling communities attached to the hull would be removed using underwater hull cleaning methods and equipment as specified in NSTM chapter-081, “Waterborne Underwater Hull Cleaning of Navy Ships” (Navy, 2006). This manual provides a description of the various tools; such as diver-operated machines with rotating brushes, either multi-brush or single-brush fitted with different brush types depending on the machine and fouling conditions present. Professional divers would use hand-held or self-propelled rotary equipment (e.g., brushes or waterjets), hand-held water jets and hydro-lance equipment, manual hand tools (e.g., scrapers, pads, and brushes), and other similar industry-recognized equipment. Multi-brush units are used to clean large unobstructed, easily accessible, areas of the hull. These are fitted with rotary cleaning heads (e.g., brushes) that sweep the growth off the hull. The units are typically held against the hull with either a high volume impeller or the suction generated by brush rotation, and ride along the hull on a set of wheels. Single-brush units are held in place by the diver and the suction force generated from the rotating brush, and are used to clean appendages and hull areas that the large multi-brush unit cannot access. For areas that are harder to reach, divers employ high-pressure water jets, hydro-lances, and hand tools (e.g., scrapers, pads and brushes). The NSTM requires divers to inspect the hull and select the appropriate brush for the fouling condition. The primary goal would be to remove fouling safely and efficiently with minimal impact to the underlying hull coating system. The in-water hull cleaning methods are not expected to result in the scraping of all hull areas down to the bare hull. Divers use the least aggressive tools necessary to effectively remove biofouling organism in an attempt to minimize removal and release of paints and other coatings or damage to the physical integrity of the hull.

In-water hull cleaning of large Navy ships (such as ex-Enterprise) typically occurs over a long period of time (i.e., weeks to months), such that biofouling material would be released slowly over time, allowing it to disperse within the environment. Although in-water hull cleaning can impact levels of DO, turbidity, nitrate, organic debris and dissolved metals in the water column, monitoring studies have shown these conditions to be very temporary, decreasing rapidly to ambient concentrations after cessation of the cleaning activity (NMFS, 2019). A study of effects on water quality was conducted during the hull cleaning of the USS ex-Independence, which indicated there was no evidence of any water or sediment quality parameter exceeding regulatory thresholds and no evidence of persistent water quality impacts (Earley et al., 2017a). Although some parameters increased from the cleaning, all parameters returned to baseline levels and were similar to reference conditions within 40 days after biofouling removal was completed (Earley et al., 2017a). Similar results would be expected with the in-water hull cleaning of ex-Enterprise.

In-water hull cleaning of ex-Enterprise is not expected to measurably change water or sediment quality parameters relative to current conditions at the Hampton Roads Metropolitan Area at Newport News Shipbuilding. Therefore, the Navy concludes that in-water hull cleaning activities that may occur at the current mooring location under Alternative 1 would have minimal impacts on biological resources.

Potential Impacts on ESA-Listed Species. Because of the potential presence of Atlantic sturgeon, green sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle in the lower portion of the James River, the Navy has determined that in-water hull cleaning of ex-Enterprise may affect these ESA-listed species. Given that in-water hull cleaning would be a single event with a small area affected, the expected low densities of ESA-listed species in the affected area, the measures taken to minimize the effects to water and sediment quality from cleaning, and the industrialized nature of the port of Newport News, the Navy concludes that the effects from in-water hull cleaning activities to ESA-listed Atlantic sturgeon, green sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle and loggerhead sea turtle would be insignificant (not measurable). In-water hull cleaning would have no effect on the shortnose sturgeon. The Navy also considered potential impacts on critical habitat for the Atlantic sturgeon, which overlaps with the current mooring location of ex-Enterprise and shipyard facilities that may be used for in-water hull cleaning of ex-Enterprise. Based on the analysis for potential water quality impacts above, the Navy anticipates that in-water hull cleaning may affect Atlantic sturgeon critical habitat. The Navy would conduct in-water hull cleaning within work windows when feasible (see Section 3.5.1.3 [Best Management Practices]), thereby further limiting potential impacts on Atlantic sturgeon critical habitat. Given both the temporary and localized impacts anticipated from in-water hull cleaning and working within seasonal restrictions, effects on Atlantic sturgeon critical habitat would be discountable (unlikely to occur).

Potential Impacts on EFH. As described above, in-water hull cleaning typically occurs over a long period of time (i.e., weeks to months), and biofouling material would be released slowly over time, allowing it to disperse within the environment. In-water cleaning would only occur at Newport News Shipbuilding if ex-Enterprise was towed to the Port of Mobile or Port of Brownsville. Although in-water hull cleaning can impact levels of DO, turbidity, nitrate, organic debris and dissolved metals in the water column, monitoring studies have shown these conditions to be very temporary, decreasing rapidly to ambient concentrations after cessation of the cleaning activity (NMFS, 2019). Therefore, the Navy has determined that hull cleaning activities may adversely affect water and substrate quality and biogenic habitats that serve as EFH and HAPC. However, these impacts are expected to be very minor in severity, short term in duration, and limited in spatial extent to the area immediately under and adjacent to the footprint of the vessel.

Ship and Tow Line Strike

Ship and tow line strike could potentially impact offshore and pelagic (open-ocean) marine organisms along the tow route from Newport News, Virginia, to the selected destination port where partial dismantlement of ex-Enterprise would occur. This section analyzes the potential impacts of ship and tow line strike based on three different scenarios—(1) partial dismantlement of ex-Enterprise at a commercial dismantlement location at or near the current mooring location, (2) partial dismantlement of ex-Enterprise at a commercial dismantlement facility in the Port of Mobile, and (3) partial dismantlement of ex-Enterprise at a commercial dismantlement facility in the Port of Brownsville.

Precise data are lacking for sea turtle mortalities directly caused by ship strikes; however, live and dead turtles are often found with deep cuts and fractures indicative of collision with a boat hull or propeller (Hazel et al., 2007; Lutcavage et al., 1997). Ship-related injuries to sea turtles are more likely to occur in areas with high boating traffic. For example, propeller wounds on loggerhead sea turtles are found often in southeast Florida, from Palm Beach County to Miami-Dade County, likely due to the prevalence of recreational boating in that region (NMFS & USFWS, 2007).

Minor strikes may cause temporary, reversible effects, such as diverting the turtle from its previous activity or causing minor injury. Major strikes are those that can cause permanent injury or death from bleeding/trauma, paralysis and subsequent drowning, infection, or inability to feed. Apart from the severity of the physical strike, the likelihood and rate of a turtle's recovery from a strike may be influenced by its age, reproductive state, and general physical condition. Much of what is published about recovery from ship strikes is inferred from observing individuals some time after a strike. Numerous sea turtles bear scars that appear to have been caused by propeller cuts or collisions with vessel hulls(Hazel et al., 2007; Lutcavage et al., 1997), suggesting that not all vessel strikes are lethal. Conversely, fresh wounds on some stranded animals may strongly suggest a ship strike as the cause of death. The actual incidence of recovery versus death is not known, given available data.

The chance of a ship and tow line strike is extremely remote because of the low probability that a large marine organism would overlap this single towing event. The relatively low speed (less than 10 knots) of the tow further reduces the chance of a ship striking a large whale (Conn & Silber, 2013; Jensen & Silber, 2004; Vanderlaan & Taggart, 2009). The majority of vessel strikes of large whales occur when ships are traveling at speeds greater than approximately 10 knots, with faster, larger ships (80 m or greater), being more likely to cause serious injury or death (Conn & Silber, 2013; Jensen & Silber, 2004; Laist et al., 2001; Vanderlaan & Taggart, 2009). Large ships that transit through shipping channels typically draft close to the bottom of the channel, which increases the likelihood of interactions with bottom-dwelling marine organisms. Vessel strikes of fish are very rare in general and their distribution in the water column further reduces the chance of a strike during a tow to a commercial dismantlement location.

Hampton Roads Metropolitan Area, Virginia

If the Navy awards a contract to a commercial shipyard facility in the Hampton Roads Metropolitan Area, Virginia, under Alternative 1, transport of ex-Enterprise would be limited to short-distance tows within the area. Biological resources potentially impacted by initial transport of ex-Enterprise to a commercial port facility within the Port of Mobile are identified in Section 3.5.2.1 (Virginia).

Potential Impacts on ESA-Listed Species. Because of the potential presence of shortnose sturgeon, Atlantic sturgeon, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle in the lower portion of the James River, the Navy has determined that ship and tow line strike may affect these ESA-listed species. A summary of the Navy's analysis for potential impacts on these ESA-listed species is included below. The Navy has determined that ship noise would have no effect on Atlantic sturgeon critical habitat. Atlantic sturgeon critical habitat designations are based upon oceanographic conditions (e.g., water quality, sediment type), ship noise would not impact the ability of waters to function as habitat.

- **Shortnose sturgeon and Atlantic sturgeon**. The factors affecting the risk of strike to sturgeon are most likely size and speed of the ship, navigational clearance, and the behavior of sturgeon in the area (e.g., foraging, migrating). Shortnose sturgeon would be very rare within the James River and lower Chesapeake Bay, so they are not likely to be struck by the tow line or ex-Enterprise. The Atlantic Sturgeon Status Review Team determined Atlantic sturgeon in the James River are at a moderate risk from ship strikes (Atlantic Sturgeon Status Review Team, 2007a). From 2007 to 2010, Balazik et al. (2012b) evaluated the cause of mortality to 31 carcasses of adult Atlantic sturgeon within the tidal freshwater portion of the James River in Virginia. Of those fish, all that were not too decomposed to properly examine exhibited gashes from ship propellers. Small, recreational boats would rarely encounter sturgeon, and it is most likely large, deep-draft ocean ships that contribute to strike and mortality of sturgeon in the James River (Balazik et al., 2012b). In summary, Atlantic sturgeon are more susceptible to ship or tow line strike compared to shortnose sturgeon because of the current ranges of these two species and their potential overlap with waters in the vicinity of the current mooring location and potential shipyard towing destinations within the Hampton Roads Metropolitan Area. Although ship and tow line strike of a shortnose sturgeon or Atlantic sturgeon would likely result in injury or death, the likelihood of a strike from a single tow event in the lower portion of the James River is discountable (unlikely to occur).
- **Sea turtles**. Sea turtles can detect approaching vessels, likely by sight (including lights from the vessel) rather than by sound (Bartol & Ketten, 2006; Hazel et al., 2007). Sea turtles seem to react more to slower moving vessels (2.2 knots) than to faster vessels (5.9 knots or greater). During an interaction between sea turtles and a 20 ft. (6 m) aluminum boat traveling at 10 knots, turtles were not able to dive to a depth sufficient to avoid collision (Hazel et al., 2007). Overall, the probability of the single ship tow encountering an ESA-listed sea turtle would be expected to be low, and the tow ship would have lookouts aboard monitoring for ship collision risks (see Section 3.5.1.3 [Best Management Practices]), which decreases the likelihood of ships or tow lines striking sea turtles. Additionally, the tow speed would be low, especially while moving through port areas, providing more opportunity for turtles to detect and avoid the ship. Any behavioral avoidance displayed, if an ESA-listed sea turtle were to encounter the tug and tow, would not result in significant disruption of breeding, feeding, or sheltering as the turtle would be expected to move away from the ship and quickly resume normal behavior. In summary, although ship and tow line strike may affect ESA-listed sea turtles, the likelihood of such an interaction is discountable (unlikely to occur).

Port of Mobile, Alabama

If the Navy awards a contract to a commercial shipyard location within the Port of Mobile, ex-Enterprise would be towed from its current mooring location approximately 1,830 nm (2,106 mi.) along the eastern seaboard, around the southern tip of Florida, along the Florida and Alabama coastlines to Mobile, Alabama, for ship dismantling (see Figure 2-8). Biological resources potentially impacted by initial transport of ex-Enterprise to a commercial port facility within the Port of Mobile are identified in Section 3.5.2.2 (Alabama).

Ship and tow line strike could potentially impact offshore and pelagic marine organisms along the tow route from Newport News Shipbuilding to the Port of Mobile. As stated previously, ship strikes are an important cause of injury and mortality for marine mammals and sea turtles along the eastern seaboard and within the Gulf of Mexico and large fish species may also be susceptible to open-ocean ship strikes while on the surface; however, strike risk in the open ocean is relatively low for slow-moving ships under tow. Once inside of Mobile Bay, ex-Enterprise proceeds under tow along the Federal Mobile Harbor Navigation Channel to the Port of Mobile. The likelihood of a ship and tow line strike increases because of the higher density of marine animals inside of the bay. As with the open-ocean movement of the tow ship, the ship speed is expected to be sufficiently low to decrease the risk of strikes. Accordingly, strike risk within Mobile Bay and along the tow route is anticipated to be negligible.

Potential Impacts on ESA-Listed Species. Because of the potential presence of the Gulf sturgeon, green sea turtle, Kemp's ridley, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee, the Navy has determined that that ship and tow line strike may affect these ESA-listed species as ex-Enterprise approaches the Port of Mobile through Mobile Bay.

- **Gulf sturgeon**. As discussed previously, sturgeon species are vulnerable to vessel strikes (NMFS, 2010). While vessel strike remains a general threat to sturgeon within Mobile Bay, the likelihood that the Proposed Action would result in a ship or tow line strike remains very low given the low tow speeds and the minimal time that ex-Enterprise under tow would be in areas where a strike may occur. Given the low speeds, infrequency of transit, and the expected low density of Gulf sturgeon along ex-Enterprise tow route through the Federal Mobile Harbor Navigation Channel to Port of Mobile commercial shipyard facility, the likelihood of a ship and tow line strike is extremely low, and therefore discountable (unlikely to occur).
- **Sea turtles**. Although sea turtles are not expected to occur within the lower reach of the Mobile River where shipyard facilities are located, sea turtles may occur along the tow route through Mobile Bay. Sea turtles spend most of their time submerged (Renaud & Carpenter, 1994; Sasso & Witzell, 2006), which reduces the risk of collision. Overall, the probability of the single ship tow encountering an ESA-listed sea turtle through Mobile Bay would be expected to be low and the tow would have lookouts aboard monitoring for ship collision risks (see Section 3.5.1.3 [Best Management Practices]), which decreases the likelihood of ships or tow lines striking sea turtles. Additionally, the tow speed would be low through Mobile Bay, providing more opportunity for turtles to detect and avoid the ship. Any behavioral avoidance displayed, if an ESA-listed sea turtle were to encounter the tug and tow through Mobile Bay, would not result in significant disruption of breeding, feeding, or sheltering as the turtle would be expected to move away from the ship and quickly resume normal behavior. In summary, although ship and tow line strike may affect ESA-listed sea turtles, the likelihood of such an interaction along the tow route to the Port of Mobile is discountable (unlikely to occur).
- **West Indian manatee**. Ship collisions are the primary anthropogenic cause of injury and mortality in the Florida subspecies (Runge et al., 2015; USFWS, 2014). Manatees are frequently exposed to potential ship collisions while foraging in shallow water, using thermal refuges, and moving among essential habitats (Buckingham et al., 1999; Gerstein, 2002). West Indian manatees respond to ship

movement via acoustic and possibly visual cues by moving away from the approaching ship, increasing their swimming speed, and moving toward deeper water (Miksis-Olds et al., 2007; Nowacek et al., 2004). The degree of the response varies with the individual manatee and may be more pronounced in deeper water, where they are more easily able to locate the direction of the approaching ship (Nowacek et al., 2004). This disturbance is a temporary response to the approaching ship. West Indian manatees have also been shown to seek out areas with a lower density of ships (Buckingham et al., 1999). West Indian manatees exhibit a clear behavioral response to ships within distances of 25–50 m (Nowacek et al., 2004). Martin et al. (2015) and Rycyk et al. (2018) found pronounced behavioral responses in tagged manatees when ships passed within 10 m of the animal. While ship speed did not have an impact on the occurrence, type, or number of behavioral changes observed in tagged manatees, results showed that manatees have more time to respond and changed their behavioral earlier when ships approached slowly compared to ships transiting on a plane at high speeds (approximately 17 knots [20 miles per hour] or greater) (Rycyk et al., 2018). Ex-Enterprise would enter Mobile Bay under tow at a speed estimated to be less than 10 knots (11.5 miles per hour) (NMFS, 2019) and transit through the Federal Mobile Harbor Navigation Channel to commercial shipyard facilities within the Port of Mobile along the Mobile River. At this speed, the risk of strike is greatly reduced because of the demonstrated ability of manatees to avoid slow moving ships. In addition, the Navy would require ex-Enterprise tow operator to maintain a lookout to minimize the risk of collision (this measure is a requirement of the 2019 NMFS Programmatic Biological Opinion for tow routes analyzed previously) (NMFS, 2019). Accordingly, the Navy has concluded that the risk for striking a West Indian manatee is discountable (unlikely to occur).

During the Navy's review of the current ranges for the Alabama sturgeon and Alabama red-bellied turtle, the Navy determined that the Proposed Action would have no effect on these two ESA-listed species. As discussed in Section 3.5.2.2 (Alabama), this riverine species is currently believed to be restricted to the lower portions of the Cahaba and Alabama rivers in south Alabama (Kuhajda & Rider, 2016) and does not occur within the lower reach of the Mobile River where shipyard facilities are located or along transportation routes through Mobile Bay. Accordingly, there would be no risk to the Alabama sturgeon from towing ex-Enterprise through Mobile Bay to shipyard facilities within the Port of Mobile. Alabama red-bellied turtles typically occur in vegetated expanses of shallow water (less than 2 m), in the backwater areas of bays, in and along river channels, and less frequently in oxbow lakes; and they require snags and dense beds of submersed and emergent aquatic vegetation for cover, predator avoidance, food, and structure for basking and thermoregulation. Because these habitat types do not occur along the tow route along the Federal Mobile Harbor Navigation Channel to Port of Mobile commercial shipyard facility, there would be no risk to this species from tow and tow line strike.

Port of Brownsville, Texas

If the Navy awards a contract to a commercial shipyard location within the Brownsville Ship Channel at the Port of Brownsville, ex-Enterprise would be towed from its current mooring location approximately 1,911 nm (2,200 mi.) along the eastern seaboard, around the southern tip of Florida, through the Gulf of Mexico, and enter the Brownsville ship channel to the Port of Brownsville for ship dismantling (see Figure 2-7).

Potential Impacts on ESA-Listed Species. Because of the reported presence of green sea turtles within the Brownville Ship Channel, the Navy has determined that towing ex-Enterprise through the Brownsville Ship Channel and to shipyard facilities at the Port of Brownsville may affect the green sea turtle. In the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019), NMFS assessed the potential for ship and tow line strike within the Port of Brownville for the ESA-listed green sea turtle. Green sea turtles may use auditory cues to react to approaching ships rather than visual cues, making them more susceptible to strike as ship speed increases (Hazel et al., 2007). Overall, the probability of the single ship tow encountering an ESA-listed sea turtle to a commercial dismantlement facility in the Port of Brownsville would be expected to be low, and the tow would have lookouts aboard monitoring for ship collision risks, which decreases the likelihood of ships or tow lines striking sea turtles. Additionally, the tow speed would be low through the Brownsville Ship Channel, providing more opportunity for turtles to detect and avoid the ship. Any behavioral avoidance displayed, if an ESA-listed sea turtle were to encounter the tug and tow through the Brownsville Ship Channel, would not result in significant disruption of breeding, feeding, or sheltering as the turtle would be expected to move away from the ship and quickly resume normal behavior. In summary, although ship and tow line strike may affect he green sea turtle, the likelihood of such an interaction along the tow route to the Port of Brownsville is discountable (unlikely to occur).

Ship Noise

Ship noise from contracted tug ships and towed Navy ships may be detectable to marine mammals, sea turtles, fish, and marine birds, although the density of species in the open ocean is so low that they are unlikely to be encountered. Nearshore species are more likely to be encountered in transit in the estuaries where origination and destination ports occur. However, these areas are already heavily trafficked by ships and the single towing event of ex-Enterprise is not expected to substantially increase noise levels above background or ambient conditions. Any response elicited from sensitive marine organisms due to ship noise is expected to be in the form of behavioral avoidance or interruption in behavior. Any behavioral response of a marine animal to ship noise would be of limited duration and magnitude. The temporary disturbance of marine mammals, sea turtles, fishes, marine birds associated with the anticipated interactions as part of the Proposed Action are not expected to result in injury or reduced fitness.

Hampton Roads Metropolitan Area, Virginia

If the Navy awards a contract to a commercial shipyard facility in the Hampton Roads Metropolitan Area, Virginia, under Alternative 1, transport of ex-Enterprise would be limited to short-distance tows within the area. Biological resources potentially impacted by initial transport of ex-Enterprise to a commercial port facility within the Port of Mobile are identified in Section 3.5.2.2 (Alabama). As discussed above, sound from contracted tug ships and towed Navy ships may be detectable to marine mammals, sea turtles, and fish, although the density of species in the open ocean is so low that they are unlikely to be encountered. Within the James River and lower Chesapeake Bay areas surrounding Hampton Roads Metropolitan Area, shipyard facilities are typically industrialized areas already exposed to high levels of anthropogenic noise (including vessel traffic) due to numerous waterfront users (e.g., industrial uses, marinas). The existing elevated anthropogenic noise in these industrialized ports would reduce the risk of behavioral responses (i.e., habituation of fish) and of masking (i.e., ship noise generated by the tug and tow would not likely exceed ambient noise levels except in very close proximity to the ship). The single movement of ex-Enterprise under tow would not significantly impact biological resources.

Potential Impacts on ESA-Listed Species. Because of the potential presence of shortnose sturgeon, Atlantic sturgeon, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle in the lower portion of the James River, the Navy has determined that ship noise may affect these ESA-listed species. A summary of the Navy's analysis for potential impacts on these ESA-listed species is included below. The Navy has determined that ship noise would have no effect on Atlantic sturgeon critical habitat. Atlantic sturgeon critical habitat designations are based upon oceanographic conditions (e.g., water quality, sediment type), ship noise would not impact the ability of waters to function as habitat.

- **Shortnose sturgeon and Atlantic sturgeon**. Because ship noise is low-frequency, it would be within the hearing range of sturgeon species (Popper, 2003, 2014). Shortnose sturgeon would be very rare within the James River and lower Chesapeake Bay, so they are not likely to be exposed to ship noise from the towing of ex-Enterprise. Shipyard facilities within the Hampton Roads Metropolitan Area are industrialized areas that are already exposed to high levels of anthropogenic noise (including vessel traffic) due to numerous waterfront users (e.g., industrial uses, marinas). The existing elevated anthropogenic noise in these industrialized ports would reduce the risk of behavioral responses (i.e., habituation of fish) and of masking (i.e., ship noise generated by the tug and tow would not likely exceed ambient noise levels except in very close proximity to the ship). Therefore, effects from ship noise associated with the Proposed Action in these areas would be temporary, localized, and consistent with existing port conditions. Long-term consequences to ESA-listed fish species are not expected as any behavioral effects would be short term as the towed ship passes through an area. In summary, Atlantic sturgeon are more likely exposed to ship noise compared to shortnose sturgeon because of the current ranges of these two species and their potential overlap with waters in the vicinity of the current mooring location and potential shipyard towing destinations within the Hampton Roads Metropolitan Area. Long-term consequences to ESA-listed fish species are not expected as any behavioral effects would be short term as the towed ship passes through an area. Due to the minimal and short term reactions anticipated, potential impacts from ship noise on ESA-listed sturgeon are expected to be insignificant (not measurable) and discountable (unlikely to occur).
- **Sea turtles**. Ship noise is low-frequency, and therefore, it would be within the hearing range of all sea turtle species (Popper, 2014). Little is known about how sea turtles use sound in their environment. Based on knowledge of their sensory biology (Bartol & Ketten, 2006; Levenson et al., 2004; Popper, 2014), sea turtles may be able to detect objects within the water column (e.g., vessels, prey, predators) via some combination of auditory and visual cues. However, research examining the ability of sea turtles to avoid collisions with vessels shows they may rely more on their vision than auditory cues (Hazel et al., 2007). Similarly, while sea turtles may rely on acoustic cues to identify nesting beaches, they appear to rely on other non-acoustic cues for navigation, such as magnetic fields (Hazel et al., 2007; Lohmann & Lohmann, 1996) and light (Avens & Lohmann, 2003; Levenson et al., 2004). Additionally, they are not known to produce sounds underwater for communication. Overall, sea turtles use of and reliance on hearing appears to be limited. Due to the low likelihood of occurrence of sea turtles within the James River and lower Chesapeake Bay and the industrialized nature of the ports, any reactions from sea turtles to noise from the single ship tow of ex-Enterprise from the current mooring location would be expected to be highly unlikely and too minor to be meaningfully evaluated. If an ESA-listed sea turtle were to encounter the tug and tow, ship noise would not result in significant disruption of breeding, feeding, or sheltering as the turtle would be expected to move away from the ship and quickly resume normal behavior. In summary, although ship noise may affect ESA-listed sea turtles, the likelihood of such an interaction is insignificant (not measurable) and discountable (unlikely to occur).

Port of Brownsville, Texas

As discussed above, sound from contracted tug ships and towed Navy ships may be detectable to marine mammals, sea turtles, and fish, although the density of species in the open ocean is so low that they are unlikely to be encountered. Once the towing ship passes between Brazos and Padre Islands (and entering the Brazos Ship Channel), ex-Enterprise would proceed under tow through the ship channel to the commercial dismantlement facility, and the likelihood of sound exposure increases because of the expected increase in density of marine animals within ship channel. However, these areas are already heavily trafficked by ships, and the single event of ex-Enterprise tow is not expected to substantially increase noise levels above background or ambient conditions. Any behavioral response of a marine animal to ship noise would be of limited duration and magnitude. Therefore, the Navy concludes that ship noise of ex-Enterprise under tow along the transit route from Newport News Shipbuilding to a commercial dismantlement facility in the Brownsville Ship Channel would have minimal impacts on biological resources.

Potential Impacts on ESA-Listed Species. Because of the reported presence of green sea turtles within the Brownville Ship Channel, the Navy has determined that ship noise generated by the single towing event of ex-Enterprise through the Brownsville Ship Channel may affect the green sea turtle. In the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019), NMFS determined that ship-generated noise from towing inactive Navy ships is insignificant and discountable because of the heavily trafficked ship channel, the low numbers of green sea turtles anticipated to be in the ship channel, the slow movement of tug boat tow operations, and the likely avoidance of collision by sea turtles by detecting audible cues (Hazel et al., 2007). Therefore, NMFS determined that effects of ship noise generated by towing ex-Enterprise through the Brownsville Ship Channel would be insignificant (not measurable) and discountable (not likely to occur).

Port of Mobile, Alabama

As discussed above, sound from contracted tug ships and towed Navy ships may be detectable to marine mammals, sea turtles, and fish, although the density of species in the open ocean is so low that they are unlikely to be encountered. Once inside of Mobile Bay, ex-Enterprise proceeds under tow along the Federal Mobile Harbor Navigation Channel to the Port of Mobile, and the likelihood of sound exposure increases because of the expected increase in density of marine animals within the bay. However, these areas are already heavily trafficked by ships, and the single event of ex-Enterprise tow is not expected to substantially increase noise levels above background or ambient conditions. Any behavioral response of a marine animal to ship noise would be of limited duration and magnitude. Therefore, the Navy concludes that ship noise of ex-Enterprise under tow along the transit route from Newport News Shipbuilding to the Port of Mobile would have minimal impacts on biological resources.

Potential Impacts on ESA-Listed Species. Because of the potential presence of the Gulf sturgeon, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee, the Navy has determined that ship noise may affect these ESA-listed species as ex-Enterprise approaches the Port of Mobile through Mobile Bay and along the tow route from Newport News Shipbuilding. Any response elicited from ESA-listed species due to ship noise is expected to be in the form of behavioral avoidance or interruption in behavior of limited duration and magnitude. Accordingly, the Navy has determined that potential effects resulting from ship noise to Gulf sturgeon, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee would be insignificant (not measurable) and discountable (unlikely to occur). As with the analysis for potential impacts from ship and tow line strike on the Alabama sturgeon and Alabama red-bellied turtle, the Navy has concluded that ship noise would have no effect on these two ESA-listed species because these species' ranges are not within any areas where ship movements would occur.

3.5.3.2.2 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

As described in Section 2.3.2.4 (Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility [Following Route Around South America]), the propulsion space section, which contains eight reactor plants, would be separated from the rest of ex-Enterprise and would then be transported to PSNS & IMF by heavy-lift ship (instead of in-water tow). The heavy-lift ship would leave the commercial dismantlement facility, navigate around the southern tip of South America, and then transit north to the U.S. West Coast, continuing up the coast to northwestern Washington and into the Strait of Juan de Fuca, then south through Puget Sound, ultimately arriving at PSNS & IMF. Figure 2-5 shows the potential routes of the heavy-lift ship, depending on which commercial dismantlement location would be utilized.

The various transit routes under Alternative 1 would traverse numerous open-ocean and nearshore biomes, which may present a vessel and tow line strike risk to marine animals (particularly marine mammals and sea turtles) (NMFS, 2019). For whales, studies show that the probability of fatal injuries from vessel strikes increases as ships operate at speeds above 14 knots (16 miles per hour) (Laist et al., 2001). Hazel et al. (2007) suggests that sea turtles may use auditory cues to react to approaching ships rather than visual cues, making them more susceptible to strike as ship speed increases.

Ship speeds ranging from 14 to 24 knots (16 to 28 mi. per hour) is the general optimal cruising speed of container ships and represents the hydrodynamic limits of the hull to perform within acceptable fuel consumption levels. Most container ships are designed to travel at speeds around 24 knots. In recognition of the significant hazard ship strikes have on marine mammals along the U.S. East Coast, the National Oceanic and Atmospheric Administration established in 2008 mandatory right whale ship strike reduction rule, establishing ship speed restrictions of 10 knots or less for ships 65 ft. in length or greater for several areas along the western Atlantic during specified times of the year (50 Code of Federal Regulations Part 224.105). Any heavy-lift ship transporting the propulsion space section, because of the ship size over 65 ft., would be subject to this rule.

The Navy has concluded that heavy-lift ship transport of the propulsion space section to PSNS & IMF would have negligible impacts on biological resources. This conclusion is based on the following:

- Heavy-lift ship speeds would generally be slower than other ships that travel at speeds known to present significant strike risks to marine mammals and sea turtles. In contrast to regular container ship traffic, heavy-lift ship speed is expected to average approximately 10 knots (11.5 miles per hour) and not exceed 14 knots (16 miles per hour).
- The heavy-lift ship transit is considered a normal maritime activity, and with only one heavy-lift ship transport trip proposed under Alternative 1, the increase in maritime traffic would be negligible.

On approach to PSNS & IMF, the propulsion space section would be brought into port under tug. Bringing in the propulsion space section of ex-Enterprise via heavy-lift ship may affect ESA-listed species along the heavy-lift routes from commercial dismantlement facilities around the southern tip of South

America, up the South and North American coasts, to PSNS & IMF. Because of the low ship speed (reduced strike risk), the Navy has determined that the heavy-lift ship movement would not likely adversely affect ESA-listed species and there would be no reasonably foreseeable takes of MMPA-protected species along the heavy-lift ship route (listed in Appendix F [ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes]) or within Puget Sound (see Section 3.5.2.4.1 [Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet]).

3.5.3.2.3 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

Work at PSNS & IMF is discussed in Section 2.3.2.5 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]). This work involves liquid removal (draining of the piping, tubing, and fluid systems remaining in the reactor compartments), equipment removal, reactor compartment packaging, and efforts to reduce radiation exposure to workers and the environment. These activities are considered normal pier-side and dry dock actions, with similar activities analyzed previously (Navy & DOE, 1996). Section 3.1 (Public and Occupational Health and Safety) includes detailed descriptions of policies and procedures to ensure safe removal of liquids and equipment.

Risk to biological resources from pier-side and dry dock work is minimized because none of the work would occur in the water and because of the standard operating procedures summarized in Section 3.1 (Public and Occupational Health and Safety). Similar work for ex-Enterprise reactor compartment removal and pier-side work was analyzed for inactive Navy cruisers in the 1996 Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants, hereinafter referred to as the 1996 EIS (Navy & DOE, 1996) and determined that pier-side and dry dock work would have no significant impacts on biological resources and no effect on ESA-listed species that may occur within the general vicinity of PSNS & IMF.

3.5.3.2.4 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

Installation of additional rail structures within Trench 94 at the DOE Hanford Site is discussed in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site). In 1996, DOE and Navy analyzed the placement of 220 reactor compartment packages in Trench 94; since that analysis, PSNS & IMF has used the concrete rail support system to place the reactor compartment packages within the trench (Navy & DOE, 1996). Ex-Enterprise reactor compartment packages would fit within the trench floor footprint and are well within the 220 total packages analyzed in 1996. Additional rail structures, however, would be added within Trench 94 at the DOE Hanford Site to support the single reactor compartment packages from ex-Enterprise, requiring limited excavation of the trench floor.

The 1996 EIS analysis determined that the placement of 220 reactor compartment packages (including the eight reactor compartment packages from ex-Enterprise under Alternative 1) would have no significant impacts on biological resources. Because limited excavation activities would be required to install additional rail components within Trench 94 at the DOE Hanford Site (previously disturbed areas), the Navy concludes that this project component would have no significant impacts on biological resources and no effect on ESA-listed species.

3.5.3.2.5 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

Reactor compartment packages would be transported by barge from PSNS & IMF to the Port of Benton barge slip. See Section 2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip) for complete description of barge transport of the reactor compartment packages. The barge route would follow the normal deep-water shipping lanes from PSNS & IMF, through Rich Passage, past Restoration Point, and northerly through Puget Sound. Proceeding through the Strait of Juan de Fuca (in U.S. territorial waters), and southerly down the Washington coast, the barge would turn east into the mouth of the Columbia River. Following the shipping channel used for the regular transport of commercial cargo, the river route would pass through the navigation locks at Bonneville, the Dalles, John Day, and McNary Dams before reaching the barge slip in the upper portion of Lake Wallula.

Although the barge route traverses through numerous habitat types and biomes, the Navy has assessed the stressors generated by a single barge transport of the reactor compartment packages to be discountable, as barge transport is a normal maritime activity. The eight reactor compartment packages would be shipped periodically as they are completed, allowing one shipment at a time. The Navy has based this determination on a history of transporting reactor compartment packages to the Port of Benton barge slip for final disposal at the DOE Hanford Site and compliance with environmental regulations that ensure safe transport. For example, the transport route for ex-Enterprise reactor compartment packages would be the same as the route used for the various cruiser and submarine packages previously shipped with no impacts on biological resources (Navy & DOE, 1996, 2012). Further, maintenance of the barge slip bottom to support offload of reactor compartment packages would comply with requirements of permits issued by USACE and WDFW. Accordingly, barge transport would have no significant impacts on biological resources, and would have no effect on ESA-listed species that may occur along the barge transport route.

3.5.3.2.6 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Once a reactor compartment package is unloaded at the Port of Benton barge slip, it is transported over land to the DOE Hanford Site. See Section 2.3.2.8 (Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site) for complete description of over land transport for the reactor compartment packages (see Figure 2-12).

Under Alternative 1, no modifications to road infrastructure are required. Accordingly, the Navy has determined that potential impacts on biological resources are negligible. There are no ESA-listed species that would be affected by the land transport phase.

3.5.3.3 Alternative 2: Dual Reactor Compartment Packages

Alternative 2 is the same as Alternative 1, except the Navy would dispose of four dual reactor compartment packages (instead of eight single reactor compartment packages) at Trench 94 at the DOE Hanford Site near Richland, Washington. Impact analysis associated with towing, partial dismantlement, propulsion space section shipment, and reactor compartment package construction efforts would be the same as for Alternative 1.

Section 2.3.3.6 (Port of Benton Barge Slip Modifications) and Section 2.3.3.7 (Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site) provide details of the different construction activities necessary to implement Alternative 2. These infrastructure improvements are needed to facilitate passage of the dual reactor compartment packages and include modification to the Port of Benton barge slip and road improvements from the barge slip to Trench 94 at the DOE Hanford Site. This section analyzes the potential impacts on biological resources that may result from these infrastructure improvements, in particular, in-water work within and adjacent to the Columbia River channel and ground disturbance along the land route. Figure 3.5-3 shows the conceptual framework for analyzing potential impacts resulting from Alternative 2.

3.5.3.3.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

Initial transport of ex-Enterprise under Alternative 2 would be the same as described under Alternative 1, where ex-Enterprise would be towed from its current location at Newport News Shipbuilding in Newport News, Virginia, to one of three commercial locations analyzed for partial dismantlement (commercial dismantlement facilities at the Hampton Roads Metropolitan Area, Virginia; the Port of Brownsville, Texas; or the Port of Mobile, Alabama). The analysis and conclusions for initial transport under Alternative 2 for biological resources are the same as for Alternative 1 (see Section 3.5.3.2.1 [Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility]). As discussed in Section 3.5.3.2.1, the Navy has determined that initial transport of ex-Enterprise would have minimal impacts on biological resources.

Potential Impacts on ESA-Listed Species. Based on the analysis under Alternative 1, the action under Alternative 2 to tow ex-Enterprise to commercial shipyard facilities at the Hampton Roads Metropolitan Area may affect the shortnose sturgeon, Atlantic sturgeon, Atlantic sturgeon critical habitat, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle. Stressors associated with towing of ex-Enterprise from its current mooring location to the Port of Mobile through Mobile Bay may affect Gulf sturgeon, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee. Towing along this route through Mobile Bay to the Port of Mobile would have no effect on the Alabama sturgeon or the Alabama red-bellied turtle. Towing of ex-Enterprise from the current mooring location to the Port of Brownsville may affect green sea turtles potentially occurring within the Brownsville Ship Channel. These determinations are included in the 2019 NMFS Programmatic Biological Opinion (NMFS, 2019).

In addition, the 2019 NMFS Programmatic Biological Opinion determined that the towing of inactive ships may affect, but would not likely adversely affect, numerous ESA-listed marine mammals, fishes, and sea turtles along the tow routes to the Port of Brownsville and shipyard facilities at the Hampton Roads Metropolitan Area, Virginia (see Appendix F [ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes]). As noted previously, the Port of Mobile was not included in the 2019 NMFS Programmatic Biological Opinion.

Potential Impacts on EFH. As described above under Alternative 1, in-water hull cleaning typically occurs over a long period of time (i.e., weeks to months), and biofouling material would be released slowly over time, allowing it to disperse within the environment. Under Alternative 2, in-water cleaning would only occur at Newport News Shipbuilding if ex-Enterprise was towed to the Port of Mobile or Port of Brownsville. Although in-water hull cleaning can impact levels of DO, turbidity, nitrate, organic debris and dissolved metals in the water column, monitoring studies have shown these conditions to be very temporary, decreasing rapidly to ambient concentrations after cessation of the cleaning activity (NMFS, 2019). Therefore, the Navy has determined that hull cleaning activities may adversely affect water and substrate quality and biogenic habitats that serve as EFH and HAPC. However, these impacts are expected to be very minor in severity, short term in duration, and limited in spatial extent to the area immediately under and adjacent to the footprint of the vessel.

3.5.3.3.2 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Following Route Around South America)

Under Alternative 2, the relocation of the propulsion space section would use the same heavy-lift ship routes analyzed under Alternative 1. For reasons stated under Alternative 1 (see Section 3.5.3.2.2 [Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility {Following Route around South America}]), potential impacts on biological resources during the relocation of the propulsion space section from the commercial dismantlement port to PSNS & IMF would be negligible. This conclusion is based on the low ship speed of the heavy-lift ship in transit to PSNS & IMF, and that heavy-lift ship transport is a normal maritime activity.

As with Alternative 1, the propulsion space section would be brought into PSNS & IMF under tug. Bringing in ex-Enterprise's propulsion space section via heavy-lift ship would not adversely affect ESA-listed species described in Section 3.5.2.4.1 (Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet).

3.5.3.3.3 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

The analysis for biological resources under Alternative 2 is the same as for Alternative 1, as discussed in Section 3.5.3.2.3 (Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages [No In-Water Work]). Accordingly, the Navy has determined that there would not be significant impacts on biological resources and no effect on ESA-listed species.

3.5.3.3.4 Port of Benton Barge Slip Modifications

Port of Benton barge slip modifications are described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications). In-water work is required for excavation to allow for widening of the current barge slip, while pile driving and concrete work would occur on land. Based on this description, the type of construction methods, and dredging and filling requirements for the project, the Navy has identified two stressors for analysis—water and sediment quality degradation and construction-generated sound. Biological resources are described for the barge slip modification area in Section 3.5.2.4.2 (Port of Benton Barge Slip). In addition to an assessment of potential impacts on general biological resources, the three ESA-listed fish species known to occur in this area are evaluated under each stressor category below.

Water and Sediment Quality Degradation

As stated in Section 2.3.3.6 (Port of Benton Barge Slip Modifications), infrastructure improvements are expected to remove approximately 2,625 cubic yards of material from the south jetty and from areas within the channel to reshape the substrate for expanding the Port of Benton barge slip. Approximately 71 cubic yards of material would be placed within the footprint of the expanded barge slip and along the sheet pile wall to provide erosion protection. Slip widening is necessary to accommodate the barge size to carry the larger dual reactor compartment packages and would increase the slip width by 18 ft. and extend the length by 15 ft. The new slip would be 80 ft. wide and 165 ft. long.

In-water work would require some equipment stationed in the water adjacent to the Port of Benton barge slip; therefore, direct disturbance to the riverbed and water quality is certain to occur during construction activities. Operation of equipment during barge slip modification would require the use of fuel and lubricants, which, if spilled into the Columbia River or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants contain poly-cyclic aromatic hydrocarbons which can be acutely toxic to salmonids and other aquatic organisms at high levels of exposure and cause lethal and sublethal effects (Culbertson et al., 2008).

Several measures would minimize or avoid potential impacts on water and sediment quality at the Port of Benton barge slip modification area. These measures are listed in Section 3.5.1.3 (Best Management Practices) and include adherence to regulatory in-water work windows, inspection of equipment prior to in-water work, provisions for offsite fueling and lubrication of equipment, spill prevention plans to prevent chemicals from entering the Columbia River (e.g., fuels, oils, grease, bitumin, paint, and waste washings), and use of turbidity fencing for in-water work. As a habitat enhancement measure for juvenile salmonids, gravel of a specific composition and size specific for juvenile habitat would be placed under the footprint currently occupied by the south jetty after the south jetty is removed. Gravel would be placed on the river bottom over the footprint of the expanded barge slip, including that of the current footprint.

In addition, the removal (dredging) of 2,625 cubic yards and the placement of 71 cubic yards of fill material within a Navigable Water would be subject to regulation under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and would require a Department of the Army permit from the USACE and the appropriate state permit issued by the Washington State Department of Ecology. The permit may include conditions that would be expected to be leveed to further reduce potential impacts on biological resources.

Based on the protective measures to contain turbidity and to reduce the likelihood of chemical contamination into the Columbia River and the addition of favorable salmonid river bottom habitat following removal of the south jetty, the Navy has determined that in-water construction activities and associated water and sediment quality stressors would have minimal impacts on biological resources.

Potential Impacts on ESA-listed Species. Under Alternative 2, construction activities would disturb sediments and temporarily suspend solids in the river channel used by ESA-listed salmonid species; therefore, the Navy has determined that the Proposed Action may affect the Chinook salmon (Upper Columbia River Spring-Run ESU), steelhead (Upper Columbia River DPS and Middle Columbia River DPS), and bull trout (Columbia River DPS). For Alternative 2, consultation would be required with NMFS and USFWS pursuant to section 7 of the ESA for infrastructure improvements at the Port of Benton barge slip. As part of the Proposed Action under Alternative 2, there are a number of measures that would minimize or avoid potential impacts on ESA-listed salmonids. These measures include the following:

- The scheduling of in-water work within the in-water work window of December 15–February 28, as identified in the 2020 NMFS Biological Opinion (USACE, 2020). This is the time frame where fish are least expected to be migrating through the area. Additionally, given the low presence of fish in the area during late fall, moving the time frame toward November 1 to accommodate construction schedule needs should have minimal biological impact (USACE, 2012). Work during these time frames would still require consultation with NMFS and USFWS.
- The use of turbidity fences during in-water construction activities, as required by Department of the Army permitting pursuant to the Clean Water Act, would further reduce any additional residual impacts on salmonids and salmonid habitat.

Therefore, the Navy concludes that any effects on ESA-listed species resulting from Alternative 2 would likely be discountable (unlikely to occur) and insignificant (not measurable). Further, construction activities under Alternative 2 would also include the placement of gravel on the south jetty footprint.

This measure is intended to provide substrate habitat preferred by juvenile salmonids. A study conducted by Trumbo (2017) for the USACE determined that the existing substrate surrounding the south jetty is of poor quality; therefore, Navy construction activities would likely enhance and improve available salmonid habitat within the general vicinity of the Port of Benton barge slip.

In-water construction activities would occur in designated critical habitat for Chinook salmon (Upper Columbia River Spring-Run ESU), steelhead (Upper Columbia River DPS and Middle Columbia River DPS), and bull trout (Columbia River DPS) (see Figure 3.5-8). As part of the Proposed Action, as stated above, the channel substrate to the south side of the Port of Benton barge slip would be altered through dredging and filling. As a result, the project would include habitat impacts within this designated critical habitat area. Therefore, the Navy has determined that the Proposed Action may affect these critical habitat designations. The project would not affect critical habitat outside the immediate area. The Navy anticipates that effects to ESA-listed salmonid habitat resulting from the Proposed Action would be discountable (unlikely to occur) and insignificant (not measurable). This preliminary conclusion is based on an analysis of potential impacts on the nine salmonid PCEs defined in Section 3.5.2.4.2 (Port of Benton Barge Slip). This analysis is summarized below by each PCE:

- **Water quality**. Construction activities associated with the Port of Benton barge slip modifications would temporarily degrade water quality in the immediate area; however, turbidity would be contained within turbidity curtains and would not continue after the project is complete. Therefore, the Navy anticipates that this principal biological feature would not be adversely affected by in-water construction because of the containment and the temporary duration of construction within the in-water work window discussed above and in Section 3.5.1.3 (Best Management Practices).
- **Migration habitat**. As part of the Proposed Action, the Navy would replace the south jetty of the existing barge slip with gravel substrate known to benefit juvenile salmonids. Therefore, the Navy anticipates that the Proposed Action would improve habitat for juvenile Chinook salmon migrating down the Columbia River along the shoreline.
- **Food availability**. The replacement of the south jetty with gravel substrate would also add a benthic food production area along the channel bottom. Therefore, the Navy anticipates that the Proposed Action would beneficially affect food availability for all salmonid species.
- **Instream habitat**. The increase in the area available for benthic food production would also enhance the instream habitat availability. The placement of gravels preferred by juvenile salmonids to the south side of the slip would further improve this area as habitat for salmonids. Therefore, the Navy anticipates that the Proposed Action would beneficially affect instream habitat for all salmonid species.
- **Water temperature**. Construction activities would not alter the water temperature of the Columbia River. Therefore, the Navy has determined that in-water construction activities at the Port of Benton barge slip would have no effect on the water temperature principal biological feature.
- **Substrate characteristics**. Substrate in the area would be altered by excavation, placement of fill and removal of the south jetty. While the area has been historically scoured by tug use, the Port of Benton barge slip could accommodate larger and wider barges than under the current design. Larger barges would necessitate an adjustment in the placement of the tugs that push the barges into place. This adjustment would cause scour further out into the river. The resulting

scour would be less likely to create potential ambush sites of juvenile salmonids by predatory fish, because of the deeper water and further distance from new gravel substrates and benthic food production areas. Additionally, after completion of the four reactor compartment shipments under Alternative 2, tug boats would no longer be situated at this location in the river to cause scour. Therefore, the Navy anticipates that effects of scour on instream habitat for salmonid species from the Proposed Action would be minimal and temporary.

- **Stream flow**. Stream flow would be altered directly at the project site. Water flow would change when the existing south jetty, which currently impedes water movement, is removed and water can move directly through the area. Therefore, the Navy anticipates that the Proposed Action would beneficially affect stream flow for all salmonid species.
- **Water quantity**. Construction activities would not alter the quantity of water within the Columbia River. Therefore, the Navy has determined that in-water construction activities at the Port of Benton barge slip would have no effect on the water quantity principal biological feature.
- **Nonindigenous species**. Construction activities would not introduce potentially invasive species into the Columbia River. Therefore, the Navy has determined that in-water construction activities at the Port of Benton barge slip would have no effect on the nonindigenous species principal biological feature.

Potential Impacts on EFH. As described above, water quality and sediment degradation would occur within the Port of Benton barge slip project area during the in-water construction period. Construction activities associated with the Port of Benton barge slip modifications would temporarily degrade water quality in the immediate area; however, turbidity would be contained within turbidity curtains and would not continue after the project is complete. Substrate in the area would be altered by excavation during the construction period, which includes the addition of gravel substrates favorable for juvenile salmon foraging. Therefore, the Navy has determined that in-water construction activities may adversely affect water and substrate quality and biogenic habitats that serve as EFH for Chinook and coho salmon. However, these impacts are expected to be very minor in severity, short term in duration, and limited in spatial extent.

Construction Noise

As described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications), multiple types of heavy equipment, such as hydraulic excavators, pile drivers, cranes, and dump trucks are expected to be used. No pile driving would occur in water.

Potential impacts on birds and other terrestrial species would likely be limited to behavioral reactions, where individual animals in close proximity would likely respond by increasing distance away from construction activities. No long-term consequences to individual animals are expected. Accordingly, there would be no consequences to any bird populations, and pile driving would not have a major adverse effect on populations of migratory bird species. Further, scheduling of construction activities (winter months) would reduce potential exposures to wildlife species. Bald eagles may be present within the project area as they are known to overwinter at the confluence of the Snake and Columbia Rivers, and there is evidence of foraging (salmon carcasses) along the shoreline of the Columbia River near the Port of Benton barge slip. Although bald eagles may perch and feed within the project area, it is not likely that temporary displacement from the project area during construction would measurably impact bald eagles. The nearest known nest is 7 mi. away, well outside the recommended standoff distance of

660 ft. With no nest disturbance or destruction, construction activities would have no effect or take (to include disturbance) of either bald or golden eagles that would require consultation with the USFWS pursuant to the BGEPA.

Other aquatic wildlife, such as amphibians, turtles, and aquatic mammals would only be exposed to noise generated under Alternative 2 construction activities if they were in the close vicinity to impact or vibratory pile driving activities. Disturbance associated with normal construction activities would result in animals distancing themselves from the construction site before on-land pile driving begins. These animals are expected to most likely respond by increasing distance from construction noise sources, or not respond at all. As discussed above, impacts on individual animals, if any, are expected to be minor and limited. No long-term consequences to individuals are expected. If animals are present, they may be exposed to in-air noise from pile driving, but they would be expected to avoid the area around active impact and vibratory pile driving construction activities.

The Navy has determined that noise generated by construction activities at the Port of Benton barge slip modification area would have no significant impacts on biological resources. This conclusion is based on the following:

- The Navy anticipates that the majority of the sound would attenuate through the ground before reaching the water, and that impacts on aquatic species would be minor in terms of impact and of temporary duration.
- The planned equipment use would produce noise levels greater than those typically occurring during recreation boating nearby and offloading operations at the Port of Benton barge slip modification area. However, none are expected to reach levels injurious to aquatic and terrestrial species.
- The scheduling of in-water construction activities would avoid seasonal migrations of fish and other wildlife (with the exception of wintering bull trout, steelhead, and stream-type Chinook).

Potential Impacts on ESA-Listed Species. The Navy has determined that the construction activities under Alternative 2 may affect the Chinook salmon (Upper Columbia River Spring-Run ESU), steelhead (Upper Columbia River DPS and Middle Columbia River DPS), and bull trout (Columbia River DPS). Sound produced under Alternative 2, however, would not likely disturb ESA-listed fish species because the highest noise-generating construction activities (sheet pile installation using a vibratory hammer, pipe pile installation using an impact hammer) would all occur on land. Most sound from pile driving activities would attenuate through the ground prior to reaching the water. To further avoid impacts to peak migrations of ESA-listed fish, in-water construction activities are scheduled to occur in winter months when salmonids are not migrating through the portion of the Columbia River of upper Lake Wallula. The Navy anticipates that in-water construction activities would occur between December 15 and February 28. The final in-water work window for any modifications of the Port of Benton barge slip would be determined during consultation with NMFS and USFWS, and in conformance with applicable Washington Administrative Code (WAC) provisions for minimizing impacts on salmonid migrations. Salmonids, if any, would be expected to occur in only very low numbers. Further, most sound from pile driving activities would attenuate through the ground prior to reaching the water. Therefore, the Navy anticipates that potential adverse effects resulting from construction activities would be discountable (unlikely to occur) and insignificant (not measurable). Construction activities may affect Steelhead Snake River Basin DPS and Chinook salmon Snake River Spring/Fall Run ESU if these salmon do not enter the Snake River and continue up the Columbia River. To date, there are no indications that these salmon would reach the Port of Benton barge slip project area; therefore, the Navy has determined that construction activities at the barge slip would have no effect on Steelhead Snake River Basin DPS and Chinook salmon Snake River Spring/Fall Run ESU.

Potential Impacts on EFH. The Navy has determined that the noise generated during construction activities under Alternative 2 may affect Chinook and coho salmon water column EFH. As described above, construction noise would not likely disturb these species or prey items because the highest noise-generating construction activities (sheet pile installation using a vibratory hammer, pipe pile installation using an impact hammer) would all occur on land and most sound from pile driving activities would attenuate through the ground prior to reaching the water. To further avoid impacts on EFH, in-water construction activities are scheduled to occur in winter months when salmonids are not migrating through the portion of the Columbia River of upper Lake Wallula. Therefore, the Navy anticipates that potential adverse effects to water column EFH within the Columbia River resulting from construction activities are expected to be very minor in severity, short term in duration, and limited in spatial extent.

3.5.3.3.5 Road Modifications Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

The route between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site would require improvements such as cutting or filling to reduce the vertical curve, filling dips in the road, paving medians, filling low sides or cutting high sides to reduce side slope, and filling road shoulders to improve intersections (see Section 2.3.3.7 [Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site]), for a description of the affected environment for biological resources).

<u>Ground Disturbance</u>

Based on the literature review for potential biological resources within the area subject to impacts, the Navy determined that the majority of these ground disturbing activities would take place on the existing roads, road margins, and the non-vegetated road-side berms. These processes could result in damage to areas adjacent to the project area from heavy machinery use. Heavy equipment can crush vegetation and compact soils, potentially damaging plant roots. Bare, disturbed, and compacted soils are vulnerable to weed invasion through natural dispersal (e.g., wind-blown seeds) or man-made dispersal (e.g., vehicles and machinery moving from site to site). However, if the activities are to remain within the existing road prism, no adverse impacts are anticipated. Road improvements would include best management practices pursuant to the DOE Hanford Site Biological Resources Management Plan and construction policies in DOE (2017b). At a minimum, proposed road improvement actions would avoid the undisturbed habitats adjacent to the project area, while keeping vehicles and heavy machinery within the non-vegetated road prism at all times, including the staging of materials, equipment, and machinery. To reduce the potential of invasive species introduction and establishment at the DOE Hanford Site, all vehicles and equipment used for construction would use cleaning stations prior to and after daily work activities.

After review of the *Bald Eagle Management Plan for the Hanford Site* (DOE, 2017a), the Navy has determined that land transport improvements would not impact bald eagles because the distance to known and historic nest sites is beyond the effects of the project. As discussed in Section 3.5.2.4.3 (Land Transport Route from the Port of Benton Barge Slip to Final Disposal Location at the Department of Energy Hanford Site), bald eagles are known to winter along the Columbia River on the DOE Hanford

Site, but no eagle nest has been reported near the barge slip. In summary, potential impacts on biological resources associated with road improvement actions under Alternative 2 would have minimal impacts on biological resources.

3.5.3.3.6 Installation of a Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

As stated in Section 2.3.3.8 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site), the rail system installation in Trench 94 at the DOE Hanford Site would be the same as described for Alternative 1. The DOE and Navy 1996 EIS determined that the placement of 220 reactor compartment packages (including the four reactor compartment packages from ex-Enterprise under Alternative 2) would have no significant impacts on biological resources (Navy & DOE, 1996). Because limited excavation activities would be required to install additional rail components within Trench 94 at the DOE Hanford Site (previously disturbed areas), the Navy concludes that this project component would have no significant impacts on biological resources and no effect on ESA-listed species.

3.5.3.3.7 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip

The four reactor compartment packages of Alternative 2 would be transported by a barge capable of handling the larger dual reactor compartment packages via the transport route from PSNS & IMF to the Port of Benton barge slip at Richland, Washington, similar to Alternative 1. As with Alternative 1, the Navy has concluded that barge transport, a normal maritime transport activity, from PSNS & IMF would have minimal impacts on biological resources.

Appendix F (ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes) includes a list of ESA-listed species that may potentially occur along the barge transport route. Because the routine nature of this activity would not significantly contribute to baseline maritime or river transportation, the Navy has determined that barge transport under Alternative 2 would have no effect on these species.

3.5.3.3.8 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

From the Port of Benton barge slip at Richland, Washington, the dual reactor compartment packages would be loaded onto a multiple-wheel, high-capacity transporter capable of handling the larger dual reactor compartment packages for transfer to Trench 94 on the DOE Hanford Site. As with Alternative 1, the Navy has concluded that the potential for impacts on biological resources are minimal. There are no ESA-listed species within the vicinity of the land transport route.

3.5.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

As described in Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement), implementation of Alternative 3 (Preferred Alternative) would consider commercial contractors and port facilities for ship dismantlement and recycling activities. Dismantlement of ex-Enterprise at an authorized commercial (non-Navy) ship dismantlement facility includes cutting apart the eight reactor plants into segments for packaging into several hundred small containers that meet Department of Transportation requirements for subsequent disposal at either a DOE and/or authorized commercial low level radioactive waste. Figure 3.5-4 shows the conceptual framework for analyzing potential impacts resulting from Alternative 3 (Preferred Alternative).

3.5.3.4.1 Tow ex-Enterprise from Newport News, Virginia to Commercial Dismantlement Facility

Initial transport of ex-Enterprise under Alternative 3 (Preferred Alternative) would be as described under Alternative 1, where ex-Enterprise would be towed from its current location at Newport News Shipbuilding in Newport News, Virginia, to one of three commercial locations for partial dismantlement: commercial dismantlement facilities in the Hampton Roads Metropolitan Area, Virginia; the Port of Brownsville, Texas; or the Port of Mobile, Alabama. The analysis and conclusions for initial transport under Alternative 3 (Preferred Alternative) are the same as for Alternative 1 (see Section 3.5.3.2.1 [Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility]). In summary, the Navy has determined that initial transport of ex-Enterprise would have minimal impacts on biological resources.

Potential Impacts on ESA-Listed Species. The potential effects of initial transport to ESA-listed species were analyzed for each destination port, as well as for the implementation of in-water hull cleaning mitigation measures at the current mooring location at Newport News Shipbuilding. Paralleling the analysis under Alternative 1, in-water hull cleaning may affect Atlantic sturgeon, green sea turtle, Kemp's ridley sea turtle, and leatherback sea turtle. In-water hull cleaning may affect Atlantic sturgeon critical habitat where that cleaning would occur in the waters of Hampton Roads Metropolitan Area, Virginia. Ship and tow line strike and ship noise may affect the shortnose sturgeon, Atlantic sturgeon, Gulf sturgeon, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, hawksbill sea turtle, loggerhead sea turtle, and West Indian manatee. The Navy has determined that Alternative 3 (Preferred Alternative) would have no impact on the Alabama sturgeon or the Alabama red-bellied turtle. The Navy has determined that stressors on ESA-listed species associated with towing ex-Enterprise to a commercial dismantlement facility are discountable (unlikely to occur). The Navy would, to the maximum extent practicable, conduct in-water hull cleaning from November 1 through February 28 in order to reduce potential effects to adult Atlantic sturgeon and sea turtles. If this schedule is achieved, hull cleaning would not affect any sea turtle species, and the potential effects to Atlantic sturgeon and their critical habitat would be discountable.

Pursuant to section 7(a)(2) of the ESA, the Navy plans to consult with NMFS and USFWS to assess potential effects on ESA-listed species from tow route scenarios under Alternative 3 (Preferred Alternative) that were not analyzed in the 2019 NMFS Programmatic Biological Opinion. The 2019 NMFS Programmatic Biological Opinion determined that the towing of inactive ships may affect, but would not likely adversely affect, numerous ESA-listed marine mammals, fishes, and sea turtles along the tow routes to the Port of Brownsville and shipyard facilities at the Hampton Roads Metropolitan Area, Virginia (see Appendix F [ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes]).

Potential Impacts on EFH. As described above under Alternatives 1 and 2, in-water hull cleaning typically occurs over a long period of time (i.e., weeks to months), and biofouling material would be released slowly over time, allowing it to disperse within the environment. Under Alternative 3 (Preferred Alternative), in-water hull cleaning would only occur at Hampton Roads Metropolitan Area if ex-Enterprise was towed to the Port of Mobile or Port of Brownsville. Although in-water hull cleaning can impact levels of DO, turbidity, nitrate, organic debris and dissolved metals in the water column, monitoring studies have shown these conditions to be temporary, decreasing rapidly to ambient concentrations after cessation of the cleaning activity (NMFS, 2019). Therefore, the Navy has determined that hull cleaning activities may adversely affect water and substrate quality and biogenic habitats that serve as EFH and HAPC. However, these impacts are expected to be very minor in severity, short term in duration, and limited in spatial extent.

3.5.3.4.2 Complete Dismantlement of ex-Enterprise at Commercial Dismantlement Facility

Complete dismantlement would occur in either Brownsville, Texas; Mobile, Alabama, or the Hampton Roads Metropolitan Area, Virginia. Procedures may vary slightly among facilities; however, the framework for assessing impacts are common to all locations. Because the Navy's dismantling contracts require that the dismantling facility obtain all applicable environmental permits prior to commencing the dismantling project, and because of the anticipated low density of marine organisms in the immediate vicinity of this activity, the Navy has determined that the impacts on biological resources resulting from potential water quality degradation are minimal. As for potential impacts of sound introduced in the marine environment during complete dismantlement activities, noise from dismantlement activities would likely be detectable to marine organisms if they were in close proximity to the ship dismantlement facility. However, due to the nature of the required activities, ship dismantlement would occur at highly industrialized locations, with baseline noise conditions elevated well above typical background levels. Therefore, it is unlikely that dismantlement activities associated with the Proposed Action would greatly increase underwater noise levels above baseline levels at these high traffic, industrialized ports. Therefore, the Navy has determined that the potential impacts on biological resources are minimal under Alternative 3 (Preferred Alternative).

Potential Impacts on ESA-Listed Species. Ship dismantling companies that are awarded contracts to tow and dismantle inactive ships are responsible for all work associated with the removal and proper disposal of hazardous materials. Contractors must comply with all applicable federal, state, and local environmental laws and regulations during the processing, use, or disposal of any material under an awarded contract. Shipbreaking companies must submit an Environmental Compliance Plan as part of the bid process. Bidders must demonstrate how the shipbreaking facility would ensure safe and environmentally sound management of all hazardous materials and wastes removed from a ship recycled at the facility, including information for asbestos, Polychlorinated Biphenyls (PCBs), fuels and oils, bilge/ballast water, heavy metals, paints and coatings, waste water/sludge, ozone depleting substances, and other potential hazardous materials. In addition, bidders must certify and/or verify that the dismantling facility has developed, implemented, and maintains a Spill Prevention, Control and Countermeasures Plan and a Stormwater Pollution Prevention Plan. The bidder must also reveal any Notices of Violations, fines or proposed fines, convictions or citations associated with environmental compliance, and whether the bidder has been the subject of any judicial or administrative proceeding related to the violation of any applicable law related to environmental compliance. Based on the requirements for environmental compliance related to the shipbreaking process described above, and the low anticipated density of ESA-listed species in the immediate vicinity of these activities, NMFS made a determination in the 2019 Programmatic Biological Opinion that the potential for effects to ESA-listed species and critical habitats associated with commercial ship breaking (or dismantling) activities is extremely unlikely to occur and thus would be discountable.

3.5.4 Mitigation

This section identifies potential mitigation measures that are not included as part of standard operating procedures or permit requirements specified in Section 3.5.1.3 (Best Management Practices).

The Navy identified the following potential mitigation actions associated with the Proposed Action and alternatives:

- If the Navy selects any of the action alternatives (Alternatives 1, 2, or 3), hull cleaning of ex-Enterprise would be required for the initial transport of ex-Enterprise to commercial dismantlement facilities outside of the Hampton Roads Metropolitan Area. The Navy would implement this measure to reduce the potential for non-indigenous aquatic organisms to be introduced to the Port of Mobile or the Port of Brownsville. Potential impacts of hull cleaning are analyzed under each alternative in Section 3.5.3 (Environmental Consequences).
- If the Navy selects Alternative 2, the Navy would include habitat improvement measures at the Port of Benton barge slip modification area within the Columbia River channel for the benefit of juvenile salmonids. As part of the Proposed Action, the Navy would replace the south jetty with favorable gravel substrate. The expectation is to improve habitat for migrating juvenile salmon. The project would add approximately 7,000 square feet of benthic food production and enhance instream habitat availability.

3.5.5 Summary of Impacts and Conclusions

Table 3.5-2 summarizes the potential impacts of the alternatives on biological resources.

Table 3.5-2: Summary of Impacts and Conclusions on Biological Resources

Potential Impacts on Biological Resources	Alternatives			
	No Action	1	2	3
In-water hull cleaning		◑	◑	◑
Ship strike and tow line strike		◑	◑	◑
Ship noise		○	○	○
Ship strike (heavy-lift ship)		○	○	
Construction-related water quality impacts (Port of Benton Barge Slip)			◑	
Ground disturbance (road modification between Port of Benton barge slip and Trench 94 at the DoE Hanford Site)			○	

Notes: ◑ = Some impact but reduced as a result of project design changes, implementation of current or proposed management practices, monitoring, or mitigation; ○ = minimal impact; Blank = no impact/not applicable

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3.6 Air Quality

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes air quality concerns associated with the Proposed Action. Congress passed the Clean Air Act (CAA) in 1970 and its amendments in 1977 and 1990 to improve air quality and reduce air pollution, which set regulatory limits on air pollutants and helped to ensure basic health and environmental protection from air pollution.

Air pollution damages the health of people, plants, animals, and water bodies as well as the exteriors of buildings, monuments, and statues. It also creates haze or smog that reduces visibility and interferes with aviation.

Air quality is defined by ambient concentrations of specific air pollutants the United States (U.S.) Environmental Protection Agency (EPA) determined may affect the health or welfare of the public and/or environment. The six major pollutants of concern are called "criteria pollutants": carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone, particulate matter (PM) consisting of dust particles less than or equal to 10 microns in diameter (PM_{10}) plus fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb).

The CAA required the EPA to establish National Ambient Air Quality Standards (NAAQS) for these criteria pollutants. These standards set specific concentration limits for criteria pollutants in the outdoor air. The concentration limits were developed because the criteria pollutants are common in outdoor air, considered harmful to public health and the environment, and come from numerous and diverse sources. The concentration limits are designed to aid in protecting public health and the environment. Areas with air pollution problems typically have one or more criteria pollutants consistently present at levels that exceed the NAAQS. These areas are designated as nonattainment for the standards. If the air quality in a geographic area meets or is cleaner than the national standard, it is called an attainment area (designated "attainment/unclassifiable"). Maintenance areas are those previously designated as a nonattainment area and subsequently redesignated to attainment.

Criteria air pollutants are classified as either primary or secondary pollutants based on how they are formed in the atmosphere. Primary air pollutants are emitted directly into the atmosphere from the source of the pollutant. Examples of primary pollutants are the smoke produced by burning wood and volatile organic compounds emitted by industrial solvents. Secondary air pollutants are those formed through atmospheric chemical reactions that usually involve primary air pollutants (or pollutant precursors) and normal constituents of the atmosphere. Ozone is a secondary pollutant that is formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors (volatile organic compounds, nitrogen oxides, and suspended PM_{10}).

Some criteria air pollutants are a combination of primary and secondary pollutants. Particulate matter, including PM_{10} and $PM_{2.5}$, are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. They are generated as secondary pollutants through chemical reactions or through the condensation of gaseous pollutants into fine aerosols.

CO emissions are primarily due to burning of fossil fuel in cars, trucks, and other vehicles or machinery. NO_2 is also primarily released in the air from the burning of fuel in cars, trucks and buses, power plants, and off-road equipment. Sources of lead emissions vary from one area to another. At the national level, major sources of lead in the air are ore and metals processing and piston-engine aircraft operating on leaded aviation fuel. Other sources are waste incinerators, utilities, and lead-acid battery manufacturers.

The highest air concentrations of lead are usually found near lead smelters. The largest source of SO_2 in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities.

In addition to the 6 criteria pollutants, the EPA currently designates 188 substances as hazardous air pollutants under the federal CAA. Hazardous air pollutants are air pollutants known or suspected to cause cancer or other serious health effects, or adverse environmental and ecological effects (EPA, 2016a). NAAQS are not established for these pollutants; however, the EPA has developed rules and control standards that limit emissions of hazardous air pollutants from specific stationary (National Emissions Standards for Hazardous Air Pollutants) and mobile sources (Mobile Source Air Toxics). These emissions are typically one or more orders of magnitude smaller than concurrent emissions of criteria air pollutants.

Ambient air quality is reported as the atmospheric concentrations of specific air pollutants at a particular time and location. The units of measure are expressed as a mass per unit volume (e.g., micrograms per cubic meter [$\mu g/m^3$] of air) or as a volume fraction (e.g., parts per million by volume). The ambient air pollutant concentrations measured at a particular location are determined by the pollutant emissions rate, local meteorology, and atmospheric chemistry. Wind speed and direction, the vertical temperature gradient of the atmosphere, and precipitation patterns affect the dispersal, dilution, and removal of air pollutant emissions from the atmosphere.

This section discusses hazardous air pollutants in relation to the prevalence of the sources emitting these pollutants during activities identified in the EIS/OEIS. Mobile sources operating as a result of the Proposed Action would be functioning over a wide dispersal area, are transient in nature, and are only a minor fraction of the criteria pollutants emissions. As such, the Proposed Action is not anticipated to produce levels of hazardous air pollutants that would indicate need for further review. For these reasons, hazardous air pollutants are not further evaluated in the analysis.

Activities conducted as part of the Proposed Action would involve mobile sources using fossil fuel combustion as a source of power, which results in generation of Greenhouse Gas emissions. Greenhouse Gas emissions are discussed further in Section 3.6.4 (Environmental Consequences).

3.6.1 Air Quality Standards

The current NAAQSs for criteria pollutants are presented in Table 3.6-1. Areas that exceed a standard are in "nonattainment" for that pollutant, while areas that meet a standard are in "attainment" for that pollutant. An area may simultaneously be in nonattainment for some pollutants and in attainment for others. Areas that achieve attainment, after having been in nonattainment, are reclassified as maintenance areas and are required to develop maintenance plans to demonstrate how the area would continue to meet federal air quality standards. Nonattainment areas for some criteria pollutants are further classified as shown below, depending upon the severity of their air quality problem, to facilitate their management:

- ozone—marginal, moderate, serious, severe, and extreme
- carbon monoxide—moderate and serious
- particulate matter—moderate and serious

States, through their air quality management agencies, are required under the CAA to prepare a State Implementation Plan (SIP) to demonstrate how the nonattainment and maintenance areas would achieve and maintain the NAAQS (Table 3.6-1). If the state fails to develop an adequate plan to achieve and maintain the NAAQS, or a SIP revision is not approved by EPA, the EPA would impose a Federal

Implementation Plan. In addition to the NAAQS, individual states are able to develop their own air quality standards that are more stringent than the federal standards.

Table 3.6-1: National Ambient Air Quality Standards

Pollutant		*Primary/ Secondary*	*Averaging Time*	*Level*	*Form*
Carbon monoxide		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead		primary and secondary	Rolling 3-month period	0.15 μg/m^3 (Note 1)	Not to be exceeded
Nitrogen dioxide		primary	1 hour	100 parts per billion (ppb)	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (Note 2)	Annual mean
Ozone		primary and secondary	8 hours	0.070 ppm (Note 3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (particulate matter)	$PM_{2.5}$	primary	1 year	12.0 μg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 μg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide		primary	1 hour	75 ppb (Note 4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Note 1: In areas designated nonattainment for the lead standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 micrograms per cubic meter as a calendar quarter average) also remain in effect.
Note 2: The level of the annual nitrogen dioxide standard is 0.053 parts per million. It is shown here in terms of parts per billion for the purposes of clearer comparison to the 1-hour standard level.
Note 3: Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) ozone standards additionally remain in effect in some areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O3 standards.
Note 4: The previous sulfur dioxide standards (0.14 parts per million 24-hour and 0.03 parts per million annual) would additionally remain in effect in certain areas: (1) any area for which it is not yet one year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous sulfur dioxide standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous sulfur dioxide standards (40 Code of Federal Regulations Part 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS.
Notes: PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, ppm = parts per million, μg/m^3 = micrograms per cubic meter.
Source: (EPA, 2016b), last updated January 7, 2016.

States may also choose to adopt the Federal Implementation Plan as an alternative to developing their own SIP. Regardless of whether EPA has approved a SIP, federal entities have to comply with all federal, state, and local requirements respecting control and abatement of air pollution.

3.6.2 Methodology

3.6.2.1 Region of Influence

The Study Area for this EIS/OEIS includes offshore and land areas of a number of states, including areas within or over state waters and international waters. These include Newport News, Virginia; the tow route; dismantlement locations; barge route; and land transport routes to waste facilities, as well as land areas several miles adjacent to these areas. State waters extend from the shoreline to 3 nautical miles (nm) from Maine to the east coast of Florida, Alabama, Mississippi, and Louisiana, and to 9 nm for Texas and the Gulf coast of Florida (43 United States Code Section 1301 et seq.*)*. A coastal state exercises sovereignty over its state waters, the air space above it, and the seabed and subsoil beneath it. Some activities of the Proposed Action would occur in state waters and primarily involve shipping and towing on Washington and Oregon state waters and at pier. However, when towing in international waters, most of the Study Area is substantially offshore, beyond state boundaries where attainment status is unclassified and NAAQS do not apply. NAAQS attainment status of adjacent onshore areas would be considered in determining whether appropriate controls for air pollution sources in the adjacent offshore state waters is warranted. Further discussion of the attainment status of the Study Area is provided in Section 3.6.3 (Affected Environment).

Identifying the Region of Influence (ROI) for air quality requires knowledge of the type of pollutant, emission rates of the pollutant source, proximity to other emission sources, and local and regional meteorology. For photochemical pollutants (i.e., made or changed by exposure to sunlight) such as ozone, the impact area may extend much farther (e.g., miles) downwind. The maximum effect of precursors on ozone levels tends to occur several hours after the time of emission during periods of high solar load (i.e., sunlight) and may occur many miles from the source. Ozone and ozone precursors transported from other regions can also combine with local emissions to produce high local ozone concentrations. Therefore, the ROI for air quality includes Newport News, Virginia, the tow route, dismantlement locations, barge route, and land transport routes to waste facilities, as well as land areas several miles adjacent to these areas. These land areas may, from time to time, be downwind from emission sources associated with the Proposed Action. The ROI includes the Air Quality Control Regions (AQCRs) established by the EPA for air quality planning purposes (40 Code of Regulations [CFR] Part 81) that cover the Hampton Roads Metropolitan Area, Virginia; Bremerton and Richland, Washington; and the Department of Energy (DOE) Hanford Site, Washington; Brownsville and Andrews, Texas; Mobile, Alabama; Clive, Utah; and Aiken, South Carolina. Details about each AQCR are presented in Section 3.6.3 (Affected Environment).

Within attainment areas, the U.S. Department of the Navy (Navy) is required to ensure that air quality does not significantly deteriorate as a result of air emissions associated with activities conducted under the Proposed Action.

In contrast, for nonattainment areas, a major source is defined based on the classification of the area under the CAA. Further discussion of major source threshold for nonattainment areas is provided in the following sections under Section 3.6.2.3.1 (General Conformity Evaluation).

3.6.2.2 Approach to Analysis

The air quality impact evaluation requires three separate analysis categories: (1) the CAA General Conformity Analysis; (2) an analysis under the National Environmental Policy Act (NEPA); and (3) an analysis under Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions*. The air emissions emitted by federal actions identified under this EIS/OEIS include stationary source emissions from infrastructure improvements and mobile source emissions from construction equipment, land transport, and marine vessel activities within the Study Area. The generated air emissions would be evaluated in one or more of the three identified analysis categories based on the geographical and spatial locations where emissions occur and CAA air quality status (nonattainment, maintenance or attainment) of those respective locations, as well as pollutants emitted, type of emission source and levels of emissions.

Impacts of air pollutants emitted by towing and barging activities in the Pacific Ocean, Atlantic Ocean, Gulf of Mexico, bays, and inland locations in the United States and some state waters (0–3 nm; 0–9 nm for Texas, and the Gulf Coast of Florida) would be evaluated under the CAA General Conformity Rule for only those areas designated as nonattainment or maintenance and only for nonattainment or maintenance criteria pollutants. Impacts of all criteria pollutants emitted inland out to 12 nm from this federal action would be evaluated under NEPA. Air pollutants emitted as result of federal action beyond 12 nm would be evaluated under EO 12114. Air pollutants emitted in Texas could travel into Mexico, where the CAA and EO 12114 do not apply. NEPA could apply, since "NEPA law directs federal agencies to analyze the effects of proposed actions to the extent they are reasonably foreseeable consequences of the proposed action, regardless of where those impacts might occur" (CEQ, 1997). However, the analysis for partial and complete dismantlement in 3.6.4 (Environmental Consequences) concludes that any impacts on air quality would be temporary, minor, and localized. Therefore, significant impacts on air quality in Mexico are not anticipated, and potential air quality impacts in Mexico are not evaluated further.

Air impacts due to transportation of non-radiological waste would be similar between alternatives and are within existing normal commercial and public shipyard compliant operations. Therefore, this section analyzes air impacts associated with transportation of radiological waste only.

3.6.2.3 Regulatory Framework

3.6.2.3.1 General Conformity Evaluation

Section 176(c)(1) of the CAA, commonly known as the General Conformity Rule, requires federal agencies to ensure that their actions conform to applicable implementation plans for achieving and maintaining the NAAQS for criteria pollutants for nonattainment and maintenance areas. Federal actions are required to conform with the approved SIP for those areas of the United States designated as nonattainment or maintenance areas for any criteria air pollutants under the CAA (40 CFR Parts 51 and 93 subpart B). The purpose of the General Conformity Rule is to ensure that applicable federal activities do not cause or contribute to new violations of the NAAQS, do not worsen existing violations of the NAAQS, and attainment of the NAAQS is not delayed.

A conformity evaluation must be completed for every applicable Navy action that generates emissions to determine and document whether a Proposed Action complies with the General Conformity Rule.

The General Conformity analysis is separate and distinct from the NEPA analysis. General Conformity is concerned with ensuring that non-permitted projects conform to the SIP. The EIS/OEIS analysis is concerned with whether an activity significantly affects the human environment. The two analyses are related in that an air impact that violates a SIP is probably "significant."

The first step in the Conformity evaluation is a Conformity Applicability Analysis, which involves calculating the non-exempt direct and indirect emissions associated with the action. If there is no current activity (the Proposed Action is completely new), then the sum of the non-exempt direct and indirect emissions equals the net change in emissions (the current level would be zero). If the action is a change from a current level of emissions, then future emissions are evaluated against the current level, defined as the "current environmental baseline conditions." The net change, then, is the difference between the emissions associated with the action and the current environmental baseline emissions. The net change may be positive, negative, or zero. The emissions thresholds that trigger a Conformity Determination are called *de minimis* levels. The *de minimis* levels for nonattainment and maintenance pollutants under the General Conformity Rule are shown in Table 3.6-2. The net change calculated for the direct and indirect emissions are compared to the *de minimis* levels published in the Conformity Rule. If the net change in emissions does not exceed *de minimis* thresholds, then a General Conformity Determination is not required, and the emissions are presumed to conform to the SIP. If the net change in emissions equal or exceed the *de minimis* threshold values, a General Conformity Determination must be prepared to demonstrate conformity with the approved SIP.

Table 3.6-2: *de minimis* Thresholds

Pollutant	***Nonattainment or Maintenance Area Type***	***de minimis Threshold (TPY)***
Ozone (VOC or NO_X)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_X)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
CO, SO_2 and NO_2	All nonattainment and maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$*	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

Notes: CO = carbon monoxide, NO_X = nitrogen oxides, NO_2 = nitrogen dioxide, Pb = lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_2 = sulfur dioxide, TPY = tons per year, VOC = volatile organic compounds. * = There are four main $PM_{2.5}$ precursor pollutants (sulfur dioxide [SO_2], nitrogen oxides [NO_x], volatile organic compounds (VOC), and ammonia [NH_3]).
Source: 40 CFR Parts 93.153(b)(1-2)

If NEPA documentation is prepared for an action, the determination that the Proposed Action is not subject to the General Conformity Rule can be described in that documentation and a signed Record of

Non-Applicability for nonattainment areas included in an appendix. Otherwise, no additional documentation is required.

3.6.2.3.2 National Environmental Policy Act

Analysis of health-based air quality impacts under NEPA includes estimates of criteria air pollutants, hazardous air pollutants and greenhouse gases occurring as result of a federal action occurring onshore out to the U.S. territorial sea limits (within 12 nm) for all construction or transport activities or those that involve vessels in U.S. territorial seas. In determining the total direct and indirect emissions caused by the action, agencies must project the future emissions in the area with the action versus the future emissions without the action, which NEPA entitles "the Baseline Condition/Affected Environment." The total direct and indirect emissions consider all emission increases and decreases that are reasonably foreseeable and are possibly controllable through a continuing program responsibility of an agency to affect emissions.

For nonattainment and maintenance criteria pollutants, the conformity *de minimis* levels are useful as NEPA analysis screening thresholds to determine significance. For these pollutants, the General Conformity *de minimis* thresholds are identical to "major source" thresholds applicable to new stationary sources under the federal CAA. As such, they represent reasoned decisions under two regulatory programs as quantities that represent thresholds of increased concern. The thresholds are lowered as the air quality of a nonattainment or maintenance area worsens. For example, the threshold for an ozone precursor is 10 tons per year (TPY) in an extreme nonattainment area, but 100 TPY in a moderate nonattainment area.

The Prevention of Significant Deterioration (PSD) Program was adopted in the CAA under 40 CFR Part 52.21. The PSD Program applies to major stationary sources of air pollutants located in attainment areas, requiring that a source demonstrate that it does not significantly deteriorate the air quality in attainment areas. Under PSD, a "major source" is defined as a facility that emits equal to or greater than 250 tons of a criteria pollutant or regulated precursor. As such, in attainment areas, the major emitting facility threshold of 250 TPY of a pollutant is the threshold of increased concern; therefore, this threshold is also a suitable screening threshold. In NEPA terms, the foregoing means that the thresholds serve as screening level thresholds of significance. That is, where emissions of a pollutant are below the threshold for a nonattainment, attainment or maintenance area, as applicable, they would not be significant—absent compounding factors, such as proximity of sensitive receptors. Where those emissions exceed the applicable threshold discussed above, they demand a harder look at factors such as region of dispersal. It should be noted that the thresholds are conservative in that they are designed to apply to stationary sources. However, the Navy is applying them to sources that may be diffused and dispersed. It should also be noted that by increasing and decreasing with the air quality of a region, these thresholds consider other activities in the region in the past and present. As such they are measures of cumulative impacts.

3.6.2.3.3 Executive Order 12114 Evaluation

The analysis of health-based air quality impacts under EO 12114 includes emission estimates covering all Federal actions outlined under the EIS that occur beyond U.S. territorial seas (greater than 12 nm). The EO 12114 air quality evaluation would use the federal CAA "major source" threshold of 250 TPY emissions level as a screening level threshold of significance as described under Section 3.6.2.3.2 (National Environmental Policy Act).

3.6.2.4 Best Management Practices

The Navy is committed to improving energy security and environmental stewardship by reducing reliance on fossil fuels. The Navy is actively developing and participating in energy, environmental, and climate change initiatives that would increase use of alternative energy and reduce emissions of greenhouse gases. The Navy has adopted an energy, environmental, and climate change goal to reduce non-tactical petroleum use; ensure environmentally sound acquisition practices; and ensure environmentally compliant operations for ships, submarines, aircraft, and facilities operated by the Navy. Examples of Navy-wide greenhouse gas reduction projects include energy-efficient construction, thermal and photovoltaic solar systems, geothermal power plants, and the generation of electricity with wind energy. The Navy continues to promote and install new renewable energy projects.

3.6.2.5 Greenhouse Gases

The EPA specifically identified carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride as greenhouse gases (EPA, 2009b) (74 *Federal Register* 66496). Carbon dioxide, methane, and nitrous oxide occur naturally in the atmosphere. These gases influence global climate by trapping heat in the atmosphere that would otherwise escape to space. The heating effect of these gases is considered the probable cause of the global warming observed over the last 50 years (EPA, 2009a). Global warming and climate change affect many aspects of the environment. Not all effects of greenhouse gases are related to climate. For example, elevated concentrations of carbon dioxide can lead to ocean acidification and can stimulate terrestrial plant growth, while methane emissions can contribute to higher ozone levels.

To estimate global warming potential, the United States quantifies greenhouse gas emissions using the 100-year timeframe values established in the *Intergovernmental Panel on Climate Change Fifth Assessment Report* (Intergovernmental Panel on Climate Change, 2014), in accordance with United Nations Framework Convention on Climate Change reporting procedures (United Nations Framework Convention on Climate Change, 2013). The dominant greenhouse gas emitted is carbon dioxide, mostly from fossil fuel combustion (85.4 percent) (EPA, 2015). Weighted by global warming potential, methane is the second-largest component of emissions, followed by nitrous oxide. Global warming potential-weighted emissions are presented in terms of equivalent emissions of carbon dioxide, using units of metric ton. The Proposed Action is anticipated to release greenhouse gases into the atmosphere. These emissions are quantified primarily using methods elaborated upon in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2018* (EPA, 2020a) for the Proposed Action, and estimates are presented at the end of the discussion for each alternative under Section 3.6.4 (Environmental Consequences). A comparison of greenhouse gas emissions for each alternative, including No Action Alternative, is provided as required by the CEQ Final Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change (CEQ, 2016).

3.6.2.6 Analysis Framework

The air quality impact evaluation requires three separate analyses: the CAA General Conformity Analysis, air analysis under the NEPA, and air analysis under EO 12114. The CAA General Conformity Analysis considers only those criteria air pollutants for which the areas of concern are designated as nonattainment or maintenance, are emitted within 0–3 nm, and are not excluded by rule 40 CFR Part 93 subpart B. Air analysis under the NEPA considers all criteria air pollutants, hazardous air pollutants, and greenhouse gases in both attainment and nonattainment areas within 12 nm. This analysis includes all emissions resulted from the proposed federal action even if the action was exempted under the CAA

General Conformity Rule. Air analysis under EO 12114 considers all criteria air pollutants, hazardous air pollutants, and greenhouse gases in both attainment and nonattainment areas, including all emissions analyzed for the federal action that occur beyond 12 nm.

For this EIS/OEIS, the Navy calculated criteria air pollutants and greenhouse gas emissions under each alternative. For the Proposed Action, hazardous air pollutants are generated, in addition to criteria air pollutants, by combustion of fuels. Fugitive volatile and semivolatile petroleum compounds also may be emitted whenever mechanical devices are used. For these source types, hazardous air pollutant emissions are typically one or more orders of magnitude smaller than concurrent emissions of criteria air pollutants and only become a concern when large amounts of fuel or other materials are consumed during a single activity or in one location. For the Proposed Action, emissions of hazardous air pollutants are intermittent and dispersed over a vast area. Only small quantities of hazardous air pollutants are expected to be emitted with very low potential exposure and health risk. A quantitative evaluation of hazardous air pollutant emissions is therefore not warranted and was not conducted.

Emission factors and schedules for operations were used to calculate total values of each emission type that would be emitted under each alternative. An emission factor represents the mass of a pollutant released into the atmosphere by a given source over a specified period of time. Emission factors can vary considerably depending on type of source, time of day, and schedule of operation. Criteria air pollutants are reported in tons, while greenhouse gases are reported in metric tons per the CAA. The air quality analysis was carried out to calculate amounts of criteria air pollutants and greenhouse gas emissions resulting from the towing of ex-Enterprise to a commercial dismantlement facility (Alternatives 1, 2, and 3); shipment of the propulsion space section from a commercial dismantlement facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF), and reactor compartment package transit from PSNS & IMF to the DOE Hanford Site (Alternatives 1 and 2 [the reactor compartment packaging alternatives]); Port of Benton barge slip modifications and road improvements (Alternative 2); the DOE Hanford Site rail system installation for reactor compartment packages (the reactor compartment packaging alternatives); and land transport routes to waste facilities (Alternative 3, Preferred Alternative). The results of these analyses were then compared to *de minimis* levels to ensure that the project meets the CAA General Conformity Rule requirements. Appendix E (Air Quality Calculations and Record of Non-Applicability) contains a summary of the air quality calculations.

3.6.2.6.1 Emission Sources

Criteria air pollutants are generated by the combustion of fuel by surface vessels and on-road/off-road vehicles and equipment involved in construction or transportation as described in Chapter 2 (Description of Proposed Action and Alternatives). The emissions from these mobile sources depend on combustion of fuel, and emissions are estimated using information provided by the Navy and other reputable, sanctioned sources. Emissions sources and the approach used to estimate emissions under the reactor compartment packaging alternatives are based, wherever possible, on information from Navy subject matter experts and established activity requirements. These data were used to estimate the numbers and types of surface ships and vessels. Emissions were assessed to identify any possibility for the magnitude of Proposed Action emissions to result in a violation of one or more NAAQS. The pollutants for which calculations are made include exhaust total hydrocarbons, carbon monoxide, nitrogen oxides, particulate matter, sulfur dioxide, carbon dioxide, and lead.

The NEPA analysis includes a separate section for a CAA General Conformity Applicability Analysis to support a determination pursuant to the General Conformity Rule (40 CFR Part 93, subpart B). This analysis focuses on activities that could impact nonattainment or maintenance areas within the ROI. As noted above, the Study Area lies partly within or adjacent to some air quality designated areas. To evaluate whether a General Conformity Determination is required, air pollutant emissions associated with the Proposed Action within the applicable designated nonattainment or maintenance areas are estimated, based on the distribution of ground-based mobile source activity as well as mobile source activities in state waters. The proposed activities within this portion of the Study Area are then compared to the General Conformity Rule *de minimis* thresholds.

3.6.2.6.2 Emission Estimates

3.6.2.6.2.1 Vessel Activities

The methods for estimating ship emissions involve evaluating the type of activity, generating the average steaming hours for ships in each area: within state waters, beyond state waters, and beyond territorial seas. Vessel emissions from river and ocean tug boats and heavy-lift ships were calculated using the *Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emission Inventories Draft Report* (EPA, 2020b) for the propulsion and onboard generation systems. Data from the EPA methodology included emission factors for each type of propulsion and type of onboard generator by ship type, as well as the fuel used. Lead emissions were estimated using the EPA speciation ratio relative to PM_{10} (SNC-Lavalin Environment, 2012). To determine the emissions from vessel activities, the number of vessels was multiplied by the number of one-way trips per transport package multiplied by the total number of packages. This value was then multiplied by the number of hours spent in each range from shore, 0–3 nm, 3–12 nm, 0–9 nm (Texas), 9–12 nm (Texas) and >12 nm. Finally, this value was multiplied by each criteria pollutant's emission factors as calculated in Appendix E (Air Quality Calculations and Record of Non-Applicability). One-way trips were analyzed for commercial tugboats, anticipating that they would be used for other non-project related purposes on their return trips. Return trips for tugboats that would be used to return the Navy barge to PSNS & IMF were analyzed.

3.6.2.6.2.2 Construction Activities

Emissions factors for construction activities (Port of Benton barge slip modifications and transport road improvements) were developed using the EPA Motor Vehicle Emission Simulator (MOVES), version 2014. The Nonroad module of MOVES 2014 was used for anticipated off-road vehicles and equipment. Lead emissions were calculated as a fraction of PM_{10}, based on specification profiles used in the California Air Resources Board (CARB) modeling (CARB, 2021). Emission factors from the EPA MOVES are in grams/operating hour, which were then converted to pounds/operating hour. The following formula was used to determine the total emissions for each piece of equipment:

$$E\ (total\ weight\ emitted) = F\ x\ H\ x\ D\ x\ Q$$

E = Emissions
F = Emissions Factor (lb/hr)
H = Quantity of Hours Operating per Day
D = Quantity of Days Operating
Q = Quantity of Equipment Used

3.6.2.6.2.3 Vehicle Transport Activities

The methods for estimating emissions from vehicle transport of reactor plant components from commercial dismantlement facilities to disposal facilities was similar to construction activities, except emission factors were developed using the On-Road module of MOVES 2014. Lead emissions were calculated as a fraction of PM_{10}, based on specification profiles used in the CARB modeling (CARB, 2021). For a conservative estimate of emissions from vehicle transport, the longest land transport route

(2,461 miles [mi.] via highway) was selected, as that would represent the highest level of emissions. At an average speed of 50 miles per hour (mph) and approximately 10 hours of driving per day, a single transport could travel approximately 500 mi. a day. This results in an average trip duration of five days, traveling 10 hours per day. One-way trips were analyzed for commercial vehicles, anticipating that they would be used for other non-project related purposes on their return trips.

3.6.2.6.2.4 Radiological Emissions

Radiological emissions are addressed in Section 3.1 (Public and Occupational Health and Safety). As such, they are not further discussed in this chapter.

3.6.3 Affected Environment

3.6.3.1 Washington

Some of the pollutant-emitting activities that would result from the Proposed Action would occur in Washington state, as described below. There are no designated areas for lead in Washington state.

3.6.3.1.1 Puget Sound Naval Shipyard & Intermediate Maintenance Facility, Washington

Construction of reactor compartment packages would occur at PSNS & IMF. PSNS & IMF is located in Kitsap County, which is under the jurisdiction of the Puget Sound Clean Air Agency (PSCAA) (King, Kitsap, Pierce and Snohomish counties). Currently, all counties managed by the PSCAA are in attainment for all criteria air pollutants, except the Kent-Seattle-Tacoma PM_{10} maintenance area and the Tacoma-Pierce County $PM_{2.5}$ maintenance area (EPA, 2021f). The 20-year maintenance period for this PM_{10} maintenance area ended on May 14, 2021 (Washington State Department of Ecology, 2021). There would be no transit through these areas for this project.

3.6.3.1.2 Department of Energy Hanford Site and the Port of Benton Barge Slip, Washington

Reactor compartment packages constructed at PSNS & IMF would be transported by barge to the Port of Benton barge slip in Richland, Washington, where each package would then be loaded onto a multiple-wheel, high-capacity transporter and hauled to Trench 94 at the DOE Hanford Site near Richland, Washington. Most of the DOE Hanford Site is within the South-Central Washington Intrastate Air Quality Control Region No. 230, but a small portion of the site is in the Eastern Washington-Northern Idaho Interstate Air Quality Control Region No. 62. All of the areas within Hanford and its surrounding counties are designated as in attainment with NAAQS for criteria air pollutants (40 CFR Part 81.348). PM concentrations can reach relatively high levels in eastern Washington state because of extreme natural events such as dust storms and large brush fires (Navy & DOE, 2012). Dust storms are treated as uncontrollable natural events under EPA policy (EPA, 1996). Accordingly, the air quality impact of such storms can be disregarded in determining whether an area is in attainment for atmospheric particulates.

3.6.3.1.3 Washington Transport Routes

Transport routes within or offshore of the state of Washington include the Pacific Ocean, the Strait of Juan de Fuca and Puget Sound for the transit of the propulsion space section and reactor compartment packages, and the Columbia River for the towing of the reactor compartment packages to the Port of Benton barge slip. The only land route is from the barge slip to Trench 94 at the DOE Hanford Site, the final disposal location for the reactor compartment packages. These routes pass through many counties and clean air agency jurisdictions. The vast majority of these regions are in attainment for all criteria pollutants. However, immediately east of the Columbia River within the area managed by the Department of Ecology, Eastern Regional Office, the Wallula region is currently designated as a maintenance area of PM_{10}. While several jurisdictions near the transport routes currently have maintenance plans (Spokane, Tacoma, Thurston County, and Yakima), the transport routes do not pass through these areas.

3.6.3.2 Virginia

The initial transport phase of the Proposed Action involves towing ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial dismantlement locations. In Newport News, Virginia, long-term waterborne protective storage and dismantlement facilities are located within the EPA Hampton Roads AQCR. This region is part of the Hampton Roads Intrastate AQCR No. 223. The Hampton Roads Intrastate AQCR includes the counties of Isle Wright, James, Southampton, and York, as well as the cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg. Currently, all counties and cities in AQCR No. 223 are designated as maintenance for the 1997 8-hour ozone NAAQS and attainment for all other criteria air pollutants, including lead NAAQSs (EPA, 2021e).

3.6.3.3 Texas

Dismantlement in Brownsville, Texas, would occur at a facility located in Cameron County, within the EPA Brownsville-Laredo AQCR No. 213. The Brownsville-Laredo Intrastate AQCR includes the counties of Cameron, Hidalgo, Jim Hogg, Starr, Webb, Willacy, and Zapata. Currently, all counties in AQCR No. 213 are in attainment for all criteria air pollutants (EPA, 2021c).

Disposal of low-level radioactive waste (LLRW) packages could occur at the Waste Control Specialists, LLC site in Andrews, Texas. This site is a part of the Midland-Odessa-San Angelo AQCR No. 218. The Midland-Odessa-San Angelo AQCR consists of 30 counties, including Andrews County. Currently, all counties in AQCR No. 218 are in attainment for all criteria air pollutants (EPA, 2021c).

Collin County and Frisco areas in Texas are the only maintenance areas for lead. The transport routes do not pass through these areas. Impacts of air pollutants emitted by the proposed activities in Mexico is not evaluated since CAA, NEPA, and EO 12114 do not apply.

3.6.3.4 Alabama

Dismantlement in Mobile, Alabama, would occur at facilities located in Mobile County, which is within the EPA Mobile-Pensacola-Panama City-Southern Mississippi AQCR No. 5. The Mobile-Pensacola-Panama City-Southern Mississippi Interstate AQCR includes three counties in Alabama, 10 counties in Florida, and 37 counties in Mississippi. Currently, all counties in AQCR No. 5 are in attainment for all criteria air pollutants (EPA, 2021a). Pike County, Alabama, is the only nonattainment area for lead in Alabama. The transport route does not pass through this area.

3.6.3.5 South Carolina

Waste disposal in South Carolina would occur at the DOE-Savannah River Site in Aiken, located in Aiken County, in western South Carolina. This county is in attainment for all criteria pollutants (EPA, 2021b).

3.6.3.6 Utah

Waste disposal in Utah would occur at EnergySolutions in Clive, Utah. The Clive waste facility is located in the West Desert of Utah approximately 75 mi. west of Salt Lake City. Clive is an unincorporated community in Tooele County, Utah. Tooele county is in nonattainment with the 2015 8-Hour Ozone standard, 2006 $PM_{2.5}$ standard, and 1971 Sulfur Dioxide NAAQS (EPA, 2021d).

3.6.3.7 Transport Routes Between Commercial Dismantlement Facilities and Disposal Facilities

Alternative 3 (Preferred Alternative) would involve the transport of the radioactive materials from the commercial dismantlement facility to one of three potential waste disposal facilities in Andrews, Texas; Clive, Utah; or Aiken, South Carolina. Nonattainment areas and maintenance areas that could be transited through are listed in Table 3.6-3 (EPA, 2021b, 2021c, 2021d).

Table 3.6-3: Nonattainment and Maintenance Areas Along Vehicle Transit Routes

Pollutant	County	Area Name	Attainment Status	*de minimis* Threshold (TPY)
8-Hour Ozone	Davis County	Northern Wasatch Front, Utah	Marginal	NOx: 100 VOC: 100
	Salt Lake County	Northern Wasatch Front, Utah	Marginal	NOx: 100 VOC: 100
	Tooele County	Northern Wasatch Front, Utah	Marginal	NOx: 100 VOC: 100
	Utah County	Southern Wasatch Front, Utah	Marginal	NOx: 100 VOC: 100
	Weber County	Northern Wasatch Front, Utah	Marginal	NOx: 100 VOC: 100
	Fort Bend County	Houston-Galveston-Brazoria, Texas	Serious	NOx: 50 VOC: 50
	Harris County	Houston-Galveston-Brazoria, Texas	Serious	NOx: 50 VOC: 50
	Chambers County	Houston-Galveston-Brazoria, Texas	Serious	NOx: 50 VOC: 50
Carbon Monoxide	Salt Lake County	Salt Lake City, Utah	Maintenance	100
	Utah County	Provo, Utah	Maintenance	100
PM_{10}	Salt Lake County	Salt Lake City, Utah	Maintenance	100
	Utah County	Provo, Utah	Maintenance	100
$PM_{2.5}$	Box Elder County	Salt Lake City, Utah	Serious	70
	Davis County	Salt Lake City, Utah	Serious	70
	Salt Lake County	Salt Lake City, Utah	Serious	70
	Tooele County	Salt Lake City, Utah	Serious	70
	Utah County	Provo, Utah	Serious	70
	Weber County	Salt Lake City, Utah	Serious	70
Sulfur Dioxide	Salt Lake County	Salt Lake Co, Utah	Primary, Secondary	100
	Tooele County	Tooele Co, Utah	Primary, Secondary	100

Notes: PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, TPY = tons per year, VOC = volatile organic compounds, NOx = nitrogen oxides.

3.6.4 Environmental Consequences

3.6.4.1 No Action Alternative

As described in Chapter 2 (Description of Proposed Action and Alternatives), under the No Action Alternative, ex-Enterprise would not be towed, dismantled, or disposed of, but rather remain in waterborne storage for an indefinite time period at its current location in Newport News Shipbuilding in Newport News, Virginia. The vessel would undergo periodic maintenance to ensure that storage continues in a safe and environmentally acceptable manner. Air emissions associated with periodic maintenance are expected to be minimal and covered under any existing facility air permits. No other long-term increases in emissions would occur, as no new stationary sources would be constructed. Therefore, no significant air quality impacts would occur under the No Action Alternative.

3.6.4.2 Alternative 1: Single Reactor Compartment Packages

3.6.4.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

As described in Chapter 2 (Description of Proposed Action and Alternatives), ex-Enterprise would be towed from its current berthing location at Newport News Shipbuilding in Newport News, Virginia, to one of three commercial dismantlement locations in Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama, for partial dismantlement of ex-Enterprise. Although three potential routes to commercial dismantlement facility are possible, the longest route (from Newport News Shipbuilding in Newport News, Virginia, to Brownsville, Texas) was selected for a conservative analysis of criteria pollutants emissions. Shorter routes are anticipated to have a smaller potential impact. A portion of Alternative 1 of the Proposed Action involves towing ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial locations for partial or complete dismantlement. Vessels performing this action would transit through the Hampton Roads AQCR No. 223, which is a Maintenance Area for the 1997 8-hour Ozone NAAQS. As a result, Proposed Action emissions were evaluated to assess compliance with the General Conformity Rule *de minimis* thresholds for Oxides of Nitrogen (NO_x) and Volatile Organic Compounds (VOC) in Section 3.6.4.2.7 (General Conformity Under Alternative 1). The towing operation would result in a minimal and temporary increase of marine vessel emissions (Table 3.6-4). No long-term increases in emission would occur, as no new stationary sources would be constructed.

Table 3.6-4: Estimated Criteria Pollutant Emissions Produced Under Alternative 1 from Transport of ex-Enterprise to Commercial Dismantlement Facility

Region	Annual Criteria Pollutant Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06
3–12 nm	0.08	0.31	0.01	0.002	0.01	0.01	1.69E-06
0–9 nm (Texas)	0.04	0.16	0.003	0.001	0.006	0.006	8.52E-07
9–12 nm (Texas)	0.04	0.42	0.016	0.001	0.006	0.005	3.07E-07
0–12 nm	0.19	0.80	0.01	0.004	0.03	0.03	4.31E-06
>12 nm	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04
Total	7.99	33.23	0.58	0.16	1.19	1.16	1.79E-04

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.2 Partial Dismantlement at Commercial Dismantlement Facility

Once at the commercial dismantlement location, the selected contractor would dispose of ex-Enterprise by partially dismantling and recycling it using established processes and techniques. The aircraft carrier dismantling contracts include a clause that requires the contractor to comply with all applicable federal, state, and local environmental, occupational safety and health laws and regulations. The dismantling/recycling would occur at an existing industrial facility that is capable of the operation with current operational credentials and permitting that would allow them to conduct the dismantling based on established processes and techniques. Therefore, it is not anticipated that the contractor would need to obtain any additional air quality related permits in order to perform the requirements of the contract.

Air emissions from this portion of the federal action would only be evaluated under NEPA. General Conformity under CAA would not apply, as locations identified are within attainment areas. In addition, dismantlement emissions from ship breaking facilities would be covered under their stationary source New Source Review permitting and, as such, would be exempted from being considered a direct or indirect emission under General Conformity Applicability Analysis.

Ship recycling activities can generate air pollutants that are regulated by the CAA. If a ship recycling facility emits regulated amounts of air pollutants, it must obtain the appropriate operating or preconstruction permit and comply with all emissions requirements set forth in that permit. Specifically, torch cutting may generate large amounts of fumes and some or all of the following materials as particulates: manganese, nickel, chromium, iron, aluminum, asbestos, and lead. It may also initiate small fires when oil or sludge is ignited by the torch. These fires are usually short-lived but may generate some intense black smoke. The cutting torches themselves can generate oxides of nitrogen and sulfur, and the process of combustion produces carbon dioxide and carbon monoxide. In spite of these releases, air pollutants from metal cutting are not likely to have a major air quality impact (EPA, 2000).

In general, ship recycling activities could result in temporary minor, localized impacts on air quality. However, ship dismantling activities that comply with applicable rules and regulations would not significantly impact air quality.

3.6.4.2.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility

The propulsion space section, which contains the eight reactor plants, would be separated from the rest of ex-Enterprise at the commercial dismantlement facility and transported to PSNS & IMF in Washington for processing and disposal. The heavy-lift ship would leave the commercial dismantlement facility, navigate around the southern tip of South America, and transit north to the U.S. West Coast, continuing up the coast to northwestern Washington and into the Strait of Juan de Fuca, then south through Puget Sound, ultimately arriving at PSNS & IMF (Figure 2-5).

Although there are three potential routes from the commercial dismantlement facility to PSNS & IMF, the longest route (from the commercial dismantlement facility in Brownsville, Texas to PSNS & IMF) was selected for analysis of criteria pollutants emissions. Shorter routes are anticipated to have a smaller potential impact. Of the approximately 23,646 mi. the heavy-lift ship would transit, only 50 mi. are conservatively expected to be within 3 nm of shore and only 93 mi. between 3 and 12 nm. Most of the distance within 3 nm of shore occurs during transit through the Strait of Juan de Fuca into PSNS & IMF. The distance between 3 and 12 nm occurs as the heavy lift ship leaves port into the Gulf of Mexico, within a portion of the waters as it transits between Florida and the Bahamas, and during the portion of the journey in the Strait of Juan de Fuca before it gets to the Port Angeles region. In Texas, the heavy-lift ship would transit only 9.1 mi. within 9 nm of shore and only 3.28 mi. between 9 and 12 nm as the vessel departs from Brownsville and travels into the Gulf of Mexico. These distances were estimated based on Figure 2-5. The remainder of the transit would be outside 12 nm from shore, along typical shipping lanes in international waters. Air emissions from this activity of the transit are shown in Table 3.6-5. The distances assumed within 3 nm of shore represent the “worst case” scenario heavy-lift ship activities occurring near the shore.

Table 3.6-5: Estimated Criteria Pollutant Emissions Produced Under Alternative 1 from Heavy-Lift Transit

Region	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm	0.21	2.33	0.09	0.01	0.03	0.03	4.45E-07
3–12 nm	0.39	4.33	0.16	0.01	0.06	0.05	8.27E-07
0–9 nm (Texas)	0.04	0.42	0.016	0.001	0.006	0.005	8.10E-08
9–12 nm (Texas)	0.01	0.15	0.006	0.000	0.002	0.002	2.92E-08
0–12 nm	0.60	6.67	0.25	0.019	0.09	0.08	1.27E-06
>12 nm	99.07	1,095.49	41.42	3.17	14.93	13.74	2.09E-04
Total	99.67	1,102.16	41.67	3.19	15.02	13.82	2.10E-04

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

Reactor compartment package construction would occur at PSNS & IMF, within 3 nm from shore (Figure 2-4). This work is expected to be performed within the available resources of the shipyard (e.g., manpower, facilities). As described in the *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)* (Navy & DOE, 2012), hereinafter referred to as the 2012 EA, all PSNS & IMF work is conducted per PSNS & IMF Air Quality Permit, which incorporates all EPA, Washington state, and regional air pollution authority (PSCAA) requirements applicable to shipyard operations. As discussed in the 2012 EA (Navy & DOE, 2012), the volume of metal to be cut and processed—the primary source of emissions during reactor compartment package preparation—is less (for ex-Enterprise over the six to eight years' time period through which the work would be concentrated) than historic peak workloads at PSNS & IMF, when up to 10 submarines per year underwent reactor compartment disposal and remnant hull recycle. In addition, increased efficiency in the metal cutting processes—such as the increased use of mechanical saws instead of cutting torches—reduces air emissions for the same volume of metal cut/processed as compared to the past. Ex-Enterprise reactor compartment package construction would not be expected to result in a significant degradation of air quality in the areas surrounding PSNS & IMF.

3.6.4.2.5 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

PSNS & IMF would use a concrete rail support system to place the reactor compartment packages in Trench 94 at the DOE Hanford site. Additional rail structures would be added within Trench 94 at the DOE Hanford site to support the single reactor compartment packages, requiring limited excavation of the trench floor. Construction for Trench 94 rail installation would involve the use of diesel-powered heavy equipment for limited excavation and site preparation and cleanup. Temporary air quality impacts are expected, but overall emissions would be minimal (Table 3.6-6).

Additionally, during the excavation work, the contractor would enforce the following actions to control fugitive dust:

- use water suppressants
- minimize activities during periods of high winds
- use covered chutes, covered containers, or collection control equipment when handling, transferring, and/or storing dusty material
- keep paved surfaces clean to minimize re-entrainment of dust into the air
- restrict access or limit vehicle speeds on unpaved areas to 15 mph
- limit the amount excavated at any one time, as needed

3.6.4.2.6 Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility by Barge to the Port of Benton Barge Slip and by Multiple-Wheel, High-Capacity Transporters to Trench 94 of Department of Energy Hanford Site

Once the reactor compartment packages are ready, each would be transported by barge to the Port of Benton barge slip via the Columbia River and from the barge slip via multiple-wheel, high-capacity transporter to the waste facility at Trench 94 at the DOE Hanford Site. Total duration of transport from PSNS & IMF to Trench 94 at the DOE Hanford Site is approximately eight weeks over a one-and-a-half year period. The transport route for the ex-Enterprise reactor compartment packages would be the same as that used for the current submarine and cruiser reactor compartment packages and has been used for numerous packages with minimal associated air impacts (Navy & DOE, 1996, 2012). Alternative 1 does not propose to change the methodologies or compliance with any applicable federal, state, and local environmental and occupational safety and health laws and regulations. Air emissions from this activity of the transit are shown in Table 3.6-6.

Table 3.6-6: Estimated Criteria Pollutant Emissions Produced Under Alternative 1 from Transport of Reactor Compartment Packages to the DOE Hanford Site

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	7.79	32.41	0.57	0.16	1.16	1.129	1.75E-04
Shipment via river tug from Vancouver, Washington, to Port of Benton barge slip	4.40	14.98	0.23	0.10	0.65	0.632	9.77E-05
Install rail system for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site	0.0580	0.0069	0.0003	4.98E-05	0.0002	0.0002	1.52E-09
Land transport via multiple-wheel, high-capacity transporters from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	0.37	1.61	0.12	0.00	0.04	0.04	1.67E-06
TOTAL 0–3 nm	12.62	49.01	0.92	0.26	1.86	1.80	2.74E-04

Table 3.6-6: Estimated Criteria Pollutant Emissions Produced Under Alternative 1 from Transport of Reactor Compartment Packages to the DOE Hanford Site (continued)

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
3–12 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	1.04	4.31	0.08	0.02	0.15	0.15	2.32E-05
TOTAL 3–12 nm	1.04	4.31	0.08	0.02	0.15	0.15	2.32E-05
0–12 nm							
Transport of Reactor Compartment Packages to Trench 94 at the DOE Hanford Site (including rail system installation)	13.66	53.32	1.00	0.28	2.01	1.95	2.97E-04
TOTAL 0–12 nm	13.66	53.32	1.00	0.28	2.01	1.95	2.97E-04
>12 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	3.58	14.88	0.26	0.07	0.53	0.52	8.01E-05
TOTAL >12 nm	3.58	14.88	0.26	0.07	0.53	0.52	8.01E-05

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, DOE = Department of Energy, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.7 General Conformity Under Alternative 1

Transit activities between the port locations and 3 nm offshore would potentially generate emissions which could impact air quality within the air basin. Pollutants emitted in the Study Area under Alternative 1 could be carried ashore by winds. However, the majority of transit activities would occur more than 12 nm offshore, and natural mixing would substantially disperse pollutants before they reach the coastal land mass. The subsections that follow evaluate the nearshore emissions within regional areas that include nonattainment, or maintenance areas. These areas are based on the definition of state waters and represent the area within which emissions would be most likely to migrate onshore due to proximity. The net emissions associated with the Proposed Action are then compared to the General Conformity *de minimis* thresholds for nonattainment/maintenance areas. Table 3.6-7 presents the estimated nearshore emissions under Alternative 1. This table conservatively presents all estimated emissions within 3 nm from shore; for General Conformity purposes; the only relevant emissions are those that occur within the Hampton Roads AQCR, Virginia, which is a maintenance area for the 1997 8-hour ozone and the Wallula, Washington region, which is a maintenance area for PM_{10}. Air pollutant emissions under Alternative 1 would not result in violations of federal air quality standards because they would not have a measurable impact on air quality in land areas. Emissions are below the applicable *de minimis* levels. A Conformity Determination is not required, and a signed Record of Non-Applicability has been prepared and presented in Appendix E (Air Quality Calculations and Record of Non-Applicability).

As discussed in Section 3.6.3.2 (Virginia), the Hampton Roads AQCR, Virginia, is a maintenance area for the 1997 8-hour ozone NAAQS. In this area, emissions associated with the Proposed Action would result from towing the ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial locations for partial dismantlement. As shown in Table 3.6-7, air pollutant emissions due to this activity under Alternative 1 would not result in violations of federal air quality standards because they would be well below the applicable *de minimis* levels.

As discussed in Section 3.6.3.1.3 (Washington Transport Routes), the Wallula, Washington region is a maintenance area for PM_{10} under the NAAQS. In this area, emissions associated with the Proposed Action would result from towing the barge with the reactor compartment package to the Port of Benton barge slip. With an anticipated barge transit speed of 8 mph, the barge would travel 12 mi. through this maintenance area in approximately 1.5 hours and contribute an extremely low level of PM_{10} or other criteria pollutants. With approximately 1.5 hours in the maintenance area, air pollutant emissions under Alternative 1 would not result in violations of federal air quality standards because they would be well below the applicable *de minimis* levels.

Table 3.6-7: Estimated Annual Emissions Produced Between 0 and 3 nm of Shore Under Alternative 1

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm							
Tow of ex-Enterprise to Commercial Dismantlement Facility	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	0.21	2.33	0.09	0.01	0.03	0.03	4.45E-07
Transport of Reactor Compartment Packages to Trench 94 at the DOE Hanford Site (including rail system installation)	12.62	49.01	0.92	0.26	1.86	1.80	2.74E-04
TOTAL 0–3 nm	12.95	51.82	1.02	0.27	1.90	1.85	2.77E-04
Nonattainment/Maintenance de minimis Levels	N/A	100	100	N/A	100	N/A	N/A
Exceeds de minimis Level?	N/A	No	No	N/A	No	N/A	N/A

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, N/A = Not Applicable. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.7.1 National Environmental Policy Act Impacts from Criteria Pollutants Under Alternative 1 for 0–12 Nautical Miles from Shore

Table 3.6-8 presents the total estimated emission results under Alternative 1 within 12 nm of the coastline. Pollutants emitted in the Study Area under Alternative 1 could be carried ashore by winds. However, the majority of transit activities would occur more than 12 nm offshore, and natural mixing would substantially disperse pollutants before they reach the coastal land mass. When using the PSD major emitting facility numbers as screening thresholds, any relevant increases would be well below the thresholds. In addition, the total quantity of criteria pollutants is very small in relation to the vastness of the Study Area (Figure 2-5 and 2-6). Therefore, no significant impacts on air quality would occur as a result of criteria pollutants emissions from activities beyond territorial activities.

Table 3.6-8: Estimated Annual Criteria Pollutant Emissions Produced Between 0 and 12 nm from Shore Under Alternative 1

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	0.19	0.80	0.01	0.004	0.03	0.03	4.31E-06
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	0.60	6.67	0.25	0.019	0.09	0.08	1.27E-06
Transport of Reactor Compartment Packages to Trench 94 at the DOE Hanford Site (including rail system installation)	13.66	53.32	1.00	0.28	2.01	1.95	2.97E-04
TOTAL	14.45	60.78	1.27	0.30	2.13	2.06	3.03E-04
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, , SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, PSD = Prevention of Significant Deterioration. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.7.2 Executive Order 12114 Impacts from Criteria Pollutants Under Alternative 1 Greater than 12 nm from Shore

The majority of transit activities would occur more than 12 nm offshore, and natural mixing would substantially disperse pollutants before they reach the coastal land mass.

Table 3.6-9 presents the total estimated emission results under Alternative 1 beyond 12 nm within the Study Area and includes all emissions generated, regardless of proximity to the coastline. When using the PSD major emitting facility numbers as screening thresholds, any relevant increases, with the exception of NO_x, would be well below the thresholds. However, the total quantity of criteria pollutants in any one location is very small in relation to the vastness of the Study Area. Therefore, no significant impacts on air quality are anticipated to occur as a result of criteria pollutants emissions from activities beyond territorial activities.

Table 3.6-9: Estimated Annual Criteria Pollutant Emissions Produced Greater than 12 nm from Shore Under Alternative 1

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	99.07	1,095.49	41.42	3.17	14.93	13.74	2.09E-04
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	3.58	14.88	0.26	0.07	0.53	0.52	8.01E-05
TOTAL	110.44	1142.80	42.26	3.41	16.63	15.39	4.64E-04
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, , VOC = volatile organic compounds, DOE = Department of Energy, PSD = Prevention of Significant Deterioration, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility
(3) Individual values may not add up exactly to total values due to rounding.

3.6.4.2.8 Greenhouse Gases

Under Alternative 1, emissions have been compared with the nationwide greenhouse gas inventory carbon dioxide equivalent (CO_2e) emissions for potential significance (Table 3.6-10). Estimated greenhouse gas emission increases associated with operations due to implementation of Alternatives 1 would be less than 0.001 percent of greenhouse gas inventory of 6,667 million metric tons of CO_2e.

Table 3.6-10: Estimated Annual Greenhouse Gas Emissions Under Alternative 1

Emissions of CO_2e (Metric Tons per Year)	
Alternative 1 Greenhouse Gas Emissions	55,534
National Greenhouse Gas Emissions	6,667,000,000
Percent of National Emissions	0.000833%

Note: CO_2e = carbon dioxide equivalent

3.6.4.3 Alternative 2: Dual Reactor Compartment Packages

Under Alternative 2, all components of the activity (towing, dismantlement, relocation of the propulsion space section, preparation of the reactor compartment disposal packages, and transport to waste facility) are similar to those under Alternative 1. Because Alternative 2 proposes the construction of four reactor compartment packages instead of eight single ones, the Port of Benton barge slip would require modifications to its barge slip as well as improvements to the road between the barge slip and Trench 94 at the DOE Hanford Site to facilitate the passage of the larger dual reactor compartment packages.

There would also be a reduction in transits between PSNS & IMF and Trench 94 at the DOE Hanford Site (from 8 to 4), which would reduce the air emissions from transit activities.

3.6.4.3.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

As described above, the ex-Enterprise would be towed from its current berthing location at Newport News Shipbuilding, to one of three commercial dismantlement facilities. This towing activity is the same as under Alternative 1. The towing operation would result in a minimal and temporary increase of marine vessel emissions (see Table 3.6-4). No long-term increases in emission would occur, as no new stationary sources would be constructed.

3.6.4.3.2 Partial Dismantlement at Commercial Dismantlement Facility

As with Alternative 1, once at a dismantlement location, the selected contractor would dispose of ex-Enterprise by partially dismantling and recycling it according to established processes and techniques. Ship recycling activities could result in temporary minor, localized impacts on air quality. However, ship dismantling activities that comply with applicable rules and regulations would not significantly impact air quality under Alternative 2.

3.6.4.3.3 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility

The shipment of the propulsion space section would occur as described in Alternative 1 (Section 3.6.4.2.3). Air emissions from this activity of the transit would be the same as Alternative 1, and are shown in Table 3.6-5.

3.6.4.3.4 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Four Dual Reactor Compartment Packages (No In-Water Work)

Reactor compartment package preparation would occur at PSNS & IMF. Unlike Alternative 1, Alternative 2 would prepare and ship four dual reactor compartment packages to the Port of Benton barge slip by barge and from there to the DOE Hanford Site by multiple-wheel, high-capacity transporters.

3.6.4.3.5 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

Installation of rail system for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site would occur as described in Alternative 1. Air emissions from this activity of the transit are shown in Table 3.6-11.

3.6.4.3.6 Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility by Barge to the Port of Benton Barge Slip and by Multiple-Wheel, High-Capacity Transporter to Trench 94 of Department of Energy Hanford Site

The transport route for the ex-Enterprise reactor compartment packages would be the same as that used for Alternative 1, only with a reduced number of shipments when compared with Alternative 1. For Alternative 2, total duration of transport from PSNS & IMF to Trench 94 at the DOE Hanford Site is expected to be four to six weeks over a 1.5-year period. Alternative 2 does not propose to change the methodologies or compliance with any applicable federal, state, and local environmental, occupational safety and health laws and regulations. Therefore, preparation and shipment of the reactor compartment packages under Alternative 2 would have minimal effects on air quality.

Table 3.6-11: Estimated Criteria Pollutant Emissions Produced Under Alternative 2 from Transport of Reactor Compartment Packages to the DOE Hanford Site

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	3.90	16.20	0.29	0.08	0.58	0.564	8.73E-05
Shipment via river tug to Port of Benton barge slip	2.20	7.49	0.11	0.05	0.33	0.316	4.89E-05
Construction Activities (rail system installation, barge slip modifications, and transport route improvements)	0.35	0.69	0.11	0.00	0.04	0.04	3.66E-07
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	0.18	0.80	0.06	0.00	0.02	0.02	8.37E-07
TOTAL 0–3 nm	6.63	25.19	0.57	0.13	0.96	0.94	1.37E-04
3–12 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	0.52	2.16	0.04	0.01	0.08	0.08	1.16E-05
TOTAL 3–12 nm	0.52	2.16	0.04	0.01	0.08	0.08	1.16E-05
0–12 nm							
Transport of Reactor Compartment Packages to Trench 94 at the DOE Hanford Site (including construction activities)	7.15	27.34	0.61	0.14	1.04	1.01	1.49E-04
TOTAL 0–12 nm	7.15	27.34	0.61	0.14	1.04	1.01	1.49E-04
>12 nm							
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	1.79	7.44	0.13	0.04	0.27	0.26	4.01E-05
TOTAL >12 nm	1.79	7.44	0.13	0.04	0.27	0.26	4.01E-05

Notes: (1): Construction emissions are shown separately in Table 3.6-12. (2) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, DOE = Department of Energy, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.3.7 Port of Benton Barge Slip Modifications

Alternative 2 would require modifications to the existing Port of Benton barge slip on the west shoreline of the Columbia River in Richland, Washington. The barge slip would be modified to accommodate the larger barge needed for dual reactor compartment packages. Construction for the barge slip modifications would involve the use of diesel-powered heavy equipment for limited excavation, delivery or removal of materials, driving steel piles, concrete mixing, and backfilling of excavated areas. Temporary air quality impacts are expected, but overall emissions would be minimal (Table 3.6-12).

3.6.4.3.8 Road Improvements Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

Additionally, the Navy may require upgrades at 11 locations on the transport route to support dual reactor compartment packages.

The proposed upgrades to the route include the following activities:

- cutting and/or filling to reduce the vertical curve
- filling dips in road
- paving medians
- filling low sides and/or cutting high sides to reduce side slope
- filling road shoulders to improve transitions (intersections)

Construction for the road upgrades would involve the use of diesel-powered heavy equipment for limited excavation, delivery of materials, backfilling of excavated areas, and paving of the roadway. Temporary air quality impacts are expected, but overall emissions would be minimal (Table 3.6-12). Additionally, during barge slip or road improvement work, the contractor would enforce the following actions to control fugitive dust:

- use water suppressants
- minimize activities during periods of high winds
- use covered chutes, covered containers, or collection control equipment when handling, transferring, and/or storing dusty material
- keep paved surfaces clean to minimize re-entrainment of dust into the air
- restrict access or limit vehicle speeds on unpaved areas to 15 mph
- limit the amount graded at any one time

Table 3.6-12: Estimated Criteria Pollutant Emissions Produced Under Alternative 2 from Construction Activities

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Install rail system for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site	0.0580	0.0069	0.0003	4.98E-05	0.0002	0.0002	1.52E-09
Port of Benton barge slip modifications	0.06	0.14	0.02	0.00	0.01	0.01	7.95E-08
Improvements to Transport Route	0.23	0.54	0.09	0.00	0.03	0.03	2.85E-07
Total Emissions	0.35	0.72	0.11	0.00	0.04	0.04	3.88E-07

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, DOE = Department of Energy. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.3.10 General Conformity Under Alternative 2

Transit activities between the port locations and 3 nm offshore would potentially generate emissions that could impact air quality within the air basin. These emissions are expected to be less than those generated under Alternative 1, since under Alternative 2 four fewer transits of the reactor compartment packages would occur. Table 3.6-13 presents the estimated nearshore emissions under Alternative 2. This table conservatively presents all estimated emissions within 3 nm from shore; for General Conformity purposes, the only relevant emissions are those that occur within the Hampton Roads AQCR, Virginia, which is a maintenance area for the 1997 8-hour ozone and the Wallula, Washington region, which is a maintenance area for PM_{10}. Air pollutant emissions under Alternative 2 would not result in violations of federal air quality standards, because they would not have a measurable impact on air quality in land areas. Emissions are below the applicable *de minimis* levels. A Conformity Determination is not required, and a signed Record of Non-Applicability has been prepared and presented in Appendix E (Air Quality Calculations and Record of Non-Applicability).

As with Alternative 1, and as shown in Table 3.6-13, emissions in the Hampton Roads AQCR, Virginia, that result from towing the ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial locations for partial dismantlement would not result in violations of federal air quality standards because they would be well below the applicable *de minimis* levels.

As with Alternative 1, emissions in the Wallula PM_{10} maintenance area are expected to be minimal due to the short time the tugboats and barge are transiting this region. In this area, emissions associated with the Proposed Action would result from towing the barge with the reactor compartment package to the Port of Benton barge slip. With an anticipated barge transit speed of 8 mph, the barge would pass 12 mi. through this maintenance area in approximately 1.5 hours and contribute an extremely low level of PM_{10} or other criteria pollutants. With approximately 1.5 hours in the maintenance area, air pollutant emissions under Alternative 2 would not result in violations of federal air quality standards because they would be well below the applicable *de minimis* levels.

Table 3.6-13: Estimated Annual Emissions Produced Between 0 and 3 nm of Shore Under Alternative 2

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	0.12	0.49	0.01	0.00	0.02	0.017	2.62E-06
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	0.21	2.33	0.09	0.01	0.03	0.03	4.45E-07
Towing/Multiple-Wheel, High-Capacity Transporter Movement Reactor Compartment Packages to Port of Benton barge slip and Trench 94 at the DOE Hanford Site	6.28	24.50	0.46	0.13	0.93	0.90	1.37E-04
Install rail system for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site	0.0580	0.0069	0.0003	4.98E-05	0.0002	0.0002	1.52E-09
Port of Benton barge slip modifications	0.06	0.14	0.02	0.00	0.01	0.01	7.95E-08
Improving Transport Route	0.23	0.54	0.09	0.00	0.03	0.03	2.85E-07
TOTAL 0–3 nm	**6.96**	**28.00**	**0.67**	**0.14**	**1.01**	**0.98**	**1.40E-04**
Nonattainment/Maintenance de minimis Levels	N/A	100	100	N/A	100	N/A	N/A
Exceeds de minimis Level?	N/A	No	No	N/A	No	N/A	N/A

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, DOE = Department of Energy, N/A = Not Applicable. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.3.10.1 National Environmental Policy Act Impacts from Criteria Pollutants Under Alternative 2 for 0–12 Nautical Miles from Shore

Table 3.6-14 presents the total estimated emission results under Alternative 2 within the Study Area and are similar to Alternative 1. When using the PSD major emitting facility numbers as screening thresholds, any relevant increases would be well below the thresholds. In addition, the total quantity of criteria pollutants is very small in relation to the vastness of the Study Area. Therefore, no significant impacts on air quality would occur as a result of criteria pollutants emissions from activities beyond territorial activities.

Table 3.6-14: Estimated Annual Criteria Pollutant Emissions Produced Between 0 and 12 nm from Shore Under Alternative 2

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	0.19	0.80	0.01	0.004	0.03	0.03	4.31E-06
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	0.60	6.67	0.25	0.019	0.09	0.08	1.27E-06
Transport of Reactor Compartment Packages to Trench 94 at the DOE Hanford Site (including rail system installation, barge slip modifications, and transport route improvements)	7.15	27.34	0.61	0.14	1.04	1.01	1.49E-04
TOTAL	7.94	34.81	0.88	0.17	1.16	1.12	1.55E-04
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, DOE = Department of Energy, nm = nautical miles, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, PSD = Prevention of Significant Deterioration. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.3.10.2 Executive Order 12114 Impacts from Criteria Pollutants Under Alternative 2 Greater than 12 Nautical Miles from Shore

Table 3.6-15 presents the total estimated emission results under Alternative 2 beyond 12 nm within the Study Area and is similar to Alternative 1, except for the shipment via ocean tug from PSNS & IMF to Vancouver, Washington. Emissions estimated from that activity are approximately half the emissions estimated under Alternative 1 due to half as many transits. The total quantity of criteria pollutants in any one location is very small in relation to the vastness of the Study Area. Therefore, minimal impacts on air quality as a result of criteria pollutants emissions from activities beyond territorial activities would occur.

Table 3.6-15: Estimated Annual Criteria Pollutant Emissions Produced Greater than 12 nm from Shore Under Alternative 2

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04
Heavy-Lift ship from Commercial Dismantlement Facility to PSNS & IMF	99.07	1,095.49	41.42	3.17	14.93	13.74	2.09E-04
Shipment via ocean tug from PSNS & IMF to Vancouver, Washington	1.79	7.44	0.13	0.04	0.27	0.26	4.01E-05
TOTAL	**108.66**	**1,135.36**	**42.12**	**3.37**	**16.37**	**15.13**	**4.24E-04**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead. PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, DOE = Department of Energy, PSD = Prevention of Significant Deterioration, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.3.11 Greenhouse Gases

Estimated greenhouse gas emission increases associated with operations due to implementation of Alternative 2 would be less than 0.001 percent of greenhouse gas inventory of 6,667 million metric tons of CO_2e (Table 3.6-16).

Table 3.6-16: Estimated Annual Greenhouse Gas Emissions Under Alternative 2

Emissions of CO_2e (Metric Tons per Year)	
Alternative 2 Greenhouse Gas Emissions	53,143
National Greenhouse Gas Emissions	6,667,000,000
Percent of National Emissions	0.000797%

Note: CO_2e = carbon dioxide equivalent.

3.6.4.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

Alternative 3 (Preferred Alternative) would include the towing of ex-Enterprise from its current location at Newport News Shipbuilding in Newport News, Virginia, to one of three commercial dismantlement facilities for dismantlement and disposal. Alternative 3 (Preferred Alternative) does not require federal construction activities, thus construction-related air emissions would not occur under Alternative 3 (Preferred Alternative).

3.6.4.4.1 Complete Dismantlement of ex-Enterprise

Once at the commercial dismantlement location, the selected contractor would dispose of ex-Enterprise by dismantling and recycling it using established processes and techniques. The aircraft carrier dismantling contracts include a clause that requires the contractor to comply with all applicable federal, state, and local environmental, occupational safety and health laws and regulations. The dismantling/recycling would occur at an existing industrial facility that is capable of the operation. It is anticipated that dismantlement emissions would be covered under an existing stationary source permit issued through New Source Review permitting process and, as such, would be exempted from being considered a direct or indirect emission under General Conformity Applicability Analysis. It is not anticipated that the contractor would need to obtain any additional air quality related permits in order to perform the requirements of the contract.

Ship recycling activities can generate air pollutants that are regulated by the CAA. If a ship recycling facility emits regulated amounts of air pollutants, it must obtain the appropriate operating or preconstruction permit and comply with all emissions requirements set forth in that permit. Specifically, torch cutting may generate large amounts of fumes and some or all of the following materials as particulates: manganese, nickel, chromium, iron, aluminum, asbestos, and lead. It may also initiate small fires when oil or sludge is ignited by the torch. These fires are usually short-lived but may generate some intense black smoke. The cutting torches themselves can generate oxides of nitrogen and sulfur, and the process of combustion produces carbon dioxide and carbon monoxide. In spite of these releases, air pollutants from metal cutting are not likely to have a major air quality impact (EPA, 2000).

In general, ship recycling activities could result in temporary minor, localized impacts on air quality. However, ship dismantling activities that comply with applicable rules and regulations would not significantly impact air quality.

3.6.4.4.2 Transport Low-Level Radioactive Waste from Commercial Dismantlement Facility to Approved Wasted Facility

Alternative 3 (Preferred Alternative) would involve the dismantlement and recycling of ex-Enterprise at the commercial dismantlement facility and the transport of the LLRW from the commercial dismantlement facility to one of three authorized waste facility locations. There are three commercial dismantlement facility locations in Virginia, Texas, and Alabama and three authorized disposal facility locations in Texas, Utah, and South Carolina (see Section 2.3.4, Alternative 3 [Preferred Alternative] – Commercial Dismantlement). The longest route was chosen to provide the most conservative analysis and air quality estimates. The route via semi-truck from commercial dismantlement facility in Brownsville, Texas to the waste facility in Clive, Utah, is the longest route at approximately 2,461 mi. As a conservative estimate, the total number of transits by semi-truck would be equal to the estimated maximum number of container express boxes for LLRW associated with the reactor plants, or 440 transits. Temporary air quality impacts are expected, but would be spread out over a large geographic area, minimizing impacts on any one area along the transport route (Table 3.6-17).

Table 3.6-17: Estimated Criteria Pollutant Emissions Produced Under Alternative 3 (Preferred Alternative)

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Tow of ex-Enterprise to Commercial Dismantlement Facility	7.99	33.23	0.59	0.17	1.19	1.16	1.79E-04
Transport Low-Level Radioactive Waste from Commercial Dismantlement Facility to Approved Waste Facility	189.82	2.45	1.71	0.014	0.12	0.12	5.14E-06
Total	197.81	35.68	2.30	0.18	1.32	1.28	1.84E-04

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). Ozone is a secondary pollutant tracked by its precursor. (2) CO = carbon monoxide, , NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.4.3 General Conformity Under Alternative 3 (Preferred Alternative)

It is anticipated that dismantlement emissions would be covered under an existing stationary source permit issued through the New Source Review permitting process and, as such, would be exempt from being considered a direct or indirect emission under General Conformity Applicability Analysis. Transit activities between the commercial dismantlement facilities and the disposal facilities would potentially generate emissions which could impact air quality within numerous air basins, as described in Section 3.6.3 (Affected Environment). Table 3.6-18 presents the estimated nearshore emissions under Alternative 3 (Preferred Alternative). Air pollutant emissions under Alternative 3 (Preferred Alternative) would not result in violations of federal air quality standards because they would not have a measurable impact on air quality in land areas.

Towing the ex-Enterprise from its current location at Newport News Shipbuilding to one of the three commercial locations for dismantlement would result in emissions within the Hampton Roads AQCR, Virginia, which is a maintenance area for the 1997 8-hour ozone NAAQS. As shown in Table 3.6-18, air pollutant emissions due to this activity under Alternative 3 (Preferred Alternative) would not result in violations of federal air quality standards because they would be well below the applicable *de minimis* levels.

Truck waste transport for the Alternative 3 (Preferred Alternative) is a contracted action. Therefore, General Conformity analysis is not applicable for this portion of Alternative 3.

As shown below, emissions are below the applicable *de minimis* levels, including those in nonattainment or maintenance areas. A Conformity Determination is not required, and a Record of Non-Applicability has been prepared and presented in Appendix E (Air Quality Calculations and Record of Non-Applicability).

Table 3.6-18: Estimated Annual Emissions Produced Between 0 and 3 nm from Shore Under Alternative 3 (Preferred Alternative)

Criteria Pollutant	**Annual Emissions (tons per year)**						
	CO	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**Pb**
Tow of ex-Enterprise to Commercial Dismantlement Facility	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06
TOTAL 0–3 nm (Entire Action)	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06
Nonattainment/Maintenance de minimis Levels	100	50 (Serious) 100 (Maint. and Marginal)	50 (Serious) 100 (Maint. and Marginal)	100	70 (Serious) 100 (Maint.)	70 (Serious) 100 (Maint.)	N/A

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, N/A = not applicable, LLRW = low-level radioactive waste. (2) Individual values may not add up exactly to total values due to rounding.

3.6.4.4.3.1 National Environmental Policy Act Impacts from Criteria Pollutants Under Alternative 3 (Preferred Alternative) for 0–12 Nautical Miles from Shore

Table 3.6-19 presents the total estimated emission results under Alternative 3 (Preferred Alternative) within 12 nm. Pollutants emitted in the Study Area under Alternative 3 (Preferred Alternative) could be carried ashore by winds. When using the PSD major emitting facility numbers as screening thresholds, any relevant increases would be well below the thresholds. In addition, the total quantity of criteria pollutants is very small in relation to the vastness of the Study Area. Therefore, no significant impacts on air quality would occur as a result of criteria air pollutant emissions from activities beyond territorial activities.

Table 3.6-19: Estimated Annual Criteria Pollutant Emissions Produced Between 0 and 12 nm from Shore Under Alternative 3 (Preferred Alternative)

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
0–3 nm Emissions	189.94	2.94	1.72	0.017	0.14	0.14	7.77E-06
3–12 nm Emissions	0.08	0.31	0.01	0.00	0.01	0.01	1.69E-06
TOTAL	190.01	3.25	1.73	0.02	0.15	0.15	9.45E-06
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, nm = nautical miles, PSD = Prevention of Significant Deterioration. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.4.3.2 Executive Order 12114 Impacts from Criteria Pollutants Under Alternative 3 (Preferred Alternative) Greater than 12 Nautical Miles from Shore

Table 3.6-20 presents the total estimated emission results under Alternative 3 (Preferred Alternative) beyond 12 nm within the Study Area. When using the PSD major emitting facility numbers as screening thresholds, any relevant increases would be well below the thresholds. The total quantity of criteria pollutants in any one location is very small in relation to the vastness of the Study Area. Therefore, minimal impacts on air quality as a result of criteria pollutants emissions from activities beyond territorial activities would occur.

Table 3.6-20: Estimated Annual Criteria Pollutant Emissions Produced Greater than 12 nm from Shore Under Alternative 3 (Preferred Alternative)

Criteria Pollutant	Annual Emissions (tons per year)						
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Initial Transport of ex-Enterprise	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04
TOTAL	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**250**

Notes: (1) Table includes criteria pollutant precursors (e.g., volatile organic compounds). (2) CO = carbon monoxide, NO_X = nitrogen oxides, Pb = Lead, PM_{10} = particulate matter ≤ 10 microns in diameter, $PM_{2.5}$ = particulate matter ≤ 2.5 microns in diameter, SO_X = sulfur oxides, VOC = volatile organic compounds, PSD = Prevention of Significant Deterioration. (3) Individual values may not add up exactly to total values due to rounding.

3.6.4.4.4 Greenhouse Gases

Under Alternative 3 (Preferred Alternative), emissions have been compared with the nationwide greenhouse gas inventory CO_2e emissions for potential significance (Table 3.6-21). Estimated greenhouse gas emissions increases associated with operations due to implementation of Alternative 3 (Preferred Alternative) would be less than 0.0001 percent of greenhouse gas inventory of 6,667 million metric tons of CO_2e.

Table 3.6-21: Estimated Annual Greenhouse Gas Emissions Under Alternative 3 (Preferred Alternative)

Emissions of CO_2e (Metric Tons per Year)	
Alternative 3 Greenhouse Gas Emissions	3,854
National Greenhouse Gas Emissions	6,667,000,000
Percent of National Emissions	0.000058%

Note: CO_2e = carbon dioxide equivalent.

Implementation of all components of Alternative 3 (Preferred Alternative) would not result in significant impacts on air quality.

3.6.5 Comparison of Greenhouse Gas Emissions for Each Alternative

Table 3.6-22 compares the Greenhouse Gas Emissions for each alternative.

Table 3.6-22: Comparison of Greenhouse Gas Emissions Under Each Alternative

Alternative	Emissions of CO_2e (Metric Tons per Year)
No Action Alternative	Negligible
Alternative 1	55,534
Alternative 2	53,143
Alternative 3 (Preferred Alternative)	3,854

3.6.6 Mitigation

All activities would comply with all applicable federal, state, and local environmental, occupational safety and health laws and regulations. If reasonably foreseeable impacts are determined to result, mitigation measures beyond best management practices would be developed and implemented. No mitigation measures are required under any of the alternatives, including the No Action Alternative, because no impacts are reasonably foreseeable.

3.6.7 Summary of Impacts and Conclusions

Table 3.6-23 summarizes the impacts of the alternatives on air quality.

Table 3.6-23: Summary of Impacts and Conclusions on Air Quality

Potential Impacts on Air Quality	Alternatives			
	No Action	1	2	3
Impacts from long-term storage				
Impacts from towing, or transport by vessel		O	O	O
Impact of transport by land		O	O	O
Impacts from Port of Benton barge slip and road improvement work			O	
Impacts of installing rail system for Reactor Compartment Packages in Trench 94 at the DOE Hanford Site		O	O	

Notes: O = Minimal impact, Blank = No impact/Not applicable, DOE = Department of Energy.

3.7 Cultural Resources

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) reviews cultural resources to assess the potential impacts of the Proposed Action and alternatives. Cultural resources is a term that encompasses prehistoric and historic archaeological sites; historic buildings, structures, and districts; and physical entities and human-made or natural features important to a culture, a subculture, or a community for traditional, religious, or other reasons. Cultural resources can be divided into three major categories:

- Archaeological resources include prehistoric and historic locations or sites where human activity measurably altered the earth or left deposits of physical remains. Archaeological resources can have a surface component, a subsurface component, or both. Shipwrecks and submerged aircraft wreck sites are also considered archaeological sites.
- Architectural resources are elements of the built environment and include standing buildings, structures, dams, bridges, landscapes, and other built environment resources of historic, engineering, or aesthetic significance.
- Traditional Cultural Properties (TCPs) include properties associated with cultural practices or beliefs of a living community that are rooted in the history of that community and are important in maintaining the continuing cultural identity of the community.

3.7.1 Methodology

3.7.1.1 Region of Influence

The Proposed Action, described in Section 2.1 (Proposed Action), is to dispose of ex-Enterprise, including its defueled reactor plants. It includes three action alternatives and one No Action Alternative. Disposal includes the dismantling and recycling of the non-radioactive remnant hull sections at a government or authorized commercial facility and removing and packaging reactor plant components for transportation and disposal as low-level radioactive waste (LLRW) to an authorized radioactive waste facility or facilities. The areas reviewed for cultural resources include locations in Mobile, Alabama; Brownsville, Texas; Hampton Roads Metropolitan Area, Virginia; and Richland, Washington. These locations contain port and shipyard facilities that may support the storage of ex-Enterprise; the complete dismantlement at commercial ship dismantlement facilities; the Port of Benton barge slip; the transport route through Pacific Northwest National Laboratory (PNNL) site and the Department of Energy (DOE) Hanford Site; and Trench 94, the DOE LLRW burial facility located at the DOE Hanford Site.

There are other components of the Proposed Action and alternatives, including waste transportation routes, ship towing routes, propulsion space section shipping routes via heavy-lift ship, partial dismantlement at commercial ship dismantlement facilities, pier-side work (no in-water work) and dry dock work at Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), and LLRW storage at commercial disposal sites that are not included in the Region of Influence (ROI) for cultural resources.

3.7.1.2 Regulatory Framework

Cultural resources are governed by federal laws and regulations, including the National Historic Preservation Act (NHPA) of 1966 as amended, the Archaeological Resources Protection Act (ARPA) of 1979 as amended, the Native American Graves Protection and Repatriation Act of 1990, the American Indian Religious Freedom Act (AIRFA) of 1978 as amended, and Executive Order (EO) 13007, *Indian Sacred Sites*.

3.7.1.2.1 National Historic Preservation Act

The NHPA of 1966, as amended, and implementing regulations (54 United States Code [U.S.C.] Section 300101 et seq.), 36 Code of Federal Regulations [CFR] Part 800) establish national policy and procedures for addressing effects to historic properties caused by federal actions. NHPA also sets federal policy for historic preservation, which includes identification, evaluation, recordation, documentation, curation, acquisition, protection, management, rehabilitation, restoration, stabilization, maintenance, research, interpretation, and conservation of objects, sites, buildings, structures and districts that are historically and culturally significant. The act establishes the National Register of Historic Places (NRHP) and National Historic Landmarks Programs, and establishes the Advisory Council on Historic Preservation as an independent federal agency. The 1980 and 1992 amendments to the NHPA direct the Secretary of the Interior to establish guidelines for curation of artifacts, national significant properties, documentation for these properties, and the preservation of federally owned historic sites.

3.7.1.2.1.1 Section 106 of the National Historic Preservation Act

Section 106 (36 CFR Part 800) requires federal agencies to take into account the effects of their undertakings on historic properties. Historic properties may include prehistoric or historic districts, sites, buildings, structures, or objects that are included in, or eligible for inclusion in the NRHP. The federal agency, in consultation with the relevant State Historic Preservation Officer (SHPO) and other consulting parties, must consider methods that would avoid, minimize, or mitigate any adverse effects that such undertaking would cause on properties that are listed in the NRHP, or that are determined to be eligible for listing. Section 106 also requires that agencies consult with any Indian tribe that attaches religious or cultural significance to historic properties that may be affected by the undertaking. Whenever the lead agency determines that the proposed undertaking could adversely affect historic properties, the Advisory Council on Historic Preservation shall be given the opportunity to participate in Section 106 consultation.

The Department of Interior, through the National Park Service, established distinct criteria for determining whether a property is eligible for listing in the NRHP. In order to be eligible for the NRHP, a property must meet the criteria for evaluation in at least one area of significance as defined by Secretary of the Interior Standards for Evaluation (36 CFR Part 60):

- associated with events that have made a significant contribution to the broad patterns of American history; or
- associated with the lives of persons significant in our past; or
- embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant or distinguishable entity whose components may lack individual distinction; or
- have yielded, or may likely yield, information important in prehistory or history.

Under Section 106 of the NHPA, actions that either directly or indirectly alter any of the characteristics that qualify a property for eligibility for listing in the NRHP "in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR Part 800.5[a][1]) constitute an adverse effect to the historic property. Federal agencies are required to consider and consult on measures to avoid, minimize, and mitigate adverse effects to historic properties.

3.7.1.2.2 Archaeological Resources Protection Act

ARPA of 1979, as amended (16 U.S.C. Sections 470aa–470mm), provides for the protection of archaeological resources on public lands and Indian lands. ARPA regulates archaeological investigation on public lands and the enforcement of penalties against those who loot or vandalize archaeological resources. The statute requires federal agencies to protect information about the locations and nature of these resources and stipulates that federal agencies notify any Indian tribe which may consider the site as having religious or cultural importance if the issuance of a permit may result in harm to, or destruction of, any Indian tribal religious or cultural site on public lands (32 CFR Part 229.7(a)).

3.7.1.2.3 American Indian Religious Freedom Act

AIRFA of 1978, as amended (42 U.S.C. Section 1996), provides protection of American Indian religious practices. AIRFA establishes the policy of the federal government "to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including, but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites."

3.7.1.2.4 Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. Sections 3001–3013) provides for the disposition and repatriation of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony. Federal agencies are required to consult with Indian tribes whenever planned activities on federal or tribal lands encounter, or are expected to encounter, these cultural items, or when such items are inadvertently discovered on federal or tribal lands.

3.7.1.2.5 Executive Order 13007 – Indian Sacred Sites

EO 13007, *Indian Sacred Sites* (61 Federal Register 26771-26772 [1996]), addresses the accommodation of sacred sites in order to protect and preserve Indian religious practice. EO 13007 directs federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sites. This EO also directs federal agencies, where appropriate, to maintain the confidentiality of sacred sites.

3.7.1.3 Best Management Practices

Cultural Resource Management Plans are developed by federal agencies to establish guidance for the identification, evaluation, recordation, curation, and management of archaeological sites, historic properties, and TCPs as individual entities or as contributing properties within an archaeological or historic district. The plans specify methods of consultation with affected tribes and Tribal Historic Preservation Officers, government agencies, and interested parties, and include strategies for the management, preservation and/or curation of representative properties, heritage assets, archives, and objects. These plans are routinely updated to ensure they comply with federal laws and regulations, EOs, Department of Defense policy, and U.S. Department of the Navy (Navy) policy.

Management of cultural resources within the DOE Hanford Site follows the *Hanford Cultural Resources Management Plan*, maintained by the DOE Richland Operations Office (DOE/RL-98-10; (DOE, 2003)). Management of cultural and biological resources within the PNNL site follow the *Pacific Northwest Site Office (PNSO) Cultural and Biological Resources Management Plan*, maintained by the DOE PNSO (DOE/PNSO-PLAN-09; (DOE, 2021)).

3.7.1.4 Approach to Analysis

Cultural resources are reviewed for the components of the Proposed Action and alternatives that contain port and shipyard facilities that may support the storage of ex-Enterprise in Newport News Shipbuilding, in Newport News, Virginia, and the complete dismantlement at commercial ship dismantlement facilities in Mobile, Alabama; Brownsville, Texas; or Hampton Roads Metropolitan Area, Virginia; and the Port of Benton barge slip, the transport route through PNNL site and the DOE Hanford Site, and Trench 94 at the DOE Hanford Site in Richland, Washington. Cultural resource identification efforts for these study areas were conducted through archival research of existing databases and previous cultural resources investigations, and an assessment of the cultural setting for these four locations.

3.7.1.5 National Historic Preservation Act Section 106 Consultation

As described in Section 3.7.1.2.1 (National Historic Preservation Act), the regulations implementing Section 106 of the NHPA specify a consultation process to assist in the identification of historic properties that may be affected by a federal action and require federal agencies to consider the effects of their actions on identified historic properties.

Disposition of ex-Enterprise as an historic vessel is covered by a Program Comment, a Section 106 program alternative for compliance with the NHPA, the procedures of which are described in Section 3.7.2.1 (Ex-Enterprise [CVN 65]).

Section 106 review of the Proposed Action and alternatives, as documented in this EIS/OEIS, confirms that Alternative 3 (Preferred Alternative) does not involve activities of the type that have the potential to cause effects on historic properties. If the preferred alternative is chosen, there are no further obligations under Section 106 or 36 CFR Part 800. If another alternative is chosen, additional Section 106 reviews may be necessary.

3.7.2 Affected Environment

3.7.2.1 Ex-Enterprise (CVN 65)

The first nuclear-powered aircraft carrier in the world, the USS Enterprise, was commissioned in November 1961 and completed 25 deployments during 51 years of service. The ship is more than 1,000 feet (ft.) in length, close to 250 ft. wide, and could reach speeds of more than 30 knots (Naval History and Heritage Command, 2015, 2019). The Navy inactivated the USS Enterprise on December 1, 2012, and stored it at Newport News Shipbuilding; in 2014, one of the anchors was transferred to the USS ABRAHAM LINCOLN (Lendon, 2014). The USS Enterprise was decommissioned and struck from the Naval Vessel Register on February 3, 2017.

The Navy, in considering listing a historic vessel, prepares a Determination of Eligibility or Determination of Ineligibility document for listing in the NRHP, and consults with the appropriate SHPO. Navy vessels that meet one or more of the criteria for evaluation in at least one area of significance as defined by Secretary of the Interior Standards for Evaluation (36 CFR Part 60), and that continue to possess integrity of (as appropriate) design, materials, workmanship, feeling and/or association, are eligible for listing in the NRHP.

Ex-Enterprise meets the criteria to be eligible for listing in the NRHP according to a Naval Ship Historical Evaluation (Final Determination initiated May 1, 2012, finalized July 11, 2012) prepared by the Naval History and Heritage Command (NHHC) ships history division. Support for its eligibility included the following elements: that ex-Enterprise was the first nuclear-powered aircraft carrier in the world, its impressive 50-year combat history, and the acts of heroism taken by several pilots and aircrew who were stationed on the ship.

Advisory Council on Historic Preservation procedures within the Program Comment for the Department of the Navy for the Disposition of Historic Vessels (75 Federal Register 12245) include the following:

- give priority to compiling histories of these eligible vessels when preparing entries in the Dictionary of American Naval Fighting Ships
- retain and provide public access to historical documentation from NRHP eligible vessels such as command operation reports, war diaries, and ship deck logs at the NHHC
- in addition to the standard curatorial items removed from the vessel upon decommissioning in accordance with required Navy policy, the Navy would make the vessel available to the Navy Curator and eligible nonprofit organizations for removal of additional equipment, parts of the vessel, etc., that contribute to the historical significance of the vessel
- within three years of designating a NRHP-eligible vessel for final disposition, deposit with the National Archives and Records Administration documentation consisting of archive-stable media including the Booklet of General Plans and the last report of the Board of Inspection and Survey describing the material condition of the vessel

In accordance with these Program Comment procedures, the National Council of State Historic Preservation Officers and other historic preservation stakeholders were notified on May 1, 2012, of the Navy determination that ex-Enterprise is eligible for listing in the NRHP. The initial eligibility determination was made available for comment by historic preservation stakeholders for 60 days. During that time, the Navy received no written comments.

To date, the Navy has annotated the entry of the ship in the Naval Vessel Register to reflect listing eligibility, which the public can access at http://www.nvr.navy.mil. Documentation consisting of historically important records pertaining to ex-Enterprise is available for viewing at the NHHC offices. The Navy has assembled an information package of historically important records for ex-Enterprise which will be turned over to the National Archives for preservation. The entry for ex-Enterprise in the Dictionary of American Naval Fighting Ships is being updated. Curatorial items were removed from ex-Enterprise following its decommissioning.

By following this Program Comment, the Navy has met its responsibilities for compliance with Section 106 of the NHPA concerning the evaluation of vessels for eligibility for listing in the NRHP and the final disposition of eligible vessels.

3.7.2.2 Washington

The study area considered for cultural resources review within Washington includes the Port of Benton barge slip; a 164 ft. (50-meter [m]) buffer along the approximately 25-mile (mi.) transport route through the PNNL site (managed by the PNSO within DOE Office of Science) and the DOE Hanford Site (managed by the DOE Richland Operations Office); and Trench 94, the DOE LLRW burial facility located at the DOE Hanford Site (Figure 3.7-1).

Figure 3.7-1: Washington Cultural Resources Study Area

3.7.2.2.1 Cultural Setting

Native Americans have occupied the lands in and around the study area for thousands of years (Relander, 1956; Walker JR., 1998). Archaeological sites identified on the DOE Hanford Site date back at least 8,000 years and are usually found along the banks of the Columbia River. Inland locations that are well-watered also show evidence of concentrated human activity, with seasonal use of arid lowlands for hunting and other resource procurement activities (Chatters, 1982; Greene, 1975; Leonhardy & Rice, 1970; Rice, 1980; DOE, 2003; Woody, 2003).

Members of the Lewis and Clark expedition were the first Euro-Americans to pass near the study area, between 1804 and 1806 during their exploration of the Columbia and Snake River Valleys. The expedition and other Euro-American explorers travelling down the Columbia River seeking fur and gold likely encountered the Wanapum Indians, who inhabited villages and fishing camps along the mid-Columbia River Basin. Neighboring groups, such as the Yakama, Umatilla, Cayuse, Walla Walla, Palus, Nez Perce, and the Middle Columbia Salish, also frequented the area to trade, gather resources, and conduct other activities. The descendants of these early inhabitants include members of three federally recognized tribes: the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and the Nez Perce Tribe, as well as one non-federally recognized tribe, the Wanapum of Priest Rapids (Wanapum).

Cattle ranchers moved into the Richland area in the 1880s, and homesteaders began appearing on the banks of the Columbia River in the 1890s (DOE, 2003). The construction of large-scale hydroelectric dams and irrigation systems in the early 20th century brought many additional farmers to the inland portions of the area. Electric power was brought to the region by 1908, when a 100 mi. electric transmission line was constructed from Wenatchee to Kennewick. This power came from the Hanford Irrigation and Power Company plant at Coyote Rapids, upriver from the study area. Water for the irrigation system was also pumped at the Coyote Rapids plant. In 1913, a branch line of the Chicago, Milwaukee, St. Paul, and Pacific Railroad was completed across the DOE Hanford Site (DOE, 2003).

During World War II, the federal government identified Hanford as an ideal place for plutonium production for the manufacturing of nuclear bombs—remote, away from densely populated areas, and with access to abundant water and electricity. In 1943, under the authority of the War Powers Act, the federal government acquired 625 square miles of land for the Manhattan Project (Harvey, 2000; Parker, 1986). The DOE Hanford Site was divided into areas that specialized in plutonium production processes. Uranium fuel elements were fabricated and jacketed in the 300 Area. In the 100 Areas, reactors radiated the uranium fuel elements to produce plutonium. Uranium was chemically dissolved and separated into plutonium and other products in the 200 Areas. The 600 Area provided support facilities for the entire area (Harvey, 2000). Richland Village, later known as the town of Richland, was established for the Hanford Engineering Works employees and families.

During the initial years of the Cold War the government sought to further develop its nuclear weapons program. Five new reactors were added during this time, and various buildings were constructed including those that housed research and development laboratories, maintenance and craft shops, administrative facilities, waste management, and environmental science research laboratories. The Hanford Construction Camp was established east of the 200 East Area to house construction workers.

However, decreased demand for radioactive materials resulted in the downsizing of the plutonium mission by the mid-1960s. At the end of the Cold War, in 1987, the last of Hanford's nine reactors was shut down (Harvey, 2000).

After the Cold War, the DOE Hanford Site shifted to a mission of environmental restoration and remediation. This has resulted in the decommissioning, decontamination, and demolition of many of the facilities built for the Manhattan Project and Cold War. Some buildings, however, have been repurposed for scientific use and reclamation activities. In 1996, DOE established a Historic Buildings Task Group to identify and evaluate buildings and structures for the Manhattan Project and Cold War Historic District (DOE, 1997a). Recently, DOE has also entered into an agreement with the National Park Service to include portions of the DOE Hanford Site in the Manhattan Project National Historical Park. At the same time, a treatment plan was developed for the management of the historic district cultural resources. The Hanford High School, located 0.5 mi. northeast of the study area, is one of the buildings in the National Park.

3.7.2.2.2 Cultural Resources Within the Study Area

The review of the Washington SHPO and Navy cultural resources records indicate that several cultural resources are located within the study area. The transport route intersects the DOE Hanford Site Plant Railroad (45BN1107) in three places, the Hanford Irrigation Ditch (45BN309) in three places, and the Richland Irrigation Ditch Lateral 4 (45BN1125) in one place; all three resources are eligible for listing in the NRHP. In addition, 19 archeological sites or isolates are located within the study area along the haul road. Most remain unevaluated or are not eligible for listing on the NRHP, with the exception of the Tsulim Site (45BN412), a NRHP-eligible prehistoric butchering site containing mammal bone fragments, fire-cracked rock, and stone tools, dating between 1600 and 2000 years before present. The haul road also passes near 45BN1142 (a potentially NRHP-eligible site consisting of a historic debris scatter with artifacts dating to early 1940s), and through the Hanford Construction Camp (45BN0308) and the edge of the Gable Mountain Archaeological District (45DT-102; potentially NRHP-eligible). The Hanford Construction Camp is a NRHP-eligible Historic District; the Hanford Irrigation Ditch (45BN309) is a contributing component of the district.

The study area is also situated almost entirely within the DOE Hanford Site Manhattan Project and Cold War Era Historic District, with contributing buildings that are NRHP-eligible. While there are 28 historic buildings in the 300 Area that contribute to the Hanford Historic District, none are located within the study area. However, the DOE Hanford Site Plant Railroad, discussed above, is documented as contributing to the Historic District (DOE, 1997b).

Local tribes have identified several places of cultural significance on the DOE Hanford Site and PNNL site landscapes, and recent tribal TCP studies and consultation undertaken between DOE (Richland Operations Office and PNSO) and the Yakama Nation, the CTUIR, the Nez Perce Tribe, and the Wanapum have identified several TCPs that are likely to be within the study area, as documented in recent Environmental Assessments (EAs). TCPs documented as eligible for listing in the NRHP in *the Proposed Conveyance of Land at the DOE Hanford Site EA* include the Yakama Nation TCP, the First Foods Gathering Areas TCP, Óykala ayn wéetes TCP, and the Shu Wipa TCP (DOE, 2015). In addition, the 1860 trail location and associated artifacts considered to be contributing elements of the NRHP-eligible Wooded Island Archaeological District (45DT-31) identified in the *Proposed Conveyance of Land at the DOE Hanford Site EA* may be located within the study area (DOE, 2015). The Shu Wipa TCP was also documented in the *Pacific Northwest National Laboratory Richland Campus Future Development EA* (hereafter referred to as the 2017 EA) (DOE, 2017). As noted in the 2017 EA, “Shu Wipa is of cultural and historic importance to the Wanapum for traditional fishing, gathering, and ceremonial purposes” (DOE, 2017). Further, the CTUIR identified the Šúuwipa TCP in the 2017 EA; this area was used for materials and medicine gathering and as a traditional fishing area. The Yakama Nation, who indicated that they hold cultural significance to the area and the cultural material within it, also identified a TCP (DOE, 2017).

The study area also passes through the Preservation Designated Area (PDA), an area set aside by DOE for the preservation of sensitive cultural resources and managed for protection of cultural and biological resources (DOE, 2015, 2017). The PDA is considered an area of cultural significance to area tribes and has been identified as a sacred site under EO 13007 by the CTUIR and the Nez Perce Tribe.

The Port of Benton barge slip is situated within the boundary of the Hanford South Archaeological District (45DT-39). The district is comprised of 50 prehistoric archaeological sites that are distributed along 11 mi. of the Columbia River; none of the recorded resources are located in the Port of Benton barge slip area. The Port of Benton barge slip area was surveyed by the U.S. Army Corps of Engineers (USACE) for cultural resources in 2016 for future barge slip infrastructure modifications (USACE, 2016). The 2016 survey resulted in negative findings for cultural material, with the exception of modern materials above and below the cut-bank. Subsurface testing conducted in the barge slip area in 2005 and 2013 has shown there are no subsurface cultural resources present at the barge slip (USACE, 2016). The built environment resources associated with the barge slip are of relatively modern origin; the Port of Benton was established in 1958 to help economic and industrial development for North Richland and Prosser. In 1965 the Port began construction of a dock, and in 1972 construction of the current slip was initiated (USACE, 2016).

3.7.2.3 Virginia

The study area considered for cultural resources review within Virginia consists of an approximately 933-acre area on the southwest side of Newport News near the confluence of the James River and the Chesapeake Bay, within the Hampton Roads Metropolitan Area, Virginia (Figure 3.7-2).

3.7.2.3.1 Cultural Setting

Recent research suggests that Virginia has been occupied by Native Americans for at least 17,000 years—the Cactus Hill site in the southern portion of the state produced a 17,000-year-old radiocarbon date and is considered to be a stone tool manufacturing site (Egloff & Woodward, 2006). These indigenous people likely lived in small groups and camped along the streams that flowed through the grasslands and pine and fir forests of the time. At the end of the Paleoindian Period, around 10,000 years ago, the inhabitants of the area were forced to adapt to a new warmer and drier climate as large game either went extinct or moved north. During the following Archaic Period (5,000–10,000 years ago), small, semi-sedentary villages were built along the rich floodplains of southern Virginia. Around this time, craft specialization and class ranking began to appear (Egloff & Woodward, 2006; Funk, 1978).

The subsequent Woodland Period (3,200 to 400 years ago) is marked by the appearance of clay pottery in the archaeological record. Gradually over the last 3,000 years, complex social, economic, and political structures evolved. Permanent villages were built along riverbanks and supported by short-term hunting and gathering trips; a wide range of pottery forms, stone and bone tools, and beads and pendants were produced; and an elaborate burial ritual evolved where the deceased were buried in ossuaries after flesh decomposition (Egloff & Woodward, 2006; Tuck, 1978).

By the time British colonists arrived in what would become Jamestown in 1607, the Powhatan Paramount Chief of the Pamunkey Tribe ruled more than 32 sub-chiefdoms in more than 150 villages in the region (Feest, 1978).

Figure 3.7-2: Virginia Cultural Resources Study Area

In the late 16th century, the first explorers in the region encountered two tribes that inhabited territories in the area: the Chesapeake Tribe occupied the Elizabeth River and Virginia Beach areas, and the Kecoughtan Tribe occupied the south end of the James-York Peninsula. Both tribes disappeared early from the historic record (Feest, 1978). Skicóak, the main village of the Chesapeake, was located near the town of Norfolk. Historical accounts suggest that the Chesapeake, who were described as a small group of 335 people, may have been decimated by the early 17th century—the last mention of the Chesapeake occurred in 1627 (Feest, 1978; Mook, 1944). Kecoughtan, the main village of the Kecoughtan Tribe, was situated 6 mi. east of what is now downtown Newport News. By the time the first English settlers had arrived in 1607, Powhatan had taken over the village and repopulated it with a small community of loyal subjects. The Kecoughtan Tribe is no longer mentioned in the historic literature after 1610, likely due to Powhatan's supplanting of the village (Feest, 1978).

No current federally or non-federally recognized tribes claim Chesapeake or Kecoughtan ancestry, though the federally recognized Pamunkey Indian Tribe of Virginia is descended from those Native Americans who once formed the Powhatan Confederacy. The federally recognized Nansemond Indian Nation continue to inhabit the Nansemond River drainage directly west of the Elizabeth River (Feest, 1978).

The point at Newport News was initially named Point Hope by Captain John Smith when the Jamestown colonists first sailed up the James River in 1607. The earliest reference to the area as Newport News is located in a letter written from Jamestown in November 1619, when those living in Kecoughtan had the opportunity to "choose their divident along the banke of the great river betweene Kequohtan and Newportes Newes" (Hatch, 2009). Two years later, Englishman Daniel Gookin was given a land grant of roughly 1,300 acres west of Newport News to develop a plantation. By 1633, Newport News had become an established watering point for ingoing and outgoing vessels to Jamestown; however, the area remained predominantly rural through the 19th century (Hatch, 2009; Reid & McCartney, 1990).

In 1880, Newport News was selected as the Atlantic terminus of the growing U.S. railroad system by Collis P. Huntington (Hiden, 1947). Huntington selected Newport News because of its protected deep water port—he envisioned a terminal for coal export in exchange for foreign commodities (Hiden, 1947; Odom, 1967). The Chesapeake Dry Dock and Construction Company was established in 1886 by Huntington's company for the purpose of repairing and maintaining ships involved in the coal trade, and the first shipyard officially opened in 1889, with the first dry dock, Dry Dock #1, constructed at this time. The city of Newport News was incorporated in 1896; by 1900, it boasted one passenger pier, two pleasure piers, four covered piers, eight open freight piers, and three coaling piers (Reid & McCartney, 1990).

In 1890, manufacture of ships was added to the mission of Chesapeake Dry Dock, and the shipyard was renamed Newport News Shipyard and Dry Dock Company. The first Navy ship built in the shipyard was the gunboat USS *Nashville* (PG-7) in 1897, and the shipyard has built over 800 ships since, for both Navy and non-military customers (Newswanger, 2011).

Newport News Shipyard continued to expand. In the early 1900s, a housing development was constructed northeast of the shipyard (The North End Historic District) to accommodate workers (Reid & McCartney, 1990). In addition, new structures were built during this period, including Dry Dock #2; a boiler; and pattern, machine, pipefitting, and paint shops. During World War I, the federal government used Newport News as an embarkation station for troops and supplies. The shipyard also ramped up work to supply the Navy with ships, and Dry Dock #3 was built during this time. Several additional residential developments were built nearby to house the influx of workers, including the Hilton Village, a residential development north of the city, and the Riverside Apartments on Washington Avenue (Reid & McCartney, 1990). After World War I, the shipyard diversified into the manufacture of locomotives, heavy machinery, water turbines, and other equipment. During World War II, Newport News served again as an embarkation station, and the shipyard employed over 31,000 workers, built 49 ships for the Navy, and retrofit 1,500 naval vessels (Reid & McCartney, 1990). When Tenneco, Inc. purchased Newport News Shipyard in 1968, a new North Yard was constructed on 150 acres of landfill. The yard features a 900-ton gantry crane, a 1,600-foot dry dock, and an 11-acre production facility (Maritime Reporter, 1986). Today, the shipyard is known as Newport News Shipbuilding and occupies 500 acres along the James River (Maritime Reporter, 1986).

3.7.2.3.2 Cultural Resources Within the Study Area

A review of the online Virginia Cultural Resources Information System managed by the Virginia State Department of Historic Resources was conducted for the study area within Virginia, with additional data provided by Naval Facilities Engineering Command, Mid-Atlantic cultural resources staff.

The review indicates that two cultural resources are known to exist within the study area: Newport News Shipbuilding and Dry Dock Company, and the Shipyard Office Building. These two properties were recorded in a 1990 architectural survey of historic downtown Newport News. At the time, Newport News Shipbuilding did not give access to the team nor provide information on any specific properties within the historic site (Reid & McCartney, 1990). Recognizing that the shipyard contains some of the oldest buildings and structures in the city, a draft NRHP nomination for a grouping of the oldest buildings between 39th and 42nd Streets was prepared, but the process was never completed (Reid & McCartney, 1990). This grouping contains Dry Dock #1 (constructed in 1889), the Engineering and Administration Building, machine and joiner shops, pattern shop, foundry, and other buildings. Dry Dock #2, built in the late 1890s, is also one of the oldest historic structures in the shipyard. The shipyard site is currently unevaluated for listing on the NRHP.

Newport News Shipbuilding acquired property between 33rd and 36th Streets west of Washington Avenue sometime after World War I. At the time, these streets contained residential and commercial buildings, several of which are listed in the Virginia Cultural Resources Information System; however, within this portion of the study area, only the Shipyard Office Building at 3301 West Avenue (121-0233) still stands.

No archaeological sites or sunken cultural resources are known to exist within the study area, and it is unlikely that intact archaeological sites would be found, as historic maps and records show that the 1969 addition of the northern yard was built almost entirely on fill, and much of the waterfront area on the south end was also built on fill (Coch, 1971). No TCPs are known to exist within the study area, nor have any historic districts been formally documented within the study area.

3.7.2.4 Texas

The study area considered for cultural resources review within Texas includes the Brownsville Ship Channel and dismantling facilities located within the Port of Brownsville, which is in a manmade inlet southwest of South Padre Island. The study area covers an area of approximately 661 acres, within which multiple facilities capable of ship dismantlement work are situated (Figure 3.7-3).

Figure 3.7-3: Texas Cultural Resources Study Area

3.7.2.4.1 Cultural Setting

Southern Texas is one of the least archaeologically known areas in the state (Black, 1989; Campbell, 1983; Hester, 1989). This is likely due to the limited archaeological research conducted in the Brownsville area; jurisdictional issues associated with the international border; and the early displacement, assimilation, and death by contagious diseases of indigenous peoples who had a history and cultural knowledge of the area (Hester, 1989). The oldest evidence of human habitation in the Rio Grande delta dates back to approximately 3,000 years ago, when the delta stabilized (Hester, 1989). The earliest sites are shell middens located on lomas adjacent to inland waterways and suggest an adaptation to the coastal estuary environment (Black, 1989).

The distinct "Brownsville Complex" appeared approximately 800 years ago and consisted of a sophisticated shell-working industry. The Complex is linked to numerous cemeteries in the region; these cemeteries are typically located in clay dunes or along the Rio Grande, usually located within higher areas due to the threat of flooding (Perttula et al., 2010). Open sites are often located near resacas (i.e., meandering channels of the Rio Grande delta), in aeolian depressions, and along the Rio Grande Channel—the variety of site types and distribution across the landscape suggest a high mobility. The subsistence patterns typically focused on marine species of shellfish and fish (Black, 1989).

The Brownsville Complex continued into the historic era and may be represented by the Coahuiltecans, who occupied the Gulf Coast from the Edwards Plateau in southern Texas south into Mexico. Coahuiltecan is at first a language group, centered around Coahuila in Northern Mexico; however, the term has also been applied to people who lived in the lower Rio Grande area. What is known about these people comes from historic records—early accounts suggest that at least 34 groups inhabited the Rio Grande delta and the surrounding area. Some of the groups ranged south of the Rio Grande Channel and are known to have spoken Cotoname, a Coahuiltecan dialect (Campbell, 1983; Salinas, 1990). Recent research, however, suggests that not all Coahuiltecans were Coahuiltecan-speakers; the richness and diversity of resources in the Rio Grande delta likely drew people from other regions as well (Salinas, 1990).

Most of the groups living in the delta shared a similar adaptation. They were highly mobile hunter gatherers who lived in autonomous groups (Hester, 1989). These groups as ethnically distinct entities slowly disappear from the historic record and are no longer mentioned after 1900. Their disappearance is likely attributed to warfare, epidemics, and gradual assimilation into Spanish society (Salinas, 1990). Recently, however, descendants of the Carrizo and Comecrudo, two groups that once inhabited the Rio Grande delta, have joined together to form the non-federally recognized Carrizo/Comecrudo Tribe of Texas (Carrizo/Comecrudo Tribe, n.d.).

The Lipan Apache, who were related to the Kiowa and Mescalero Apache, arrived in Texas from eastern New Mexico sometime between 1750 and 1850 after being pushed south by the Comanche (Hester, 1989). Continued war with the Comanche and the onslaught of American settlers caused the Lipan to splinter into different bands scattered across southern Texas and northern Mexico at the periphery of the Comanche range. When Texas was annexed by the United States in 1845, the government began establishing reservations for the Apache and Comanche, first on the Brazos River. In 1867, the Treaty of Medicine Lodge Creek established a reservation for most remaining Comanches, Kiowas, and Kiowa Apache in southwestern Oklahoma (Lipscomb, 2019). This group is the federally recognized Comanche Nation. In 1903, some members of the Lipan Apache Big Water band were forced onto the Mescalero Apache Reservation in New Mexico, a federally recognized tribe today. About the same time, the Lipan Apache Sun Otter band established an enclave in San Antonio on the site of an ancestral camp. This group, along with surviving members of the Little Breech Cloth and Tall Grass bands, have merged to form the Lipan Apache Tribe of Texas. This tribe is recognized by the state of Texas and is seeking federal recognition (Lipan Apache Tribe of Texas, n.d.).

Alvarez de Peneda, a Spanish Conquistador and cartographer, was the first European to visit Padre and Brazos Islands, located at the east end of the Brownsville Ship Channel. A few years later, Spanish Captain Francisco Garay named the sandbar that separated the islands Brazos Santiago Pass. In 1770, a small settlement was established at Point Isabel, which is located on the mainland side of the inland waterway. Shortly after this, a port was established on the north end of Brazos Island. Both ports were active early on, though the shallow Pass often caused difficulties for ship passage (Fox, 1989; Hoyt et al., 1991).

In 1845, the Republic of Texas was annexed into the United States precipitating the Mexican-American War. The following year, U.S. General Zachary Taylor established Fort Brown on the north side of the Rio Grande River in anticipation of forthcoming war. After the United States won the Mexican-American War and the border stabilized, Charles Stillman, a wealthy New York merchant, bought nearly 4,700 acres surrounding Fort Brown and established the town of Brownsville, anticipating the growth of a new metropolis to serve American interests (Kearney & Knopp, 1991). Americans began moving to the Brownsville area to grow cotton and citrus, and to establish new businesses (Hoyt et al., 1991; Rhodes, 2019). The economy of the area, and thus the prosperity of the businesses, was highly dependent on the ability to ship goods in and out of the area. Brownsville prospered early on when Port Isabel was an active port and goods were transported by steamboat up the Rio Grande River. However, the Brownsville economy slowly declined when the newly constructed Mexican National Railroad bypassed the area. In 1904, the St. Louis, Brownsville, and Mexican Railroad between Brownsville and the deep-water port of Aransas, 200 mi. north, was constructed, causing the economy to improve again. The high cost of transport from Aransas motivated Brownsville businessmen to seek a way to construct a local deep-water port (Hoyt et al., 1991).

The USACE had developed plans for a deep-water harbor at Brazos Santiago as early as 1854. The Rivers and Harbors Act of 1881 outlined a plan to construct parallel jetties to protect the pass and establish a deep-water harbor at Port Isabel. The southern jetty completed in 1883 was washed out shortly thereafter. This essentially put the project on hold for 20 years, until it was discovered in 1904 that funds remained from the project. The USACE used these funds to dredge a channel from Brazos Santiago Pass across Laguna Madres to Point Isabel. This channel was built to accommodate light steamers crossing the bar at Brazos Santiago; unfortunately, the new harbor was rendered useless when the steamer Luzon sank (Hoyt et al., 1991).

In the second decade of the 20th century, the efforts of the Brownsville Waterways Association pushed Congress to approve a project to dredge a channel through the pass. Dredging began inside and outside the harbor, and two jetties were constructed in 1927 (Hoyt et al., 1991). The Rivers and Harbors Act of 1930 authorized construction of the current 19 mi. long Brownsville Ship Channel, which extends from Brazos Santiago Pass on the east to within 5 mi. of Brownsville on the west. This new channel cut through a mix of terrestrial and lake habitats, and was dredged to a depth of 25 ft. and a width of 100 ft. at the bottom and 250 ft. at the surface. Much of the dredged material was deposited along the northern bank of the channel. Shortly after completion of the channel, two docks and two warehouses were constructed at the new Brownsville port (Hoyt et al., 1991).

The Port of Brownsville opened on May 16, 1936, and improvements to the channel have occurred over the years until its depth reached 36 ft. The Water Resources Bill of 1986 authorized further dredging to a depth of 42 ft., and the USACE is currently working to further deepen the channel to 52 ft. (Hoyt et al., 1991; USACE, 2014; Valley Business Report, 2019).

The Brownsville study area experienced no development until five ship salvage companies were established between 1971 and 1976. Over the years, these salvage yards have changed hands and undergone various improvements including the installation of slips, filling and levelling, construction of bulkheads, moorings, and installation of underground utilities. Today, three salvage companies are present within the study area, flanking the north and south sides of the Brownsville Channel: SteelCoast Company, LLC, and All Star Metals, LLC on the north side of the channel, and EMR International Shipbreaking Limited, LLC on the southwest side of the channel.

3.7.2.4.2 Cultural Resources Within the Study Area

A review of the Texas Historical Commission Online Atlas of Cultural Resources was conducted for this review, which indicated that no cultural resources have been documented in the study area. Most archaeological sites in the delta are located on lomas, or the natural levees that flank resacas. An s-shaped resaca crosses through the center of the study area, flanked by the Loma de la Madriguera; as such, there is the potential for buried archaeological sites to occur underneath fill and spoil materials. No TCPs, sunken cultural resources, or shipwrecks are known to exist within the study area.

3.7.2.5 Alabama

The study area considered for cultural resources review within Alabama is located where the Mobile River empties into Mobile Bay and the Gulf of Mexico and consists of a 437-acre area that encompasses public, deep-water terminals and commercial facilities capable of ship dismantlement work (Figure 3.7-4).

3.7.2.5.1 Cultural Setting

The earliest human occupation of Alabama occurred approximately 15,000 years ago; however, the earliest evidence of humans in the Mobile Bay area occurs around 7,000 to 8,000 years ago (Brose et al., 1983; Halligan et al., 2016; Mistovich & Knight, 1983; Wilson, 1983). Earlier sites may be buried or destroyed as a result of sea level rise (Wilson, 1983). Around 10,500 years ago with warming climates, the ice age megafauna disappeared, and people adopted a more generalized hunter-forager subsistence strategy (Hoksbergen, 2011). During the Archaic period (approximately 10,500 to about 3,000 years ago) people retained a nomadic lifestyle, but technology and procurement strategies became more sophisticated, and long-distance exchange networks were established. When sea levels began to stabilize near the end of the Archaic period, indigenous Americans established base camps in the upper and lower parts of Mobile Bay to harvest oysters (Meredith, 2015). The following Woodland Period (3,000 to 1,000 years ago) is characterized by increasing population growth and complexity. Horticulture was widely adopted, as was the manufacture of pottery and the use of bow and arrow technology. Complex death and burial ceremonies were also adopted (Hoksbergen, 2011). The Hopewell Ceremonial Complex, characterized by large geometric earthworks and conical mounds, developed in the Ohio River Valley during the end of the Middle Woodland Period, and is represented in the northern Alabama region as the Copena Mortuary Complex (Dumas, 2015).

Figure 3.7-4: Alabama Cultural Resources Study Area

Prehistoric culture throughout the southeast underwent a radical shift around 1,000 years ago as the Mississippian culture, originating in the Mississippi River Valley, spread eastward. An identifying feature of the Mississippian culture is the appearance of large, rectangular flat-topped platform mounds. These mounds served as the platforms for temples and other important buildings and were often arranged around an open plaza (Willey, 1966). A regional variant of the Mississippian culture was the Pensacola Culture, which arose in the Gulf Plain area and stretched from Pensacola, Florida to Biloxi, Mississippi, including the Mobile River valley (Brown, 2017).

Native Americans living in Alabama during the early historic period were the Choctaw, who occupied the territory west of Mobile near the Alabama-Mississippi border; the Chickasaw, who lived north of them; and the Creek, who occupied northern and eastern Alabama. All were descended from the Mississippian people. With the Treaty of Cusseta, the Creeks gave up their territory in Alabama and were forcibly removed to Indian Territory in Oklahoma in 1836. A small group evaded capture, remaining in Alabama. The descendants of this group joined together and established the Poarch Band of Creek Indians, headquartered in Atmore, the only federally recognized tribe in Alabama (Hahn, 2015). The Choctaw ceded all their lands in the Treaty of Dancing Rabbit Creek and were removed to Oklahoma in 1831. A few thousand remained in Mississippi and Alabama, and their descendants formed the Mississippi and MOWA Bands of the Choctaw Indians. The MOWA are recognized by the state of Alabama and are seeking federal recognition (O'Brien, 2017). After signing a treaty with the federal government, the Chickasaw were removed to Oklahoma Territory in 1838, after purchasing the western half of the Choctaw reservation (O’Brien, 2019).

The Mabila Tribe occupied the Mobile delta and bay area at the time of European contact and were close allies of the French. The Mabila were likely affiliated with the Pensacola Temple Mound Culture (Brown, 2017). In the early 1700s, other displaced tribes from Florida and Mississippi moved to the Mobile delta seeking protection from the French. When Mobile came under British control in 1763, many of the local Indians left the area, either moving west into Spanish territory or joining the Choctaw (Brown, 2001).

The Spanish began exploring the Gulf of Mexico in the early 16th century, and likely sailed into Mobile Bay; however, Hernando de Soto is the first explorer to offer a definitive account of the area (Galloway, 1995). In 1701, the French built Fort Louis de la Louisiane and established a small colony at Twenty-seven Mile Bluff, 27 mi. upriver from Mobile Bay (Thomason, 2001). Toward the end of the first decade, however, it became clear that this inland delta location was not ideal, and a decision was made in 1711 to build a new fort downriver at the head of Mobile Bay, where Mobile exists today, and move the fledgling French settlement to that location (Waselkov, 2000).

This was an improvement, as it made communicating with other colonies much easier and was closer to the growing port on Dauphin Island. Over the next decade, however, Port Dauphin suffered multiple misfortunes, and in 1719, the settlement was abandoned. In 1723, the French began construction of a new 11-acre stone fort in the shape of a four-pointed star. Named Fort Condé in honor of Louis Henri de Bourbon, Duke of Bourbon, Prince of Condé, this fort was able to house more than 200 men (Kirkland, 2017). The new town of Mobile and Fort Conde served as the capital of French Louisiana until 1763 (Mistovich & Knight, 1983; Waselkov, 1990).

At the conclusion of the Seven Year’s War in 1763, the English took control of Fort Conde and renamed it Fort Charlotte, after the new wife of George III. In 1780, Mobile changed hands again when Spain defeated the English and claimed the territory east of the Mississippi River (Kirkland, 2016). Following the war of 1812, Mobile came under the jurisdiction of the United States, first as part of the Mississippi Territory, and then as part of the newly created state of Alabama in 1819. During this time, it rapidly became an international port, when hundreds of settlers purchased tracts of land. During the Antebellum period, Mobile became the major exporting center for Alabama to markets in the northeast and Europe (Kirkland, 2016). As businesses began to flourish in the 1820s, Mobile began to expand south; Fort Charlotte was demolished in 1823 to make way for newly platted streets. The bricks and other debris from the Fort were deposited in the marshy waterfront along Water Street (Seacat & Maygarden, 2011).

At 10 ft. deep, Mobile Bay had always been too shallow for deep draft ships to enter. As early as the 1850s, the USACE developed plans to create a ship channel to allow larger ships to enter the port. From 1870 on, the USACE created, deepened, and widened the channel to its current depth of 45 ft. In the late 1800s, the cotton trade gradually declined, while shipbuilding and importing fruit from Latin America became the main drivers of the local economy (Kirkland, 2020; Mistovich & Knight, 1983). By 1904, three railroad tracks extended through the city, with spurs to many of the waterfront industries (Sanborn Map Company, 1904).

The Alabama Dry Dock Company and Shipbuilding (ADDSCO) was established in 1916 and became one of the largest employers in the city at the time (Kirkland, 2020). Residential expansion occurred south of downtown during the 1920s, to house waterfront industrial workers (Seacat & Maygarden, 2011). ADDSCO was located on the north end of Pinto Island and ultimately expanded to include the entire west side of Pinto Island. A ferry transported ADDSCO workers from downtown Mobile to Pinto Island. During World War II, ADDSCO increased its workforce tenfold and the city’s overall waterfront workforce exceeded 89,000. During this time, the company added new dry docks, constructed 20 Liberty Ships and 102 oil tankers, and retrofit 2,800 vessels for combat. After the war ended, the company laid off all but 2,000 workers, though it continued to repair ships until it received a Navy contract in 1967 to produce rescue ships (Kirkland, 2015). Downtown residential neighborhoods declined in population after World War II, as people moved to other sections of the city.

Today, two major shipyards in the study area are Alabama Shipyard LLC, located on the north half of Pinto Island, and Modern American Recycling Services (MARS), located on the west side of the Mobile River channel. ADDSCO shipyard facilities that once occupied the shore at the south end of Pinto Island are gone, and the shoreline area appears unused, except for the Pinto Island Port facility at the far south, outside of the study area. The MARS facility occupies approximately three-quarters of the western waterfront portion of the study area, with Gulf Coast Vending Services and a vacant waterfront lot at the north end of the study area. MARS currently consists of several long buildings paralleling Water Street and a large open yard with a floating dry dock at the south end. The 1924 Sanborn map does not show these buildings, and the configuration of the shoreline is substantially different; this area has undergone major modification since the 1920s. Aerial imagery also reveals that most of the western Mobile shoreline is armored, but occasional pier timbers are seen at the edge of the channel. Directly south of the MARS facility is a large Mobile Port facility, with derricks on the Mobile and Pinto Island sides of the channel. Current aerial imagery of Alabama Shipyards, LLC property compared to the 1924 Sanborn maps shows some of the historic ADDSCO buildings remaining (Main Office, Warehouses No. 2 and 3, Service Building, Machine Shop, Carpenter Shop, and a building adjacent to the latter), five of the seven piers, and one of three floating dry docks (Sanborn Map Company, 1924).

3.7.2.5.2 Cultural Resources Within the Study Area

A review of the records on file at the Office of Archaeological Research at the University of Alabama indicate that one archaeological site (MB-552) has been documented in the study area. This site is located in the northwest corner of the study area and consists of buried structural remains, brick walls, foundations, floors, pits, postholes, and wooden remains dating from the 18th through the 20th centuries. The NRHP eligibility of the site has not been determined. No sunken cultural resources or TCPs are known to exist within the study area.

The historic ADDSCO shipyard on Pinto Island containing dry docks and other facilities dating back to World War I and buildings dating from World War II, comprise a historic district with 13 contributing properties (BAE Maritime Historic District). The district is NRHP eligible under Criteria A and C for its association with the shipbuilding industry in Mobile and the architectural styles of the buildings (DOT, 2014).

The Mobile Bay estuary and rivers also form a complex historical environment with a high potential for submerged cultural resources. Historic research has documented the presence of at least 137 historic shipwrecks near Mobile (Tidewater Atlantic Research, 2006). However, much of the study area currently contains fill soil, save for a strip of low-lying mucky peat (Lafitte Muck), which extends through the north central part of Pinto Island to the east (Soil Survey Staff, n.d.). Historic maps show that Pinto island and the Mobile shorelines are substantially altered from when they were first mapped over 100 years ago.

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Ex-Enterprise is currently located at Newport News Shipbuilding, a commercial facility in Newport News, Virginia. As described in Section 2.3.1 (No Action Alternative), under the No Action Alternative, ex-Enterprise would remain in waterborne storage at this location for an indefinite period of time.

Two cultural resources are located within the study area for this location: the Shipyard Office Building (121-0233) and Newport News Shipbuilding & Dry Dock Company Shipyard, which is comprised of a number of historic buildings and structures (121-0051). Because ex-Enterprise would not be moved from its current location, no impacts on these cultural resources would occur under the No Action Alternative as the type of actions required to prepare and keep a ship in long-term storage in water would not impact any documented architectural resources. Additionally, the study area in Virginia does not contain any archeological sites or TCPs that would be impacted by the No Action Alternative.

3.7.3.2 Alternative 1: Single Reactor Compartment Packages

As described in Section 2.3.2 (Alternative 1 – Single Reactor Compartment Packages), eight single reactor compartment packages would be constructed at PSNS & IMF in Bremerton for disposal at the DOE Hanford Site located within the study area. The reactor compartment packages would be transferred to Trench 94 via an approximately 25 mi. transport route from Port of Benton barge slip through the PNNL site and the DOE Hanford Site to Trench 94.

Under Alternative 1, a concrete rail support system would be used to place the reactor compartment packages in Trench 94 at the DOE Hanford Site. Additional rail structures would be added within Trench 94 to support the single reactor compartment packages, requiring limited excavation of the trench floor. The study area at Trench 94 does not contain any known archaeological resources that would be impacted as a result of the excavation activities and, due to the current depth of the trench floor, no impacts on unknown subsurface archaeological deposits from the installation of the rail structures is anticipated.

The Port of Benton barge slip is within the boundary of the Hanford South Archaeological District (45DT-39) but none of the 50 prehistoric archaeological sites that comprise the district are located in the study area. Two districts (Gable Mountain Archaeological District [45DT-102] and Hanford Construction Camp Historic District [45BN0308]) overlap with the approximately 25 mi. transport route, and the DOE Hanford Site Plant Railroad (45BN1107), Hanford Irrigation Ditch (45BN309), and Richland Irrigation Ditch Lateral 4 (45BN1125) intersect the transport route at several locations. In addition, 19 archeological sites or isolates are located within 50 m of the transport route. Several identified TCPs are also likely to be within the study area, and the transport route passes through the PDA, an area set aside by DOE for tribal use. Under Alternative 1, no modifications or improvements would be required to the barge slip or the transport route. Because the transport route would be utilized in its current condition, in accordance with the original design of the roadways and consistent with how the road is currently utilized, no impacts on cultural resources are expected to occur for the land transport of reactor compartment packages from Port of Benton barge slip to Trench 94 at the DOE Hanford Site under Alternative 1.

3.7.3.3 Alternative 2: Dual Reactor Compartment Packages

Under Alternative 2, the transfer of reactor compartment packages to Trench 94 would occur along the same approximately 25 mi. transport route from Port of Benton barge slip through the PNNL site and the DOE Hanford Site. However, as described in Section 2.3.3 (Alternative 2 – Dual Reactor Compartment Packages), infrastructure modifications to the Port of Benton barge slip and improvements to the transport route would be required because of the heavier weight and larger size of the four dual reactor compartment packages that would be transported to Trench 94 at the DOE Hanford Site.

As described in Section 2.3.3.6 (Port of Benton Barge Slip Modifications), infrastructure modifications to the Port of Benton barge slip involve widening and lengthening the barge slip (in-water work) and inland-only pile driving and concrete work. As discussed in Section 3.7.3.2 (Alternative 1: Single Reactor Compartment Packages) above, the barge slip is within the boundary of the Hanford South Archaeological District (45DT-39), but none of the 50 prehistoric archaeological sites that comprise the district are located within the barge slip area, and no archaeological resources have been identified within the land portion of the barge slip modification area. Additionally, as described in Section 3.7.2.2.2 (Cultural Resources within the Study Area), subsurface testing efforts conducted at the barge slip have shown there are no subsurface cultural resources present. The slip itself was constructed in the 1970s and does not meet the minimum age threshold to qualify as a historic property (USACE, 2016); in order to be eligible for listing in the NRHP, a property must be at least 50 years of age, unless it is of "exceptional importance" (Sherfy & Luce, 1998).

As described in Section 2.3.3.7 (Road Modifications between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site), proposed improvements to the transport route include several areas of cutting and filling to adjust side-slope transitions and reduce vertical curves at 11 locations to support dual reactor compartment packages that could weigh up to 3,304 tons and be carried by larger transporters. Road improvements within the 11 locations would also include activities such as paving medians and filling road shoulders to improve intersections. Under Alternative 2, the same cultural resources are within the transport route portion of the study area as Alternative 1. As discussed in Section 3.7.3.2 (Alternative 1: Single Reactor Compartment Packages) above, no impacts on cultural resources are expected to occur for the land transport of reactor compartment packages from the barge slip to Trench 94 at the DOE Hanford Site outside of the improvement areas.

The Richland Irrigation Ditch (45BN1125) crosses the transport route at Location 2. At this location, road improvements would involve the placement of fill for the gradual vertical curve transition at the intersection with George Washington Way. While the fill is proposed to be placed only within the disturbed area of the roadways, potential impacts on the cultural resource could occur from temporary construction and staging activities.

At Location 7, the DOE Hanford Site Plant Railroad (45BN1107) crosses the transport route approximately 330 ft. (100 m) south of the proposed road improvements. At this location, the filling in of a dip in the road and paving of the median is proposed, both of which would occur within the existing roadway. As such, no impacts on the railroad are expected from the fill and paving activities, but impacts from temporary construction and staging activities could occur.

Location 8 is within the boundaries of the Hanford Construction Camp (45BN0308); a NRHP-eligible Historic District. At Location 8, the adjustment of the side-slope transition is proposed by filling the southbound lanes of the transport route. The Hanford Irrigation Ditch (45BN309), a contributing component of the Historic District and a NRHP-eligible resource, intersects the road at Location 8, and unevaluated archaeological site 45BN1142, also associated with Historic District, is located within the study area near the improvement area. While the proposed fill and paving activities to adjust the side-slope transition at Location 8 are proposed to occur within the existing roadway, away from the known cultural resource locations, temporary construction and staging activities may potentially impact the resources.

At Location 9, an adjustment to the side-slope transition on both sides of the railroad crossing (Hanford Site Plant Railroad; 45BN1107) is proposed by either filling eastbound lanes or cutting westbound lanes, or by filling westbound lanes or cutting and paving eastbound lanes. The DOE Hanford Site Plant Railroad has been determined eligible for listing on the NRHP. While all cut and fill activities to improve the side-slope transition are proposed to occur within the road shoulder away from the railroad crossing, potential impacts on the railroad from transport route improvement activities may occur from temporary construction and staging activities.

In addition to the potential impacts on known cultural resources within the study area at Locations 2, 7, 8, and 9, impacts on unknown intact subsurface archaeological deposits may occur where proposed transport route improvements may involve cut or excavation activities at Locations 3, 4, 6, 9, and 11, or by the placement of fill material at Locations 1, 2, 4, 5, 8, 10, and 11. Potential impacts may also occur to the PDA and to TCPs that may be within the study area at the transport route improvement locations.

3.7.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

Under Alternative 3 (Preferred Alternative), the complete dismantling of ex-Enterprise would consist of removing mechanical, hydraulic, and/or electronic components that have potential market value for resale or reuse and then physically cutting the remainder of the hull to allow the recycling of metals and other material by sale to salvage yards or smelters. As described in Section 2.3.4 (Alternative 3 [Preferred Alternative] – Commercial Dismantlement), dismantlement would include cutting apart the eight reactor plants into segments for packaging into several hundred small containers that would fit into typical shipping containers, and these would subsequently be disposed of at a DOE and/or authorized commercial low-level radioactive waste facility.

The complete dismantlement of ex-Enterprise would occur at a commercial ship dismantling facility located in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama. Two cultural resources are located within the Hampton Roads Metropolitan Area study area, the Shipyard Office Building (121-0233) and Newport News Shipbuilding & Dry Dock Company Shipyard (121-0051). No known archaeological sites or TCPs are within the study area; historic records provide strong evidence that the shipyard was built on fill material. Within the Brownsville study area, no known archaeological sites, historic buildings, or TCPs are known to exist, and dredging of the Brownsville ship channel has likely removed any shipwrecks or cultural resources within the channel itself. One archaeological site (MB-552) is located in the corner of the Mobile study area, and the BAE Maritime Historic District occupies the area of the former ADDSCO Shipyard on Pinto Island. No TCPs are known to exist within the Mobile study area.

While the specific facility for commercial dismantlement has not been identified, dismantling would occur within the controlled industrial boundary of a commercial ship dismantling facility as part of an ongoing program, consistent with normal shipyard work. The Navy would place a contract to dismantle ex-Enterprise at a commercial facility, and the Navy envisions implementing the Nuclear Regulatory Commission (NRC) decommissioning process for radioactive material licensees described in the NRC Consolidated Decommissioning Guidance (NUREG-1757), with direct support from the NRC. Within the Hampton Roads Metropolitan Area study area, numerous government and commercial vessels have been constructed and/or deactivated at the five pier areas and in the four dry docks at Newport News Shipbuilding, and multiple dismantling facilities exist within the Brownsville and Mobile study areas capable of ship dismantlement work. The current commercial dismantlement facilities are capable of ship dismantlement work, and no commercial facility would need permanent infrastructure to accommodate the ex-Enterprise dismantlement. As such, the complete dismantlement of ex-Enterprise would not impact any of the known cultural resources within the study areas and involves no activities of the type that historic properties could be affected within Newport News Shipbuilding and Dry Dock Company Shipyard or the BAE Maritime Historic District within the Hampton Roads Metropolitan Area and Mobile study areas, respectively. While there is potential for buried archaeological sites to occur underneath any fill and spoil materials within the Mobile study area, and for buried archaeological sites or sunken cultural resources to be present in sediments along the Mobile River or within the river itself, no infrastructure improvements to the selected facility are anticipated for the Proposed Action and alternatives, and the discovery of buried cultural resources is unlikely. As such, no impacts on subsurface or underwater archaeological sites are expected to occur under Alternative 3 (Preferred Alternative).

3.7.4 Mitigation

While ex-Enterprise is eligible for listing in the NRHP, the Navy has met its responsibilities for compliance with Section 106 of the NHPA concerning the final disposition of eligible vessels by following the Advisory Council on Historic Preservation procedures within the Program Comment for the Department of the Navy for the Disposition of Historic Vessels (75 Federal Register 12245) and no further mitigation is required.

All ex-Enterprise disposal activities related to the Proposed Action and alternatives would comply with applicable federal, state, and local environmental and health laws and regulations, and existing cultural resources management plans. As no impacts on cultural resources are reasonably foreseeable under the No Action Alternative, Alternative 1, or Alternative 3 (Preferred Alternative), no mitigation measures are required. Under Alternative 2, potential impacts on known cultural resources related to transport route improvements between Port of Benton barge slip and Trench 94 at the DOE Hanford Site would be mitigated by the avoidance of known cultural resource locations during design of the transport route improvements at Locations 2, 7, 8, and 9 and by the presence of a qualified archaeological monitor meeting Secretary of the Interior Professional Qualifications Standards, as promulgated in 36 CFR Part 61, during all transport route improvement activities at these locations. Impacts on unknown or buried intact archaeological sites within the proposed transport route improvement locations would be avoided by the presence of a qualified archaeological monitor for all activities at the proposed transport route improvements.

Additional mitigation measures identified at the time of the Final EIS/OEIS and/or Record of Decision would be described, as appropriate, in those documents.

3.7.5 Summary of Impacts and Conclusions

Table 3.7-1 summarizes the potential impacts of the alternatives on cultural resources.

Table 3.7-1: Summary of Impacts and Conclusions on Cultural Resources

Potential Impacts on Cultural Resources	Alternatives			
	No Action	1	2	3
Impacts on surface archaeological resources			◑	
Impacts on subsurface archaeological resources			◑	
Impacts on submerged or sunken archaeological resources				
Impacts on architectural resources				
Impacts on TCPs			◑	

Notes: ◑ = Potential impact but reduced as a result of project design changes, implementation of current or proposed best management practices, monitoring, or mitigation; Blank = no impact/not applicable; TCP = Traditional Cultural Property

3.8 Noise

This section of the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) describes potential impacts related to noise as a result of the Proposed Action and alternatives. Types or sources of noise and the effects of noise on people and associated sensitive receptors in the human environment are discussed in this section. Noise in relation to biological resources, as well as how sound propagates in water, is discussed in Section 3.5 (Biological Resources).

Sound consists of minute vibrations that travel through a medium, such as air or water, and can be sensed by the human ear. Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although continuous and extended exposure to high noise levels can cause hearing loss, the principal human response to noise is annoyance. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day. A noise sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries.

3.8.1 Methodology

3.8.1.1 Region of Influence

The project Region of Influence (ROI) includes all areas where noise is generated by activities under all alternatives. However, identifying the ROI for each particular alternative requires knowledge of the type of noise-generating activity, noise levels of equipment, length of time the noise would be generated, and proximity to sensitive receptors. The ROI for the No Action Alternative includes Newport News, Virginia. The ROI for Alternatives 1 and 2 (the reactor compartment packaging alternatives) includes the following:

- the tow route from the current location of ex-Enterprise in Newport News, Virginia, to commercial dismantlement facilities in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama;
- the heavy-lift ship transit route from the commercial dismantlement facility to Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) and surrounding areas;
- the barge transit route from PSNS & IMF to the Port of Benton barge slip;
- the multiple-wheel, high-capacity transporter transit route from the barge slip to Trench 94 at the Department of Energy (DOE) Hanford Site; and
- Richland, Washington, and surrounding areas.

The ROI for Alternative 3 (Preferred Alternative) includes the following:

- the tow transit route from the current location of ex-Enterprise in Newport News, Virginia, to a commercial dismantlement facility at Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama;
- the commercial dismantlement facilities and surrounding areas;
- travel corridors to the potential waste facilities; and
- the potential waste facilities themselves.

3.8.1.2 Regulatory Framework

3.8.1.2.1 Noise Control Act

The Noise Control Act of 1972, as amended, directs all federal agencies to carry out programs within their jurisdiction in a manner that promotes an environment free from noise that jeopardizes health and welfare, to the fullest extent within agency authority.

3.8.1.2.2 Federal Interagency Committee on Urban Noise

The federal government suggests land-use compatibility criteria for different noise zones; however, land-use compatibility is regulated at the local level. Based on the guidelines in the Federal Interagency Committee on Urban Noise (1980), residential areas and schools are considered compatible where the Day-Night average sound level (DNL) is less than or equal to 65 A-weighted decibels (dBA). Outdoor recreational activities are compatible with noise levels less than or equal to 70 dBA. Parks are compatible with noise levels less than or equal to 75 dBA (Federal Interagency Committee on Urban Noise, 1980).

3.8.1.2.3 United States Environmental Protection Agency Noise Standards

The United States (U.S.) Environmental Protection Agency (EPA) determined a 24-hour exposure level of 70 decibels (dB) as the level of environmental noise at which no measurable hearing loss would be expected to occur over a lifetime (EPA, 1974). This exposure level is also the threshold for hearing loss avoidance.

3.8.1.2.4 Federal Highway Administration Noise Standards

Noise standards, regulations, and policies related to highway traffic noise have been adopted by the Federal Highway Administration. The administration’s Roadway Construction Noise Model User’s Guide provides a useful methodology to evaluate construction (including demolition) noise impacts and is used in this analysis (Federal Highway Administration, 2006).

3.8.1.2.5 U.S. Occupational Safety and Health Administration

29 Code of Federal Regulations contains the principal set of rules and regulations from the U.S. Occupational Safety and Health Administration issued by federal agencies regarding occupational noise exposure. Specifically, regulations and standards governing general industry are provided in 29 Code of Federal Regulations Part 1910.95.

3.8.1.2.6 Navy Safety and Occupational Health Program

The Navy Occupational Safety and Health Program addresses the maintenance of safe and healthful conditions in the workplace or the occupational environment. It applies to all Navy civilian and military personnel and operations ashore or afloat. Chief of Naval Operations Manual 5100.23D, the Navy Occupational Safety and Health Program Manual, is the basic Navy Safety and Occupational Health Program document used to carry out the program. It refers to both afloat and shore commands.

3.8.1.3 Best Management Practices

Naval Facilities Planning in the Noise Environment (Publication P-970) provides allowable noise levels and guidance for selecting a site for new facilities within the noise environment of military installations. The document also discusses noise reduction techniques to render marginally acceptable locations suitable for use (Naval Facilities Engineering Command, 1978).

3.8.1.4 Approach to Analysis

This EIS/OEIS evaluates the potential impacts resulting from noise produced from the proposed dismantlement and disposal of ex-Enterprise under three alternatives for the Proposed Action, as well as potential impacts under a No Action Alternative. Additional information on the effects of noise on biological resources is provided in Section 3.5 (Biological Resources) of this EIS/OEIS. Based on discussions in Chapter 2 (Description of Proposed Action and Alternatives) and because transportation of waste and recyclable materials would not markedly increase regional traffic, the movement of waste from the selected commercial dismantlement facility to an approved waste disposal or recycling facility is only briefly described in this section.

3.8.1.4.1 Basics of Sound

The loudest sounds detected comfortably by the human ear have intensities a trillion times higher than sounds that can barely be detected. Therefore, using a linear scale to represent sound intensity is not feasible. The dB is a logarithmic unit used to represent the intensity of a sound, also referred to as the sound level. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. The most common scale for characterizing sound is the dBA, which gives greater weight to the frequencies of sound to which the human ear is most sensitive. It is correlated with annoyance caused by noise sources such as traffic and construction. Figure 3.8-1 provides typical A-weighted noise levels in various indoor and outdoor environments.

Some noise sources (e.g., air conditioner, vacuum cleaner) are measured as continuous sounds that maintain a constant sound level for a period of time. Other sources (e.g., automobile, heavy truck) are measured by the maximum sound produced during an event, such as a vehicle passing by. Other sounds (e.g., urban daytime, urban nighttime) are measured as averages taken over extended periods of time. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

3.8.1.4.2 Noise Metrics

A metric is a system for measuring or quantifying a particular characteristic of a subject. Since noise is a complex physical phenomenon, multiple noise metrics help to more accurately quantify the noise environment. The noise metrics used in this EIS/OEIS are summarized below.

3.8.1.4.3 Day-Night Average Sound Level

The DNL metric is the energy-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10 p.m. and 7 a.m. (acoustic night). DNL values are average quantities, mathematically representing the continuous sound level that would be present if all variations in sound level that occur over a 24-hour period were averaged to have the same total sound energy. DNL is the standard noise metric used by the U.S. Department of Housing and Urban Development, Federal Aviation Administration, EPA, and the Department of Defense. Most people are exposed to sound levels of 50–55 DNL or higher on a daily basis. Research indicates about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB DNL (Federal Interagency Committee on Urban Noise, 1980). Therefore, the 65 dB DNL noise contour is used to determine compatibility of military operations with local land use.

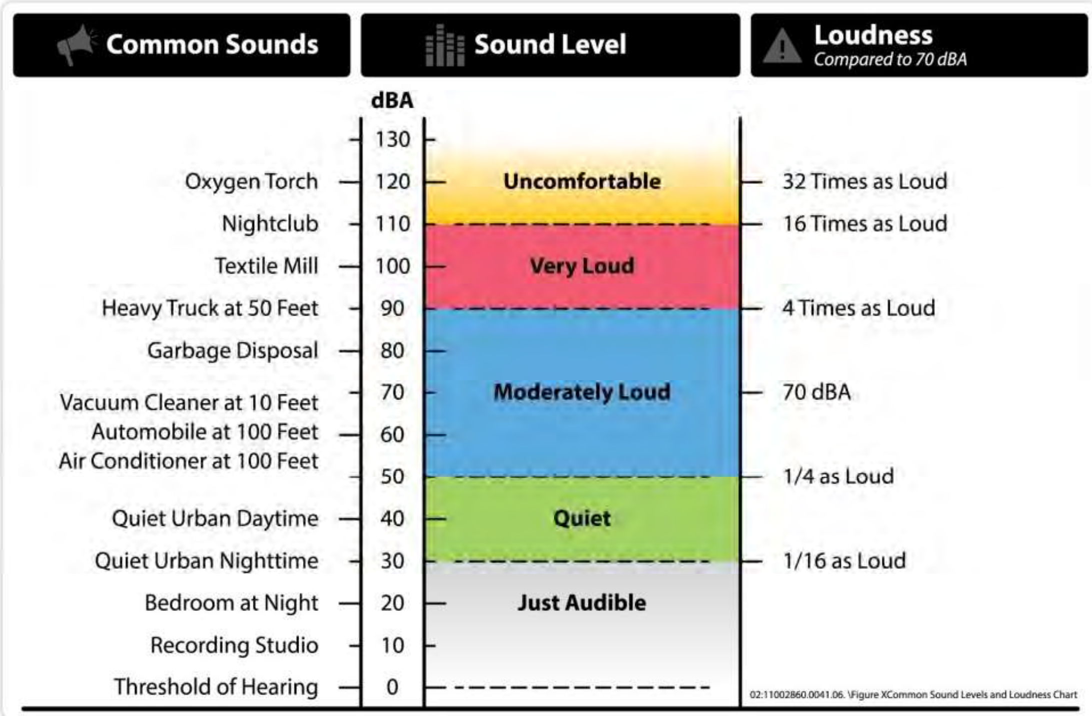

Figure 3.8-1: Typical A-Weighted Environmental Noise Levels

3.8.1.4.4 Equivalent Sound Level

The Equivalent Sound Level, measured in dB, is a cumulative noise metric that represents the average sound level (on a logarithmic basis) over a specified period of time—for example, an hour, a school day, daytime, nighttime, weekend, facility rush periods, or a full 24-hour day (i.e., the equivalent sound level for a full 24-hour day is similar to the DNL metric but for the fact that the DNL metric includes the additional 10 dB for those events during acoustic night).

3.8.1.4.5 Noise Effects

Some studies have linked increases in noise with human health effects, such as hearing impairment, sleep disturbance, cardiovascular effects, and psychophysiological effects (USACE, 2012; Van Kempen et al., 2002)[1]. Both short- and long-term exposure to very loud noises and long-term exposure to lower levels of sound (chronic exposure) can affect health. Damage to hair cells of the cochlea (the auditory portion of the inner ear) and hearing impairment can be caused by acute exposure to sounds greater than 120 dB (Babisch, 2005; Goelzer et al., 2001).

3.8.1.4.6 Propagation of Sound in the Environment

In an ideal setting in which sound propagates away from a point source in air without any outside influence (e.g., a barrier reflecting or attenuating the sound), sound energy radiates uniformly outward in all directions from the source in a pattern referred to as spherical spreading (noise in relation to biological resources, as well as how sound propagates in water, is discussed in Section 3.5, Biological Resources). As sound energy propagates away from the sound source, both the sound level and

[1] USACE is an acronym for U.S. Army Corps of Engineers

frequency change. For each doubling of distance from the source, the sound level attenuates (or drops off) at a rate of 6 dBA.

When a sound is not from a single point source but is instead from multiple sources along a line, like the noise made by the continuous movement of vehicles on a highway, the source of the sound appears to emanate from a linear source rather than from a point source. The sound level from a linear source decreases by approximately 3–4 dBA with a doubling of the distance from the source (Goelzer et al., 2001).

In a real-world setting, a number of factors can influence how sound propagates in the environment; the ideal case of spherical spreading is an approximation of reduction with distance. Wind is the single most important meteorological factor within approximately 500 feet (ft.) of the sound source, while vertical air temperature gradients are more important in sound propagation over longer distances. Other atmospheric conditions such as air temperature, humidity, and turbulence also can have a major effect on received sound levels.

Whether natural or man-made, a large object or barrier in the path between a sound source and a receptor can reduce sound levels substantially. The impact of this shielding depends on the size and material of the object as well as the frequency content of the sound source. Natural terrain, buildings, and walls can serve as noise barriers, often reducing sound levels by 5–10 dB.

3.8.2 Affected Environment

3.8.2.1 Washington

The areas considered for analysis of potential impacts from noise within Washington include PSNS & IMF, the transportation route from PSNS & IMF to the Port of Benton barge slip, and the land transport route from the barge slip to the final disposal location at the DOE Hanford Site. The following sections describe the affected environment potentially impacted by proposed activities at PSNS & IMF, the barge slip, and the land transport route from the barge slip to the final disposal location at the DOE Hanford Site.

3.8.2.1.1 Puget Sound Naval Shipyard & Intermediate Maintenance Facility, Washington

PSNS & IMF is a major tenant of Naval Base Kitsap in Bremerton, Washington. The eastern portion of Naval Base Kitsap is a fenced, high-security area known as the Controlled Industrial Area, which defines the PSNS & IMF operating area. PSNS & IMF is bordered on the south by Sinclair Inlet, and on the north and east by the city of Bremerton. The majority of PSNS & IMF is developed and covered with impervious surface. Most of the remaining, non-contiguous, undeveloped areas are also disturbed and typically landscaped with a mix of ornamental and native trees, shrubs, and lawn. Immediately north of PSNS & IMF is a mixed-use area, with several churches, residences, and schools. The closest residences are approximately 0.1 mile (mi.) from the dry dock areas of PSNS & IMF. The closest school and church are approximately 0.25 and 0.2 mi., respectively.

Noise is associated, generally, with any industrial facility. PSNS & IMF, especially in dry dock areas, resounds with noises associated with its operations, such as the movement of cranes, trucks, other heavy equipment, hand-operated tools, and the busy flow of traffic Virtually confined to the shoreline area, this noise does not adversely impact surrounding human populations or those portions of PSNS & IMF that are used for personnel quarters, food service areas, or similar activities.

3.8.2.1.2 Port of Benton Barge Slip, Washington

Within a radius of 1 mi. of the Port of Benton barge slip is a mix of residential; undeveloped desert shrub vegetation; industry, agency, and educational facilities; and irrigated agricultural operations. Small residential areas are present approximately 0.5 mi. east of the barge slip across the Columbia River and 0.25 mi. to the south of the barge slip. Upon review of the EPA NEPASSIST web mapper, no non-residential noise-sensitive receptors are located within 0.5 mi. of the project site. The closest school is approximately 1.5 mi. south of the barge slip. The Federal Engineers and Constructors office building is the nearest building to the barge slip, situated approximately 580 ft. west, southwest.

Current noise impacts are primarily due to motor vehicle traffic along roadways and seasonal recreational watercraft along the Columbia River. Agricultural noise impacts associated with irrigated farm operations are seasonal and of limited duration. Aircraft noise impacts exist from the Richland Airport, about 3.5 mi. away, and the Tri-Cities Airport near Pasco, about 9 mi. away. The Port of Benton barge slip receives periodic barge shipments resulting in temporary noise impacts from the operation of motorized equipment used to off-load the packages.

3.8.2.2 Virginia

3.8.2.2.1 Newport News, Virginia

Newport News Shipbuilding lies near the mouth of the James River, immediately west of Huntington and U.S. 664. Shipbuilding facilities have noises associated with their operations, such as the movement of cranes, trucks, other heavy equipment, hand-operated tools, and the busy flow of traffic in an industrial setting. Conditions surrounding the project site range from a highly populated urban area, to a heavily industrial area, to unpopulated water in the James River. Four churches and three schools, considered to be noise-sensitive receptors, are located within 0.5 mi. of the project site (EPA NEPASSIST web mapper). Current noise impacts are primarily due to motor vehicle traffic along roadways and seasonal recreational watercraft along the James River. Typical ambient levels in the residential areas immediately east of Newport News range from 61 to 65 dBA DNL (Virginia Department of Transportation, 2016).

3.8.2.3 Texas

Commercial dismantlement facilities are approximately 2 mi. from Brownsville, Texas, and is located approximately 6 mi. northeast of the Brownsville South Padre Island International Airport. Upon review of the EPA NEPASSIST web mapper, no non-residential noise-sensitive receptors are located within 0.5 mi. of the project site. The closest human sensitive receptors are residences, which are approximately 3 mi. east-southeast of the Brownsville facilities. Similar to PSNS & IMF, noise is associated with operations such as the movement of cranes, trucks, other heavy equipment, hand-operated tools, and the flow of vehicle and rail traffic in an industrial setting.

3.8.2.4 Alabama

Conditions surrounding the project site in Mobile, Alabama, range from a highly populated urban area, to a heavily industrial area, to unpopulated open water in Mobile Bay. Similar to PSNS & IMF, noise is associated with operations such as the movement of cranes, trucks, other heavy equipment, hand-operated tools, and the flow of vehicle and rail traffic in an industrial setting. Four churches, two schools, and four historic properties, considered to be noise-sensitive receptors, are located within 0.5 mi. of the project site (EPA NEPASSIST web mapper). With the exception of one historic property, all of these receptors are closer to Interstate (I)-10 where traffic noise dominates the ambient noise environment.

3.8.3 Environmental Consequences

3.8.3.1 No Action Alternative

As described in Chapter 2 (Description of Proposed Action and Alternatives), ex-Enterprise would remain in waterborne storage indefinitely at its existing location in Newport News, Virginia. Storage facility staff would perform periodic inspections and maintenance of the ship while in storage, to include a detailed interior inspection annually, an underwater exterior inspection of the hull after every eight years in waterborne storage, and placement of the ship in dry dock for inspection and repair after every 15 years in waterborne storage. Further, no construction, dredging, or modifications to facilities or significant noise-generating activities are involved under the No Action Alternative. Therefore, there are no anticipated noise impacts under the No Action Alternative.

3.8.3.2 Alternative 1: Single Reactor Compartment Packages

3.8.3.2.1 Tow ex-Enterprise from Newport News, Virginia, to Commercial Dismantlement Facility

As described in Chapter 2 (Description of Proposed Action and Alternatives), ex-Enterprise would be towed from its current berthing location at Newport News, Virginia to one of the three commercial dismantlement locations (Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; or Mobile, Alabama).

It is anticipated that at least two marine tug boats would be used to move the ship from Newport News, Virginia, to one of the three commercial dismantlement facilities. The proposed route is from the mouth of the James River into the Atlantic Ocean, and follows the coastline to a dismantlement location. Towing with commercial tugs has minimal noise. Noise levels from tugs have been documented to be approximately 87 dBA at a distance of 50 ft. At a distance of 1,600 ft., the received noise level would be less than 60 dBA, and would continue to decrease with increasing distance from the shore. Towing activities under Alternative 1 are not expected to contribute to the on-shore noise environment, regardless of tow distance. Further, no construction, dredging, or modifications to facilities or significant noise-generating activities would be involved during the initial transport under Alternative 1. Therefore, there are no anticipated noise impacts associated with the initial transport of ex-Enterprise.

3.8.3.2.2 Partial Dismantlement at Commercial Dismantlement Facility

Once at the dismantlement facility, the selected contractor would partially dismantle and recycle ex-Enterprise using established processes and techniques. The aircraft carrier dismantling contracts by the U.S. Department of the Navy (Navy) include a clause requiring compliance with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. Commercial dismantlement facilities in the proposed locations currently perform ship dismantlement work, so no new noise-generating activities would occur at the selected contractor facility. Community noise levels (Day-Night Levels) in surrounding communities are not anticipated to change.

3.8.3.2.3 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

Under Alternative 1, partial dismantlement would create waste and recyclable materials that require proper disposal. As described in Chapter 2 (Description of Proposed Action and Alternatives), it is anticipated that these materials would be contained in container express (CONEX) boxes for shipment over the course of the partial dismantlement process. Transport from the dismantlement facility to the disposal site would occur by trucks. The use of semi-trucks on highways is not anticipated to change the acoustic environment surrounding the transportation corridors because typical public use is high, with many vehicles traversing the road per day. Highway traffic noise typically averages 75 dBA at a distance of 50 ft. from the highway. Businesses and residences are typically set back 300 ft. from highways and receive sound levels of approximately 67 dBA (using the sound propagation loss of 3 dB per doubling of distance).

In a typical hour, the traffic volume would need to double to increase the noise level by 3 dB. Trucks would not travel to the waste facility at the same time but rather as they are prepared and loaded at the dismantlement site over the course of several years. The number of trucks prepared and loaded at the dismantlement site per day would not double the traffic volume, nor increase traffic such that average noise levels would notably increase. Therefore, no noise impacts are anticipated from the transportation of waste or recyclable materials.

3.8.3.2.4 Ship ex-Enterprise Propulsion Space Section via Heavy-Lift Ship from Commercial Dismantlement Facility to Puget Sound Naval Shipyard & Intermediate Maintenance Facility

The Navy would relocate the propulsion space section from the commercial dismantlement facility via heavy-lift ship that would transit through established shipping lanes around the southern tip of South America, north along the west coast of the United States, into the Strait of Juan de Fuca, and into PSNS & IMF. By using established shipping lanes and staying more than 200 nautical miles offshore for most of the route, noise associated with ship transit would occur far from shore. Therefore, no noise impacts are anticipated from the relocation of the propulsion space section via heavy-lift ship to PSNS & IMF.

3.8.3.2.5 Work at Puget Sound Naval Shipyard & Intermediate Maintenance Facility – Eight Single Reactor Compartment Packages (No In-Water Work)

Once at PSNS & IMF, the Navy would dismantle the propulsion space section and construct eight single reactor compartment packages for disposal. PSNS & IMF facilities currently dismantle ships and, aside from the larger size of ex-Enterprise, no new noise-generating activities would occur at the facility. Therefore, noise from work at PSNS & IMF is not anticipated to change the Day-Night Levels in surrounding communities.

3.8.3.2.6 Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site

As described in Section 2.3.2.6 (Install Rail System for Reactor Compartment Packages in Trench 94 at the Department of Energy Hanford Site), additional rail structures would be added within Trench 94 at the DOE Hanford Site to support the single reactor compartment packages, requiring limited excavation of the trench floor. Given the lack of sensitive receptors in the vicinity of Trench 94 at the DOE Hanford Site, noise impacts from rail installation are not anticipated.

3.8.3.2.7 Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to the Port of Benton Barge Slip

As described in Section 2.3.2.7 (Barge Transport of Reactor Compartment Packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility to Port of Benton Barge Slip), the waterborne portion of the transport route follows deep-water shipping lanes from PSNS & IMF, westerly through the Strait of Juan De Fuca (in U.S. territorial waters), and southerly down the Washington coast to the mouth of the Columbia River. The route then leads up the Columbia River, following the shipping channel used for the regular transport of commercial cargo.

In the past, and as reflected in the *2012 Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)* and *1996 Final*

Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants (Navy & DOE, 1996, 2012), these activities have had no associated noise impacts on the surrounding communities or sensitive receptors. Given the similarity of the previous actions, no new impacts from noise-generating activities during the barge transport are anticipated.

3.8.3.2.8 Land Transport of Reactor Compartment Packages from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site

Each reactor compartment package would be off-loaded at the Port of Benton barge slip and transported via multiple-wheel, high-capacity transporter to the disposal site via the same transport route as used for various cruiser and submarine reactor compartment packages. In the past, and as reflected in the 2012 *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)* and 1996 *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants* (Navy & DOE, 1996, 2012), these activities have had no associated noise impacts on the surrounding communities or sensitive receptors. Given the similarity of the previous actions, no new impacts from noise-generating activities during the off-load are anticipated.

Alternative 1 includes transportation and disposal activities that have occurred in the past with little to no noise impacts. Additionally, methodologies and compliance with applicable federal, state, and local environmental and occupational safety and health laws and regulations would continue under Alternative 1. Therefore, because of the historical lack of noise impacts from transportation, and that there are no new activities proposed, Alternative 1 noise-generating activities that would degrade the acoustic environment are not anticipated.

3.8.3.3 Alternative 2: Dual Reactor Compartment Packages

Under Alternative 2, all components of the activity in common with Alternative 1 would have the same noise impacts as Alternative 1. However, because Alternative 2 proposes the construction of four larger and heavier dual reactor compartment packages instead of eight, single reactor compartment packages, the Port of Benton barge slip would require modification as would the road between the barge slip and Trench 94 at the DOE Hanford Site, Washington, to facilitate the passage of dual reactor compartment packages. Noise impacts under Alternative 2 would be the same as under Alternative 1 except for reactor compartment package shipment, the barge slip modifications, and the road improvements. Four fewer packages would result in four fewer shipments and off-loading activities, which lessens the noise in comparison to shipments under Alternative 1. However, construction of barge slip modifications and road improvements would temporarily increase noise levels. The sections below detail potential noise impacts from barge slip modifications and road improvements.

3.8.3.3.1 Port of Benton Barge Slip Modifications

Under Alternative 2, the Navy proposes to modify the existing Port of Benton barge slip on the west shoreline of the Columbia River in Richland, Washington. The barge slip would be modified to accommodate the larger barge required for dual reactor compartment packages. The slip would be widened 18 ft. and extended by 15 ft., making the new slip 80 ft. wide and 165 ft. long. All construction would be completed in the course of a year, with pile driving taking a few months. The widening would require the removal of the south jetty. A 70 ft.-long sheet pile wall would be tied into the south edge of the current slip face. This wall would be constructed of approximately 11 sheet piles driven with a vibratory hammer 50–65 ft. into the soil, and would end up at 0–15 ft. above the river bed. The sheet piles would be vibrated into the ground prior to the removal of the jetty.

The existing slip headwall would need to be strengthened to handle the increased weight of the larger loads. To strengthen the headwall the Navy would place 24 landside pipe piles 30-inches in diameter, spaced 10 ft. apart using an impact hammer. A concrete slab would be placed on top of the piles. The new slab would be level with the existing sill cap and soil anchor slabs. No widening of the road would be needed.

There are currently several groups of noise-sensitive receptors in the area of the project site. The nearest sensitive receptor is the commercial building for the Federal Engineers and Constructors, located approximately 500 ft. west of the project area. The closest residential area is located approximately 860 ft. south of the project area along the Columbia River. The second-closest residential area is located approximately 0.5 mi. east of the project area across the Columbia River. Due to this distance, noise impacts from construction are anticipated to be audible, though not high enough to meaningfully impact the DNL levels at this location.

Construction would involve using diesel-powered heavy equipment for tasks, including limited excavation, delivering materials, driving pipe piles, mixing concrete, backfilling excavated areas, and re-graveling affected areas of the roadway. Temporary noise levels between 74 and 90 dBA at a distance of 50 ft. could be generated by earth-moving equipment (e.g., excavators, backhoes, and trucks). Based on data for typical noise ranges (Washington State Department of Transportation, 2012), materials-handling equipment (e.g., concrete mixers) could generate noise levels ranging from 77 to 81 dBA at 50 ft. Therefore, in general, noise levels generated from non-pile driving construction activities could range from 74 to 89 dBA at 50 ft. (Table 3.8-1).

Table 3.8-1: Anticipated Construction Equipment Used and Typical Sound Levels

Equipment Description	Impact Device?	Actual Measured Average dBA L_{max} at 50	Approximate Received dBA L_{max} at 300 feet
Impact Pile Driver	Yes	110	94
Vibratory Pile Driver	No	105	89
Concrete Saw	No	90	74
Pavement Scarifier	No	90	74
Grader	No	89	73
Jackhammer	Yes	89	73
Auger Drill Rig	No	84	68
Scraper	No	84	68
Tractor	No	84	68
Compactor (ground)	No	83	67
Dozer	No	82	66
Concrete Pump Truck	No	81	65
Crane	No	81	65
Excavator	No	81	65
Generator	No	81	65
Roller	No	80	64
Concrete Mixer Truck	No	79	63
Front End Loader	No	79	63

Table 3.8-1: Anticipated Construction Equipment Used and Typical Sound Levels (continued)

Equipment Description	Impact Device?	Actual Measured Average dBA L_{max} at 50	Approximate Received dBA L_{max} at 300 feet
Backhoe	No	78	62
Paver	No	77	61
Dump Truck	No	76	60
Pickup Truck	No	75	59
Flat Bed Truck	No	74	58

Note: dBA = A-weighted decibels, L_{max} = maximum sound level.
Source: (Washington State Department of Transportation, 2012)

Both vibratory and impact pile drivers are proposed for use during barge slip modifications. Vibratory pile drivers are proposed to be used to drive sheet piles into the south edge of the current slip face. A vibratory pile driver has a set of jaws that clamp onto the top of the pile. The pile is held steady while the hammer vibrates the pile to the desired depth. Because vibratory hammers are not impact tools, noise levels are typically not as high as with impact pile drivers (see Table 3.8-1). Further, vibratory pile driving would be performed on land prior to the jetty being removed.

Driving steel pipe piles with an impact pile driver would be one of the loudest components of the project. A typical diesel impact pile driver generates an average noise level of approximately 110 dBA maximum sound level at 50 ft. (see Table 3.8-1) (Washington State Department of Transportation, 2012). The drop-off rate for construction equipment during a single event and stationary noise sources is approximately 6 dBA per doubling of distance. These drop-off rates assume no obstructions, which would increase the noise drop-off rate. The worst-case noise level generated by pile driving (110 dBA maximum sound level at 50 ft.) was calculated based on a conservative 6 dBA drop-off rate. Typical maximum noise levels would be much lower farther away from the construction site or when louder construction methods such as pile driving are not occurring. Additionally, the local topography may also play a role in further reducing the sounds emanating from the construction site, as the site is approximately 45 ft. below the surrounding area at the bottom of an excavated road cut. This would naturally reduce the amount of noise coming from the construction site.

Impact pile driving typically occurs over a short period of time (typically between 15 minutes and an hour) with a break between the driving of each pile-segment as well as breaks to reposition between pile driving locations. Impact pile driving has the highest potential for a detrimental noise impact and would generate the loudest construction noise, about 94 dBA at 300 ft. from the construction zone, based on calculations with a conservative 6 dB drop-off rate per doubling of distance. Areas surrounding the project are zoned for commercial and residential use; thus, potential detrimental impacts on residential zones are possible from pile driving. Sound levels from pile driving at the closest residential area (approximately 860 ft. south) are expected to be near 86 dBA. At these levels, it is anticipated that pile driving noise would represent an intrusive event in the sound environment. However, the fact that the pile driving location is below grade would likely reduce the amount of noise that propagates from the site as the surrounding berms would block some portion of the sound. Further, the substrate at the Port of Benton barge slip modification area is composed of gravels and silt fines down to bedrock. This type of substrate offers less resistance to pile driving, allowing more of the energy from the strike to go into placing the pile and less energy to be radiated out in the form of sound. If needed, less power could be applied to each strike, which would also lower the amount of noise from pile driving. However, doing so would result in longer pile driving times to complete. Additionally, according to the Municipal Code

Chapter 9.16, Nuisances, Section 9.16.050, Exceptions (C) of the City of Richland, construction occurring between the hours of 7:00 a.m. and 9:00 p.m. are exempt from the prohibitions of Municipal Code Chapter 9.16, Nuisances, Section 9.16.045 (Prohibitions). Therefore, while intrusive, it is not anticipated that pile driving during this working window would represent a notable degradation of the acoustic environment or increase in the Day-Night Levels in adjacent communities.

3.8.3.3.2 Road Modifications Between Port of Benton Barge Slip and Trench 94 at the Department of Energy Hanford Site

Improvements may be required at 11 locations (Figure 3.8-2) over the course of a year along the transport route to support dual reactor compartment packages potentially weighing 3,304 tons. Proposed improvements to the route include the following changes:

- cutting and/or filling to reduce the vertical curve
- filling dips in the road
- paving medians
- filling low sides and/or cutting high sides to reduce side slope
- filling road shoulders to improve transitions (intersections)

Construction would involve using diesel-powered heavy equipment for limited excavation, delivering materials, backfilling excavated areas, and paving the roadway. Temporary noise levels of 74–90 dBA at a distance of 50 ft. could be generated by earth-moving equipment (excavators, backhoes, pavement scarifiers, and trucks), based on data of typical noise ranges.

Most road modifications would occur along sections of roads far removed from any sensitive receptors. The closest road modification location (Location 1, Figure 3.8-2) is approximately 0.4 mi. north of the closest residential receptor and approximately 0.6 mi. from residential areas on the east side of the Columbia River. Under the worst-case scenario (the closest work site to sensitive receptors), the received sound level is estimated to be below 60 dBA. At these levels, it is not anticipated that road construction noise would represent a notable degradation of the acoustic environment or an increase in the Day-Night Levels in adjacent communities.

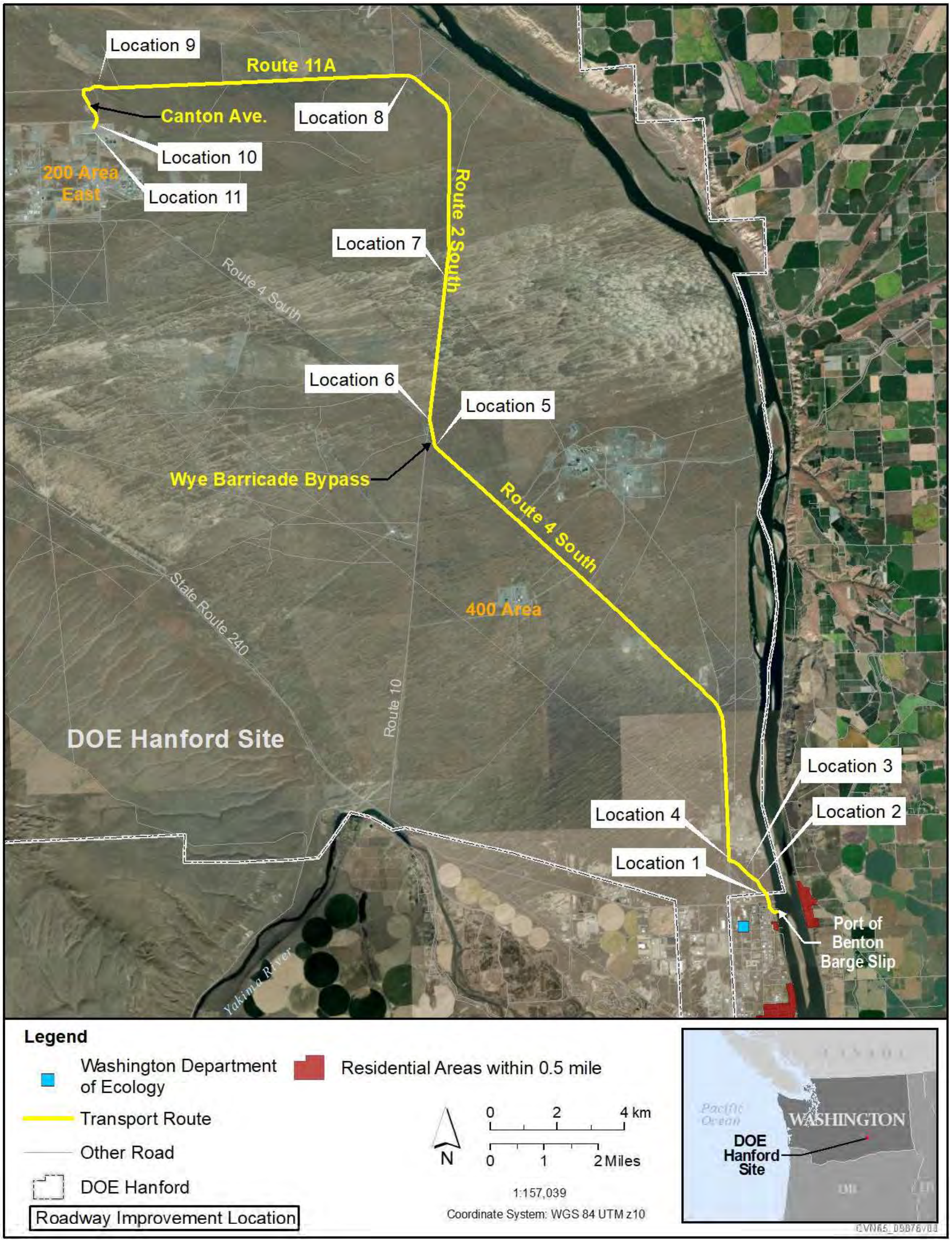

Figure 3.8-2: Locations of Proposed Improvements

3.8.3.4 Alternative 3 (Preferred Alternative): Commercial Dismantlement

Under Alternative 3 (Preferred Alternative) the entire ex-Enterprise would be dismantled at a commercial facility over approximately five years. The initial preparation and transport of ex-Enterprise from Newport News, Virginia, would be the same as the reactor compartment packaging alternatives.

The sections below detail potential noise impacts from dismantlement and disposal at a commercial dismantlement facility. Disposal of low-level radioactive at approved waste facilities is not discussed in detail due to standard operating plans/permits in place at the waste facilities and because the Proposed Action would not increase or alter current work conducted at these sites.

3.8.3.4.1 Complete Dismantlement of ex-Enterprise

Once at the dismantlement facility, the selected contractor would completely dismantle and recycle ex-Enterprise using established processes and techniques. The aircraft carrier dismantling contracts include a clause requiring compliance with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. The Navy would place a contract to dismantle ex-Enterprise at a commercial facility, and the Navy envisions implementing the Nuclear Regulatory Commission (NRC) decommissioning process for radioactive material licensees described in the NRC Consolidated Decommissioning Guidance (NUREG-1757) with direct support from the NRC. Commercial dismantlement facilities in the proposed locations have performed ship dismantlement activities and currently perform ship dismantlement work, so no new noise-generating activities would occur at the facility. Noise impacts on surrounding communities are not anticipated to change.

3.8.3.4.2 Transport Waste and Recyclable Materials from Commercial Dismantlement Facility to an Approved Waste Disposal or Recycling Facility

For purposes of this EIS/OEIS, if all contaminated and clean waste and recyclable materials from the dismantlement operations are packaged in a 95-cubic yard CONEX box with a weight limit of 55,000 pounds (27.5 tons) per container, the 75,000-ton ex-Enterprise would generate more than 2,700 CONEX box shipments. The total number of shipments could exceed 3,000 when considering waste from materials used in the dismantlement process. Smaller containers would result in a greater number of shipments. If shipments are sent as soon as prepared, approximately two to three CONEX boxes would be shipped a day via truck.

In a typical hour, the traffic volume would need to double to increase the noise level by 3 dB. Under Alternative 3 (Preferred Alternative), there would be at least one CONEX box per truck, for a maximum number of 3,000 trucks. Trucks would not travel to the waste facility at the same time but rather as they are prepared and loaded at the dismantlement site over the course of approximately five years. The number of trucks prepared and loaded at the dismantlement site per day would not double the traffic volume, nor increase traffic such that average noise levels would notably increase.

If transport occurred via rail, CONEX boxes would be loaded onto trains as they are prepared and shipped along with other shipping containers along existing rail networks. As these networks experience several train transits per day, it is not anticipated that the shipment of CONEX boxes would add to train transit volume. Therefore, while noise from a passing train can be intrusive, the inclusion of additional cars to the train would only minimally increase community noise levels.

3.8.3.4.3 Transport Low-Level Radioactive Waste from Commercial Dismantlement Facility to Approved Wasted Disposal Facility

The eight reactor plants would be broken down and placed into approximately 440 CONEX boxes for shipment over the course of two to three years. Transport from the dismantlement facility to the disposal site could occur by barge, truck, or rail. Barge transport would be similar to routine towing activities described under initial transport, and typically would occur at distances from shore (approximately 0.25–0.5 mi.) and sensitive receptors where noise would not change the acoustic environment. If shipment of the 440 CONEX boxes occurred via truck, the increase on roadways would be minimal and the number of trucks prepared and loaded at the dismantlement site per day would not double the traffic volume, nor increase traffic such that average noise levels would notably increase.

Alternative 3 (Preferred Alternative) would include transport and dismantlement activities that have occurred in the past with little to no noise impacts. Additionally, methodologies and compliance with applicable federal, state, and local environmental and occupational safety and health laws and regulations would continue under Alternative 3 (Preferred Alternative). Therefore, because of the historical lack of noise impacts from transportation and no new activities proposed, Alternative 3 (Preferred Alternative) is not anticipated to cause noise-generating activities that would degrade the acoustic environment or increase the Day-Night Levels.

3.8.4 Mitigation

All proposed activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. Additionally, under Alternative 2, construction activities near the Port of Benton barge slip would be conducted between the hours of 7:00 a.m. and 9:00 p.m. to comply with the Municipal Code Chapter 9.16, Nuisances, Section 9.16.045, Prohibition (9) of the City of Richland.

No mitigation measures are required under any of the alternatives, including the No Action Alternative, to mitigate noise impacts because no impacts on community noise levels are reasonably foreseeable. If reasonably foreseeable impacts are determined to result, mitigation measures would be developed and implemented. For example, if impacts from pile driving strikes at the Port of Benton barge slip under Alternative 2 are noted at sensitive receptor locations, these intermittent impacts can be reduced by requiring the pile driving activities to use less energy per blow, but that would then use more blows to drive the pile. In this manner, the amount of noise per strike would be reduced. Also under Alternative 2, the Navy would notify the Environmental Molecular Sciences Laboratory (approximately 0.7 mi southwest of the barge slip) and the Laser Interferometer Gravitational-Wave Observatory (approximately 1.5 mi. southwest of the Wye Barricade Bypass) of pile-driving and construction activities to ensure those activities do not interfere with data collection at either facility.

3.8.5 Summary of Impacts and Conclusions

Table 3.8-2 summarizes the potential impacts of the Proposed Action and Alternatives on sensitive receptors.

Table 3.8-2: Summary of Impacts and Conclusions on Noise Environment

Potential Impacts from Noise	Alternatives			
	No Action	1	2	3
Impacts to sensitive receptors			◑	
Change to community noise levels (Day-Night Levels)			○	

Notes: ◑ = Some impact but reduced as a result of project design changes, implementation of current or proposed best management practices, monitoring, or mitigation; ○ = minimal impact; Blank = no impact/not applicable

3.9 Summary of Potential Impacts on Resources and Impact Avoidance and Minimization

This section describes the potential impacts and proposed mitigation measures that the United States (U.S.) Department of the Navy (Navy) would implement to avoid or reduce potential impacts from the disposal of the decommissioned, defueled ex-Enterprise aircraft carrier, including its reactor plants. As a cooperating agency for the Proposed Action and alternatives, the Department of Energy would implement applicable mitigation measures developed by the Navy for the Proposed Action and alternatives, including the No Action Alternative.

The Navy would also implement existing best management practices and standard operating procedures specific to each resource area under the Proposed Action and alternatives as discussed in Sections 3.1 through 3.8. In many cases, existing best management practices provide a benefit to environmental, human, and cultural resources. Existing best management practices differ from mitigation measures because they are designed to provide for safety and mission success, whereas mitigation measures are designed specifically to avoid or reduce potential environmental impacts. An example of an existing best management practice is the Navy avoiding known navigation hazards that appear on navigational charts, such as submerged wrecks and obstructions, during water travel. As a standard collision avoidance procedure, watch personnel also monitor for marine mammals that have the potential to be in the direct path of the ship. In addition to the proposed mitigation measures and existing best management practices specific to the Proposed Action and alternatives, the Navy has existing routine operating instructions (e.g., training manuals) and local installation instructions (e.g., Integrated Natural Resource Management Plans) that were developed to meet other safety and environmental compliance requirements or initiatives. The Navy would continue complying with applicable operating instructions and local installation instructions within the Study Area, as appropriate.

National Environmental Policy Act regulations require that an Environmental Impact Statement include discussion of measures where required as a means to mitigate adverse environmental impacts. The intention of mitigation is to reduce the adverse effects of an action on the environment. Council on Environmental Quality regulations (40 Code of Federal Regulations Section 1508.20) identify the following five ways to reduce or mitigate the severity or intensity of adverse impacts:

- avoiding the impact altogether
- minimizing impacts
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- compensating for the impact by replacing or providing substitute resources or environments

This section provides summaries of impacts and lists potential mitigation measures that are proposed to reduce impacts associated with the Proposed Action and alternatives (Table 3.9-1). Potential mitigation measures generally aim to reduce impacts from disposal of the decommissioned, defueled ex-Enterprise aircraft carrier including its reactor plants to the human, cultural, and biological environment and are presented as applicable.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.1 **Public and Occupational Health and Safety**	**<u>No Action Alternative</u>:** • The impacts of the No Action Alternative on public and occupational health and safety would be minimal. **<u>Alternative 1</u>:** • Occupational safety and health impacts from maritime transportation would be minimal. • The radiation dose to the public from the transportation of radioactive wastes is estimated to be minor and considerably below the average background levels of radiation. Therefore, radiological impacts from the tow of ex-Enterprise are expected to be negligible. • Shipment of the propulsion space section would result in an insignificant radiation dose to crew members and members of the public. • While shipyard work and marine transport carry occupational risks that are higher than other occupations, the impacts of Alternative 1 on worker health and safety would be minimal. • The Navy estimates that the collective dose for all workers to prepare the eight Ex-Enterprise reactor compartment package under Alternative 1 would be 300 Roentgen equivalent man (rem). The dose per worker would remain below regulatory limits. As such, impacts of radiation exposure on public health and safety would be minimal. • The construction of the concrete rail support system at Trench 94 at the Department of Energy (DOE) Hanford Site would be conducted in accordance with applicable DOE Orders and procedures regarding construction and occupational and public safety. As such, impacts on public health and safety would be minimal. • Radiation levels on the exterior of the reactor compartment packages for transport are expected to be negligible and shipment would result in an insignificant radiation dose to crew members and members of the public. **<u>Alternative 2</u>:** • Public and occupational health and safety impacts for Alternative 2 would be similar to Alternative 1.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.1 **Public and Occupational Health and Safety (continued)**	• The occupational dose for Alternative 2 would be lower than Alternative 1 as there would be less radiological work associated with constructing the dual reactor compartment packages. • Port of Benton barge slip modification and road improvement work would be conducted in accordance with applicable federal and state regulations regarding occupational health and safety and protection of the public. As such, impacts on public and occupational health and safety would be minimal. **<u>Alternative 3 (Preferred Alternative)</u>:** • While shipyard work and marine transport carry occupational risks that are higher than other occupations, the impacts of Alternative 3 (Preferred Alternative) on worker health and safety would be minimal. • The radiation dose to the public from the transportation of radioactive wastes is estimated to be minor and considerably below the average background levels of radiation. Therefore, radiological impacts from the tow of ex-Enterprise and shipping waste from the commercial dismantlement facility are expected to be negligible. • The Navy estimates that the collective dose for all workers under Alternative 3 (Preferred Alternative) would be 540 rem over three years. The dose per worker would remain below regulatory limits. As such, impacts of radiation exposure on public health and safety would be minimal. • Regardless of the location used for Alternative 3 (Preferred Alternative), the impacts of Alternative 3 (Preferred Alternative) on public health and safety within the location-specific Region of Influence (ROI) would be considered minimal. The work described at commercial dismantlement facilities analyzed in this National Environmental Policy Act document is similar to work already conducted by industries at these locations and would use established processes and regulations. These activities have been analyzed previously under the *Final Environmental Assessment Decommissioning and Dismantling of STURGIS and MH-1A* (USACE, 2014). **<u>Mitigation</u>:** • There are no mitigation measures beyond those required by federal, state, and local laws under any of the alternatives, including the No Action Alternative. Mitigation measures are not required for resource areas where there is minimal impact from the Proposed Action.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.2 **Hazardous and Radioactive Waste Management**	**<u>No Action Alternative</u>:** • Periodic maintenance and inspections would be performed to ensure that the ship is maintained in a safe and environmentally responsible manner. Access to the ship would be controlled to limit exposure to hazardous and radioactive materials to trained personnel involved in maintaining the ship. **<u>Alternative 1</u>:** • Work under Alternative 1 would include hazardous and radioactive materials and wastes, including low-level radioactive waste (LLRW). The impacts from managing these materials and wastes would be minimal. • Partial dismantlement of ex-Enterprise at a commercial dismantlement facility would generate 5,522 tons of hazardous waste (see Table 3.2-1). Management and disposal of these hazardous wastes would result in minimal impacts on the environment. • Non-radioactive and non-hazardous materials would be transported and recycled or disposed of at regional facilities in accordance with applicable local, state, and federal laws. • Hazardous and radioactive material and waste management operations from dismantlement of the propulsion space section would be consistent with ongoing and regulated practices described in the Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) Waste Management Procedures and state and federal waste regulations. These waste disposal operations would not strain the existing capacity of available disposal sites. • Reactor compartment package barge transit from PSNS & IMF to Port of Benton barge slip, land transportation from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site, and installation of rail system in Trench 94 at the DOE Hanford Site would require the use of hydraulic fluids, oils, and fuels. These materials would be managed and disposed of using applicable regulations, site procedures, and best management practices, resulting in minimal impacts. **<u>Alternative 2</u>:** • Work under Alternative 2 would include hazardous and radioactive materials and wastes, including LLRW. The impacts from managing these materials and wastes would be minimal.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.2 **Hazardous and Radioactive Waste Management (continued)**	• Impacts of hazardous and radioactive materials and wastes under Alternative 2 include all impacts described under Alternative 1. • Activities associated with construction at the Port of Benton barge slip or during road improvements could generate small volumes of hazardous wastes in the form of spilled fuel, hydraulic fluids, or lubricant from construction equipment. Any hazardous wastes generated as a result of these activities would be managed in accordance with applicable regulations and policies resulting in minimal impacts. **<u>Alternative 3 (Preferred Alternative)</u>:** • The management of additional hazardous material and hazardous waste encountered throughout the ship would be consistent with ongoing and regulated practices at the commercial dismantlement locations and result in minimal impacts on the environment. • LLRW operations and disposal would result in minimal impacts on the environment. **<u>Mitigation</u>:** No mitigation measures would be necessary under any of the alternatives, including the No Action Alternative, as analysis concluded that the public and occupational health and safety impacts would be considered minimal.
Section 3.3 **American Indian Tribal Resources and Treaty Rights**	**<u>No Action Alternative</u>:** • Long-term storage is consistent with past and current uses and would have no impacts associated with American Indian tribal resources and treaty rights. **<u>Alternative 1</u>:** • Transit would occur within established shipping lanes and would not impede access to usual and accustomed (U&A) fishing grounds. Bottom scour during docking at PSNS & IMF would not occur. • Transit, pier-side work, barge transport, and land transport activities would have minimal impacts on biological resources and water quality with the use of best management practices.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.3 **American Indian Tribal Resources and Treaty Rights (continued)**	• Installation of additional rail structures in Trench 94 at the DOE Hanford Site would not change the use of Trench 94 and Trench 94 is not a location currently used for tribal resource gathering. • Alternative 1 would have minimal impacts on American Indian tribal resources and treaty rights. **<u>Alternative 2</u>:** • Impacts on American Indian tribal resources and treaty rights under Alternative 2 include all impacts described under Alternative 1. • In-water construction activities for the Port of Benton barge slip modification would have some impacts on biological resources, but these would be reduced through the use of protective measures. These activities may impede access to U&A fishing grounds temporarily while construction is underway, and fish may be more difficult for tribal fishers to catch. • Best management practices during construction activities would be designed to ensure minimal impacts on culturally significant fish species. There would be a temporary adverse effect during construction, with no adverse effect long term and the potential to improve salmonid rearing habitat long term. • Some potential impacts on culturally significant vegetation associated with road improvement actions within a tribal sacred site (Preservation Designated Area at the DOE Pacific Northwest National Laboratory site) under Alternative 2 would be reduced through the use of protective measures (such as restricting vehicle use to the current borders of the haul road) and based on consultation with affected tribes. • Alternative 2 would have more potential impacts than Alternative 1 because of the Port of Benton barge slip modification and road improvements at the DOE Pacific Northwest National Laboratory site, with some impacts on American Indian tribal resources and treaty rights; these would be reduced through use of proposed management practices. **<u>Alternative 3 (Preferred Alternative)</u>:** Alternative 3 (Preferred Alternative) would not impact American Indian tribal resources and treaty rights because recycling and disposal are routine operations and the Navy's outreach and research efforts have not identified tribal resources and treaty rights concerns at the commercial dismantlement or waste disposal facilities.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.3 **American Indian Tribal Resources and Treaty Rights (continued)**	**Mitigation:** All activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. If reasonably foreseeable impacts are determined to result, mitigation measures beyond best management practices would be developed and implemented. No mitigation measures are required under any of the alternatives, including the No Action Alternative, because no major impacts requiring mitigation are reasonably foreseeable on treaty-reserved rights and tribal resources.
Section 3.4 **Socioeconomics and Environmental Justice**	**No Action Alternative:** • Long-term storage of ex-Enterprise is not likely to measurably improve or impact the human, economic, or environmental condition of the ROI, and no disproportionate impacts are anticipated on environmental justice populations as a result of the No Action Alternative. **Alternative 1:** • Impacts from towing operations would be minimized as a result of adherence to existing best management practices, including compliance with the Navy Towing Manual SI740-AA-MAM-010, Rev 3, July 2002. Additionally, towing operations would occur in open ocean or rivers, which would not come in contact with low income or minority populations, impact the local economy or housing, or result in a change in population in the ROI. • With adherence to applicable regulations and use of existing transport systems, there would not be a disproportionate impact on environmental justice populations and impacts on socioeconomic resources from waste transport activities would be minimal. • Impacts on the local economies would be minimal. • Additional workers are not needed at PSNS & IMF to conduct activities associated with Alternative 1, so no impact on housing in the Washington ROI is anticipated.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.4 **Socioeconomics and Environmental Justice (continued)**	**Alternative 2:** • Impacts on socioeconomics and environmental justice populations under Alternative 2 include all impacts described under Alternative 1. • Construction at the Port of Benton barge slip and the transport route at the DOE Hanford Site would result in temporary work and could be accomplished by the existing workforce. Impacts associated with construction on socioeconomic resources are anticipated to be minimal, and no disproportionate impacts on environmental justice populations would occur. **Alternative 3 (Preferred Alternative):** • Impacts from towing operations would be minimized as a result of adherence to existing best management practices, including compliance with the Navy Towing Manual SI740-AA-MAM-010, Rev 3, July 2002 Additionally, towing operations would occur in open ocean or rivers, which would not come in contact with low income or minority populations, impact the local economy or housing, or result in a change in population in the ROI. • The addition of the workers to the Virginia, Texas, or Alabama ROI would indirectly have a small benefit to the local economy, through the temporary increase of approximately 94 workers to the Virginia, Texas, or Alabama ROI for a period of three to five years. The additional workers would result in less than 0.01 percent increase to the population, and impacts on the population, economy, and housing markets, would be negligible. • Although there are environmental justice populations in the Alternative 3 (Preferred Alternative) ROIs, impacts associated with the dismantlement and disposal of ex-Enterprise are anticipated to be minimal with risks consistent with ongoing work in the areas. Therefore, no disproportionate impacts on environmental justice populations would occur. **Mitigation:** • All activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. No mitigation measures are required under any of the alternatives, including the No Action Alternative, because no major impacts are reasonably foreseeable.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.5 **Biological Resources**	**<u>No Action Alternative</u>:** • Under the No Action Alternative, there would be no stressors on biological resources. Dry dock maintenance avoids potential impacts on the in-water environment of the James River, including adult Atlantic sturgeon during spawning migrations up the James River (and designated critical habitat) and the seasonal occurrence of sea turtles within the Chesapeake Bay. **<u>All Action Alternatives</u>:** • In-water hull cleaning of ex-Enterprise may be required in accordance with previous agreements between the Navy and National Marine Fisheries Service (NMFS) (NMFS, 2019). • While water impacts of in-water hull cleaning have been adjudicated by Uniform Navy Discharge Standards, Endangered Species Act (ESA) and Essential Fish Habitat (EFH) impacts are anticipated to be localized and temporary, with standard operating procedures further minimizing potential impacts. The Navy has determined that in-water hull cleaning may affect Atlantic sturgeon, Atlantic sturgeon critical habitat, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle. In-water hull cleaning would have no effect on the shortnose sturgeon. • Ship and tow line strike and ship noise could potentially impact offshore and pelagic (open-ocean) marine organisms such as marine mammals, fishes, sea turtles, or marine birds along the tow route of the ex-Enterprise; however, the likelihood of such an encounter is extremely remote because of the low probability that a large marine organism would overlap this single towing event. The NMFS 2019 Programmatic Biological Opinion (NMFS, 2019) determined that ship and towline strike and ship noise may affect ESA listed species in open waters; however, these impacts are discountable (strike is extremely unlikely to occur) and insignificant (ship noise would have no measurable effect).

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.5 **Biological Resources (continued)**	○ If the Navy selects a commercial dismantlement facility within the Hampton Roads Metropolitan Area, Virginia, towing ex-Enterprise from its current mooring location may affect shortnose sturgeon, Atlantic sturgeon, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle. ○ If the Navy selects a commercial dismantlement facility at the Port of Mobile, towing ex-Enterprise through Mobile Bay may affect the Gulf sturgeon, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee. Towing of ex-Enterprise through Mobile Bay would have no effect on the Alabama sturgeon or red-bellied turtle. ○ If the Navy selects a commercial dismantlement facility at the Port of Brownsville, towing may affect the green sea turtle. These impacts were analyzed under the NMFS 2019 Programmatic Biological Opinion (NMFS, 2019). **<u>Alternative 1:</u>** • Impacts on biological resources under Alternative 1 include all impacts described under All Action Alternatives. • Heavy-lift ship transport of the propulsion space section to PSNS & IMF and barge transport of the reactor compartment packages would have negligible impacts on biological resources. The heavy-lift ship and barge speeds would generally be slower than other ships that travel at speeds known to present significant strike risks to marine mammals and sea turtles, and heavy-lift ship transit and barge transport are considered normal maritime activities. Alternative 1 would have one heavy-lift ship transport and eight barge transits. **<u>Alternative 2</u>:** • Impacts on biological resources under Alternative 2 include all impacts described under All Action Alternatives. • Alternative 2 would have one heavy-lift ship transport and four barge transits.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.5 Biological Resources (continued)	• In-water construction activities during the Port of Benton barge slip modification would introduce water and sediment quality stressors. These stressors would have minimal impacts on biological resources based on the protective measures to contain turbidity and to reduce the likelihood of chemical contamination into the Columbia River. ○ Construction activities would disturb sediments and temporarily suspend solids in the river channel used by ESA-listed salmonid species; therefore, the Navy has determined that the Proposed Action may affect the Chinook salmon (Upper Columbia River Spring-Run Evolutionarily Significant Unit [ESU]), steelhead (Upper Columbia River Distinct Population Segment [DPS] and Middle Columbia River DPS), and bull trout (Columbia River DPS). In-water construction activities would occur in designated critical habitat for Chinook salmon (Upper Columbia River Spring-Run ESU), steelhead (Upper Columbia River DPS and Middle Columbia River DPS), and bull trout (Columbia River DPS). The Navy has determined that the Proposed Action may affect designated critical habitat. Under Alternative 2, there are a number of measures that would minimize or avoid potential impacts on ESA-listed salmonids. These measures include conducting in-water work within an in-water work window that reduces potential impacts and the creation of additional favorable salmonid river bottom habitat following the removal of the south jetty. The Navy also determined that construction activities at the Port of Benton under Alternative 2 may adversely affect EFH; however, the potential impacts would be temporary and short-term. • Noise generated by construction activities at the Port of Benton barge slip would have minimal impacts on biological resources. ○ Construction noise under Alternative 2 may affect the Chinook salmon (Upper Columbia River Spring-Run ESU), steelhead (Upper Columbia River DPS and Middle Columbia River DPS), and bull trout (Columbia River DPS). Construction would occur during the winter in-water work window when salmonids are not migrating; therefore salmonids, if any, would be expected to occur in only very low numbers. Potential adverse effects resulting from construction activities would be discountable (unlikely to occur) and insignificant (not measurable). The Navy also determined that construction noise may adversely affect EFH; however, the potential impacts are expected to be very minor in severity, short term in duration, and limited in spatial extent.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
	• Potential impacts on biological resources associated with road improvement actions under Alternative 2 would have minimal impacts on biological resources and would have no effect on ESA-listed species.
Section 3.5 **Biological Resources (continued)**	<u>**Alternative 3 (Preferred Alternative)**</u>**:** • Impacts on biological resources under Alternative 3 include all impacts described under All Action Alternatives. • Pursuant to section 7 of the ESA, the Navy will consult on the Preferred Alternative with NMFS and USFWS to determine the effect of the hull cleaning on species in Virginia, as discussed above. Additionally, in accordance with the Magnuson–Stevens Fishery Conservation and Management Act, the Navy will consult on the Preferred Alternative with NMFS, the Mid-Atlantic Fishery Management Council, and the New England Fishery Management Council to determine the effect of the hull cleaning on EFH in Virginia as discussed above. The Navy does not anticipate adverse effects at this time. • The Navy will consult with NMFS and USFWS to determine the effect of the ship strike and tow and ship noise on species in Virginia and Alabama, as discussed above. The Navy does not anticipate adverse effects at this time. <u>**Mitigation**</u>**:** • If the Navy selects any of the action alternatives (Alternatives 1, 2, or 3 [Preferred Alternative]), hull cleaning of ex-Enterprise would be required for the initial transport of ex-Enterprise to commercial dismantlement facilities outside of the Hampton Roads Metropolitan Area, Virginia. The Navy would implement this measure to reduce the potential for non-indigenous aquatic organisms to be introduced to the Port of Mobile or the Port of Brownsville. Hull cleaning would potentially impact water and sediment quality at the current mooring location at Newport News Shipbuilding, Virginia. Potential impacts of hull cleaning are analyzed under each alternative in Section 3.5.3 (Environmental Consequences). • If the Navy selects Alternative 2, the Navy would include habitat improvement measures at the Port of Benton barge slip modification area within the Columbia River channel for the benefit of juvenile salmonids. The Navy would replace the south jetty with favorable gravel substrate. The expectation is to improve habitat for migrating juvenile salmon. The project would add approximately 7,000 square feet of benthic food production and enhance instream habitat availability.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.6 **Air Quality**	**No Action Alternative:** • No significant air impacts. **Alternative 1:** • Towing of ex-Enterprise would result in a minimal and temporary increase of marine ship emissions. • Ship recycling and ship dismantling activities would comply with applicable rules and regulations and would not significantly impact air quality. • Air emissions from shipping of the propulsion space section with heavy-lift ship are expected to be well below de minimis levels. • Reactor compartment package preparation would not be expected to result in a significant degradation of air quality. • Air emissions from the transport of the reactor compartment packages are expected to be below de minimis levels. **Alternative 2:** • Impacts on air quality under Alternative 2 include all impacts described under Alternative 1. • Temporary air quality impacts are expected from the Port of Benton barge slip modifications and road improvements, but overall emissions would remain below *de minimis* levels. **Alternative 3 (Preferred Alternative):** • Towing ex-Enterprise would result in a minimal and temporary increase of marine ship emissions. • Ship recycling and ship dismantling activities would comply with applicable rules and regulations and would not significantly impact air quality.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.6 **Air Quality (continued)**	**<u>Mitigation</u>:** All activities would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations. If reasonably foreseeable impacts are determined to result, mitigation measures beyond best management practices would be developed and implemented. No mitigation measures are required under any of the alternatives, including the No Action Alternative, because no impacts are reasonably foreseeable.
Section 3.7 **Cultural Resources**	**<u>No Action Alternative</u>:** • No impacts to cultural resources are expected to occur under the No Action Alternative. **<u>Alternative 1</u>:** • No impacts on cultural resources are expected to occur for the land transport of reactor compartment packages from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site under Alternative 1. • No impacts to cultural resources are expected to occur for the limited excavation required for the installation of rail system in Trench 94 at the DOE Hanford Site. **<u>Alternative 2</u>:** • Impacts on cultural resources for the land transportation from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site outside of the improvement areas and installation of rail system in Trench 94 at the DOE Hanford Site would be similar to Alternative 1. • No impacts on cultural resources are expected to occur from the modifications to the Port of Benton barge slip under Alternative 2. • Improvements on the transport route from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site could have potential impacts on the Preservation Designated Area (PDA) and identified Traditional Cultural Properties (TCPs).

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.7 **Cultural Resources (continued)**	• Improvements to the transport route at Locations 2, 7, 8, and 9 could have potential impacts on known cultural resources, and impacts on unknown subsurface archaeological deposits may occur where proposed transport route improvements may involve cut or excavation activities at Locations 3, 4, 6, 9, and 11, or by the placement of fill material at Locations 1, 2, 4, 5, 8, 10, and 11. **<u>Alternative 3 (Preferred Alternative)</u>:** • No impacts to cultural resources are expected to occur under Alternative 3 (Preferred Alternative). **<u>Mitigation</u>:** All ex-Enterprise disposal activities related to the Proposed Action and alternatives would comply with all applicable federal, state, and local environmental and occupational safety and health laws and regulations, and existing cultural resources management plans. • The Ex-Enterprise is eligible for listing in the National Register of Historic Places; however, the Navy has met its responsibilities for compliance with Section 106 of the National Historic Preservation Act concerning the final disposition of eligible vessels by following the Advisory Council of Historic Preservation procedures within the Program Comment for the Department of the Navy for the Disposition of Historic Vessels (75 Federal Register 12245) and no further mitigation is required. No impacts on cultural resources are reasonably foreseeable under the No Action Alternative, Alternative 1, or Alternative 3 (Preferred Alternative) and no mitigation measures are required. • Under Alternative 2, known cultural resource locations would be avoided during design of the transport route improvements at Locations 2, 7, 8, and 9 and a qualified archaeological monitor meeting Secretary of the Interior Professional Qualifications Standards, as promulgated in 36 Code of Federal Regulations Part 61 would be present during all improvement activities at the proposed transport route improvement locations. Additional mitigation measures identified at the time of the Final Environmental Impact Statement/Overseas Environmental Impact Statement and/or Record of Decision will be described, as appropriate, in those documents.

Table 3.9-1: Summary of Environmental Impacts for the No Action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Preferred Alternative) (continued)

Resource Category	Summary of Impacts and Potential Mitigation Measures
Section 3.8 **Noise**	**No Action Alternative:** • The No Action Alternative is not anticipated to cause noise-generating activities that would degrade community noise levels (Day-Night Levels). **Alternative 1:** • Alternative 1 is not anticipated to cause noise-generating activities that would degrade community noise levels (Day-Night Levels). **Alternative 2:** • Alternative 2 is anticipated to cause noise-generating activities (e.g., pile driving), which would only minimally increase community noise levels (Day-Night Levels). **Alternative 3 (Preferred Alternative):** • Alternative 3 (Preferred Alternative) is not anticipated to cause noise-generating activities that would degrade community noise levels (Day-Night Levels). **Mitigation:** • No mitigation measures are required under any of the alternatives, including the No Action Alternative, to mitigate noise impacts because no impacts on community noise levels (Day-Night Levels) are reasonably foreseeable. If reasonably foreseeable impacts are determined to result, mitigation measures would be developed and implemented.

Note: USACE = U.S. Army Corps of Engineers

4 CUMULATIVE IMPACTS

This chapter provides information on the cumulative impacts analyzed in this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS).

4.1 Principles of Cumulative Impacts Analysis

The approach taken herein to analyze cumulative impacts meets the objectives of the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) regulations, and CEQ guidance. CEQ regulations (40 Code of Federal Regulations Parts 1500-1508) provide the implementing procedures for NEPA. The regulations define “cumulative effects” as:

> *…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 Code of Federal Regulations 1508.7).*

The CEQ provides guidance on cumulative impacts analysis in the *Council on Environmental Quality’s Considering Cumulative Effects Under the NEPA* (CEQ, 1997). This guidance further identifies cumulative effects as those environmental effects resulting “from spatial and temporal crowding of environmental perturbations. The effects of human activities will accumulate when a second perturbation occurs at a site before the ecosystem can fully rebound from the effects of the first perturbation.” Noting that environmental impacts result from a diversity of sources and processes, this CEQ guidance observes that “no universally accepted framework for cumulative effects analysis exists,” while also noting that certain general principles have gained acceptance. One such principle provides that “cumulative effects analysis should be conducted within the context of resource, ecosystem, and community thresholds—levels of stress beyond which the desired condition degrades.” Thus, “each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters.” Therefore, cumulative effects analysis normally will encompass a Region of Influence (ROI) or geographic boundaries beyond the immediate area of the Proposed Action, and a timeframe including past actions and foreseeable future actions, to capture these additional effects. Bounding the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. Thus, CEQ guidelines observe that it “is not practical to analyze cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.”

4.1.1 Determination of Significance

Per CEQ Guidance (CEQ, 1997), the “levels of acceptable change used to determine the significance of effects will vary depending on the type of resource being analyzed, the condition of the resource, and the importance of the resource as an issue.” Furthermore, “this change is evaluated in terms of both the total threshold beyond which the resource degrades to unacceptable levels and the incremental contribution of the Proposed Action to reaching that threshold.” In practice, “the analyst must determine the realistic potential for the resource to sustain itself in the future and whether the Proposed Action will affect this potential.” In other words, for a Proposed Action to have a cumulatively significant impact on an environmental resource, two conditions must be met. First, the combined effects of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the effects of the Proposed Action, must be significant. Second, the Proposed Action must make a measurable or meaningful contribution to that significant cumulative impact.

4.1.2 Identifying Region of Influence or Geographical Boundaries for Cumulative Impacts Analysis

The ROI or geographic boundaries for analyses of cumulative impacts can vary for different resources and environmental media. CEQ guidance (1997) indicates that geographic boundaries for cumulative impacts almost always should be expanded beyond those for the project-specific analyses. This guidance continues, indicating that one way to evaluate geographic boundaries is to consider the distance an effect can travel, and it identifies potential cumulative assessment boundaries accordingly. For air quality, the potentially affected air quality regions are generally the appropriate boundaries for assessment of cumulative impacts from releases of pollutants into the atmosphere; however, greenhouse gases impact the entire atmosphere. For water resources and land-based effects, watershed boundaries may be the appropriate regional boundary. For wide-ranging or migratory wildlife, specifically marine mammals, fish, turtles, and sea birds, any impacts of the Proposed Action might combine with the impacts of other activities or processes within the range of the population.

A ROI for evaluating the cumulative impacts of the Proposed Action is defined for each resource in Section 4.3 (Resource-Specific Cumulative Impact Analysis). The basic ROI or geographic boundary for the majority of resources analyzed for cumulative impacts in this EIS/OEIS is each portion of the Study Area (see Figures 2-1, 2-2, 2-4 through 2-8, 2-12, and 2-15 through 2-19). However, the geographic boundaries for cumulative impacts analysis for some resources are expanded to include activities outside of the Study Area that might impact migratory or wide-ranging animals. Other activities potentially originating from outside the Study Area that are considered in this analysis include impacts associated with maritime traffic (e.g., ship strikes and underwater noise) and commercial fishing (e.g., bycatch and entanglement).

4.2 Projects and Other Activities Analyzed for Cumulative Impacts

Cumulative analysis includes consideration of past, present, and reasonably foreseeable future actions. For past actions, the cumulative impacts analysis only considers those actions or activities that have had ongoing impacts that may be additive to impacts of the Proposed Action. Likewise, present and reasonably foreseeable future actions selected for inclusion in the analysis are those that may have effects additive to the effects of the Proposed Action as experienced by specific environmental receptors.

The cumulative impacts analysis makes use of the best available data, quantifying impacts where possible and relying on qualitative description and best professional judgement where detailed measurement is unavailable. Because specific information and data on past projects and actions are typically scarce, the analysis of past effects is often qualitative (CEQ, 1997). Likewise, analysis for ongoing actions is often inconsistent or unavailable. All likely future development or use of the region is considered to the greatest extent possible, even when a foreseeable future action is not planned in sufficient detail to permit complete analysis (CEQ, 1997).

The cumulative impacts analysis is bounded by the length of the Proposed Action, which would be a maximum of nine-and-a-half years under Alternative 1, six-and-a-half years under Alternative 2, and five years under Alternative 3 (Preferred Alternative). After dismantlement is complete, and the disposal of low-level radioactive waste (LLRW) is complete, impacts from the project would no longer contribute to cumulative impacts on the environment. As discussed in Section 3.2.1.2.1.1 (Federal Radioactive Waste Regulations), ex-Enterprise reactor compartment packages would have the same or better 600 to 2,000-year containment life as previous reactor compartment packages disposed of at Trench 94. The reactor vessels inside the compartments would provide an additional containment life into the tens of thousands of years at Trench 94. In 2012, the United States (U.S.) Department of the Navy (Navy) prepared the *Final Environmental Assessment on the Disposal of Decommissioned, Defueled Naval Reactor Plants from USS Enterprise (CVN 65)*, which provides additional details. For commercial dismantlement, the reactor vessel may provide a similar containment life under corrosion inhibiting conditions and, in any case, would exceed the 500-year containment life assumed for Class C waste disposed of under Nuclear Regulatory Commission license (Navy & DOE, 2012).

Table 4-1 describes federal, state, and commercial actions that have had, continue to have, or could be expected to have some impact upon resources also impacted by the Proposed Action within the Study Area and surrounding areas. These activities are selected based on information obtained during the scoping process, communications with other agencies, a review of other military activities, literature review, previous NEPA analyses, and other available information. For a perspective of the general project locations, such as sites where Naval or commercial dismantlement could occur and disposal sites, please refer to Figures 2-1, 2-2, 2-4 through 2-8, 2-12, and 2-15 through 2-19, which depict the Study Area and boundaries of individual Naval and commercial dismantlement and disposal sites.

1 **Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis**

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Washington – Kitsap County					
Environmental Impact Statement (EIS) for Bremerton Waterfront Infrastructure Improvements at Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF)	PSNS & IMF	The Navy is currently evaluating multiple alternatives for Bremerton waterfront infrastructure improvements at PSNS & IMF to address critical deficiencies in dry dock capacity, capability, and survivability. This action could occur at some point before, during, or after execution of ex-Enterprise disposal. These efforts will be analyzed in a separate document under the National Environmental Policy Act (NEPA). These infrastructure improvements would occur independent of the location or method of ex-Enterprise disposal, and these improvements would not be analyzed as a consequence of ex-Enterprise disposal work. Disposal of ex-Enterprise does not force or shape the alternatives for Bremerton waterfront improvements being considered. This project could have cumulative effects on all resource categories.		X	X
Conducting Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Five-Year Review	PSNS & IMF	Under CERCLA the Navy must conduct 5-year reviews at the site of PSNS & IMF site, among other eligible sites, due to remedial actions occurring at the site and resulting in hazardous substances, pollutants, or contaminants remaining at levels that do not allow for unlimited use and unrestricted exposure. To complete a 5-year review for PSNS & IMF, the Navy must evaluate documents and pertinent data, inspect the site, and conduct interviews relevant to the hazardous waste generation at the site and disposal in order to assess whether or not the remedies previously selected are functioning as intended. The Navy completed the fourth and most recent 5-year review in October of 2017 and has scheduled to complete the next 5-year review in 2022 (Navy, 2017). Actions taken under CERCLA by the Navy could have cumulative effects on public health and safety, hazardous materials and waste, and biological resources.	X		X

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Actions Carried Forward Under the Integrated Natural Resources Management Plan (INRMP) Naval Base (NAVBASE) Kitsap	NAVBASE Kitsap	This INRMP combines and updates existing individual natural resource management plans at NAVBASE Kitsap properties. The INRMP is consistent with the military use of the property and would meet the goals and objectives established in the Sikes Act Improvement Act. This revised INRMP aims to implement an ecosystem-based conservation program and have a net-positive effect on environmental resources compared to the previous INRMP (Navy, 2018, 2019a). This INRMP could have cumulative effects on biological resources and cultural resources.		X	X
Manchester Fuel Tank Replacement, Manchester Fuel Depot	Manchester, Washington	Thirty-four of the original underground storage tanks at the Manchester Fuel Depot built in the 1940s and 1950s are being closed by the Navy. The decommissioned underground storage tanks are being filled with inert material per Washington state underground storage tank regulations. Additionally, the Navy built 6 new aboveground storage tanks that hold 125,000 barrels (5.25 Million [M] gallons) of fuel each, fueling docks, and other infrastructure to support the refueling facility. This is the largest military fueling facility in the continental United States (Marpac Construction, 2018). Construction and operation of this facility could have cumulative effects on air quality.		X	X
Annapolis Ferry Dock Upgrades	Port Orchard, Washington	Kitsap Transit has begun construction on the expansion of the Annapolis ferry dock, which is located across Sinclair Inlet from PSNS & IMF. Pile driving for the expansion of the dock was set to be completed in early 2020; currently, Kitsap Transit has not provided an updated completion date. This construction and operation could have cumulative effects on biological resources, and noise (Vosler, 2020).		X	
Marina Square Hotel and Apartment Construction	Bremerton, Washington	The Marina Square Hotel and Apartment buildings are currently under construction. Upon completion this development will include 2 buildings housing 125 hotel rooms and over 130 apartments (Sound West Group, 2015). The total budget for this project is $130M and is expected to be completed in 2022 (Sound West Group, 2021; Vosler, 2019). This construction and operation could have cumulative effects on socioeconomics and environmental justice, hazardous materials and waste, air quality, and noise.		X	X
Pile Replacement and Pier Maintenance	Naval Base Kitsap Bremerton, Washington	The Navy completed pile removal and replacement at Naval Base Kitsap Pier 4 in 2018. The National Marine Fisheries Service authorized the Navy take of marine mammals due to activities related to removal and installation of piles at Pier 4 (Navy, 2015). This project was completed in 2018 and its past construction could have cumulative effects on biological resources, and noise.	X		

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Marine Structure Maintenance and Pile Replacement Activities, Navy Region Northwest	Puget Sound, Washington	The Navy is performing repair, maintenance, and replacement of piles in the Navy Northwest Region. This project covers all these activities for 2019–2023 (Navy, 2019a). This project could have cumulative effects on biological resources, air quality, hazardous materials and waste, and noise.		X	X
Navy Operations Carried Out Under the Northwest Training and Testing (NWTT) EIS/Overseas Environmental Impact Statement (OEIS) and Supplemental Environmental Impact Statement (SEIS)/OEIS	Pacific Northwest – PSNS & IMF	The NWTT EIS/OEIS and SEIS/OEIS states that training and testing activities are being conducted by the Navy in existing range complexes, operating areas, testing ranges, and Navy pier-side locations in the Pacific Northwest. The SEIS/OEIS does not cover on-land training and testing activities. The NWTT SEIS/OEIS was completed and released to the public in September 2020. PSNS & IMF is included in these documents. NWTT operations could cause cumulative effects on all resource categories with the exception of socioeconomics and environmental justice.		X	X
Renovations on Historic Building 460 at PSNS & IMF	PSNS & IMF	Building 460 is located at PSNS & IMF and houses the shipfitter and welder shops there. These renovations would add a rooftop railing and restore the 60-foot, four-panel sliding door of the building. The rooftop railing project has a budget of approximately $2.24M and the door restoration has a budget of approximately $1M (Stanford, 2018). This project could have cumulative effects on socioeconomics and environmental justice, cultural resources, and air quality.		X	X
Actions Carried out Under the Manchester Fuel Depot INRMP	Manchester, Washington	A revised INRMP is replacing the current INRMP that is consistent with the military use of the property and allows the base to meet the goals and objectives established in the Sikes Act Improvement Act. This revised INRMP aims to implement an ecosystem-based conservation program and have a net-positive effect on environmental resources (Navy, 2019a). This INRMP could have cumulative effects on all resource categories with the exception of socioeconomics and environmental justice.		X	X

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Washington – Benton, Franklin, and Grant Counties					
Construction and use of the Clover Island Shoreline Transformation Project	Clover Island, Kennewick, Washington	Clover Island has a long history of shoreline management projects. This project is funded by a $1M allocation from the city of Kennewick. The city of Kennewick intends to improve the infrastructure and shoreline of the island. These improvements include shoreline stabilization, trail construction, installation and improvement of utility and drainage infrastructure, landscaping, and preparation of commercial building sites. The Port of Kennewick will own and manage the new buildings slated for commercial use (County of Benton, 2021a). This project is currently in its public review and planning phase. Construction and use of this Clover Island project could have cumulative effects on socioeconomics and environmental justice, biological resources, hazardous materials and waste, air quality, and noise.			X
Columbia Gardens Development	City of Kennewick & Port of Kennewick, Washington	Development of the Columbia Gardens is complete and the infrastructure and new buildings are operational. Development included construction of infrastructure such as sewer extensions and parking areas along with two buildings on a 6-acre parcel to prepare space for restaurants, retail, and other similar types of businesses. The total budget for this development was $1.1M and is expected to result in over 100 permanent jobs (County of Benton, 2021b). Construction and operation of the Columbia Gardens Development could have cumulative effects on socioeconomics and environmental justice, hazardous materials and waste, and noise.	X	X	
Construction of new Administration Building at Benton County's Kennewick Complex	Kennewick, Washington	The County of Benton was awarded $13.6M to build a new administrative office building in west Kennewick. This building will relieve the overcrowded office building the county administration currently operates from. Construction began in February 2020 and is still underway (Kraemer, 2020). Construction and operation of this new building could have cumulative effects on transportation, hazardous materials and waste, biological resources, cultural resources, air quality, and noise.		X	

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Operation of the Federal Columbia River Power System	Columbia River Basin	Located on the mainstem Columbia River and in several of its major tributaries, the Federal Columbia River Power System comprises 33 hydroelectric projects in the Columbia River Basin and provides about one third of the electricity used in the Pacific Northwest. The U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers (USACE) planned, designed, constructed, own, and operate the federal water projects in the Pacific Northwest. Operation of these dams, most notably McNary Dam and Lake Wallula, and their associated reservoirs and shorelines have demonstrated the ability to improve fish passages along the Columbia and Snake Rivers. Continued operations of these dams and reservoirs could have cumulative effects on biological, cultural, and tribal resources.		X	
Grand Coulee Fish Maintenance Project Operations	Above Grand Coulee Dam on the Columbia River	This project was established in 1937 and established National Fish Hatcheries as mitigation to compensate for anadromous fish losses above Grand Coulee Dam. Entiat, Leavenworth, and Winthrop National Fish Hatcheries are mitigation hatcheries established by the Grand Coulee Fish Maintenance Project (1937) to compensate for anadromous fish losses above Grand Coulee Dam. All three produce spring or summer Chinook salmon, and Winthrop National Fish Hatchery produces steelhead. Coho salmon are also raised in cooperation with the Yakama Nation. (USFWS, 2014). This project, along with the Proposed Action, could have cumulative effects on biological resources.		X	
Yakima/Klickitat Fisheries Project Operations	Columbia River	The Yakima/Klickitat Fisheries Project is one of the largest fishery management projects in the Columbia River Basin. The goal of the project is to “restore sustainable and harvestable populations of salmon, steelhead, and other at-risk species to the Yakima and Klickitat sub-basins of the Columbia River” (Yakima Nation Fisheries, 2020). This project could have cumulative effects on tribal resources and biological resources.		X	
Odessa Groundwater Replacement Project Operation	Columbia Basin Project, Grand Coulee Dam	The U.S. Bureau of Reclamation is implementing a project to reduce reliance on the Odessa Aquifer by replacing irrigation flows with water sourced from the Columbia River. Diversions would primarily occur from Grand Coulee Dam to Lake Roosevelt, then be pumped into the Feeder Canal for storage at Banks Lake. From Banks Lake, water would be delivered to the Columbia Basin Project users. These diversions would occur upstream from Hanford Reach, but would remove approximately 164,000 acre-feet per year from the Columbia River, thereby reducing annual flows downstream. This project, along with the Proposed Action, could have cumulative effects on biological resources.		X	X

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project	Location	Project Description	Project Timeframe		
			Past	Present	Future
Modification of the Right Embankment of the Priest Rapids Dam	The Priests Rapids Dam	The Federal Energy Regulatory Commission issued a Final Environmental Assessment in January 2021 amending Grant County Public Utility District's license to modify the right embankment of the Priest Rapids Dam, immediately upstream from the Hanford Site on the Columbia River. The project replaces the existing earthen dam, adds reinforcement to the right bank of the river to address the stability of the embankment near the Priest Rapids Dam facility, ensures the safety of the neighboring Wanapum Indian tribal village below, and improves earthquake safety. A new roller-compacted concrete dam with a short connecting embankment and secant pile cut-off wall will be tied into the existing embankment. The dam will be constructed on basalt bedrock downstream from the existing embankment. This project, along with the Proposed Action, could have cumulative effects on biological resources.		X	X
Virginia – Newport News					
Naval Facilities and Engineering Command (NAVFAC) Waterfront Construction Projects	NAVFAC Mid-Atlantic Hampton Roads Metropolitan Area	In 2018, NAVFAC Mid-Atlantic awarded 5 contracts totaling $95M in the adjacent areas of the Hampton Roads Metropolitan Area, Virginia, to 5 individual contractors. These contracts could include "construction, renovation, alteration, and repairs for general construction projects" on elements of "warehouses, training facilities, personnel support and service facilities, housing facilities, etc.," according to the DoD webpage (DoD, 2018). All of these projects are expected to be completed by August 2022. Their past construction and continued usage could have cumulative effects on socioeconomics and environmental justice, biological resources, air quality, waste management, and noise.		X	
Texas – Brownsville					
Brazos Island Harbor (BIH) Channel Improvement	BIH Channel, Port of Brownsville, Texas	This project is under jurisdiction of Texas Department of Transportation (TDOT) and construction phase began in 2019 and is expected to take 2–3 years. Construction involved in this project includes dredging (Texas Department of Transportation, 2018). Impacts from the BIH Channel improvement project, combined with the Proposed Action, could have cumulative effects on socioeconomics and environmental justice, biological resources, hazardous materials and waste, and air quality.		X	
Construction of Overweight Road Connecting the Port of Brownsville and State Highway 4	Brownsville Ship Harbor, Texas	The TDOT granted environmental clearance for the construction of a 2-mile overweight road connecting the Port of Brownsville and State Highway 4. The project has a budget of $20M and is the first phase of the TDOT East Loop Project. Construction is expected to end in late 2021 (Port of Brownsville, 2020). This construction and operation along with the Proposed Action could have cumulative effects on hazardous materials and waste, biological resources, air quality, and noise.		X	

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project Description			Project Timeframe		
			Past	Present	Future
New Passenger Terminal Construction at Brownsville/South Padre Island International Airport (BRO)	Brownsville, Texas BRO	The BRO completed construction on its new passenger terminal, and it has been operational since early 2020. The new building is almost 50,000 square feet larger than the original terminal building at the airport which is 37,000 square feet. Included in this project is also an extension of the runway by 3 kilometers. Given the proximity of the BIA to the Port of Brownsville, construction and operation of the new terminal, combined with the Proposed Action, could have cumulative effects on socioeconomics and environmental justice, hazardous materials and waste, biological resources, air quality, and noise.		X	
Liquified Natural Gas (LNG) Terminal Construction	Brownsville Ship Channel, Texas	The Federal Energy Regulatory Commission has prepared a Final EIS in 2019 for the siting, construction, and operation of an LNG terminal. Construction of the terminal and other necessary infrastructure will consist of a pipeline meter station, natural gas pretreatment and liquefaction facilities, two LNG storage tanks, marine dock and LNG transfer facilities, control room, administration/maintenance building, site access road, and utilities (power, water, and communication systems). The construction involved in this project, along with the Proposed Action, could have cumulative effects on air quality, biological resources, and socioeconomics and environmental justice.			X
Alabama – Mobile Bay & Mobile County					
Dismantlement of Surface Ship Support Barge in Alabama Shipyard	Alabama Shipyard, Mobile Bay	Dismantlement has begun at the Alabama Shipyard of the Navy decommissioned Surface Ship Support Barge. The dismantlement is a joint venture between APTIM Federal Services, LLC and Alabama Shipyard. The project is expected to be complete in 2024 and budgeted at $129 million. As a result, this project is expected to create hundreds of jobs in Mobile (Alabama Shipyard, 2021). During dismantlement, this project, along with the Proposed Action, could have cumulative effects on hazardous materials and waste, and socioeconomics and environmental justice.		X	

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project Description			Project Timeframe		
			Past	Present	Future
Automotive Roll-On Roll-Off Terminal Construction	Port of Mobile, Mobile River, Alabama	The Alabama State Port Authority (ASPA) announced a concession agreement had been signed in early 2020 for construction of the AutoMOBILE International Terminal. The project secured about $42M in funding, and the terminal is now operational (Harris, 2021). Construction and operation of the new terminal, along with the Proposed Action, could result in cumulative effects on socioeconomics and environmental justice, biological resources, hazardous materials and waste, air quality, and noise.	X		
I-10 Bridge Improvement	I-10 crossing and adjacent to Mobile River, Alabama	This project has been redrafted after its initial proposal received concern and objection from the public. Following this project being redrafted, decision makers, including the Mayor of Mobile, announced a new plan for the bridge that incorporated public feedback while still achieving the goal of reducing seasonal congestion (Alabama Political Reporter, 2021). Currently, there is no official schedule for this project (Mobile Area Chamber of Commerce, 2018). Along with the Proposed Action, this project could have cumulative effects on socioeconomics and environmental justice, air quality, and noise.			X
Activities Carried Out Under the Mobile Harbor General Reevaluation Report (GRR) with Integrated SEIS	Port of Mobile, Alabama	The USACE and ASPA have signed the Record of Decision for the Mobile Harbor GRR SEIS (International Dredging Review, 2019). Construction is underway and is expected to be complete for all phases in 2025 (USACE, 2021). This project includes six phases to ultimately dredge within the Port of Mobile to deepen and widen certain bar, bay and river channels, incorporate minor bend easing, and expansion of the Choctaw Pass turning basin. In total this project would include a minimum dredging of 1.5M cubic yards of dredge material (International Dredging Review, 2019). This project, along with the Proposed Action, could have cumulative effects on socioeconomics and environmental justice, biological resources, hazardous materials and waste, air quality, and noise.		X	

Table 4-1: Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)

Project Description			Project Timeframe		
			Past	Present	Future
Activities Carried Out Under the National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund	Mobile Bay, Alabama Coast, and greater Gulf Coast	The NFWF Gulf Environmental Benefit Fund was established in the wake of two plea agreement approvals regarding the 2010 Deepwater Horizon explosion and oil spill from BP and Transocean. The agreement awarded $2.5 billion to the NFWF for habitat restoration and other conservation projects to combat oil damage along the Gulf Coast (National Fish and Wildlife Foundation, 2018). In Alabama alone there are 36 projects funded by the NFWF and other conservation investments totaling $355M (National Fish and Wildlife Foundation, 2020). These projects include restoration, habitat enhancement, and conservation acquisition projects. Since these projects aim to minimize environmental damage from the Deepwater Horizon oil spill, they are low impact and intended to benefit the overall ecosystem. Given that these projects are intended to result in positive environmental impacts, when combined with the Proposed Action, there could be cumulative effects on socioeconomics and environmental justice, biological resources, and air quality.	X	X	X
Phase 3 of Container Terminal Expansion	Port of Mobile, Mobile River, Alabama	The ASPA completed construction in March 2020 of a 400-foot container dock extension (Work Boat Staff, 2020). This expansion allows the berth to safely and easily handle two container ships simultaneously. While this project is completed, residual effects from construction and current effects from operation, combined with the Proposed Action, could have cumulative effects on socioeconomics and environmental justice, biological resources, hazardous materials and waste, and air quality.		X	X

4.3 Resource-Specific Cumulative Impact Analysis

Since the information available on past, present, and reasonably foreseeable actions varies in quality and level of detail, impacts of these actions were quantified where available data made it possible; otherwise, professional judgment and experience were used to make a qualitative assessment of impacts. Due to the large scale of the study area and multiple activities and stressors interacting in the ocean and land environment (Table 4-1), the analysis for the incremental contribution to cumulative stress that the Proposed Action may have on a given resource is largely qualitative.

Chapter 3 (Affected Environment and Environmental Consequences) of this EIS/OEIS includes a robust discussion of cumulative effects in that it takes into account the current condition of each resource as impacted by past and present human activity, and by prospects for recovery reflecting relevant future activity. Chapter 3 includes discussion of the "general threats," an analysis of aggregate project effects, and a broader level analysis specific to areas where impacts are concentrated (i.e., the Study Area and areas immediately adjacent). Therefore, the Chapter 3 analysis is referenced and briefly summarized in each section below to provide context and perspective to the rationale for the conclusions that the Proposed Action would have an insignificant contribution to the cumulative stress experienced by these resources, when specific past, present, and reasonably foreseeable actions are added to the analysis.

In this chapter, cumulative impacts were analyzed for each resource addressed in Chapter 3 (Affected Environment and Environmental Consequences). Analysis was not separated by alternative because the data available for the cumulative effects analysis was mostly qualitative in nature and, from a landscape-level perspective, these qualitative impacts are expected to be generally similar.

Under the Proposed Action, the Navy would implement the mitigations detailed in Section 3.9 (Summary of Potential Impacts on Resources and Impact Avoidance and Minimization) to avoid or reduce potential impacts on biological, socioeconomic, and cultural resources in the Study Area.

4.3.1 Public and Occupational Health and Safety

4.3.1.1 Region of Influence

The ROI for public health and safety is the project area, immediate surrounding areas, and transportation routes for hazardous and radioactive waste.

4.3.1.2 Impacts of Other Actions

Other actions being conducted at or in the vicinity of Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF), the Port of Benton barge slip modification area, and the Department of Energy (DOE) Hanford Site transport route could produce similar occupational and public health and safety hazards on the same scale as Alternatives 1 and 2 (the reactor compartment packaging alternatives). However, these actions would also be required to comply with applicable federal, state, and local regulations.

Other actions on or in the vicinity of commercial shipyards, under the reactor compartment packaging alternatives (partial dismantlement) and Alternative 3 (Preferred Alternative, complete dismantlement), could produce similar occupational and public health and safety hazards as the Proposed Action, but no other single ship dismantlement or repair project would likely be larger than the dismantlement of ex-Enterprise. However, the combination of multiple smaller concurrent projects could result in similar or greater potential for impacts. All of these actions would be required to implement occupational health and safety measures and implement controls to protect the health and safety of the public required by state and federal regulations. These mandated requirements would reduce potential impacts on overall public health and safety to less than significant levels.

4.3.1.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

Ports and shipyards are hubs for sources of air pollution from the movement of ships, trucks, trains, and other cargo-carrying equipment. Air pollution can cause health effects such as asthma, respiratory disease, cardiovascular disease, lung cancer, and premature death. Workers and residents in these communities are frequently subject to increased air pollution. As such, the Proposed Action would have the potential to contribute to cumulative public health and safety impacts at commercial shipyard sites, PSNS & IMF, the Port of Benton barge slip, the DOE Hanford Site transport route, or during waste transportation from commercial shipyard sites to disposal sites. However, these impacts would be short term, temporary, and minimized with the implementation of regulatory-driven controls. Since public health and safety impacts from operations and transportation would be addressed with the incorporation of well-established safety requirements, the Proposed Action would not have a significant impact on the cumulative impacts on public health and safety.

Throughout operations, ship towing, heavy-lift ship transportation, and waste transportation, the Proposed Action would be required to incorporate safety and environmental control measures mandated by federal and state laws.

4.3.1.4 Cumulative Impacts on Public and Occupational Health and Safety

For operations at PSNS & IMF and at commercial shipyards, controls are mandated at the site level and not the project level. In accordance with these requirements, air emissions permits, water discharge permits, and occupational safety and radiation safety plans and procedures would be implemented to protect site workers and the public. In compliance with applicable regulatory requirements, the Proposed Action would prevent unsafe exposures of site workers and the public to hazardous environments and would not result in significant cumulative impacts at PSNS & IMF and at commercial shipyards. Likewise, with compliance of existing regulations and ship storage procedures, the No Action alternative would not result in significant cumulative impacts.

At PSNS & IMF, the Port of Benton barge slip, and at the DOE Hanford Site, occupational exposures and public exposures would be limited based on all facility operations and not just the Proposed Action. For example, environmental release limits from PSNS & IMF are based on all emission sources on the site, and the radiation dose limit to the public is based on exposure to all potential radiation sources on the site. For a site radiation worker, his/her radiation dose is limited to 5,000 millirem per year for all projects he/she is engaged in regardless of how many projects they are working on or the project locations. According to the report titled *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and their Support Facilities* (Navy, 2019b), no Program personnel have exceeded 40 percent of the Program's annual limit between 1980 and 2018 (i.e., no personnel have exceeded 2 Roentgen equivalent man in any year in the last 39 years), and no civilian or military Program personnel have ever, in over 60 years of operation, exceeded the federal lifetime dose limit (the federal lifetime dose limit was eliminated in 1994). Because the radiation dose for a site radiation worker falls below the annual total effective dose equivalent, the Proposed Action, in conjunction with other projects near PSNS & IMF, the barge slip, and the DOE Hanford Site transport route, would not result in significant cumulative impacts on public health and safety.

Under Alternative 3 (Preferred Alternative), annual radiation dose limits to workers provided in 10 Code of Federal Regulations 20, subpart C, Occupation Dose Limits, are to include doses received at any work site during a calendar year. Therefore, while doses can be accumulated from different projects, the dose limit does not change. Conversely, each radioactive materials licensee controls emissions and public exposures to meet off-site dose limits through its own license. Furthermore, the public dose limit of 100 millirem per year for Nuclear Regulatory Commission or state licensees is by design set sufficiently low that cumulative dose from multiple licensees is protective of public health.

4.3.2 Hazardous Materials and Wastes

4.3.2.1 Region of Influence

The ROI for the assessment of impacts of the Proposed Action from hazardous and radioactive waste are the project area and immediately surrounding areas. However, hazardous and radioactive waste disposal is not limited to the region of the Proposed Action; therefore, the cumulative ROI is nationwide.

4.3.2.2 Impacts of Other Actions

Commercial dismantlement locations in the Alternative 3 (Preferred Alternative) ROI would likely not have another concurrent dismantlement project generating LLRW. However, LLRW disposal has a nationwide ROI. There would likely be multiple operations with the ROIs for each of the Proposed Action alternatives, including neighboring or co-located shipyard operations, that would be generating non-radioactive and non-hazardous wastes for disposal and recycle. However, management of these waste streams has a regional ROI. Because of the Navy goal of limiting waste and maximizing recycling, the cumulative impact of these projects on waste disposal capacity in the timeframe of the Proposed Action would be insignificant. Because recycling is a commercial commodity, the ROI can be national or international. Other contributing projects could include ongoing and future commercial nuclear power plant decommissioning projects including those in California, Florida, New York, Wisconsin, and elsewhere; the decommissioning of small U.S. Army nuclear power reactors in northern Virginia and Alaska; the decommissioning of the Nuclear Ship Savannah (a nuclear-powered commercial ship currently located in Baltimore, Maryland); and other demolition and remediation projects. Because hazardous waste disposal is not limited to the region of the Proposed Action, the cumulative impact of these projects on hazardous waste disposal capacity in the timeframe of the Proposed Action would be less than significant.

4.3.2.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

The Proposed Action would have the potential to contribute short-term cumulative impacts at the project sites and long-term at the disposal sites from generated wastes. The No Action alternative would not contribute to cumulative impacts.

Throughout operations and transportation, the Proposed Action would be required to incorporate hazardous and radioactive waste management measures mandated by federal and state laws. In compliance with applicable regulatory requirements, the Proposed Action would limit the impacts from the management and disposal of hazardous and radioactive materials and waste.

The reactor compartment packaging alternatives would result in the generation of hazardous waste from dismantlement activities at commercial shipyards and generation of LLRW at PSNS & IMF. Alternative 3 (Preferred Alternative) would also result in the generation of LLRW from dismantlement activities at commercial shipyards with no waste generated at PSNS & IMF. A total of approximately 17,600 cubic yards (yd^3) of radioactive waste would be generated under Alternative 3 (Preferred Alternative) (conservatively assumes 40 yd^3 per shipment and 440 shipments). This amount would represent about 0.5 percent of Waste Control Specialist, LLC’s licensed disposal capacity of 3.1 million

yd^3 available for LLRW generated by the government. The LLRW disposal volume estimate is also less than 0.5 percent of EnergySolutions' disposal capacity of approximately 10 million yd^3 (Utah Division of Radiation Control, 2015). Therefore, the amount of generated waste would not have a noticeable cumulative effect on the disposal capacity at available disposal sites.

4.3.2.4 Cumulative Impacts on Hazards and Hazardous Materials

In 1996, the Navy prepared the *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants*, which provides a cumulative analysis of 220 reactor compartment packages in Trench 94 at the DOE Hanford Site (Navy & DOE, 1996). This analysis encompasses ex-Enterprise reactor compartment packages because these compartments are similar in content to reactor compartments already evaluated and would not cause the total number within the trench to exceed 220. Radioactivity contained within Trench 94 poses no significant cumulative effect relative to the DOE Hanford Site (Navy & DOE, 2012).

The amount of hazardous wastes generated from the dismantlement of ex-Enterprise could have a noticeable impact on some hazardous waste operations. As provided in Table 3.2-1, an estimated 8,813 tons of hazardous waste would be generated from Alternative 3 (Preferred Alternative). The capacities of hazardous waste facilities differ greatly. In 2017, Chemical Waste Management Inc. in Emelle, Alabama, received more than 103,000 tons of hazardous waste (EPA, 2017a)[1], while US Ecology Texas near Robstown, Texas, received nearly 42,000 tons (EPA, 2017b).

Hazardous materials and waste impacts during dismantlement operations and disposal would be addressed with the incorporation of well-established waste management regulations and site-specific procedures accepted by regulatory agencies, therefore, no cumulative impacts would occur. Cumulatively, the impact of other actions on LLRW disposal capacity in the timeframe of the Proposed Action would be less than significant.

4.3.3 American Indian Tribal Resources and Treaty Rights

4.3.3.1 Region of Influence

The ROI for tribal resources and treaty rights includes elements in the Pacific Northwest: (1) the shipping route of the ex-Enterprise propulsion space section via heavy-lift ship from a commercial dismantlement facility to PSNS & IMF (following a route around South America), (2) areas within port and shipyard facilities at PSNS & IMF that may support dismantlement of ex-Enterprise, (3) infrastructure improvements in Trench 94 at the DOE Hanford Site for disposal of reactor compartment packages, (4) barge transport of reactor compartment packages from PSNS & IMF to the Port of Benton barge slip, (5) the immediate vicinity and surrounding habitats of the barge slip that may be subject to infrastructure improvements, and (6) land transport routes requiring infrastructure improvements that may impact tribal resources between the barge slip and the DOE Hanford Site. For the purposes of cumulative impacts, the ROI can broadly be defined as including Sinclair Inlet within Puget Sound, the coastal waterway around Puget Sound and along western Washington, the Columbia River to Upper Lake Wallula at the Port of Benton, and DOE Hanford Site. As such, this analysis focuses on the reactor compartment packaging alternatives, and not the No Action Alternative or Alternative 3 (Preferred Alternative).

[1] EPA is an acronym for U.S. Environmental Protection Agency.

Project components in the Hampton Roads Metropolitan Area, Virginia; Brownsville, Texas; and Mobile, Alabama, including potential tow routes to these facilities from the current mooring location at Newport News Shipbuilding in Newport News, Virginia, are not included in the analysis because there are no "Indian lands" as defined by Department of Defense Instruction 4710.02, Department of Defense Interactions with Federally Recognized Tribes, that would be impacted by the tow route, commercial dismantlement facilities, or waste disposal and recycling facilities, and the Navy's outreach and research efforts have not identified treaty rights or protected tribal resources concerns for these locations.

4.3.3.2 Impacts of Other Actions

Based on the literature review, other actions may impact tribal resources through in-water demolition, construction, and dredging for waterfront improvements along Sinclair Inlet, including for the Bremerton Waterfront Improvements at PSNS & IMF. These actions could impact tribal resources and treaty rights if they adversely affect harvestability and availability of tribal resources, including fish and shellfish, and their habitat, or otherwise interfere with tribal fishing activities, for example, by preventing tribal fisherman from accessing their Usual and Accustomed fishing areas. Noise and vibrations from construction of in-water projects throughout Sinclair Inlet could cause changes in fish migration, making them more difficult to catch. In-water demolition, construction, and dredging could affect juvenile hatchery-released in Sinclair Inlet. Projects that result in removal of contaminated sediments from Sinclair Inlet would likely benefit tribal resources in the long term, including those completed under the Conducting Comprehensive Environmental Response Compensation and Liability Act and the revised ecosystem-based approach Integrated Natural Resources Management Plan for Naval Base Kitsap properties.

Other ongoing projects that have impacts on tribal resources include channel modifications along the Columbia River and tributaries. Along the Columbia River, including Upper Lake Wallula, projects with the most significant impacts on the recovery of fisheries are associated with the Grand Coulee Fish Maintenance Project, Yakima/Klickitat Fisheries Project, and continued operation of Federal Columbia River Power System dams. The fishery management projects seek to restore sustainable and harvestable fish populations, which are impacted by the continued operation of dams.

Other projects being conducted in the vicinity of PSNS & IMF and the Port of Benton barge slip would be required to comply with applicable federal, state, and local regulations. These requirements may reduce potential impacts on American Indian Tribal Resources and Treaty Rights.

Waterways and ports along the ROI are currently used by commercial, recreational, and other vessels including military vessels.

4.3.3.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

As discussed in Section 3.3 (American Indian Tribal Resources and Treaty Rights), potential impacts on fish and fish habitat at the Port of Benton barge slip could occur with infrastructure improvements. However, there would be a temporary impact during construction, with the potential to improve salmonid habitat long term. Potential impacts could occur to the tribal Preservation Designated Area (PDA) at the DOE Pacific Northwest National Laboratory Site, with culturally significant tribal resources, due to road improvements between the barge slip and Trench 94 at the DOE Hanford Site. The Proposed Action would be required to comply with applicable federal, state, and local regulations. The Navy would consult with affected tribes and impacts, if any, would be determined upon the results of those consultations.

4.3.3.4 Cumulative Impacts on American Indian Traditional Resources

The cumulative consequences of other projects together with the Proposed Action would not significantly impact American Indian tribal resources or treaty rights at any of the locations. Temporary impacts on fish and fish habitat at the Port of Benton barge slip could occur but the modifications have the potential to improve salmonid habitat long term. Pending consultation, potential impacts on the tribal PDA at the DOE Pacific Northwest National Laboratory Site could occur to culturally significant biological resources, but protective measures could be used to prevent or minimize potential disturbances during construction. As a result, the Proposed Action would not combine with impacts from other past, present, or future actions in a manner that would create a cumulative impact.

4.3.4 Socioeconomics and Environmental Justice

4.3.4.1 Region of Influence

The ROI for socioeconomic and environmental justice analysis includes the independent cities and counties immediately surrounding the naval and commercial facilities in Virginia, Texas, Alabama, and Washington state where the dismantlement and disposal of ex-Enterprise may occur. The ROI for Virginia includes the independent cities of Newport News, Hampton Roads Metropolitan Area, Virginia Beach, Chesapeake, Portsmouth, Poquoson, Suffolk, and Williamsburg, and Isle of Wright, Surry, York, and James City counties. The ROI for Texas includes the city of Brownsville and Cameron, Hidalgo, and Willacy counties. The ROI for Alabama includes the City of Mobile, and Mobile and Baldwin counties. Finally, the ROI for Washington includes the City of Bremerton and Kitsap County, in which PSNS & IMF are located, the city of Pasco and Franklin County, as well as the cities of Kennewick and Richland and Benton County, where the Port of Benton barge slip and the DOE Hanford Site are located.

4.3.4.2 Impacts of Other Actions

Other projects in the ROI have the potential to produce minor impacts on minority and low-income populations, local economy and housing. However, other projects would be required to comply with applicable federal, state and local regulations. Secondary or indirect cumulative impacts on socioeconomic resources are dependent on the availability of other resources to populations, such as housing, and the local economy. Secondary or indirect cumulative impacts on environmental justice populations would be evaluated for each action, and therefore would not contribute meaningfully to cumulative impacts on environmental justice populations in the ROI. Waterways and ports are currently used along the ROI and are traveled by commercial, recreational and other vessels including military.

4.3.4.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

The analysis in Section 3.4 (Socioeconomics and Environmental Justice) indicates that the Proposed Action is not expected to result in long-term impacts. There would not be a disproportionate impact on environmental justice populations and impacts on socioeconomic resources in the ROI would be minimal. Long-term storage of ex-Enterprise under the No Action Alternative is not likely to measurably improve or impact the socioeconomic condition and environmental justice populations of the ROI since it would be maintained in waterborne storage at its current location at Newport News Shipbuilding, in Newport News, Virginia. These activities would be in alignment with typical shipyard activities and would result in negligible effects above baseline conditions at the storage facility. The Proposed Action would benefit the local economy in utilizing local resources and labor for the Port of Benton barge slip modifications. The additional work would indirectly contribute to the local economy by adding increases in revenue and workforce wages, which would result in spending and stimulation of the local economy. There would be no socioeconomic change in shipyard regions since the work performed would neither increase nor decrease housing unit levels or availability. Under Alternative 3 (Preferred Alternative), approximately 94 workers would temporarily relocate to the commercial dismantlement facility. The number of workers needing to relocate may be fewer if the facility is in the Hampton Roads Metropolitan Area, since local workers have the skills to dismantle a nuclear-powered ship. However, neither number of workers represents a meaningful increase in population or housing since they would only relocate temporarily.

The Proposed Action would take place in established shipping channels, the open ocean, and in existing industrial complexes, away from the general public and environmental justice communities. All dismantlement and transportation activities would be conducted in compliance with applicable federal, state, and local laws and regulations. Ex-Enterprise dismantlement and disposal would not result in significant impacts on environmental justice populations, therefore no disproportionate impacts on environmental justice populations would occur.

4.3.4.4 Cumulative Impacts on Socioeconomics and Environmental Justice

The analysis in Section 3.4 (Socioeconomics and Environmental Justice) indicates that impacts on socioeconomic resources would be temporary and activities associated with the Proposed Action would not result in disproportionate impacts on environmental justice populations. Therefore, there would be no significant cumulative impact on socioeconomics resources or disproportionate impacts on environmental justice populations in the ROI as a result of the Proposed Action and other projects in the area.

4.3.5 Biological Resources

4.3.5.1 Region of Influence

As stated in Section 3.5.1.1 (Region of Influence), the Study Area for biological resources included the following locations: (1) areas within port and shipyard facilities that may support dismantlement of ex-Enterprise; (2) Port of Benton barge slip that may be subject to infrastructure improvements; and (3) land transportation routes requiring infrastructure improvements that may impact biological resources. For the purposes of cumulative impacts, the ROI can broadly be defined as including Sinclair Inlet within Puget Sound, the Upper Lake Wallula of the Columbia River, and bays and intercoastal waterways surrounding port facilities considered in this analysis.

The context for the analysis of biological resources provided in Section 3.5.1.2 (Regulatory Framework) includes adherence to state and federal guidelines enacted under various regulatory frameworks. In support of this EIS/OEIS, the Navy conducted a literature review and identified various species-specific recovery plans, location-specific natural resource planning documents, and regional conservation initiatives that concern biological resources potentially impacted by the Proposed Action. The analysis for cumulative impacts of the Proposed Action on biological resources considers potential impacts on these plans and initiatives.

4.3.5.2 Impacts of Other Actions

Based on the literature review, other actions may impact biological resources through channel modifications along the Columbia River and tributaries, riparian habitat degradation, agricultural activities, and predation and competition from non-native species (Bond et al., 2019; Gamble, 2016). For species within the Upper Lake Wallula of the Columbia River, the projects with the most significant impacts on the recovery of fisheries are associated with the Grand Coulee Fish Maintenance Project and continued operation of Federal Columbia River Power System dams. In addition, public utility districts upstream of Lake Wallula own and operate dams and fish passage systems, affecting the amount and timing of water flowing into upper Lake Wallula, as well as fish passage through the area. Grant Public Utility District owns and operates Priest Rapids and Wanapum dams. Chelan Public Utility owns Rock Island and Rocky Reach dams. Douglas Public Utility owns one more non-federally owned dam before the U.S. Canadian border—Wells Dam that forms Lake Pateros. The Federal Energy Regulatory Commission issued a Final Environmental Assessment in January 2021 amending Grant County Public Utility District 's license to modify the right embankment of the Priest Rapids Dam, immediately upstream from the Hanford Site on the Columbia River. The project replaces the existing earthen dam, adds reinforcement to the right bank of the river to address the stability of the embankment near the Priest Rapids Dam facility, ensures the safety of the neighboring Wanapum Indian tribal village downstream, and improves earthquake safety. A new roller-compacted concrete dam with a short connecting embankment and secant pile cut-off wall will be tied into the existing embankment. The roller compacted concrete dam will be constructed on basalt bedrock downstream from the existing embankment. The project team will be monitoring for potential dam failures 24 hours a day, 7 days a week while excavating behind the existing embankment. Project duration is from 2021 through 2024, with anticipated completion of the project in January 2024.

Other ongoing projects that have fewer impacts but are important to the understanding of incremental and cumulative impacts include reclamation projects, such as the U.S. Bureau of Reclamation proposed Odessa Groundwater Replacement Project. This project entails replacing the groundwater source for irrigating 70,000 acres within the existing boundaries of the Columbia Basin Project with surface water from the Columbia River at Lake Roosevelt. Following full implementation, the Odessa Groundwater Replacement Project would withdraw an average of 164,000 acre-feet of water annually from Lake Roosevelt via the Keys Pumping Plant at Grand Coulee Dam. As with the Federal Columbia River Power System, project proponents have a long history of Section 7 Endangered Species Act consultations with the National Marine Fisheries Service and U.S. Fish and Wildlife Service, which have resulted in a minimization of potential impacts on fisheries. In addition, the Port of Benton continues to service the agribusiness, manufacturing, technology, transportation, and tourism sectors. These projects also must go through other agency regulatory reviews, such as U.S. Army Corps of Engineers-administered programs under this agency’s mandate to administer Section 10 of the Rivers and Harbors Act of 1899 and Section 404 Clean Water Act of 1972.

4.3.5.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

As detailed in Section 3.5 (Biological Resources), the primary stressors on biological resources include the following:

- stressors associated with in-water hull cleaning which potentially impact water and sediment quality at the current mooring location (Newport News Shipbuilding), including release of chemicals associated with antifouling paints, depression of dissolved oxygen from the decay of organic matter removed from the hull prior to towing
- stressors associated with ship strike and tow line strike, from towing of ex-Enterprise from the current mooring location to destination ports
- stressors associated with ship noise from ships in transit resulting from propulsion sounds as tug boats or heavy lift ships transit through an area
- stressors associated with construction activities at the Port of Benton, Washington, including water and sediment quality impacts associated with barge slip and substrate modifications, as well as construction noise from on-land pile driving and in-water construction activities

- stressors associated with ground disturbance associated with land transport route modifications from the Port of Benton barge slip to Trench 94 at the DOE Hanford Site

For all alternatives analyzed in this EIS/OEIS, these stressors would likely cause temporary impacts at the current mooring location of ex-Enterprise, and initial transit routes from the current mooring location to destination ports. If Alternative 2 is selected, infrastructure improvements at the Port of Benton barge slip would introduce sound into the water and potentially impact water quality in the immediate vicinity of the construction activity. These stressors would occur between November 1 and February 28—the standard practice for in-water construction activities designed to avoid salmonid migrations and minimize impacts. The Proposed Action would also replace the south jetty with a gravel substrate known to benefit juvenile salmonids and increase benthic forage production. This action would provide long-term benefits for salmonids in the project area. Additionally, bald eagles typically arrive in mid-November and occupy the shorelines during the winter months. Wintering eagles use different habitats for various daily activities including perching, foraging, roosting, and nesting. The review of buffer restrictions and historic and current nest site locations found no overlap with the land transport route. There are no large trees for roosts, perching, or nesting in the vicinity of the barge slip or along the land transportation route. Bald eagles, however, could forage in the river channel near the barge slip. The closest known nest is 7 miles downriver in the Yakima Delta and would not be impacted by the project.

4.3.5.4 Cumulative Impacts on Biological Resources

Taken together, the impacts of the Proposed Action, when considered in combination with other activities, would not exceed baseline conditions because of the very limited contribution of impacts from the Proposed Action. The Proposed Action as currently analyzed, would not have the potential to meaningfully combine with other projects to result in a significant cumulative impact on biological resources.

4.3.6 Air Quality

4.3.6.1 Region of Influence

As described in Section 3.6.2.1 (Region of Influence), the ROI for air quality is dependent on the type of pollutant, emission rates, other emission sources, and meteorology. For inert pollutants, the ROI is generally limited to a few miles downwind from the source. For a photochemical pollutant, such as ozone, the ROI may extend much farther downwind. The concentration of many small emission sources in a particular air basin, under the right circumstances, could incrementally contribute to regional air quality degradation.

The context for air quality analysis provided in Section 3.6 (Air Quality) includes adherence to state and federal plans enacted to achieve and maintain air quality. These plans were developed with direct, indirect, and cumulative impacts in mind. As the plans are developed, the establishment of significance criteria includes an inventory of existing emissions and the development of thresholds that ensure new activities avoid or mitigate significant air quality impacts. Unlike other resource areas, the analytical construct for this air quality analysis in Section 3.6 (Air Quality) is effectively a quantified look at applicable activity emissions and a region's ability to maintain or recover air quality as measured by the criteria air pollutants in light of other, existing emissions. As a whole, the air quality throughout the ROI is generally very good or excellent as shown by ongoing monitoring of all criteria pollutants against National Ambient Air Quality Standards and State Ambient Air Quality Standards (Section 3.6.3, Affected Environment).

4.3.6.2 Impacts of Other Actions

The majority of the relevant, past, present, and reasonably foreseeable actions considered as part of the cumulative impacts in Section 4.2 (Projects and Other Activities Analyzed for Cumulative Impacts) that contribute to emissions of criteria air pollutants involve construction activities. These projects include development of a new facility, demolition or renovation of existing facilities, or road construction/maintenance.

Present and reasonably foreseeable projects in Virginia that could produce increases in air emissions include, but are not limited to, the following projects: the Hampton Roads Bridge-Tunnel Expansion and the Newport News Atkinson bridge construction. Present and reasonably foreseeable projects in Brownsville, Texas that could produce localized air emissions include, but are not limited to, the following projects: Brazos Island Harbor Channel Improvement Project, Dock Maintenance Dredging, Construction of Overweight Road connecting the Port of Brownsville and State Highway 4, and the new passenger terminal at Brownsville/South Padres Island International Airport. Present and reasonably foreseeable projects in Mobile, Alabama include, but are not limited to, construction activities, such as development of a new facility, demolition or renovation existing facilities, or road construction/maintenance.

Most projects identified at this time are slated to be complete prior to the onset of any commercial ship dismantlement. Therefore, no projects are currently identified that would overlap with the Proposed Action to create a cumulative impact on air quality.

4.3.6.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

As detailed in Section 3.6 (Air Quality) sources of emissions from the proposed alternatives would include ships, vehicles or trains, as well as construction equipment. The Proposed Action would result in localized and temporarily elevated emissions, but criteria pollutant would not exceed *de minimis* thresholds. Fugitive dust from Port of Benton barge slip and road improvements are expected, but implementation of dust control measures (e.g., watering, minimize activity during high wind events, speed limits) would minimize these impacts. Hazardous air pollutant emissions are anticipated to be small and were dismissed as a stressor of impact. Hazardous air emissions from vehicles and equipment used for Port of Benton barge slip modifications and improvements to the Hanford Site Route 2S roadway under Alternative 2 would also be reduced by on-board emission control devices (e.g., catalytic converters, filters, positive crankcase ventilation [PCV] valves) maintained in accordance with manufacturers' recommendations, minimizing unnecessary vehicle idling, and use of ultra-low sulfur diesel fuel (15 parts per million maximum).

4.3.6.4 Cumulative Impacts on Air Quality

The Proposed Action would have a very limited contribution to air pollutants. The past projects that were described above were mostly construction projects. Following their completion, they ceased to produce pollutant emissions, or produced only insignificant amounts of emissions going forward. Therefore, these projects no longer produce pollutants that impact the ambient air quality and are not considered further in this cumulative analysis.

The aspect of the Proposed Action that would lead to the most predominant impact on the ambient air quality of the region would be the construction under Alternative 2 associated with Port of Benton barge slip widening or road improvements associated with transport of reactor compartment packages to Trench 94. However, their impacts on the ambient air quality would only persist for as long as construction. Following their completion, the ambient air quality would return to its former levels. As to the Proposed Action as currently analyzed, it would not have the potential to meaningfully combine with other projects to result in a significant impact on ambient air quality. There would be no significant cumulative impact on air quality in any of the counties in the ROI as a result of the Proposed Action and other projects and actions in the area.

4.3.7 Cultural Resources

4.3.7.1 Region of Influence

The areas reviewed for cultural resources include locations containing port and shipyard facilities that may support the storage or complete dismantlement of ex-Enterprise within Mobile, Alabama; Brownsville, Texas; or Hampton Roads Metropolitan Area, Virginia, the Port of Benton barge slip, the DOE Hanford Site transport route, and Trench 94 at the DOE Hanford Site. The protection and preservation of cultural resources is governed by a number of federal laws, statutes, and executive orders; the context for cultural resources analysis provided in Section 3.7 (Cultural Resources) includes adherence to state and federal guidelines enacted under various regulatory frameworks.

4.3.7.2 Impacts of Other Actions

Based on the literature review, other actions could adversely affect historic and prehistoric archaeological sites, built environment resources, or Native American sacred sites. In undeveloped areas, cultural resources could be impacted by surface removal of vegetation resulting in erosion or loss of native plant species, which may also impact tribal use of traditional plant species. Construction projects or grading activities may impact or destroy cultural resources. Operation of dams related to the Federal Columbia River Power System project could have cumulative impacts on cultural resources in the area of potential effect of the project. For built environment resources, construction of modern infrastructure may contribute to changes in the viewshed or setting of Historic Districts. Modifications to structures or objects may result from projects potentially impacting the integrity of historic properties. The Manchester Fuel Tank Replacement, Manchester Fuel Depot project includes the filling of decommissioned underground storage tanks built in the 1940s and 1950s, which may affect historic properties if they were to be determined eligible for listing in the National Register as part of the National Historic Preservation Act Section 106 process.

4.3.7.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

As detailed in Section 3.7 (Cultural Resources), the process the Navy used for identifying cultural resources included archival research of existing databases and previous cultural resources investigations, and literature research. Based on the analysis in Section 3.7 (Cultural Resources), the No Action Alternative, Alternative 1, and Alternative 3 (Preferred Alternative) would not result in any impacts on cultural resources. Alternative 2 could result in impacts on known and unknown archaeological resources during the implementation of improvements to the transport route between the Port of Benton barge slip and Trench 94 at the DOE Hanford Site. However, these impacts would be mitigated by the avoidance of known cultural resource locations during design of the transport route improvements and by the presence of an archaeological monitor for all grading or ground-disturbing work associated with the improvement activities. Potential impacts on known or unknown Traditional Cultural Properties or to the PDA may also occur under Alternative 2.

4.3.7.4 Cumulative Impacts on Cultural Resources

Taken together, the combined impacts of the Proposed Action and other activities would contribute incrementally to indirect and direct cumulative effects on cultural resources. However, the Proposed

Action would not incrementally contribute to significant cumulative impacts associated with other past, present, or future projects on cultural resources.

4.3.8 Noise

4.3.8.1 Region of Influence

As described in Section 3.8.1.1 (Region of Influence), ROIs vary between the No Action Alternative and the three action alternatives. The ROI for the No Action Alternative includes Newport News Shipbuilding, Virginia. The ROI for the reactor compartment packaging alternatives includes the transit route from the current location of ex-Enterprise in Newport News Shipbuilding in Newport News, Virginia, to a commercial dismantlement facility; transit route from a commercial dismantlement facility to PSNS & IMF; the transit route from PSNS & IMF to the Port of Benton barge slip; the transit route from the barge slip to Trench 94 at the DOE Hanford Site; as well as Richland, Washington, surrounding areas, and Kitsap County, Washington. The ROI for Alternative 3 (Preferred Alternative) includes the transit route from the current location of ex-Enterprise in Newport News Shipbuilding, to a commercial dismantlement facility in Brownsville, Texas; Newport News, Virginia; or Mobile, Alabama, and their respective surrounding areas; or travel corridors from dismantlement facilities to the potential disposal sites in Clive, Utah, Aiken South Carolina, or Andrews, Texas.

4.3.8.2 Impacts of Other Actions

The majority of the relevant, noise-related past, present, and reasonably foreseeable actions considered as part of the cumulative impacts in Section 4.2 (Projects and Other Activities Analyzed for Cumulative Impacts) involve construction activities, such as development of a new facility, demolition or renovation of existing facilities, or road construction/maintenance.

Noise generating projects are identified in Section 4.2 (Projects and Other Activities Analyzed for Cumulative Impacts) as occurring throughout the ROI, and in support of roads, airports, or other infrastructure. Present and reasonably foreseeable projects in Virginia that could produce localized noise include, but are not limited to, the following projects: the Hampton Roads Bridge-Tunnel Expansion and the Newport News Atkinson bridge construction. New and ongoing projects would increase noise, but only in the immediate vicinity of the project. Noise attenuates, or decreases, with increasing distance from a project site. The amount of noise that may reach a sensitive receptor is both dependent on the equipment used (and the sound levels created by that equipment) and the distance to the sensitive receptor from the construction site. However, construction noise would be noticeable to persons living and working nearby and may cause additional annoyance. Construction related would result in short-term increases in daytime sound levels near those projects.

Present and reasonably foreseeable projects in Brownsville, Texas, that could produce localized noise include, but are not limited to, the following projects: Brazos Island Harbor Channel Improvement Project, Construction of Overweight Road connecting Port of Brownsville and State Highway 4, and the new passenger terminal at Brownsville/South Padres Island International Airport. The first two projects are in the same region as the commercial dismantlement facility. While the actions associated with these projects may increase the local noise, these sites are removed from sensitive receptors, thus minimizing their potential impact. The new passenger terminal project is complete and operations would not contribute to a cumulative rise in the ambient noise level in the ROI.

Present and reasonably foreseeable projects in Mobile, Alabama, that could produce localized noise include, but are not limited to, construction activities, such as development of a new facility, demolition or renovation of existing facilities, or road construction/maintenance. Most projects identified at this time are slated to be complete prior to the onset of any commercial ship dismantlement. Therefore, no projects are currently identified that would overlap with the Proposed Action to create a cumulative increase in the ambient noise environment.

4.3.8.3 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

As detailed in Section 3.8 (Noise) the primary activities that create localized noise include ship dismantlement and recycling, transport of reactor plant components, and construction activities associated with Port of Benton barge slip modifications or improvements to the DOE Hanford Site transport route. Current commercial dismantlement facilities may not perform work similar to the Proposed Action at this time, but they are capable of ship dismantlement work. Aside from the larger size of ex-Enterprise, no new noise-generating activities would occur at the facilities and noise levels in surrounding communities are not anticipated to change. Similarly, transport from the dismantlement facility to the disposal site could occur by barge, truck, or rail. Barge transport would be similar to routine towing activities described under initial transport, and typically would occur at distances from shore and sensitive receptors where noise would not change the acoustic environment. The use of semi-trucks on highways is not anticipated to change the acoustic environment surrounding the transportation corridors because typical use is high, with many vehicles traversing the road per day.

Construction activities are the most likely to contribute to cumulative impacts. However, the impacts on the acoustic environment would be temporary, ceasing when the construction projects are complete. Further, proposed construction activities would not overlap with any identified noise generating project in the region.

4.3.8.4 Cumulative Impacts on Noise

Taken together, the combined impacts of the Proposed Action and other activities that would impact the noise environments would not exceed baseline conditions because of the very limited contribution of impacts from the Proposed Action. The Proposed Action as currently analyzed, would not have the potential to meaningfully combine with other projects to result in a significant impact on the acoustic environment.

4.4 Summary of Cumulative Impacts

The analyses presented in this chapter and the individual resource sections indicate that the incremental contribution of Alternative 1, Alternative 2, or Alternative 3 (Preferred Alternative) would not have the potential to contribute meaningfully to any potential significant cumulative impact with respect to any of these resource areas.

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5 OTHER CONSIDERATIONS REQUIRED BY NEPA

This chapter provides detailed information on other considerations required by the National Environmental Policy Act (NEPA) analyzed in this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS).

5.1 Introduction

In accordance with the Council on Environmental Quality (CEQ) regulations for implementing NEPA, federal agencies shall, to the fullest extent possible, integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively.

5.2 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

Implementation of the Proposed Action and alternatives for this EIS/OEIS would comply with applicable federal, state, and local laws, regulations, and executive orders. The United States (U.S.) Department of the Navy (Navy) is consulting with regulatory agencies, as appropriate, during the NEPA process and prior to implementation of the Proposed Action and alternatives to ensure that requirements are met.

In accordance with 40 Code of Federal Regulations (CFR) Part 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and alternatives and the objectives of federal, regional, state, and local land use plans, policies, and controls. Table 5-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and alternatives, and describes briefly how compliance with these laws and regulations would be accomplished.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	***Status of Compliance***
Regulations	
Archaeological Resources Protection Act of 1979, Title 16 U.S.C. Sections 470aa–470mm	No archaeological investigations on public lands are expected to occur for the Proposed Action and alternatives. Impacts on unknown or buried archaeological sites during the implementation of the Proposed Action and alternatives would be avoided by the presence of an archaeological monitor for any grading or ground-disturbing work, as discussed in Section 3.7 (Cultural Resources).
Atomic Energy Act (AEA) (42 U.S.C. Sections 2011–2259)	The AEA establishes regulatory authorities to promote the safe use of nuclear technology in civilian and defense applications. Specific regulations of the Nuclear Regulatory Commission (NRC) and Department of Energy (DOE) are discussed in subsequent rows of this table.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives (continued)

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. Sections 668–668c)	Bald eagles may be found in the general vicinities of Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) and the Port of Benton locations; potential impacts on the species are analyzed in Section 3.5.3.3. Bald eagles are known to nest near PSNS & IMF facility (see Section 3.5.2.4.1 [Puget Sound Naval Shipyard & Intermediate Maintenance Facility and Sinclair Inlet]) within approximately 400 meters of the shoreline. Bald eagles use the Columbia River and surrounding areas in the Port of Benton region, but the closest known nest is several miles downstream of the proposed barge slip modification (see Section 3.5.2.4.2 [Port of Benton Barge Slip]). The United States (U.S.) Department of the Navy (Navy) has concluded consultation with U.S. Fish and Wildlife Service (USFWS) under the BGEPA is not warranted because of there is no potential for the Proposed Action to disturb known nesting and foraging locations.
Clean Air Act (CAA) (42 U.S.C. Section 7401 et seq.)	The Proposed Action and alternatives would not exceed the *de minimis* levels for CAA conformity, as discussed in Section 3.6 (Air Quality). A Record of Non-Applicability has been prepared (see Appendix E [Air Quality Calculations and Record of Non-Applicability]) to ensure operational activities are accounted for within the currently approved State Implementation Plan. Regardless of alternative chosen, applicable CAA and Greenhouse Gas requirements will be met.
Clean Water Act (33 U.S.C. Section 1251 et seq.)/Rivers and Harbors Act (33 U.S.C. Section 401 et seq.)	The Navy will continue to implement and comply with the requirements as outlined in 40 Code of Federal Regulations (CFR) Part 1700.
Coastal Zone Management Act (16 U.S.C. Section 1451 et seq.)	Refer to Section 5.3 below for discussion of Navy compliance with the Coastal Zone Management Act.
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. Section 9601 et seq.)	The Navy would report any spill or release of hazardous substance of a quantity equal to or greater than the reportable quantity to the U.S Environmental Protection Agency.
Dredged Material Management Requirements	Dredging of the Port of Benton barge slip would comply with all applicable requirements for the assessment, characterization, and management (disposal) of dredged material. Proper procedures would be followed for evaluating potential contaminant-related environmental impacts of dredging, the aquatic placement of dredged material in inland waters, and disposal of dredged material in ocean waters.
Emergency Planning and Community Right-to-Know Act (42 U.S.C. Section 11001 et seq.)	The Navy or its contractor would maintain Safety Data Sheets and inform Local Emergency Planning Committees of the Proposed Action and alternatives as required to assist them in their planning efforts.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives (continued)

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Endangered Species Act (ESA) (16 U.S.C. Section 1531 et seq.)	In 2019, the National Marine Fisheries Service (NMFS) issued the Programmatic Biological and Conference Opinion on the Towing of Inactive U.S. Navy Ships from their Existing Berths to Dismantling Facilities or other Inactive Ship Site (NMFS, 2019). The Navy also consulted with USFWS for the West Indian manatee (Florida subspecies) in 2018 for towing and dismantlement activities (USFWS, 2018). In 2019, USFWS provided their concurrence that dismantling inactive ships at PSNS & IMF would not likely adversely affect the bull trout. In 2021, NMFS renewed a programmatic Biological Opinion with the Navy concerning operations and management of PSNS & IMF. The current operating permit for dry dock activities was renewed in January 2021 (NMFS, 2021). The Navy will consult with the USFWS and NMFS in accordance with section 7 of the ESA for portions of the Preferred Alternative not covered under programmatic or previous consultations with NMFS and USFWS.
Hazardous Materials Transportation Act of 1975 (49 U.S.C. Section 5101 et seq.)	The Navy would comply with applicable requirements of the Hazardous Materials Transportation Act.
Low Level Radioactive Waste Policy Amendments Act of 1985 (42 U.S.C. Sections 2021b-j)	Commercial NRC or agreement state licensed radioactive waste sites may accept waste generated from decommissioning of ex-Enterprise.
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. Section 1801 et seq.)	The Navy has determined that hull cleaning activities may adversely affect water and substrate quality and biogenic habitats that serve as Essential Fish Habitat (EFH) and Habitat of Particular Concern. However, these effects would be insignificant and short-term. The Navy will consult with NMFS under Alternative 3 (Preferred Alternative) for potential impacts on EFH associated with in-water hull cleaning at Newport News Shipbuilding.
Marine Mammal Protection Act (MMPA) (16 U.S.C. Section 1361 et seq.)	The Proposed Action and alternatives would not exceed thresholds established by the MMPA to consult (as discussed in Section 3.5, Biological Resources). Regardless of the alternative chosen, MMPA requirements will be met.
Migratory Bird Treaty Act (MBTA) (16 U.S.C. Sections 703–712)	In accordance with a directive issued by the Deputy Assistant Secretary of Defense in February 2018 (DoD, 2018)[1], the Proposed Action, including applicable standard operating procedures, minimizes take of migratory birds protected under the MBTA.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives (continued)

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
National Environmental Policy Act (NEPA) (42 U.S.C. Section 4321 et seq.); Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR Parts 1500-1508); Navy procedures for Implementing NEPA (32 CFR Part 775 and Chief of Naval Operations Instruction 5090.1D)	This Environmental Impact Statement/Overseas Environmental Impact Statement has been prepared in accordance with NEPA, CEQ regulations, and Procedures for Implementing NEPA (32 CFR Part 775).
National Historic Preservation Act (NHPA) (54 U.S.C. Section 306108)	The analysis of activities for the Proposed Action and alternatives in this EIS/OEIS indicates that the preferred alternative does not require the type of activities that would affect historic properties and that Section 106 would not be required; however, if another alternative is chosen, NHPA consultation requirements will be met as discussed in Section 3.7 (Cultural Resources) and Section 3.3 (American Indian Tribal Resources and Treaty Rights).
National Marine Sanctuaries Act (16 U.S.C. Section 1431 et seq.)	All water transit routes of the Proposed Action and alternatives specifically avoid National Marine Sanctuaries, to the extent possible. The route stays outside of the Area to be Avoided of the Olympic Coast National Marine Sanctuary. No activities presented in the Proposed Action and alternatives impact National Marine Sanctuaries, as discussed in Section 3.5 (Biological Resources).
The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. Section 3001–3013)	If Native American remains or items of cultural patrimony are encountered during the implementation of the alternative chosen, work in that area will be halted so the requirements of this regulation can be followed, as discussed in Section 3.3 (American Indian Tribal Resources and Treaty Rights) and Section 3.7 (Cultural Resources).
Standards for Protection Against Radiation (10 CFR Part 20)	All alternatives would meet or exceed 10 CFR Part 20 requirements.
Packaging and Transportation of Radioactive Material (10 CFR Part 71 and 49 CFR Parts 171 to 177)	Radioactive and hazardous waste packaging and transportation would be conducted in accordance with applicable NRC and Department of Transportation regulations.
Occupational Safety and Health Act of 1970; Occupational Safety and Health Administration (OSHA)	The Navy or Contractor would be compliant with all applicable OSHA standards.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives (continued)

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
OSHA Regulations in 29 CFR Part 1926, Subpart P; 10 CFR Part 851; and DOE G 450.4-1C Integrated Safety Management Guide	All earthwork performed within the DOE Hanford Site shall comply with the requirements set forth in the CFR and DOE manual and requires a Hanford Site Excavation Permit. This permit would be obtained for the road grading that is part of Alternative 2.
Resource Conservation and Recovery Act (42 U.S.C. Section 6901 et seq.)	The Navy contractors would treat, store, transport, and dispose of all wastes in accordance with federal, state, and local regulations throughout the implementation of the Proposed Action and alternatives (as discussed in Section 3.2 [Hazardous and Radioactive Waste Management]).
Toxic Substances Control Act (15 U.S.C. Section 2601 et seq.)	All regulated chemicals would be used in accordance with instructions and operational constraints, as described in Section 3.2 (Hazardous and Radioactive Waste Management).
Washington State Building Code	For Alternative 2, which would include structural improvements at the Port of Benton barge slip and road grading, a geotechnical report would be prepared for the project.
Executive Orders (EOs)	
EO 11988, *Floodplain Management*	Dredging of the Port of Benton barge slip would reduce the amount of fill in the floodplain and it is anticipated that there would be no change in the annual flooding of the shoreline.
EO 11990, *Protection of Wetlands*	Dredging of the Port of Benton barge slip would not be anticipated to impact the small wetland area south of the barge slip, as flows in the main part of the Columbia River would not change, and sediment deposition along the shoreline downstream of the barge slip would continue to occur.
EO 12088, *Federal Compliance with Pollution Control Standards*	All necessary actions would be taken for the prevention, control, and abatement of environmental pollution. Section 1–4 of this Executive Order was revoked by EO 13148.
EO 12114, *Environmental Effects Abroad of Major Federal Actions*	The analysis of health-based air quality impacts under EO 12114 includes emissions estimates that involve ships outside of U.S. territorial seas.

Table 5-1: Principal Federal and State Laws, Regulations, Executive Orders, and Policies Applicable to the Proposed Action and Alternatives (continued)

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*	The Proposed Action and alternatives would not result in any disproportionately high and adverse human health or environmental effects on minority or low-income populations
EO 13007, *Indian Sacred Sites*	The Proposed Action and alternatives could result in a potential impact on an Indian sacred site, but would not limit access to Indian sacred sites by Indian religious practitioners. All of the requirements of this EO will be met, as discussed in Section 3.7 (Cultural Resources) and Section 3.3 (American Indian Tribal Resources and Treaty Rights).
EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*	The Proposed Action and alternatives would not result in disproportionate environmental health or safety risks to children, as discussed in Section 3.4 (Socioeconomics and Environmental Justice).
EOs for Invasive Species: EO 11987 – *Exotic Organisms*, EO 13112 – *Invasive Species*, EO 13751 – *Safeguarding the Nation from the Impacts of Invasive Species*	As part of the Proposed Action and alternatives, measures would be in place to reduce the potential for spreading invasive species and are discussed specifically in the analysis for potential impacts on biological resources under each alternative in Section 3.5 (Biological Resources). These measures primarily concern in-water hull maintenance and the potential to spread invasive species from the current mooring location to commercial shipyards and from commercial shipyards to PSNS & IMF (see Section 3.5.1.3 [Best Management Practices]).
EO 13175, *Consultation and Coordination with Indian Tribal Governments*	In accordance with this EO and with Navy policy, the Navy routinely consults with Indian tribal governments. The Proposed Action would not have substantial direct effects on one or more Indian tribes, on the relationship between the federal government and Indian tribes, or on the distribution of power and responsibilities between the federal government and Indian tribes, as discussed in Section 3.3 (American Indian Tribal Resources and Treaty Rights).
EO 13840, *Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States*	All activities associated with the Proposed Action and alternatives would be consistent with this EO.
EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*	The Proposed Action is consistent with the policy's goals to "empower our workers and communities; promote and protect our public health and the environment; and conserve our national treasures and monuments" (EO 13990).

[1]DoD is an acronym for Department of Defense

5.3 Coastal Zone Management Act Compliance

The Coastal Zone Management Act (CZMA) of 1972 (16 United States Code Section 1451, et seq.) encourages coastal states to be proactive in managing coastal zone uses and resources. The act established a voluntary coastal planning program and requires participating states to submit a Coastal Management Plan to the National Oceanic and Atmospheric Administration for approval. Under the act, federal actions that have an effect on a coastal use or resource are required to be consistent, to the maximum extent practicable, with the enforceable policies of federally approved Coastal Management Plans.

The CZMA defines the coastal zone as extending "to the outer limit of state title and ownership under the Submerged Lands Act" (i.e., 3 nautical miles or 9 nautical miles from the shoreline, depending on the location). The coastal zone extends inland only to the extent necessary to control the shoreline.

A consistency determination, a negative determination, or a *de minimis* exemption may be submitted for review of federal agency activities. A federal agency submits a consistency determination when it determines that its activity may have either a direct or an indirect effect on a state coastal use or resource. In accordance with 15 CFR Part 930.39, the consistency determination includes a brief statement indicating whether the proposed activity will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the management program. The consistency determination must be based on evaluation of the relevant enforceable policies of the management program. In accordance with 15 CFR Part 930.35, "if a Federal agency determines that there will not be coastal effects, then the Federal agency shall provide the State agencies with a negative determination for a Federal agency activity: (1) Identified by a state agency on its list, as described in section 930.34(b), or through case-by-case monitoring of unlisted activities; or (2) Which is the same as or is similar to activities for which consistency determinations have been prepared in the past; or (3) For which the Federal agency undertook a thorough consistency assessment and developed initial findings on the coastal effects of the activity." Thus, a negative determination must be submitted to a state if the agency determines no coastal effects and one or more of the triggers above is met.

De minimis exemptions are activities proposed by the federal agency that have already been reviewed and approved by the state (after allowing for public review and comment), and those that the state has recognized as having insignificant direct or indirect (secondary or cumulative) effects on its coastal resources.

5.3.1 Coastal Management Program

The Region of Influence for Alternative 3 (Preferred Alterative) includes Virginia, Texas, and Alabama. The following provides a brief description of the regulating agency and coastal management program in each state.

Virginia

The Virginia Coastal Zone Management Program was created in 1986 pursuant to the CZMA with the purpose of protecting Virginia's designated coastal resources. The Virginia Department of Environmental Quality is the lead agency responsible for coordinating federal consistency determinations and is overseen by the National Oceanic and Atmospheric Administration Office for Coastal Management for compliance. Virginia's Coastal Management Area includes most of Tidewater Virginia, the coastal waters of the U.S. territorial area extending to Virginia sovereign limits, four tidal rivers, and watersheds including Virginia's Atlantic Coast, Chesapeake Bay, and Albemarle-Pamlico Sound. The Virginia Coastal Zone Management Program enforces preestablished policies for projects regarding various land and water use types and their corresponding possible sources of pollution.

The Navy has determined that the towing of inactive Navy ships would have no effect on any coastal use or resource in the Virginia state coastal zone. Therefore, the Navy intends to send a General Negative

Determination to the Virginia Department of Environmental Quality for the towing of Navy inactive ships.

If the Navy is required to clean the hull of ex-Enterprise prior to initial transport, and if the implementation of hull-cleaning mitigation measures within dry dock is not feasible, the Navy would conduct hull cleaning at the current mooring location in water (Newport News Shipbuilding, Virginia) or at a nearby facility within the Hampton Roads Metropolitan Area, Virginia. The Navy underwater hull cleaning activities meet the requirements of the Clean Water Act under the Uniform National Discharge Standards (UNDS) Program for Phase II Batch Two Discharges. The Navy submitted a National Consistency Determination to 35 states (including Virginia) for UNDS Program Phase II Batch Two Discharges, which include underwater ship husbandry discharges that occur during the inspection, maintenance, cleaning, and repair of hulls and hull appendages while a vessel is waterborne. In response, Virginia provided concurrence that UNDS Phase II Batch Two discharges are consistent to the maximum extent practicable with the enforceable policies of the Virginia coastal management program.

Texas

Under the standards created by the CZMA to preserve, protect, restore, and enhance the nation's coastal resources, the Texas Coastal Management Program was established with the purpose of developing a comprehensive approach to manage coastal natural resources in Texas. The Texas Coastal Management Program aims to improve coastal management practices that align with the long-term ecological and economic productivity of coastal resources. The Texas General Land Office is responsible for carrying out the program and has established enhancement areas along the coast of Texas that include wetlands, ocean resources, and many others. The enhancement areas undergo prioritization with the highest-ranking areas, driving program needs and direction of management efforts in coordination with the Office for Coastal Management.

The Navy has determined that the towing of inactive Navy ships would have no effect on any coastal use or resource in the Texas state coastal zone. The Navy previously consulted with the Texas Coastal Resources Program on the general action of towing one or more inactive ships in the Texas coastal zone, and obtained concurrence from the Texas Coastal Resources Program this action would have no effect. Therefore, no additional CZMA consultation with Texas is required.

Alabama

The Alabama Department of Conservation and Natural Resources, State Lands Division, Coastal Section oversees the Alabama Coastal Management Program with the intent of preserving coastal resources for future generations while allowing for economic growth. This program was developed in accordance with the federal rules and regulations set forth by the CZMA in order to manage land and water activities within Alabama's Coastal Area. Alabama's Coastal Area lies between the continuous 10-foot contour that extends in Baldwin and Mobile counties following seaward to the outer limits of the U.S. territorial sea. The Alabama Department of Conservation and Natural Resources is the lead agency responsible for planning, fiscal management, and education outreach of public information, while the Alabama Department of Environmental Management oversees regulatory, permitting, monitoring and enforcement of the program.

The Navy has determined that the towing of inactive Navy ships would have no effect on any coastal use or resource in the Alabama state coastal zone. Therefore, the Navy intends to send a General Negative Determination to the Alabama Department of Conservation and Natural Resources, State Lands Division, Coastal Section for the towing of Navy inactive ships.

5.4 Relationship Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity

In accordance with the CEQ regulations (40 CFR Part 1502), this EIS/OEIS analyzes the relationship between the short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment.

The Proposed Action and alternatives would be categorized as having both short- and long-term impacts. For example, shipment of waste generated from the Proposed Action on highways would result in short-term and minimal impacts on air quality consistent with existing use of highways. All radioactive wastes decay over time, resulting in the need to implement long-term protections from radiation. The waste disposal facilities authorized to receive waste generate as part of the Proposed Action are required to demonstrate continued protection of the public and the environment associated with radioactive waste disposal. The analysis in this document has found that these activities would not greatly impact resources, and therefore are not expected to result in any impacts that would reduce environmental productivity; permanently narrow the range of beneficial uses of the environment; or pose long-term risks to health, safety, or general welfare of the public.

5.5 Irreversible or Irretrievable Commitment of Resources

NEPA requires that environmental analysis include identification of “any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented” (42 United States Code Section 4332). Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy or minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., building demolition, the disturbance of a cultural site).

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Proposed Action and alternatives would involve human labor; the consumption of fuel, oil, and lubricants for construction vehicles; and loss of natural resources. Most impacts would be short term and temporary or, if long lasting, would be negligible. Therefore, implementation of the Proposed Action and alternatives would not result in major irreversible or irretrievable commitment of resources.

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6 List of Preparers

There are no references in this chapter.