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

APPENDICES

AUGUST 2022

Environmental Impact Statement/ Overseas Environmental Impact Statement

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

TABLE OF CONTENTS

List of Figures

There are no figures in this appendix.

List of Tables

There are no tables in this appendix.

This page intentionally left blank.

Appendix A Federal Register Notices

Appendix A contains the following Federal Register Notice:

1. Notice of Intent to Prepare an Environmental Impact Statement/Overseas Environmental Impact Statement for Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and Its Associated Naval Reactor Plants and To Announce Public Scoping Meetings (Federal Register Doc. 2019-11221)

Federal Register / Vol. 84, No. 105 / Friday, May 31, 2019 / Notices 25243

CONTRACTS BRANCH

Michael R. Jurkowski,
Deputy Director, Business & PL Operations.
[FR Doc. 2019–11404 Filed 5–30–19; 8:45 am]
BILLING CODE 6353–01–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Intent To Prepare an Environmental Impact Statement/ Overseas Environmental Impact Statement for Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and Its Associated Naval Reactor Plants and To Announce Public Scoping Meetings

AGENCY: Department of the Navy, DoD
ACTION: Notice.

SUMMARY: Pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as implemented by the Council on Environmental Quality, and Presidential Executive Order 12114, the Department of the Navy (DON) announces its intent to prepare an Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts associated with the disposal of the decommissioned, defueled ex-Enterprise (CVN 65), including its associated reactor plants. The proposed action executes the Chief of Naval Operations (CNO) policy for inactive ships stricken from the Naval Vessel Register and designated for disposal by dismantling in order to reduce the Navy's inactive ship inventory and eliminate costs associated with maintaining the ship in a safe stowage condition.

DATES: The 45-day public scoping period begins May 31, 2019 and ends July 15, 2019. Public scoping meetings will be held on June 18, 20, 25, and 27, 2019. All public comments are due by July 15, 2019.

ADDRESSES: The public scoping meetings will be held at the following locations (all times local):

1. June 18, 2019, 5:00 p.m. to 8:00 p.m., Denbigh Community Center, 15198 Warwick Boulevard, Newport News, VA 23608–2631.
2. June 20, 2019, 5:00 p.m. to 8:00 p.m., Fort Brown Memorial Center, 600 International Boulevard, Brownsville, TX 78520–5738.
3. June 25, 2019, 5:00 p.m. to 8:00 p.m., Mountain View Middle School, 2400 Perry Avenue, Bremerton, WA 98310–5139.
4. June 27, 2019, 5:00 p.m. to 8:00 p.m., Richland Public Library, 955 Northgate Drive, Richland, WA 99352–3505.

Comments may be provided at the public scoping meetings, by mail, and through the project website at: *https://www.CarrierDisposalEIS.com*. Mailed comments must be postmarked no later than July 15, 2019 and mailed to the address: Puget Sound Naval Shipyard and Intermediate Maintenance Facility, 1400 Farragut Avenue, Bremerton, WA 98314–5001, Attn: Kellie M. Randall, Public Affairs Officer, CVN65 EIS, for consideration in the Draft EIS/OEIS preparation. The DON is requesting public comments on the scope of the analysis, including potential environmental issues and viable alternatives to be considered during the development of the Draft EIS/OEIS.

The scoping meetings will consist of an informal, open house session with informational poster stations staffed by DON representatives. Meeting details will be announced in local area newspapers. Additional information on the public scoping meetings and comment submittal will be available on the project website at: *https://www.CarrierDisposalEIS.com*.

FOR FURTHER INFORMATION CONTACT: Puget Sound Naval Shipyard and Intermediate Maintenance Facility, 1400 Farragut Avenue, Bremerton, WA 98314–5001, Attn: Kellie M. Randall, Public Affairs Officer, CVN65 EIS, 360–476–7111, or project website: *https://www.CarrierDisposalEIS.com*.

SUPPLEMENTARY INFORMATION: The DON's action proponent is the Director, Naval Nuclear Propulsion (CNO N00N). The Department of Energy (DOE) is a cooperating agency in the preparation of the EIS/OEIS. The proposed action is to dispose of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier, including its reactor plants. The proposed action would entail dismantling and recycling the non-radioactive hull sections of the ex-Enterprise at a designated facility in accordance with applicable Federal, state and local laws, and the removal and packaging of the ex-Enterprise reactor plants for transportation and disposal as low-level radioactive waste to authorized radioactive waste burial ground(s). The removal of nuclear fuel from the ex-Enterprise reactor plants has already taken place and is not part of the proposed action. The disposal of the ex-Enterprise is needed to comply with CNO policy for inactive ships stricken from the Naval Vessel Register and with the Naval Nuclear Propulsion Program's statutory responsibilities under 50 U.S.C. 2406 and 2511. The purpose of the proposed action is to reduce the U.S. Navy inactive ship inventory, eliminate costs associated with maintaining the ship in a safe stowage condition, and to dispose of legacy radiological and hazardous wastes in an environmentally responsible manner, while meeting the operational needs of the United States Navy.

The DON, in coordination with the DOE as a cooperating agency, prepared a Final Environmental Assessment (EA) entitled, "Disposal of Decommissioned, Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)" dated August 2012. In the Finding of No Significant Impact, the Navy decided to remove the reactor compartments from ex-Enterprise at Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), prepare the reactor compartments for disposal as reactor compartment packages, recycle non-radioactive hull sections, and transport the reactor compartment packages for disposal at the DOE Hanford Site near Richland, Washington. The DON has since identified new preliminary alternatives that could address the disposal of the ex-Enterprise.

DON is preparing this EIS/OEIS to consider these preliminary alternatives and potentially others that may be identified during the EIS/OEIS scoping process. The DON is considering the following preliminary alternatives to satisfy the purpose and need:

Alternative 1—Partial dismantlement of ex-Enterprise at an authorized commercial dismantlement facility by removing areas of the ship outside the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF to prepare eight single reactor compartment packages for disposal at DOE Hanford Trench 94. This alternative is an extension of the reactor plant disposal program at PSNS & IMF as discussed in the 2012 EA.

Alternative 2—Partial dismantlement of ex-Enterprise at an authorized commercial dismantlement facility by removing areas of the ship outside the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF to prepare four reactor compartment packages for disposal at DOE Hanford Trench 94. Each package would contain two of the ship's eight reactor plants.

Alternative 3—Dismantlement of the ex-Enterprise at an authorized commercial dismantlement facility, including 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 commercial low-level radioactive waste facility.

Alternative 4—No action. Under the no action alternative, the defueled ex-Enterprise would be stored waterborne. The vessel would require periodic maintenance to ensure that storage continues in a safe and environmentally responsible manner.

DON will evaluate the potential environmental impacts from the no action alternative and identified action alternatives. DON will analyze potential impacts on environmental resources resulting from activities included in identified alternatives in accordance with 40 CFR 1502.16. Direct, indirect, and cumulative impacts will be analyzed.

Ship dismantlement activities will be performed in accordance with all applicable Federal, state, and local environmental laws and regulations, occupational safety and health laws and regulations, and in accordance with the Naval Nuclear Propulsion Program's statutory responsibilities under 50 U.S.C. 2406 and 2511.

The scoping process is helpful in identifying public concerns and local issues to be considered during the development of the EIS/OEIS. Federal, state, and local agencies; federally recognized tribes; non-governmental organizations; and interested persons are encouraged to provide substantive comments to the DON on potential impacts to environmental resources. All substantive comments provided orally, electronically, or in writing at the scoping meetings, submitted via the project website, or mailed to the address provided in the **FOR FURTHER INFORMATION CONTACT** section will be taken into consideration during the development of the EIS/OEIS.

Dated: May 23, 2019.

M.S. Werner,

Commander, Judge Advocate General's Corps, U.S. Navy. Federal Register Liaison Officer.

[FR Doc. 2019–11221 Filed 5–30–19; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

Federal Need Analysis Methodology for the 2020–21 Award Year—Federal Pell Grant, Federal Work-Study, Federal Supplemental Educational Opportunity Grant, William D. Ford Federal Direct Loan, Iraq and Afghanistan Service Grant, and TEACH Grant Programs

AGENCY: Federal Student Aid, Department of Education.

ACTION: Notice.

SUMMARY: The Secretary announces the annual updates to the tables used in the statutory Federal Need Analysis Methodology that determines a student's expected family contribution (EFC) for award year (AY) 2020–21 for student financial aid programs, Catalog of Federal Domestic Assistance (CFDA) Numbers 84.063, 84.033, 84.007, 84.268, 84.408, and 84.379. The intent of this notice is to alert the financial aid community and the broader public to these required annual updates used in the determination of student aid eligibility.

FOR FURTHER INFORMATION CONTACT: Marya Dennis, U.S. Department of Education, Room 63G2, Union Center Plaza, 830 First Street NE, Washington, DC 20202–5454. Telephone: (202) 377–3385.

If you use a telecommunications device for the deaf (TDD) or a text telephone (TTY), call the Federal Relay Service (FRS), toll free, at 1–800–877–8339.

SUPPLEMENTARY INFORMATION: Part F of title IV of the Higher Education Act of 1965, as amended (HEA), specifies the criteria, data elements, calculations, and tables the Department of Education (Department) uses in the Federal Need Analysis Methodology to determine the EFC.

Section 478 of the HEA requires the Secretary to annually update the following four tables for price inflation—the Income Protection Allowance (IPA), the Adjusted Net Worth (NW) of a Business or Farm, the Education Savings and Asset Protection Allowance, and the Assessment Schedules and Rates. The updates are based, in general, upon increases in the Consumer Price Index (CPI).

For AY 2020–21, the Secretary is charged with updating the IPA for parents of dependent students, adjusted NW of a business or farm, the education savings and asset protection allowance, and the assessment schedules and rates to account for inflation that took place between December 2018 and December 2019. However, because the Secretary must publish these tables before December 2019, the increases in the tables must be based on a percentage equal to the estimated percentage increase in the Consumer Price Index for All Urban Consumers (CPI–U) for 2019. The Secretary must also account for any under- or over-estimation of inflation for the preceding year.

In developing the table values for the 2019–20 AY, the Secretary assumed a 1.6 percent increase in the CPI–U for the period December 2017 through December 2018. The actual inflation for this time period was 1.9 percent. The Secretary estimates that the increase in the CPI–U for the period December 2018 through December 2019 will be 2.4 percent.

Additionally, section 601 of the College Cost Reduction and Access Act of 2007 (CCRAA, Pub. L. 110–84) amended sections 475 through 478 of the HEA affecting the IPA tables for the 2009–10 through 2012–13 AYs and required the Department to use a percentage of the estimated CPI to update the table in subsequent years. These changes to the IPA impact dependent students, as well as independent students with dependents other than a spouse and independent students without dependents other than a spouse. This notice includes the new 2020–21 AY values for the IPA tables, which reflect the CCRAA amendments. The updated tables are in sections 1 (Income Protection Allowance), 2 (Adjusted Net Worth of a Business or Farm), and 4 (Assessment Schedules and Rates) of this notice.

Under section 478(d) of the HEA, the Secretary must also revise the education savings and asset protection allowances for each AY. The Education Savings and Asset Protection Allowance table for AY 2020–21 has been updated in section 3 of this notice.

Section 478(h) of the HEA also requires the Secretary to increase the amount specified for the employment expense allowance, adjusted for inflation. This calculation is based on increases in the Bureau of Labor Statistics' marginal costs budget for a two-worker family compared to a one-worker family. The items covered by this calculation are: Food away from home, apparel, transportation, and household furnishings and operations. The Employment Expense Allowance table for AY 2020–21 has been updated in section 5 of this notice.

Section 478(g) of the HEA directs the Secretary to update the tables for State and other taxes after reviewing the Statistics of Income file data maintained by the Internal Revenue Service. This

This page intentionally left blank.

Environmental Impact Statement/ Overseas Environmental Impact Statement

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

TABLE OF CONTENTS

List of Figures

List of Tables

Appendix B Public Involvement and Distribution

This appendix includes descriptions of United States (U.S.) Navy (Navy) efforts to involve the public in preparing the Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants. The Department of Energy is a cooperating agency on the EIS/OEIS.

B.1 Project Website

A project website was established to provide the public with project information and to accept comments electronically. The project website address is www.carrierdisposaleis.com, and was made available to the public on May 31, 2019. The website address was included in all public notifications.

Public notifications, the fact sheet booklet, posters, frequently asked questions, and references are available on the project website. Spanish versions of notices and informational materials are also posted on the website.

B.2 Scoping Periods

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 Navy intent 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. In 2019, the initial public scoping phase began with the publication of a Notice of Intent in the *Federal Register* (FR) (84 FR 25243) on May 31, 2019. The Notice of Intent announced the public scoping period and the dates, times, and locations of public scoping meetings. The FR notice can be found in Appendix A (Federal Register Notices). The scoping period ran for 45 days from May 31, 2019, through July 15, 2019.

As a result of comments received during public scoping conducted in 2019, the Navy reopened the public scoping period and added Mobile, Alabama to the Study Area as an additional location for consideration as an alternative. In compliance with National Environmental Policy Act (NEPA), the Navy held an additional public scoping period to solicit comments from federal, state, and local agencies; federally recognized tribes; nongovernmental organizations; and interested persons from August 12, 2020, through September 11, 2020. Comments on the scope of the analysis were accepted at the public meetings, by mail and through the project website.

B.2.1 Public Scoping Notifications

The Navy prepared materials in 2019 to notify the public of the intent to prepare an EIS/OEIS and provide information about the Proposed Action and alternatives, and the opportunity to submit comments. Public notices prepared for the reopened scoping period included this information as well as the addition of Mobile, Alabama, as a potential location for commercial dismantlement. Public notices prepared in 2020 also explained that, due to federal and state guidance and measures put in place 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 Navy made significant efforts to notify the public to ensure maximum public participation during both scoping processes. A summary of these efforts follows.

B.2.1.1 Notification Letters

During the 2019 scoping phase, tribal letters were mailed first-class on May 28, 2019, to 45 tribal leaders of federally recognized Native American tribes. Stakeholder letters also were sent May 29–31, 2019, to 137 federal, state, and local elected officials and government agencies, and non-federally recognized tribes or tribal groups. A Spanish version of the stakeholder letter was included for local elected officials in Texas. Additionally, an email notification was sent to the staffers of local elected officials in the Washington state area.

During the 2020 scoping phase, tribal letters, along with a fact sheet booklet, were sent on August 10, 2020, to 19 tribal leaders of federally recognized Native American tribes in the Mobile, Alabama area. Stakeholder letters, along with a fact sheet booklet, also were sent on August 10, 2020, to 135 federal, state, and local elected officials and government agencies, non-federally recognized tribes, and certain nongovernmental organizations in the Mobile, Alabama area.

Entities that received the scoping notification letters can be found in Table B-1, and an example of the tribal letter, English and Spanish stakeholder letters, and email notification can be found in Figure B-1, Figure B-2, Figure B-3, Figure B-4, Figure B-5, Figure B-6, and Figure B-7.

Table B-1: Entities that Received the Scoping Notification Letters

Federally Recognized Native American Tribes, Non-Federally Recognized Tribes, or Tribal Groups	
Federally Recognized Tribes	Mississippi Band of Choctaw
Absentee Tribe of Shawnee	Monacan Nation
Alabama-Coushatta Tribe of Texas	Muckleshoot Indian Tribe
Alabama-Quassarte Tribal Town	Muscogee (Creek) Nation
Apache Tribe of Oklahoma	Nansemond
Caddo Nation of Oklahoma	Nez Perce Tribe
Catawba Indian Nation	Poarch Band of Creek Indians
Cherokee Nation	Pamunkey Indian Tribe
Cheyenne and Arapaho Tribes, Oklahoma	Port Gamble S'Klallam Tribe
Chickasaw Nation	Puyallup Tribe of the Puyallup Reservation
Chickahominy Indian Tribe	Quileute Tribe of the Quileute Reservation
Chickahominy Indian Tribe - Eastern Division	Quinault Indian Nation
Chitimacha Tribe of Louisiana	Rappahannock Tribe
Choctaw Nation	Samish Indian Nation
Comanche Nation, Oklahoma	Seminole Nation of Oklahoma
Confederated Tribes and Bands of the Yakama Nation	Shawnee Tribe
	Skokomish Indian Tribe
Confederated Tribes of the Umatilla Indian Reservation	Suquamish Indian Tribe of the Port Madison Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon	Swinomish Indian Tribal Community
	The Alabama Coushatta Tribe of Texas
Coushatta Tribe of Louisiana	The Osage Nation
Delaware Nation	The Quapaw Tribe of Oklahoma
Eastern Band of Cherokee Indians	Thlopthlocco Tribal Town
Eastern Shawnee Tribe of Oklahoma	Tonkawa Tribe of Indians of Oklahoma
Hoh Indian Tribe	Tulalip Tribes of Washington

Jamestown S'Klallam Tribe Jena Band of Choctaw Indians Kialegee Tribal Town Kickapoo Traditional Tribe of Texas Kiowa Indian Tribe of Oklahoma Lower Elwha Tribal Community Lummi Tribe of the Lummi Reservation Makah Indian Tribe of the Makah Indian Reservation Mescalero Apache Tribe of the Mescalero Reservation, New Mexico Miccosukee Tribe of Indians	Tunica-Biloxi Indian Tribe Tuscarora Nation United Keetoowah Band of Cherokee Upper Mattaponi Tribe Upper Skagit Indian Tribe Wichita and Affiliated Tribes **Non-Federally Recognized Tribes or Tribal Groups** Wanapum Band of Indians Clatsop-Nehalem Confederated Tribes Lipan Apache Tribe of Texas MOWA Band of Choctaw

Federal Elected Officials and Federal Agencies

U.S. Senators (Alabama, Texas, Virginia, Washington)
U.S. Representatives (Alabama District 1, Texas District 34, Virginia District 3, Washington District 4, 6)
Bureau of Indian Affairs
- Northwest Regional Office

Department of Transportation
- Office of Transportation Policy (P-32)

Environmental Protection Agency
- Gulf of Mexico Program
- Office of Federal Activities
- Region 3
  - Office of Communities, Tribes, and Environmental Assessment
- Region 4
- Region 6
  - Office of Communities, Tribes, and Environmental Assessment
- Region 10
  - Oregon Operations Office
  - Washington Operations Office

National Oceanic and Atmospheric Administration
- National Marine Fisheries Service
  - Columbia Basin Branch
  - Northwest Regional Office
  - Southeast Regional Office
  - Oregon/Washington Office

Nuclear Regulatory Commission
Olympic Coast National Marine Sanctuary
U.S. Army Corps of Engineers
- Galveston District
- Mobile District
- Norfolk District
- Northwestern Division
- Seattle District
- Southwestern Division

U.S. Coast Guard
- Atlantic Area
- Office of Operating and Environmental Standards (CG-3 PSO)
- Sector Mobile

U.S. Department of Agriculture
- Natural Resources Conservation Science

U.S. Fish & Wildlife Service
- Gulf Restoration Office
- Branch of Conservation Planning Assistance
- Northern Gulf Coastal Program
- Pacific Region
- Southeast Region
- Southwest Field Office
- Southwest Region
- Virginia Field Office
- Western Washington Office

U.S. Nuclear Regulatory Commission, Texas

State Elected Officials and State Agencies

Office of the Governor (Alabama, Texas, Virginia, Washington)
State Senators (Alabama District 33, Texas District 27, Virginia 1, 2, 5, 6)
State of Virginia Delegates (District 79, 83, 91, 92, 94, 95)
Washington State Legislature Representatives (District 8, 23, 26)
Alabama Department of Agriculture and Industries
Alabama Department of Conservation & Natural Resources - Marine Resources Division, Baldwin County
Alabama Department of Conservation & Natural Resources - Marine Resources Division, Mobile County
Alabama Department of Conservation & Natural Resources - State Lands Division
Alabama Department of Conservation & Natural Resources - State Lands, Coastal Section
Alabama Department of Conservation & Natural Resources - Wildlife & Freshwater Fisheries
Alabama Department of Conservation and Natural Resources, Marine Resources Division
Alabama Department of Economic and Community Affairs, Energy Division
Alabama Department of Economic and Community Affairs, Office of Water Resources
Alabama Department of Environmental Management - Nonpoint Source Pollution Control Program
Alabama Department of Environmental Management, Mobile Coastal Field Office
Alabama Department of Public Health - Baldwin County Health Department
Alabama Department of Public Health - Escambia County Health Department
Alabama Department of Public Health - Mobile County Health Department
Alabama Department of Public Health, Office of Radiation Control
Alabama Department of Transportation, Southwest Region
Alabama Emergency Management Agency
Alabama Forestry Commission, Baldwin County
Alabama Forestry Commission, Mobile County
Alabama Historical Commission
Alabama Soil & Water Conservation Committee
Alabama State Lands Division
Alabama State Port Authority, Board of Directors
Commonwealth of Virginia, Department of Environmental Quality
Commonwealth of Virginia, Department of Historic Resources
Commonwealth of Virginia, Marine Resources Commission
Geological Survey of Alabama
Oregon Department of Agriculture
Oregon Department of Energy
- Nuclear Safety and Emergency Preparedness

Oregon Department of Environmental Quality
Oregon Department of Health, Radiation Protection Services
Oregon Department of State Lands
Oregon Military Department
Oregon Parks & Recreation Department
Oregon Water Resources Department

Pacific States Marine Fisheries Commission
Port of Virginia
South Carolina Department of Health and Environmental Control
Texas Commission on Environmental Quality, Radioactive Materials Division
Texas Department of State Health Service, Radiation Control Program MC 7927
Texas Department of State Health Services, Consumer Protection Division
Texas General Land Division
Texas General Land Office, Coastal Protection Division
Texas Historical Commission
Texas Parks and Wildlife Department
Virginia Department of Environmental Quality
Virginia Department of Health, Office and Radiological Health
Virginia Department of Historic Resources
Virginia Health Department, Office of Drinking Water
Washington Department of Archaeology & Historic Preservation
Washington Department of Ecology, Nuclear Waste Program
Washington Department of Ecology, Richland Nuclear Waste Office
Washington Department of Fish and Wildlife, Region 3
Washington Department of Fish and Wildlife, Region 6
Washington Department of Health, Office of Radiation Protection

Local Elected Officials and Local Agencies

Baldwin County, Alabama
- County Commissioner, District 3
- Highway Department
- Planning & Zoning Department
- Soil & Water Conservation District

Benton County, Washington
Brownsville Fire Department (Texas)
Cameron County, Texas
- County Administrator
- County Commissioner, Precincts 1, 3, 4
- County Judge

City of Bremerton (Washington)
City of Brownsville (Texas)
- City Manager
- Commissioners, Districts 1, 2, 3, 4

City of Daphne (Alabama)
- Building Inspection Department
- Environmental Programs Department

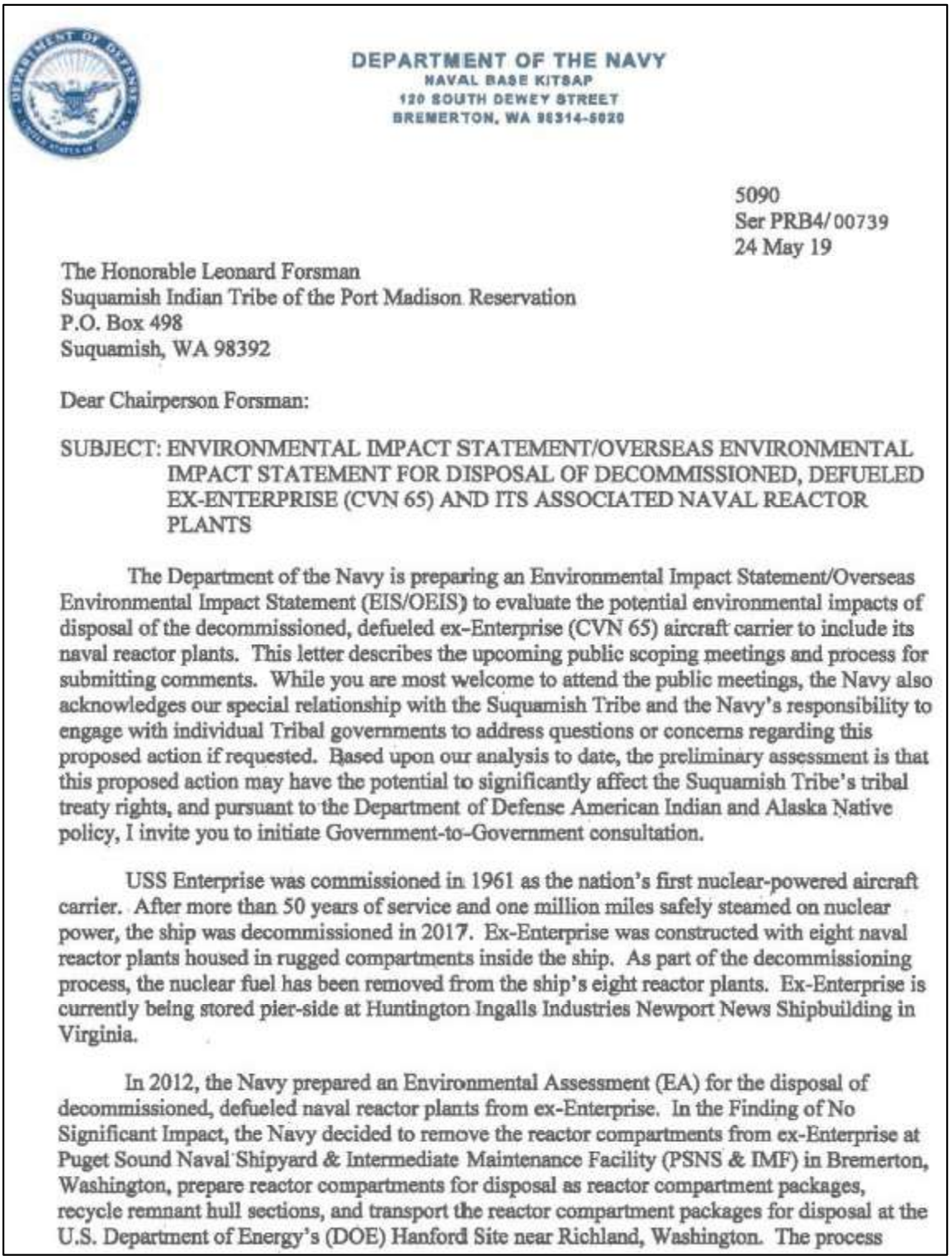
City of Foley (Alabama)
- Wolf Bay Watershed Watch

City of Hampton (Virginia)
- City Manager
- Mayor
- Vice Mayor

City of Gulf Shores (Alabama)
City of Kennewick (Washington)
- Mayor

City of Mobile (Alabama)
- City Councilman, District 2
- Mayor
- Fire and Rescue Department

Parks and Recreation
Public Works
Build Mobile
City of Orange Beach (Alabama)
City of Newport News (Virginia)
Mayor
City of Norfolk (Virginia)
City Manager
Mayor
Public Relations Manager
City of Pasco (Washington)
Mayor
City of Port Orchard (Washington)
Mayor
City of Richland (Washington)
City Manager
Mayor
Mayor Pro Tem
City of South Padre Island (Texas)
City Planner
City of Spanish Fort (Alabama)
Planning Department
Escambia County, Florida
James City County Board of Supervisors (Virginia)
Kitsap County (Washington)
Commissioners, Districts 2, 3
Historic Mobile Preservation Society (Alabama)
Mobile Area Water & Sewer Service (Alabama)
Mobile City Council, District 7 (Alabama)
Mobile County (Alabama)
County Attorney
County Commissioners, Districts 1, 2, 3
Environmental Services
Soil & Water Conservation District
Mobile Historic Development Commission (Alabama)
Multnomah County, Oregon
Port of Benton (Washington)
Port of Brownsville (Texas)
South Alabama Regional Planning Commission
York County Board of Supervisors (Virginia)



DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/00739
24 May 19

The Honorable Leonard Forsman
Suquamish Indian Tribe of the Port Madison Reservation
P.O. Box 498
Suquamish, WA 98392

Dear Chairperson Forsman:

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

The Department of the Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts of disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier to include its naval reactor plants. This letter describes the upcoming public scoping meetings and process for submitting comments. While you are most welcome to attend the public meetings, the Navy also acknowledges our special relationship with the Suquamish Tribe and the Navy's responsibility to engage with individual Tribal governments to address questions or concerns regarding this proposed action if requested. Based upon our analysis to date, the preliminary assessment is that this proposed action may have the potential to significantly affect the Suquamish Tribe's tribal treaty rights, and pursuant to the Department of Defense American Indian and Alaska Native policy, I invite you to initiate Government-to-Government consultation.

USS Enterprise was commissioned in 1961 as the nation's first nuclear-powered aircraft carrier. After more than 50 years of service and one million miles safely steamed on nuclear power, the ship was decommissioned in 2017. Ex-Enterprise was constructed with eight naval reactor plants housed in rugged compartments inside the ship. As part of the decommissioning process, the nuclear fuel has been removed from the ship's eight reactor plants. Ex-Enterprise is currently being stored pier-side at Huntington Ingalls Industries Newport News Shipbuilding in Virginia.

In 2012, the Navy prepared an Environmental Assessment (EA) for the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise. In the Finding of No Significant Impact, the Navy decided to remove the reactor compartments from ex-Enterprise at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, prepare reactor compartments for disposal as reactor compartment packages, recycle remnant hull sections, and transport the reactor compartment packages for disposal at the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. The process

Figure B-1: Tribal Scoping 2019 Notification Letter

described in the 2012 EA is an extension of the established program that has been utilized to safely dispose of 133 naval reactor compartments since 1986.

The Navy has since identified new disposal alternatives that may be more cost-effective and better utilize available resources within the Navy's public shipyards. Therefore, the Navy is preparing this EIS/OEIS to consider these alternatives and potentially others that may be identified during the EIS/OEIS scoping process. The Navy is considering the following preliminary alternatives:

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create eight individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years.

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create four individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years. Each package would contain two of the ship's reactor plants, and thus be larger and heavier than the packages that would be needed to dispose of the eight reactor plants individually.

- Dismantle ex-Enterprise at an authorized commercial ship dismantlement facility including cutting apart the eight reactor plants into segments for packaging into several hundred small containers for subsequent disposal at established DOE or commercial waste facilities.

The Navy will also evaluate the No Action alternative, which involves waterborne storage of ex-Enterprise.

In compliance with the National Environmental Policy Act (NEPA) of 1969, a public scoping period will be held from May 31, 2019 to July 15, 2019. The Navy will conduct open house public scoping meetings to support an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to the proposed action. Four public scoping meetings will be held:

- June 18, 2019 from 5:00 p.m. to 8:00 p.m. at Denbigh Community Center, 15198 Warwick Boulevard, Newport News, VA 23608;
- June 20, 2019 from 5:00 p.m. to 8:00 p.m. at Fort Brown Memorial Center, 600 International Boulevard, Brownsville, TX 78520;
- June 25, 2019 from 5:00 p.m. to 8:00 p.m. at Mountain View Middle School, 2400 Perry Avenue, Bremerton, WA 98310;
- June 27, 2019 from 5:00 p.m. to 8:00 p.m. at Richland Public Library, 955 Northgate Drive, Richland, WA 99352.

2

Figure B-1: Tribal Scoping 2019 Notification Letter (continued)

Should you choose not to initiate Government-to-Government consultations, or in addition to that process, you may provide input on identifying specific issues and concerns that should be through participation in the above-listed public scoping meetings, or by submitting comments online at the Navy's EIS/OEIS project website www.carrierdisposaleis.com. These comments must be received by July 15, 2019. You may submit comments, additional information, and updated contact information to:

Public Affairs Office
Attn: Kellie Randall
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
1400 Farragut Ave.
Bremerton, WA 98314-5001

The DOE is a cooperating agency for this EIS/OEIS. The Navy's Notice of Intent to prepare this EIS/OEIS will be available at the above Navy website as well as the DOE Hanford NEPA website at www.hanford.gov/page.cfm/EnvironmentalImpactStatements. Additional supporting NEPA documents will also be available on the Navy's website, including the 2012 EA for the ex-Enterprise and the 1996 EIS.

I look forward to working with you to provide additional information you may need and address your concerns. Feel free to contact me at (360) 627-4000 (work), (360) 340-6543 (cell), or edward.schrader@navy.mil, or my Environmental Director, Mr. Greg Leicht, (360) 315-5411 or gregory.leicht@navy.mil, with any questions or comments.

Sincerely,

E. A. Schrader
Captain, U.S. Navy
Commanding Officer

3

Figure B-1: Tribal Scoping 2019 Notification Letter (continued)

DEPARTMENT OF THE NAVY
NAVAL NUCLEAR PROPULSION PROGRAM
NAVAL SEA SYSTEMS COMMAND (SEA 08)
1333 ISSAC HULL AVENUE SE
WASHINGTON NAVY YARD DC 20376-8010

24 May 2019

The Honorable Jerome Delvin
Benton County
P.O. Box 190
Prosser, WA 99350

Dear Chairperson Delvin:

The Department of the Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts of disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier to include its naval reactor plants. This letter describes the upcoming public scoping meetings and process for submitting comments. The Navy is requesting your comments on the scope, content, and issues to be considered during the development of the EIS/OEIS.

USS Enterprise was commissioned in 1961 as the nation's first nuclear-powered aircraft carrier. After more than 50 years of service and one million miles safely steamed on nuclear power, the ship was decommissioned in 2017. Ex-Enterprise was constructed with eight naval reactor plants housed in rugged compartments inside the ship. As part of the decommissioning process, the nuclear fuel has been removed from the ship's eight reactor plants. Ex-Enterprise is currently being stored pier-side at Huntington Ingalls Industries Newport News Shipbuilding.

In 2012, the Navy prepared an Environmental Assessment (EA) for the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise. In the Finding of No Significant Impact, the Navy decided to remove the reactor compartments from ex-Enterprise at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, prepare the reactor compartments for disposal as reactor compartment packages, recycle remnant hull sections, and transport the reactor compartment packages for disposal at the U.S. Department of Energy (DOE) Hanford Site near Richland, Washington. The process described in the 2012 EA is an extension of the established program that has been utilized to safely dispose of 133 naval reactor compartments since 1986.

The Navy has since identified new disposal alternatives that may be more cost-effective and better utilize available resources within the Navy's public shipyards. Therefore, the Navy is preparing this EIS/OEIS to consider these alternatives and potentially others that may be identified during the EIS/OEIS scoping process. The Navy is considering the following preliminary alternatives:

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing

Figure B-2: Stakeholder Scoping 2019 Notification Letter (English)

and disposal. PSNS & IMF would create eight individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years.

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create four individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years. Each package would contain two of the ship's reactor plants, and thus be larger and heavier than the packages that would be needed to dispose of eight reactor plants individually.

- Dismantle ex-Enterprise at an authorized commercial ship dismantlement facility, including cutting apart the eight reactor plants into segments for packaging into several hundred small containers for subsequent disposal at established DOE or commercial waste facilities.

The Navy will also evaluate the No Action alternative, which involves waterborne storage of ex-Enterprise.

In compliance with the National Environmental Policy Act (NEPA) of 1969, a public scoping period will be held from May 31, 2019 to July 15, 2019. The Navy will conduct open house public scoping meetings to support an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to the proposed action. Four public scoping meetings will be held:

- June 18, 2019 from 5:00 p.m. to 8:00 p.m. at the Denbigh Community Center, 15198 Warwick Boulevard, Newport News, VA 23608;

- June 20, 2019 from 5:00 p.m. to 8:00 p.m. at Fort Brown Memorial Center, 600 International Boulevard, Brownsville, TX 78520;

- June 25, 2019 from 5:00 p.m. to 8:00 p.m. at Mountain View Middle School, 2400 Perry Avenue, Bremerton, WA 98310;

- June 27, 2019 from 5:00 p.m. to 8:00 p.m. at Richland Public Library, 955 Northgate Drive, Richland, WA 99352.

Your input in identifying the specific issues and concerns that should be assessed is important to the process. Regardless of whether you are able to participate in the public scoping meetings, you may submit comments, additional information, and any updated contact information to:

2

Figure B-2: Stakeholder Scoping 2019 Notification Letter (English) (continued)

Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Avenue, Stop 2072
Bremerton, WA 98314-2072

You may also submit comments online at the Navy's EIS/OEIS project website www.CarrierDisposalEIS.com. To be considered for the Draft EIS/OEIS, the Navy must receive comments by July 15, 2019.

The DOE is a cooperating agency for this EIS/OEIS. The Navy's Notice of Intent to prepare this EIS/OEIS will be available at the above Navy website as well as the DOE Hanford NEPA website at www.hanford.gov/page.cfm/EnvironmentalImpactStatements. Additional supporting NEPA documents will also be available on the Navy's website, including the 2012 EA for the ex-Enterprise and the 1996 EIS.

I look forward to working with you to provide additional information you may need and address your concerns. Feel free to contact Kellie Randall, Public Affairs Officer, PSNS & IMF, at (360) 476-7111 with any questions or comments.

Sincerely,

J. M. AVERY
Director, Regulatory Affairs Division
Naval Nuclear Propulsion Program/
Naval Reactors

3

Figure B-2: Stakeholder Scoping 2019 Notification Letter (English) (continued)

DEPARTMENT OF THE NAVY
NAVAL NUCLEAR PROPULSION PROGRAM
NAVAL SEA SYSTEMS COMMAND (SEA 08)
1333 ISSAC HULL AVENUE SE
WASHINGTON NAVY YARD DC 20376-8010

24 de mayo de 2019

El Departamento de la Armada de los Estados Unidos está preparando una Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS, por sus siglas en inglés) para evaluar los posibles impactos ambientales resultantes de la eliminación del ex-Enterprise decomisionado y sin combustible nuclear (CVN 65) para incluir sus plantas navales de reactores asociadas. Esta carta describe las próximas reuniones públicas de determinación del alcance del EIS/OEIS y el proceso de presentación de comentarios. La Armada está solicitando sus comentarios sobre el alcance, el contenido y los asuntos que se considerarán durante el desarrollo del EIS/OEIS.

USS Enterprise fue comisionado en 1961 como el primer portaaviones de propulsión nuclear del país. Después de más de 50 años de servicio y un millón de millas impulsadas de manera segura con energía nuclear, el barco fue decomisionado en 2017. El ex -Enterprise se construyó con ocho plantas de reactores navales ubicadas en compartimentos resistentes dentro del barco. Como parte del proceso de decomisionamiento, el combustible nuclear ha sido retirado de las ocho plantas de reactores del barco. Actualmente, el ex -Enterprise está almacenado en el muelle de Huntington Ingalls Industries Newport News Shipbuilding.

En 2012, la Armada preparó una Evaluación Ambiental (EA, por sus siglas en inglés) para la eliminación de las plantas navales de reactores desarmadas y sin combustible nuclear del ex- Enterprise. Después de obtener un Resultado de Ningún Impacto Significativo (FONSI, por sus siglas en inglés), la Armada decidió remover los compartimentos del reactor del ex-Enterprise en el Astillero Naval de Puget Sound y la Instalación de Mantenimiento Intermedio (PSNS e IMF, por sus siglas en inglés) en Bremerton, Washington, preparar los compartimentos del reactor para su eliminación en paquetes de eliminación para los compartimentos de reactor, reciclar las secciones del casco remanente, y transportar los paquetes de eliminación para los compartimentos de reactor al Sitio Hanford del Departamento de Energía de los Estados Unidos (DOE, por sus siglas en inglés) cerca de Richland, Washington. El proceso descrito en la EA de 2012 es una extensión del programa establecido que se ha utilizado para eliminar de forma segura los 133 compartimentos de los reactores navales desde 1986.

Desde entonces, la Armada ha identificado nuevas alternativas de eliminación que pueden ser más rentables y utilizar mejor los recursos disponibles en los astilleros navales públicos de la Armada. Por lo tanto, la Armada está preparando esta EIS/OEIS para considerar estas alternativas y otras posibles que puedan identificarse durante el proceso de alcance de la EIS/OEIS. La Armada está considerando las siguientes alternativas preliminares:

- Desmantelar parcialmente el ex-Enterprise en una instalación comercial de eliminación retirando partes del barco fuera de los compartimientos del reactor naval. El resto del barco que contiene los compartimientos del reactor naval se transportarían luego al PSNS e IMF para su procesamiento y eliminación. PSNS e IMF crearían ocho paquetes individuales de compartimientos de reactores para su eliminación en el Sitio de Hanford

Figure B-3: Stakeholder Scoping 2019 Notification Letter (Spanish)

del DOE, utilizando el programa establecido que ha eliminado exitosamente los compartimientos de reactores navales durante más de 30 años.

- Desmantelar parcialmente el ex-Enterprise en una instalación comercial de eliminación retirando partes del barco fuera de los compartimientos del reactor naval. El resto del barco que contiene los compartimientos del reactor naval se transportaría luego al PSNS e IMF para su procesamiento y eliminación. PSNS e IMF crearían cuatro paquetes individuales de compartimientos de reactores para su eliminación en el Sitio de Hanford del DOE, utilizando el programa establecido que ha eliminado exitosamente los compartimientos de reactores navales durante más de 30 años. Cada paquete contendría dos de las plantas de reactores del barco, y por lo tanto sería más grande y más pesados que los paquetes que se necesitarían para la eliminación individual de ocho plantas de reactores.

- Desmantelar el ex -Enterprise en una instalación comercial de desmantelamiento de barcos, incluyendo la separación de las ocho plantas de reactores en segmentos para ser empaquetados en varios cientos de pequeños contenedores para su posterior eliminación en instalaciones establecidas del DOE o instalaciones comerciales de desechos.

La Armada también evaluará la alternativa de "no acción", que implica el almacenamiento en el agua del ex -Enterprise.

De conformidad con la Acta de política nacional del medioambiente (NEPA, por sus siglas en inglés) de 1969, se llevará a cabo un periodo de alcance público desde el 31 de mayo de 2019 hasta el 15 de julio de 2019. La Armada llevará a cabo reuniones públicas tipo casa abierta para la determinación de alcance del EIS/OEIS para apoyar un proceso inicial abierto para determinar el alcance de los asuntos que se abordarán, así como para identificar asuntos importantes relacionados con la acción propuesta. Se llevarán a cabo cuatro reuniones públicas para el alcance del EIS/OEIS:

- 18 de junio de 2019 de 5:00 p.m. a 8:00 p.m. en Denbigh Community Center, 15198 Warwick Boulevard, Newport News, VA 23608;

- 20 de junio de 2019 de 5:00 p.m. a 8:00 p.m. en Fort Brown Memorial Center, 600 International Boulevard, Brownsville, TX 78520;

- 25 de junio de 2019 de 5:00 p.m. a 8:00 p.m. en Mountain View Middle School, 2400 Perry Avenue, Bremerton, WA 98310;

- 27 de junio de 2019 de 5:00 p.m. a 8:00 p.m. en Richland Public Library, 955 Northgate Drive, Richland, WA 99352.

Sus comentarios identificando específicamente los asuntos e inquietudes que se deben evaluar son importantes para el proceso. Independientemente de si puede participar en las reuniones públicas, puede enviar sus comentarios, información adicional y cualquier información de contacto actualizada a:

Figure B-3: Stakeholder Scoping 2019 Notification Letter (Spanish) (continued)

Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Avenue, Stop 2072
Bremerton, WA 98314-2072

También puede enviar sus comentarios en línea en el sitio web del proyecto de la EIS/OEIS de la Armada en www.CarrierDisposalEIS.com. Para que sus comentarios sean considerados para la elaboración del Borrador de la EIS/OEIS, la Armada debe recibir sus comentarios a más tardar el 15 de julio de 2019.

El DOE es una agencia cooperante en la elaboración de esta EIS/OEIS. El Aviso de Intención de la Armada para la preparación de esta EIS/OEIS estará disponible en el sitio web de la Armada indicado anteriormente, así como en el sitio web de la NEPA del DOE de Hanford en www.hanford.gov/page.cfm/EnvironmentalImpactStatements. Los documentos adicionales relativos a la NEPA también estarán disponibles en el sitio web de la Armada, incluyendo la EA de 2012 del ex-Enterprise y la EIS de 1996.

Espero trabajar con usted para proporcionarle la información adicional que pueda necesitar y responder a sus inquietudes. No dude en comunicarse con Kellie Randall, la Oficial de Asuntos Públicos de PSNS e IMF, llamando al (360) 476-7111 si tiene alguna pregunta o comentario.

Atentamente,

J. M. AVERY
El Director, División de Asuntos Regulatorios
Programa Naval de Propulsión Nuclear/
Reactores Navales

3

Figure B-3: Stakeholder Scoping 2019 Notification Letter (Spanish) (continued)

Subject: NSO/ex-Enterprise EIS/OEIS
Attachments: 008-19 Navy to prepare an Environmental Impact Statement - Overseas Environmental Impact Statement.pdf
NWNavyChallengePackage-190531.pdf

Good morning. First, thanks to those of you that were able to come to the Naval Special Operations (NSO) demonstration last week. Hopefully, that was helpful and gave you some idea of the training the Navy Seals have been doing in Washington State and around Puget Sound. I wanted to let you know there will be one more demo on June 12th, at 1:30 p.m. for those of you that missed last week's demo due to scheduling conflicts, but have an interest and would like to attend next week on the 12th. Please let me know as soon as possible.

On a different note, the Navy is preparing to evaluate the potential environmental impacts associated with the disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier, including its naval reactor plants by preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). I wanted to forward a copy of the press release sent to the media for your information and awareness. I am also forwarding the most current version of the Challenge Package. The Challenge Package has background and talking points on some of the Navy projects. This document provides information for your awareness and to help you to answer any questions you may get from your constituents - or you can always give me a call if you like.

If you ever have any questions or concerns, please give me a call.

Very Respectfully, Sheila

Sheila Murray
Navy Region Northwest Deputy Public Affairs
1100 Hunley RD, Silverdale, WA 98315
(360) 396-4981 (D),(360) 340-5398 (C)

Figure B-4: Email Notification 2019

DEPARTMENT OF THE NAVY
NAVAL NUCLEAR PROPULSION PROGRAM
NAVAL SEA SYSTEMS COMMAND (SEA 08)
1333 ISSAC HULL AVENUE SE
WASHINGTON NAVY YARD DC 20376-8010

August 10, 2020

The Honorable Stephanie A. Bryan
Poarch Band of Creek Indians
5811 Jack Springs Rd.
Atmore, AL 36502

Dear Chairperson Bryan:

The Department of the Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts of disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier and its associated naval reactor plants. This letter describes how you can receive additional information and the process for submitting comments on the scope of the analysis, including potential viable alternatives and environmental issues for analysis in the Draft EIS/OEIS. The Navy also acknowledges our special relationship with Native American Tribes and the responsibility to engage with individual tribal governments to address questions or concerns regarding this proposed action if requested. Based upon our analysis to date, the Navy does not believe the proposed action has the potential to significantly affect tribal rights or protected resources.

USS Enterprise was commissioned in 1961 as the nation's first nuclear-powered aircraft carrier. After more than 50 years of service and one million miles safely steamed on nuclear power, the ship was decommissioned in 2017. Ex-Enterprise was constructed with eight naval reactor plants housed in rugged compartments inside the ship. As part of the decommissioning process, the nuclear fuel has been removed from the ship's eight reactor plants. Ex-Enterprise is currently being stored pier-side at Huntington Ingalls Industries Newport News Shipbuilding in Virginia.

In 2012, the Navy prepared an Environmental Assessment (EA) for the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise. In the Finding of No Significant Impact, the Navy decided to remove the reactor compartments from ex-Enterprise at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, prepare reactor compartments for disposal as reactor compartment packages, recycle remnant hull sections, and transport the reactor compartment packages for disposal at the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. The process described in the 2012 EA is an extension of the established program that has been utilized to safely dispose of 135 naval reactor compartments since 1986.

The Navy has since identified new disposal alternatives that may be more cost-effective and better utilize available resources within the Navy's public shipyards. Therefore, the Navy is preparing this EIS/OEIS to consider these alternatives and potentially others that may be

Figure B-5: Tribal Scoping 2020 Notification Letter

identified during the EIS/OEIS scoping process. The Navy is considering the following preliminary alternatives:

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create eight individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years.

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create four individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years. Each package would contain two of the ship's reactor plants, and thus be larger and heavier than the packages that would be needed to dispose of the eight reactor plants individually.

- Dismantle ex-Enterprise at an authorized commercial ship dismantlement facility including cutting apart the eight reactor plants into segments for packaging into several hundred small containers for subsequent disposal at established DOE or commercial waste facilities.

The Navy will also evaluate a No Action alternative, which involves waterborne storage of ex-Enterprise.

As a result of comments received during public scoping conducted in 2019, the Navy has added the Mobile, Alabama area to the area of study for this EIS/OEIS. In compliance with the National Environmental Policy Act (NEPA) of 1969, an additional public scoping period will be held from August 12, 2020 to September 11, 2020 to support an early and open process for determining the scope of issues to be addressed and identifying significant issues related to the proposed action. You may learn more about the project in the enclosed fact sheet and at the project's website, www.CarrierDisposalEIS.com. Due to current federal and state guidance and measures put in place in response to COVID-19, the Navy is unable to hold an in-person public scoping meeting in Mobile, Alabama. To assist the public in determining whether to submit a formal comment on the project, the Navy will respond to questions from the public from August 19, 2020 to September 2, 2020. During this period, the public may submit questions to the Navy about the proposed action at info@carrierdisposaleis.com. Public meetings are expected to be held after the release of the Draft EIS/OEIS next year.

Your input in identifying the specific issues and concerns that should be assessed is important to the process. You may provide input by submitting comments by mail or online at the Navy's EIS/OEIS project website www.CarrierDisposalEIS.com. These comments must be received by September 11, 2020 for consideration in the Draft EIS/OEIS. You may submit comments, additional information, and updated contact information to:

2

Figure B-5: Tribal Scoping 2020 Notification Letter (continued)

Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Avenue, Stop 2072
Bremerton, WA 98314-2072

If you desire to initiate Government-to-Government consultation, please forward the name(s), title(s), and contact information for your point(s) of contact so my staff can coordinate our consultation with you.

The DOE is a cooperating agency for this EIS/OEIS. The Navy's Notice of Intent to prepare this EIS/OEIS is available at the above Navy website as well as the DOE Hanford NEPA website at www.hanford.gov/page.cfm/EnvironmentalImpactStatements. Additional supporting NEPA documents are also available on the Navy's website, including the 2012 EA for the ex-Enterprise and the 1996 EIS.

I look forward to working with you to provide additional information you may need and address your concerns. Please contact the Navy Region Southeast On-Scene Coordinator Representative, John Baxter, at (904) 942-2282 with any questions or comments.

Sincerely,

J. M. AVERY
Director, Regulatory Affairs Division
Naval Nuclear Propulsion Program/
Naval Reactors

3

Figure B-5: Tribal Scoping 2020 Notification Letter (continued)

DEPARTMENT OF THE NAVY
NAVAL NUCLEAR PROPULSION PROGRAM
NAVAL SEA SYSTEMS COMMAND (SEA 08)
1240 ISAAC HULL AVENUE SE
WASHINGTON NAVY YARD DC 20376-8010

5090
Ser 08ADM/0[illegible]
August 5, 2020

The Honorable Richard Shelby
U.S. Senate, State of Alabama
304 Russell Senate Office Bldg.
Washington, DC 20510

Dear Senator Shelby:

The Department of the Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts of disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier and its associated naval reactor plants. This letter describes how you can receive additional information and the process for submitting comments on the scope of the analysis, including potential viable alternatives and environmental issues for analysis in the Draft EIS/OEIS. We wish to continue our direct relationship with you and address any questions or concerns you may have with this proposed action.

USS Enterprise was commissioned in 1961 as the nation's first nuclear-powered aircraft carrier. After more than 50 years of service and one million miles safely steamed on nuclear power, the ship was decommissioned in 2017. Ex-Enterprise was constructed with eight naval reactor plants housed in rugged compartments inside the ship. As part of the decommissioning process, the nuclear fuel has been removed from the ship's eight reactor plants. Ex-Enterprise is currently being stored pier-side at Huntington Ingalls Industries Newport News Shipbuilding in Virginia.

In 2012, the Navy prepared an Environmental Assessment (EA) for the disposal of decommissioned, defueled naval reactor plants from ex-Enterprise. In the Finding of No Significant Impact, the Navy decided to remove the reactor compartments from ex-Enterprise at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Washington, prepare the reactor compartments for disposal as reactor compartment packages, recycle remnant hull sections, and transport the reactor compartment packages for disposal at the U.S. Department of Energy (DOE) Hanford Site near Richland, Washington. The process described in the 2012 EA is an extension of the established program that has been utilized to safely dispose of 135 naval reactor compartments since 1986.

The Navy has since identified new disposal alternatives that may be more cost-effective and better utilize available resources within the Navy's public shipyards. Therefore, the Navy is preparing this EIS/OEIS to consider these alternatives and potentially others that may be identified during the EIS/OEIS scoping process. The Navy is considering the following preliminary alternatives:

Figure B-6: Stakeholder Scoping 2020 Notification Letter (English)

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create eight individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years.

- Partially dismantle ex-Enterprise at a commercial disposal facility by removing areas of the ship outside of the naval reactor compartments. The remainder of the ship containing the naval reactor compartments would then be transported to PSNS & IMF for processing and disposal. PSNS & IMF would create four individual reactor compartment packages for disposal at the DOE Hanford Site, using the established program that has successfully disposed of naval reactor compartments for over 30 years. Each package would contain two of the ship's reactor plants, and thus be larger and heavier than the packages that would be needed to dispose of the eight reactor plants individually.

- Dismantle ex-Enterprise at an authorized commercial ship dismantlement facility, including cutting apart the eight reactor plants into segments for packaging into several hundred small containers for subsequent disposal at established DOE or commercial waste facilities.

The Navy will also evaluate a No Action alternative, which involves waterborne storage of ex-Enterprise.

As a result of comments received during public scoping conducted in 2019, the Navy has added the Mobile, Alabama area to the area of study for this EIS/OEIS. In compliance with the National Environmental Policy Act (NEPA) of 1969, an additional public scoping period will be held from August 12, 2020 to September 11, 2020 to support an early and open process for determining the scope of issues to be addressed and identifying significant issues related to the proposed action. You may learn more about the project in the enclosed fact sheet and at the project's website, www.CarrierDisposalEIS.com. Due to current federal and state guidance and measures put in place in response to COVID-19, the Navy is unable to hold an in-person public scoping meeting in Mobile, Alabama. To assist the public in determining whether to submit a formal comment on the project, the Navy will respond to questions from the public from August 19, 2020 to September 2, 2020. During this period, the public may submit questions to the Navy about the proposed action at info@carrierdisposaleis.com. Public meetings are expected to be held after the release of the Draft EIS/OEIS next year.

Your input in identifying the specific issues and concerns that should be assessed is important to the process. You may submit comments, additional information, and any updated contact information to:

2

Figure B-6: Stakeholder Scoping 2020 Notification Letter (English) (continued)

Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Avenue, Stop 2072
Bremerton, WA 98314-2072

You may also submit comments online at the Navy's EIS/OEIS project website www.CarrierDisposalEIS.com. To be considered for the Draft EIS/OEIS, the Navy must receive comments by September 11, 2020.

The DOE is a cooperating agency for this EIS/OEIS. The Navy's Notice of Intent to prepare this EIS/OEIS is available at the above Navy website as well as the DOE Hanford NEPA website at www.hanford.gov/page.cfm/EnvironmentalImpactStatements. Additional supporting NEPA documents are also available on the Navy's website, including the 2012 EA for the ex-Enterprise and the 1996 EIS.

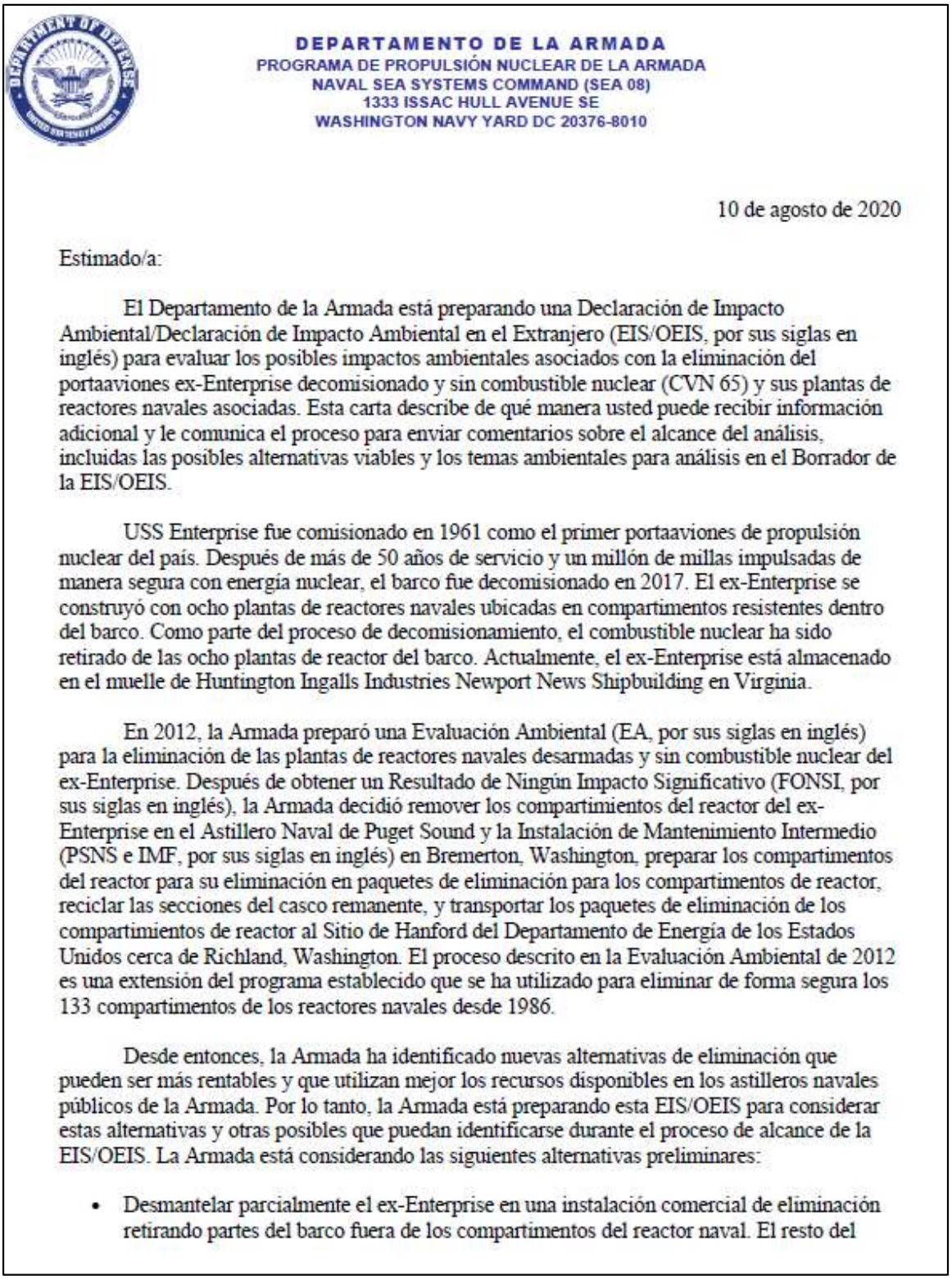
I look forward to working with you to provide additional information you may need and address your concerns. Feel free to contact me or Mr. Neil Lapointe at (202) 781-5805 with any questions or comments.

Very Respectfully,

J. F. CALDWELL, JR.
Admiral, U.S. Navy

3

Figure B-6: Stakeholder Scoping 2020 Notification Letter (English) (continued)



DEPARTAMENTO DE LA ARMADA
PROGRAMA DE PROPULSIÓN NUCLEAR DE LA ARMADA
NAVAL SEA SYSTEMS COMMAND (SEA 08)
1333 ISSAC HULL AVENUE SE
WASHINGTON NAVY YARD DC 20376-8010

10 de agosto de 2020

Estimado/a:

El Departamento de la Armada está preparando una Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS, por sus siglas en inglés) para evaluar los posibles impactos ambientales asociados con la eliminación del portaaviones ex-Enterprise decomisionado y sin combustible nuclear (CVN 65) y sus plantas de reactores navales asociadas. Esta carta describe de qué manera usted puede recibir información adicional y le comunica el proceso para enviar comentarios sobre el alcance del análisis, incluidas las posibles alternativas viables y los temas ambientales para análisis en el Borrador de la EIS/OEIS.

USS Enterprise fue comisionado en 1961 como el primer portaaviones de propulsión nuclear del país. Después de más de 50 años de servicio y un millón de millas impulsadas de manera segura con energía nuclear, el barco fue decomisionado en 2017. El ex-Enterprise se construyó con ocho plantas de reactores navales ubicadas en compartimentos resistentes dentro del barco. Como parte del proceso de decomisionamiento, el combustible nuclear ha sido retirado de las ocho plantas de reactor del barco. Actualmente, el ex-Enterprise está almacenado en el muelle de Huntington Ingalls Industries Newport News Shipbuilding en Virginia.

En 2012, la Armada preparó una Evaluación Ambiental (EA, por sus siglas en inglés) para la eliminación de las plantas de reactores navales desarmadas y sin combustible nuclear del ex-Enterprise. Después de obtener un Resultado de Ningún Impacto Significativo (FONSI, por sus siglas en inglés), la Armada decidió remover los compartimientos del reactor del ex-Enterprise en el Astillero Naval de Puget Sound y la Instalación de Mantenimiento Intermedio (PSNS e IMF, por sus siglas en inglés) en Bremerton, Washington, preparar los compartimentos del reactor para su eliminación en paquetes de eliminación para los compartimentos de reactor, reciclar las secciones del casco remanente, y transportar los paquetes de eliminación de los compartimientos de reactor al Sitio de Hanford del Departamento de Energía de los Estados Unidos cerca de Richland, Washington. El proceso descrito en la Evaluación Ambiental de 2012 es una extensión del programa establecido que se ha utilizado para eliminar de forma segura los 133 compartimentos de los reactores navales desde 1986.

Desde entonces, la Armada ha identificado nuevas alternativas de eliminación que pueden ser más rentables y que utilizan mejor los recursos disponibles en los astilleros navales públicos de la Armada. Por lo tanto, la Armada está preparando esta EIS/OEIS para considerar estas alternativas y otras posibles que puedan identificarse durante el proceso de alcance de la EIS/OEIS. La Armada está considerando las siguientes alternativas preliminares:

- Desmantelar parcialmente el ex-Enterprise en una instalación comercial de eliminación retirando partes del barco fuera de los compartimentos del reactor naval. El resto del

Figure B-7: Stakeholder Scoping 2020 Notification Letter (Spanish)

barco que contiene los compartimientos del reactor naval se transportarían luego al PSNS e IMF para su procesamiento y eliminación. PSNS e IMF crearían ocho paquetes individuales de compartimientos de reactores para su eliminación en el Sitio de Hanford del Departamento de Energía de los Estados Unidos, utilizando el programa establecido que se ha utilizado para eliminar exitosamente los compartimientos de reactores navales durante más de 30 años.

- Desmantelar parcialmente el ex-Enterprise en una instalación comercial de eliminación retirando partes del barco fuera de los compartimentos del reactor naval. El resto del barco que contiene los compartimientos del reactor naval se transportarían luego al PSNS e IMF para su procesamiento y eliminación. PSNS e IMF crearían cuatro paquetes individuales de compartimientos de reactores para su eliminación en el Sitio de Hanford del Departamento de Energía de los Estados Unidos, utilizando el programa establecido que se ha utilizado para eliminar exitosamente los compartimientos de reactores navales durante más de 30 años. Cada paquete contendría dos de las plantas de reactor del barco, y por lo tanto sería más grande y más pesado que los paquetes que se necesitarían para la eliminación individual de ocho plantas de reactor.

- Desmantelar el ex-Enterprise en una instalación comercial de desmantelamiento de barcos, incluyendo la separación de las ocho plantas de reactores en segmentos para ser empaquetados en varios cientos de pequeños contenedores para su posterior eliminación en instalaciones establecidas de desechos del Departamento de Energía de los Estados Unidos o en instalaciones de desechos comerciales.

La Armada también evaluará la alternativa de No Acción, que implica el almacenamiento a base de agua del ex-Enterprise.

Como resultado de los comentarios recibidos durante la determinación pública del alcance realizada en 2019, la Armada ha incorporado al área de Mobile, Alabama, al área de estudio para esta EIS/OEIS. En cumplimiento de la Ley de política nacional del medioambiente (NEPA, por sus siglas in inglés) de 1969, se abrirá un período adicional de determinación pública del alcance desde el 12 de agosto de 2020 hasta el 11 de septiembre de 2020 para dar lugar a un proceso abierto que se realiza de manera temprana para determinar el alcance de los temas que se deben abordar e identificar los temas significativos relacionados con la acción propuesta. Puede obtener más información sobre el proyecto a través de la ficha técnica y en el sitio web del proyecto, en www.CarrierDisposalEIS.com. Debido a las actuales indicaciones y medidas implementadas a nivel federal y estatal por causa de la COVID-19, la Armada no puede realizar una reunión presencial de determinación pública del alcance en Mobile, Alabama. Para ayudar al público a determinar si corresponde enviar un comentario formal sobre el proyecto, la Armada responderá a las preguntas del público desde el 19 de agosto de 2020 hasta el 2 de septiembre de 2020. Durante este período, el público puede enviar preguntas a la Armada sobre la acción propuesta a la siguiente dirección: info@CarrierDisposalEIS.com. Se espera que las reuniones públicas se realicen después de la publicación del Borrador de la EIS/OEIS el próximo año.

2

Figure B-7: Stakeholder Scoping 2020 Notification Letter (Spanish) (continued)

Sus comentarios para identificar los temas e inquietudes específicos que deben analizarse son importantes para el proceso. Puede enviar comentarios, información adicional y cualquier información de contacto actualizada a:

Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Avenue, Stop 2072
Bremerton, WA 98314-2072

También puede enviar sus comentarios en línea en el sitio web del proyecto de la EIS/OEIS de la Armada en www.CarrierDisposalEIS.com. Para ser considerado para el Borrador de la EIS/OEIS, la Armada tiene que recibir los comentarios a más tardar el 11 de septiembre de 2020.

El Departamento de Energía de los Estados Unidos es una agencia cooperante en la preparación de esta EIS/OEIS. El Aviso de Intención de preparación de esta EIS/OEIS de la Armada se encuentra disponible en el sitio web de la Armada mencionado arriba así como en el sitio web de Hanford del Departamento de Energía de los Estados Unidos NEPA, en www.hanford.gov/page.cfm/EnvironmentalImpactStatements. También puede encontrar documentos de apoyo adicionales relacionados con la NEPA en el sitio web de la Armada, incluida la Evaluación Ambiental de 2012 del ex-Enterprise y la EIS de 1996.

Espero trabajar con usted para proporcionarle información adicional que pudiera necesitar y abordar sus inquietudes. Si tiene preguntas o comentarios, no dude en comunicarse con la Sra. Kellie Randall, Oficial de Asuntos Públicos, PSNS e IMF, llamando al (360) 476-7111.

Atentamente,

J. M. AVERY
Director de la División de Asuntos Regulatorios
Programa de Propulsión Nuclear Naval/Reactores Navales

3

Figure B-7: Stakeholder Scoping 2020 Notification Letter (Spanish) (continued)

B.2.1.2 Postcard Mailers

A postcard was mailed first-class to 455 tribal staff, media outlets, nongovernmental organizations, and individuals on May 30, 2019. For the reopened scoping period, a postcard was sent on August 10, 2020, to 116 tribal staff, media outlets, nongovernmental organizations, and individuals in the Mobile, Alabama area. The English and Spanish-versions of the postcard mailers were made available on the project website and are shown in Figure B-8, Figure B-9, Figure B-10, and Figure B-11.

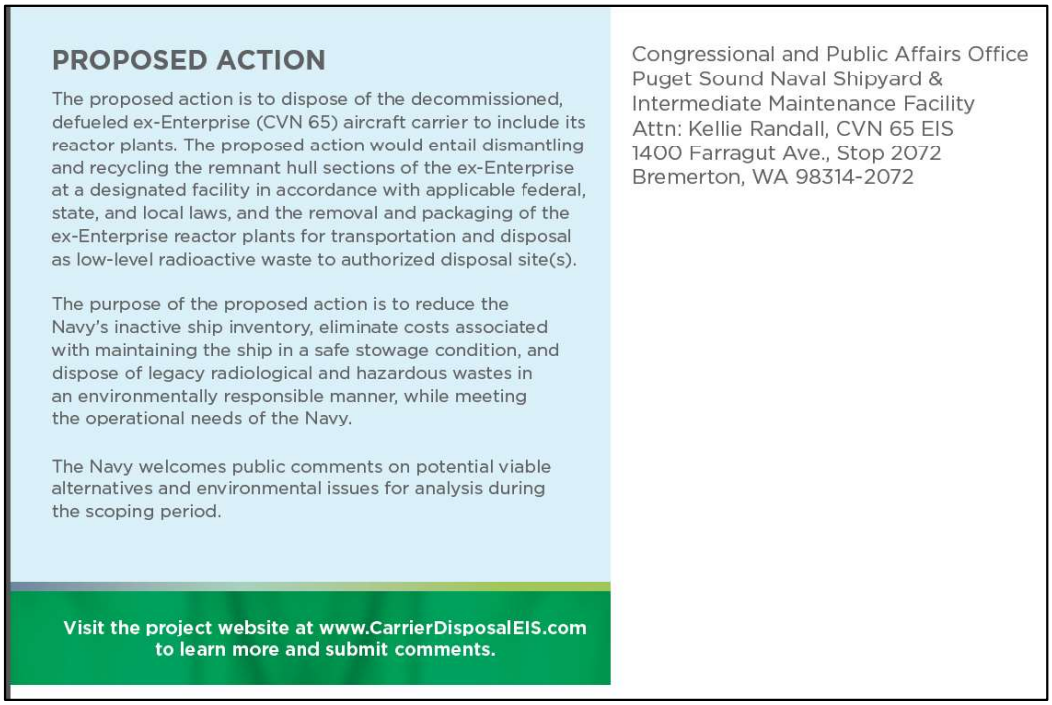
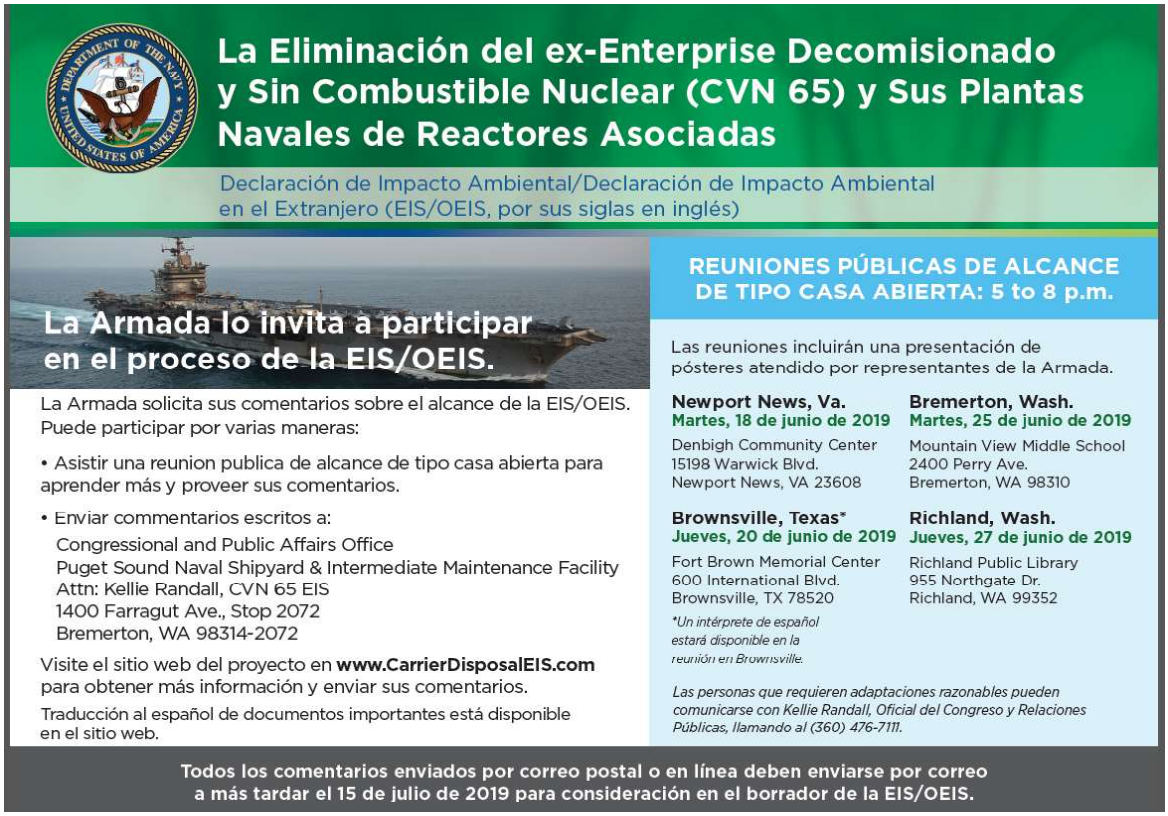


Figure B-8: Postcard Mailer for 2019 Scoping (English) (Front and Back)



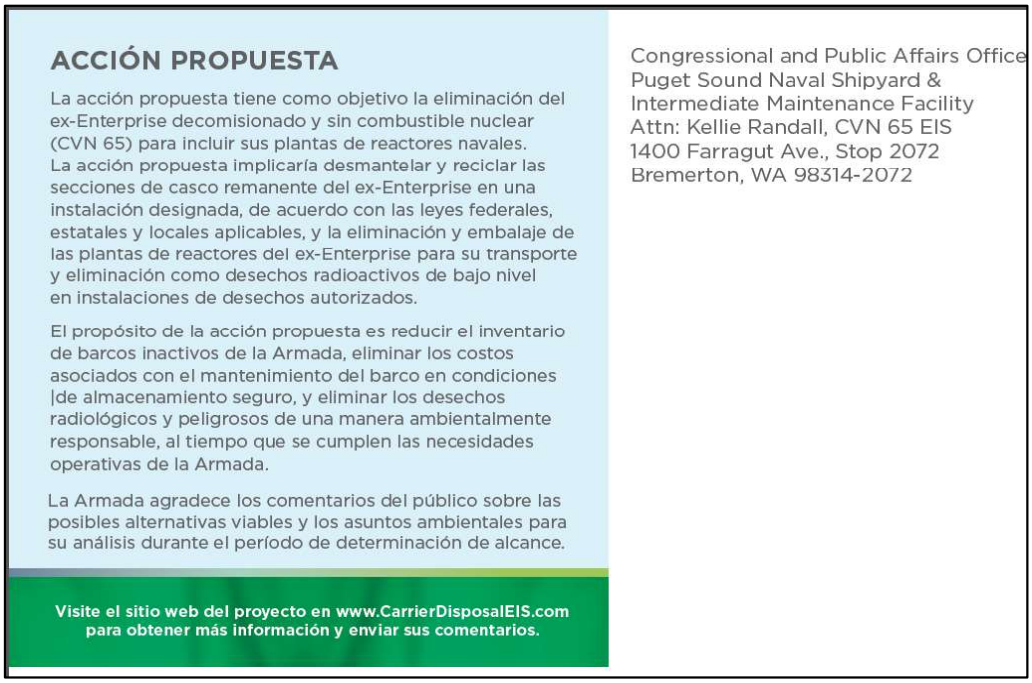


Figure B-9: Postcard Mailer for 2019 Scoping (Spanish) (Front and Back)

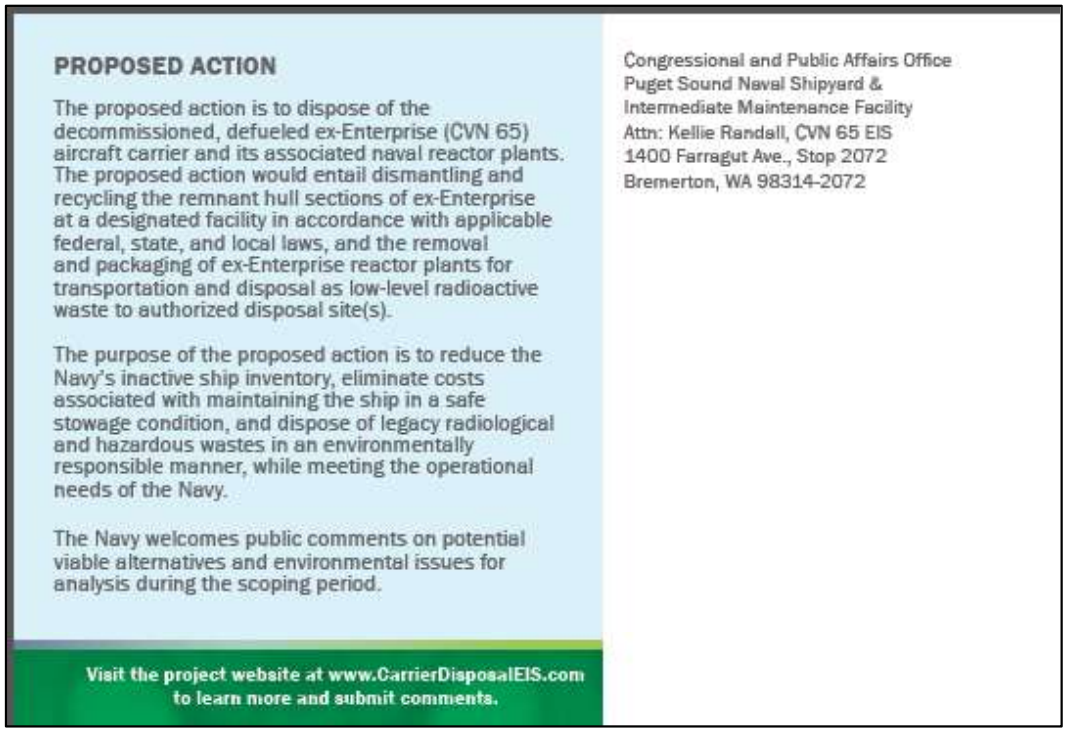


Figure B-10: Postcard Mailer for 2020 Scoping (English) (Front and Back)

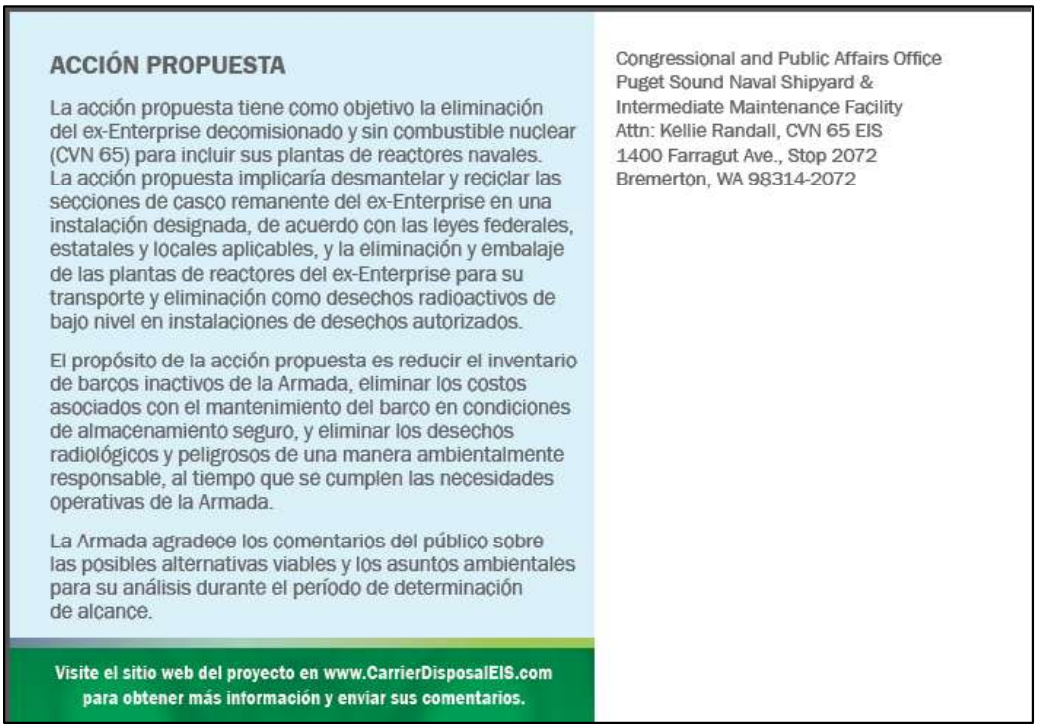


Figure B-11: Postcard Mailer for 2020 Scoping (Spanish) (Front and Back)

B.2.1.3 Newspaper Advertisements

The Navy published display advertisements in local and regional newspapers to announce the 2019 and 2020 scoping periods, the 2019 scoping meetings, and the public's opportunity to comment on the scope of the analysis. The advertisements included a brief description of the Proposed Action; dates, times, and locations of the scoping meetings, the project website address, the duration of the comment period, and information on how to provide comments. The newspapers and publication dates are indicated in Table B-2. An example of the announcement in English and Spanish are shown in Figure B-12, Figure B-13, Figure B-14, and Figure B-15.

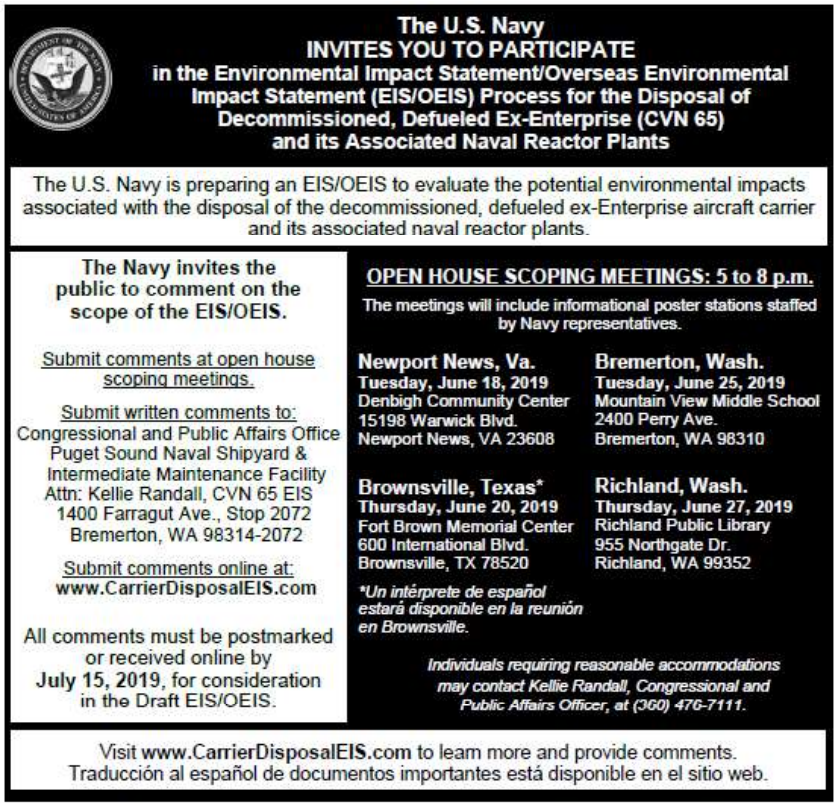
Table B-2: Newspaper Publications During 2019 and 2020 Scoping Phases

Newspaper	Newspaper Coverage	Publication Dates
The Virginia-Pilot	Norfolk, VA	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Monday, June 10, 2019 Saturday, June 15, 2019
The Daily Press	Norfolk, VA	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 8, 2019 Saturday, June 15, 2019
Augusta Chronicle	Richmond and Columbia counties, GA; Aiken County, SC	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 8, 2019 Saturday, June 15, 2019
Aiken Standard	Aiken County, SC	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 8, 2019 Saturday, June 15, 2019
Brownsville Herald	Brownsville, TX	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Monday, June 10, 2019 Tuesday, June 18, 2019
El Nuevo Heraldo (Spanish)	Brownsville, TX	Saturday, June 1, 2019 Sunday, June 2, 2019 Monday, June 3, 2019 Monday, June 10, 2019 Tuesday, June 18, 2019
The Seattle Times	King County, WA; Statewide	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 15, 2019 Saturday, June 22, 2019

Table B-2: Newspaper Publications During 2019 and 2020 Scoping Phases (continued)

Newspaper	Newspaper Coverage	Publication Dates
The Kitsap Sun	Kitsap County, WA	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 15, 2019 Sunday, June 23, 2019
Tri-City Herald	Tri-County, WA	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 22, 2019 Sunday, June 23, 2019
The Oregonian	Portland, OR; Statewide	Friday, May 31, 2019 Saturday, June 1, 2019 Sunday, June 2, 2019 Saturday, June 15, 2019 Sunday, June 22, 2019
The Portland Tribune	Portland, OR	Tuesday, June 4, 2019 Thursday, June 6, 2019 Tuesday, June 18, 2019 Thursday, June 20, 2019
Mobile Press-Register	Mobile, AL	Wednesday, Aug. 12, 2020 Friday, Aug. 14, 2020 Sunday, Aug. 16, 2020

Notes: AL = Alabama, GA = Georgia, OR = Oregon, SC = South Carolina, TX = Texas, VA = Virginia, WA = Washington



The U.S. Navy
INVITES YOU TO PARTICIPATE
in the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) Process for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants

The U.S. Navy is preparing an EIS/OEIS to evaluate the potential environmental impacts associated with the disposal of the decommissioned, defueled ex-Enterprise aircraft carrier and its associated naval reactor plants.

The Navy invites the public to comment on the scope of the EIS/OEIS.

Submit comments at open house scoping meetings.

Submit written comments to:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

Submit comments online at:
www.CarrierDisposalEIS.com

All comments must be postmarked or received online by **July 15, 2019**, for consideration in the Draft EIS/OEIS.

OPEN HOUSE SCOPING MEETINGS: 5 to 8 p.m.

The meetings will include informational poster stations staffed by Navy representatives.

Newport News, Va.
Tuesday, June 18, 2019
Denbigh Community Center
15198 Warwick Blvd.
Newport News, VA 23608

Bremerton, Wash.
Tuesday, June 25, 2019
Mountain View Middle School
2400 Perry Ave.
Bremerton, WA 98310

Brownsville, Texas*
Thursday, June 20, 2019
Fort Brown Memorial Center
600 International Blvd.
Brownsville, TX 78520

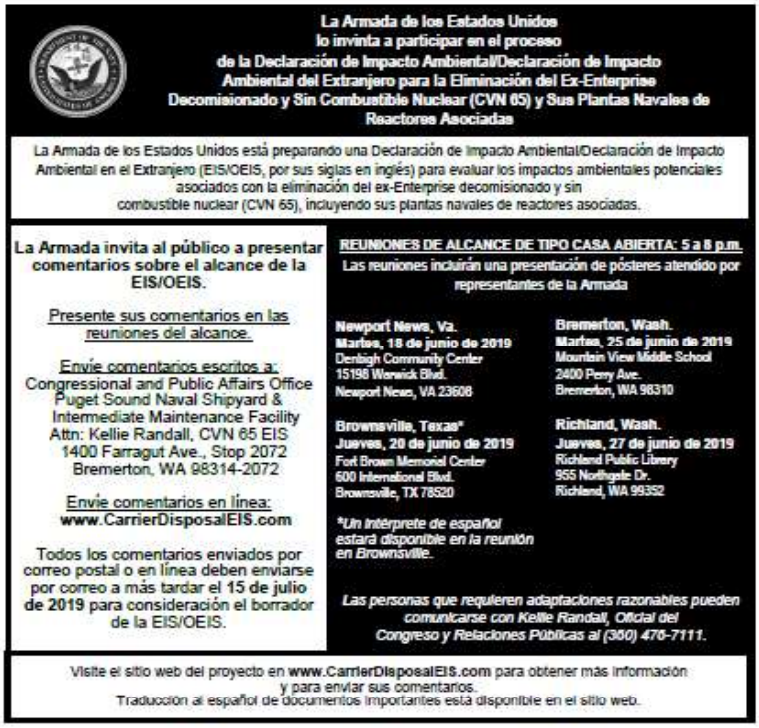
Richland, Wash.
Thursday, June 27, 2019
Richland Public Library
955 Northgate Dr.
Richland, WA 99352

**Un intérprete de español estará disponible en la reunión en Brownsville.*

Individuals requiring reasonable accommodations may contact Kellie Randall, Congressional and Public Affairs Officer, at (360) 476-7111.

Visit www.CarrierDisposalEIS.com to learn more and provide comments.
Traducción al español de documentos importantes está disponible en el sitio web.

Figure B-12: Newspaper Announcement of 2019 Scoping (English)



La Armada de los Estados Unidos
lo invita a participar en el proceso
de la Declaración de Impacto Ambiental/Declaración de Impacto Ambiental del Extranjero para la Eliminación del Ex-Enterprise Decomisionado y Sin Combustible Nuclear (CVN 65) y Sus Plantas Navales de Reactores Asociadas

La Armada de los Estados Unidos está preparando una Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS, por sus siglas en inglés) para evaluar los impactos ambientales potenciales asociados con la eliminación del ex-Enterprise decomisionado y sin combustible nuclear (CVN 65), incluyendo sus plantas navales de reactores asociadas.

La Armada invita al público a presentar comentarios sobre el alcance de la EIS/OEIS.

Presente sus comentarios en las reuniones del alcance.

Envíe comentarios escritos a:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

Envíe comentarios en línea:
www.CarrierDisposalEIS.com

Todos los comentarios enviados por correo postal o en línea deben enviarse por correo a más tardar el **15 de julio de 2019** para consideración el borrador de la EIS/OEIS.

REUNIONES DE ALCANCE DE TIPO CASA ABIERTA: 5 a 8 p.m.

Las reuniones incluirán una presentación de pósteres atendido por representantes de la Armada

Newport News, Va.
Martes, 18 de junio de 2019
Denbigh Community Center
15198 Warwick Blvd.
Newport News, VA 23608

Bremerton, Wash.
Martes, 25 de junio de 2019
Mountain View Middle School
2400 Perry Ave.
Bremerton, WA 98310

Brownsville, Texas*
Jueves, 20 de junio de 2019
Fort Brown Memorial Center
600 International Blvd.
Brownsville, TX 78520

Richland, Wash.
Jueves, 27 de junio de 2019
Richland Public Library
955 Northgate Dr.
Richland, WA 99352

**Un intérprete de español estará disponible en la reunión en Brownsville.*

Las personas que requieren adaptaciones razonables pueden comunicarse con Kellie Randall, Oficial del Congreso y Relaciones Públicas al (360) 476-7111.

Visite el sitio web del proyecto en **www.CarrierDisposalEIS.com** para obtener más información y para enviar sus comentarios.
Traducción al español de documentos importantes está disponible en el sitio web.

Figure B-13: Newspaper Announcement of 2019 Scoping (Spanish)

The U.S. Navy
INVITES YOU TO PARTICIPATE
in the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) Process for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants

The U.S. Navy is preparing an EIS/OEIS to evaluate the potential environmental impacts associated with the disposal of the decommissioned, defueled ex-Enterprise aircraft carrier and its associated naval reactor plants.

The Navy invites the public to comment on the scope of the EIS/OEIS.

- Submit written comments to:
  Congressional and Public Affairs Office
  Puget Sound Naval Shipyard & Intermediate Maintenance Facility
  Attn: Kellie Randall, CVN 65 EIS
  1400 Farragut Ave., Stop 2072
  Bremerton, WA 98314-2072
- Submit comments online at:
  www.CarrierDisposalEIS.com

All comments must be postmarked or received online by **Sept. 11, 2020** for consideration in the Draft EIS/OEIS.

Please share this information to help inform your community.

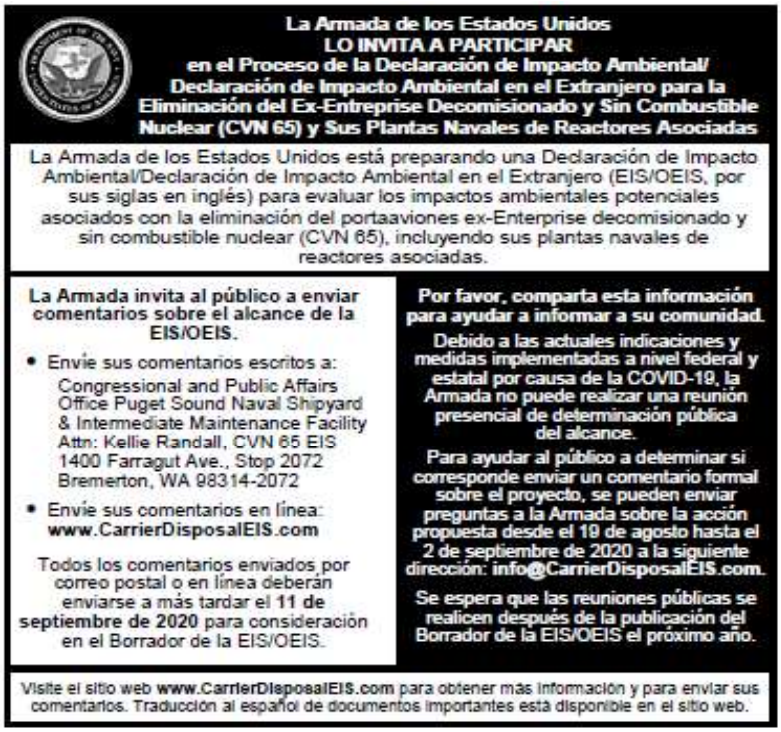
Due to current federal and state guidance and measures put in place in response to COVID-19, the Navy is unable to hold an in-person public scoping meeting.

To assist the public in determining whether to submit a formal comment on the project, questions may be submitted from Aug. 19 to Sept. 2, 2020, at **info@CarrierDisposalEIS.com**.

Public meetings are expected to be held after the release of the Draft EIS/OEIS next year.

Visit **www.CarrierDisposalEIS.com** to learn more and provide comments.
Traducción al español de documentos importantes está disponible en el sitio web.

Figure B-14: Newspaper Announcement of 2020 Scoping (English)



La Armada de los Estados Unidos
LO INVITA A PARTICIPAR
en el Proceso de la Declaración de Impacto Ambiental/ Declaración de Impacto Ambiental en el Extranjero para la Eliminación del Ex-Entreprise Decomisionado y Sin Combustible Nuclear (CVN 65) y Sus Plantas Navales de Reactores Asociadas

La Armada de los Estados Unidos está preparando una Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS, por sus siglas en inglés) para evaluar los impactos ambientales potenciales asociados con la eliminación del portaaviones ex-Enterprise decomisionado y sin combustible nuclear (CVN 65), incluyendo sus plantas navales de reactores asociadas.

La Armada invita al público a enviar comentarios sobre el alcance de la EIS/OEIS.

- Envíe sus comentarios escritos a:
  Congressional and Public Affairs Office Puget Sound Naval Shipyard & Intermediate Maintenance Facility
  Attn: Kellie Randall, CVN 65 EIS
  1400 Farragut Ave., Stop 2072
  Bremerton, WA 98314-2072
- Envíe sus comentarios en línea:
  www.CarrierDisposalEIS.com

Todos los comentarios enviados por correo postal o en línea deberán enviarse a más tardar el **11 de septiembre de 2020** para consideración en el Borrador de la EIS/OEIS.

Por favor, comparta esta información para ayudar a informar a su comunidad.

Debido a las actuales indicaciones y medidas implementadas a nivel federal y estatal por causa de la COVID-19, la Armada no puede realizar una reunión presencial de determinación pública del alcance.

Para ayudar al público a determinar si corresponde enviar un comentario formal sobre el proyecto, se pueden enviar preguntas a la Armada sobre la acción propuesta desde el 19 de agosto hasta el 2 de septiembre de 2020 a la siguiente dirección: **info@CarrierDisposalEIS.com**.

Se espera que las reuniones públicas se realicen después de la publicación del Borrador de la EIS/OEIS el próximo año.

Visite el sitio web **www.CarrierDisposalEIS.com** para obtener más información y para enviar sus comentarios. Traducción al español de documentos importantes está disponible en el sitio web.

Figure B-15: Newspaper Announcement of 2020 Scoping (Spanish)

B.2.1.4 News Releases

Puget Sound Naval Shipyard & Intermediate Maintenance Facility Public Affairs Office distributed a news release to regional media outlets to coincide with the release of the Notice of Intent on May 31, 2019. A second news release was distributed to media outlets on June 13, 2019, five days prior to the start of the public meetings. Spanish versions of the news releases were distributed to media in the Brownsville, Texas area. On August 12, 2020, a news release was distributed to local and regional media outlet announcing the reopening of the scoping period.

Public service announcements for the Newport News, Virginia, and Brownsville, Texas, areas were distributed on June 13, 2019. Public service announcements for the Bremerton, Washington, and Richland, Washington, areas were distributed on June 20, 2019.

News releases and public service announcements are shown in Figure B-16, Figure B-17, Figure B-18, and Figure B-19.

Puget Sound Naval Shipyard
& Intermediate Maintenance Facility
Congressional and Public Affairs Office
1400 Farragut Avenue
Bremerton, WA 98314-5001
(360) 476-7111 Fax: (360) 476-0937
psns.pao.fct@navy.mil

Release No: 008-19
May 31, 2019

Navy to prepare an Environmental Impact Statement/Overseas Environmental Impact Statement for the disposal of the decommissioned, defueled ex-Enterprise (CVN 65) and its associated naval reactor plants

BREMERTON, Washington -- The U.S. Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to evaluate the potential environmental impacts associated with the disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier, including its naval reactor plants.

The proposed action is to dispose of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier to include its reactor plants. The proposed action would entail dismantling and recycling the remnant hull sections of the ex-Enterprise at a designated facility in accordance with applicable federal, state, and local laws, and the removal and packaging of the ex-Enterprise reactor plants for transportation and disposal as low-level radioactive waste to authorized disposal site(s).

The purpose of the proposed action is to reduce the Navy's 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.

Public Open House Scoping Meetings
The public is invited to attend open house scoping meetings to learn about the proposal and submit comments on the scope of the EIS/OEIS, including potential viable alternatives and environmental issues for analysis. Meetings will be held in an open-house format, with poster displays and subject matter experts available for questions.

Four open house scoping meetings will be held from **5 to 8 p.m.** at the following locations.

Virginia: **Tuesday, June 18, 2019**
Denbigh Community Center
15198 Warwick Blvd.
Newport News, VA 23608

Figure B-16: Puget Sound Naval Shipyard & Intermediate Facility 2019 News Release (English)

Texas: **Thursday, June 20, 2019***
Fort Brown Memorial Center
600 International Blvd.
Brownsville, TX 78520
**Un intérprete de español estará disponible en la reunión en Brownsville.*

Washington: **Tuesday, June 25, 2019**
Mountain View Middle School
2400 Perry Ave.
Bremerton, WA 98310

Thursday, June 27, 2019
Richland Public Library
955 Northgate Dr.
Richland, WA 99352

Individuals requiring reasonable accommodations may contact Kellie Randall, Congressional and Public Affairs Officer, at (360) 476-7111.

Traducción al español de documentos importantes está disponible en el sitio web.

Public Comments
The Navy welcomes public comments on potential viable alternatives and environmental issues for analysis during the scoping period. Comments may be submitted via mail, online, or at the scoping meetings. All comments must be postmarked or received online by **July 15, 2019,** for consideration in the Draft EIS/OEIS.

Mail:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

Online: **www.CarrierDisposalEIS.com**

Visit the project website at **www.CarrierDisposalEIS.com** to learn more and submit comments.

MEDIA AVAILABILITY: There is an opportunity for media to speak with senior Navy leaders at 4:30 p.m. before each meeting. Media interested in attending or seeking further information should contact Kellie Randall, Congressional and Public Affairs Officer, (360) 476-7111.

-30-

Figure B-16: Puget Sound Naval Shipyard & Intermediate Facility 2019 News Release (English) (continued)

Puget Sound Naval Shipyard
& Intermediate Maintenance Facility
Congressional and Public Affairs Office
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072
(360) 476-7111 Fax: (360) 476-0937
psns.pao.fct@navy.mil

Release No: 016-19
June 20, 2019

Navy to hold public scoping meetings for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants Environmental Impact Statement/Overseas Environmental Impact Statement

BREMERTON, Washington -- The public is invited to attend open house scoping meetings to learn about an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) being prepared for the disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier, including its naval reactor plants. The U.S. Navy is seeking public input and involvement, which are fundamental aspects of the EIS/OEIS development process under the National Environmental Policy Act.

Scoping meetings will provide the public with the opportunity to receive project-related information, ask questions of Navy representatives, and submit comments on the scope of the EIS/OEIS, including potential viable alternatives and environmental issues for analysis. Meetings will be held in an open-house format with poster displays and subject matter experts available for questions.

Four open house scoping meetings will be held from **5 to 8 p.m.** at the following locations.

Virginia:	**Tuesday, June 18, 2019** Denbigh Community Center 15198 Warwick Blvd. Newport News, VA 23608
Texas:	**Thursday, June 20, 2019*** Fort Brown Memorial Center 600 International Blvd. Brownsville, TX 78520 **Un intérprete de español estará disponible en la reunión en Brownsville.*
Washington:	**Tuesday, June 25, 2019** Mountain View Middle School 2400 Perry Ave. Bremerton, WA 98310

Figure B-16: Puget Sound Naval Shipyard & Intermediate Facility 2019 News Release (English) (continued)

Thursday, June 27, 2019
Richland Public Library
955 Northgate Dr.
Richland, WA 99352

Individuals requiring reasonable accommodations may contact Kellie Randall, Congressional and Public Affairs Officer, at (360) 476-7111.

Traducción al español de documentos importantes está disponible en el sitio web.

Public Comments
The Navy welcomes public comments on potential viable alternatives and environmental issues for analysis during the scoping period. Comments may be submitted via mail, online, or at the scoping meetings. All comments must be postmarked or received online by **July 15, 2019,** for consideration in the Draft EIS/OEIS.

Mail:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

Online: **www.CarrierDisposalEIS.com**

Proposed Action
The proposed action is to dispose of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier to include its reactor plants. The proposed action would entail dismantling and recycling the remnant hull sections of the ex-Enterprise at a designated facility in accordance with applicable federal, state, and local laws, and the removal and packaging of the ex-Enterprise reactor plants for transportation and disposal as low-level radioactive waste to authorized disposal site(s).

The purpose of the proposed action is to reduce the Navy's 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.

Visit the project website at **www.CarrierDisposalEIS.com** to learn more or submit comments.

MEDIA AVAILABILITY: There is an opportunity for media to speak with senior Navy leaders at 4:30 p.m. before each meeting. Media interested in attending or seeking further information should contact Kellie Randall, Congressional and Public Affairs Officer, (360) 476-7111.

-30-

Figure B-16: Puget Sound Naval Shipyard & Intermediate Facility 2019 News Release (English) (continued)

Puget Sound Naval Shipyard
& Intermediate Maintenance Facility
Congressional and Public Affairs Office
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072
(360) 476-7111 Fax: (360) 476-0937
psns.pao.fct@navy.mil

Release No: 013-20
August 12, 2020

Navy to reopen public scoping period for the disposal of decommissioned, defueled ex-Enterprise (CVN 65) and its associated naval reactor plants Environmental Impact Statement/Overseas Environmental Impact Statement

BREMERTON, Washington – The U.S. Navy is reopening the public scoping period to all interested parties for the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) being prepared for the disposal of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier and its associated naval reactor plants. The Navy has added Mobile, Alabama as a potential location for commercial dismantlement based on public scoping comments received during the initial scoping phase in 2019. The public scoping period is open from **Aug. 12 to Sept. 11, 2020**.

Public Comments

The Navy is seeking public input and involvement, which are fundamental aspects of the EIS/OEIS development process under the National Environmental Policy Act. The Navy welcomes public comments on potential viable alternatives and environmental issues for analysis during the scoping period. Comments may be submitted via mail or online. It is not necessary to resubmit scoping comments already made if the comments have not changed. Comments must be postmarked or received online by **Sept. 11, 2020**, for consideration in the Draft EIS/OEIS.

Mail:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: Kellie Randall, CVN 65 EIS
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

Online: **www.CarrierDisposalEIS.com**

Figure B-17: Puget Sound Naval Shipyard & Intermediate Facility 2020 News Release (English)

Public Questions

Due to current federal and state guidance and measures put in place in response to COVID-19, the Navy is unable to hold an in-person public scoping meeting in Mobile, Alabama. To assist the public in determining whether to submit a formal comment on the project, the Navy will respond to questions from the public from **Aug. 19 to Sept. 2, 2020**. During this period, the public may submit questions to the Navy about the proposed action at **info@CarrierDisposalEIS.com**.

Proposed Action

The proposed action is to dispose of the decommissioned, defueled ex-Enterprise (CVN 65) aircraft carrier and its associated naval reactor plants. The proposed action would entail dismantling and recycling the remnant hull sections of ex-Enterprise at a designated facility in accordance with applicable federal, state, and local laws, and the removal and packaging of ex-Enterprise reactor plants for transportation and disposal as low-level radioactive waste to authorized disposal site(s).

The purpose of the proposed action is to reduce the Navy's 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.

Visit the project website at **www.CarrierDisposalEIS.com** to learn more or submit comments.

Traducción al español de documentos importantes está disponible en el sitio web.

-30-

Figure B-17: Puget Sound Naval Shipyard & Intermediate Facility 2020 News Release (English) (continued)

Astillero Naval de Puget Sound
e Instalación de Mantenimiento Intermedio
Oficina del Congreso y Relaciones Públicas
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072
(360) 476-7111 Fax (360) 476-0937
psns.pao.fct@navy.mil

Comunicado de prensa N.°: 013-20
12 de agosto de 2020

La Armada reabrirá el período de determinación pública del alcance para la Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS, por sus siglas en inglés) sobre la eliminación del ex-Enterprise decomisionado y sin combustible nuclear (CVN 65) y sus plantas de reactores navales asociadas

BREMERTON, Washington - La Armada de los Estados Unidos está reabriendo el período de determinación pública a todas las partes interesadas para la Declaración de Impacto Ambiental/Declaración de Impacto Ambiental en el Extranjero (EIS/OEIS) para evaluar los posibles impactos ambientales relacionados con la eliminación del portaaviones ex-Enterprise decomisionado y sin combustible nuclear (CVN 65) y sus plantas de reactores navales asociadas. La Armada ha incorporado a Mobile, Alabama, como una ubicación posible para el desmantelamiento comercial conforme a los comentarios de determinación pública del alcance recibidos durante la fase inicial de determinación del alcance realizada en 2019. El período de determinación pública del alcance permanecerá abierto desde el **12 de agosto hasta el 11 de septiembre de 2020**.

Comentarios Públicos

La Armada busca contar con los comentarios y la participación del público, los cuales son aspectos fundamentales del proceso de desarrollo de la EIS/OEIS de conformidad con la Ley de Política Nacional del Medioambiente. La Armada aprecia los comentarios públicos sobre las alternativas viables posibles y los temas ambientales para análisis durante el período de determinación del alcance. Los comentarios se pueden enviar por correo postal o en línea. No es necesario volver a enviar los comentarios sobre determinación del alcance ya realizados si estos no han cambiado. Los comentarios deberán enviarse por correo postal o en línea a más tardar el **11 de septiembre de 2020** para su consideración en el Borrador de la EIS/OEIS.

Figure B-18: Puget Sound Naval Shipyard & Intermediate Facility 2020 News Release (Spanish)

Correo postal:
Congressional and Public Affairs Office
Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Attn: **Kellie Randall**, *CVN 65 EIS*
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072

En línea: **www.CarrierDisposalEIS.com**

Preguntas públicas
Debido a las actuales indicaciones y medidas implementadas a nivel federal y estatal por causa de la COVID-19, la Armada no puede realizar una reunión presencial de determinación pública del alcance en Mobile, Alabama. Para ayudar al público a determinar si corresponde enviar un comentario formal sobre el proyecto, la Armada responderá a las preguntas del público desde el **19 de agosto hasta el 2 de septiembre de 2020**. Durante este período, el público puede enviar preguntas a la Armada sobre la acción propuesta a la siguiente dirección: **info@CarrierDisposalEIS.com.**

Acción Propuesta
La acción propuesta es eliminar el portaaviones ex-Enterprise decomisionado y sin combustible nuclear (CVN 65) y sus plantas de reactores navales asociadas. La acción propuesta implicará el desmantelamiento y el reciclaje de las secciones del casco remanente del ex-Enterprise en una instalación designada de conformidad con las correspondientes leyes federales, estatales y locales, y la remoción y separación en paquetes de las plantas de reactores del ex-Enterprise para su transporte y eliminación como residuo radioactivo de bajo nivel en un sitio de eliminación autorizado.

El objetivo de la acción propuesta es reducir el inventario de buques inactivos de la Armada, eliminar los costos asociados con el mantenimiento de buques en condiciones de almacenamiento seguro y eliminar los residuos peligrosos y de legado radiológico de manera responsable con el medio ambiente, a la vez que se da cumplimiento a las necesidades operativas de la Armada.

Visite el sitio web del proyecto en **www.CarrierDisposalEIS.com** para obtener más información o enviar comentarios.

Traducción al español de documentos importantes está disponible en el sitio web.

-30-

Figure B-18: Puget Sound Naval Shipyard & Intermediate Facility 2020 News Release (Spanish) (continued)

Puget Sound Naval Shipyard & Intermediate Maintenance Facility
Congressional and Public Affairs Office
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072
(360) 476-7111 Fax: (360) 476-0937
psns.pao.fct@navy.mil

Release No: 014-19
June 20, 2019

PUBLIC SERVICE ANNOUNCEMENT:
Public open house scoping meeting for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants Environmental Impact Statement/Overseas Environmental Impact Statement

(35 Seconds)
FOR IMMEDIATE RELEASE

ANNOUNCER

THE U-S NAVY INVITES THE PUBLIC TO ATTEND AN OPEN HOUSE SCOPING MEETING TO LEARN ABOUT THE ENVIRONMENTAL IMPACT ANALYSIS BEING PREPARED FOR THE DISPOSAL OF THE DECOMMISSIONED, DEFUELED EX-ENTERPRISE AIRCRAFT CARRIER, INCLUDING ITS NAVAL REACTOR PLANTS.

THE PUBLIC MEETING CONSISTS OF AN OPEN HOUSE POSTER SESSION FROM FIVE TO EIGHT P-M ON JUNE TWENTY-FIFTH AT THE MOUNTAIN VIEW MIDDLE SCIIOOL IN BREMERTON. YOU CAN LEARN MORE ABOUT TIIE PROJECT AND SUBMIT COMMENTS AT THE PUBLIC MEETING OR AT W-W-W DOT CARRIER-DISPOSAL-E-I-S DOT COM.

-30-

Figure B-19: Puget Sound Naval Shipyard & Intermediate Facility 2019 Public Service Announcements

Puget Sound Naval Shipyard
& Intermediate Maintenance Facility
Congressional and Public Affairs Office
1400 Farragut Ave., Stop 2072
Bremerton, WA 98314-2072
(360) 476-7111 Fax: (360) 476-0937
psns.pao.fct@navy.mil

Release No: 014-19
June 20, 2019

PUBLIC SERVICE ANNOUNCEMENT:
Public open house scoping meeting for the Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and its Associated Naval Reactor Plants Environmental Impact Statement/Overseas Environmental Impact Statement

(35 Seconds)
FOR IMMEDIATE RELEASE

ANNOUNCER

THE U-S NAVY INVITES THE PUBLIC TO ATTEND AN OPEN HOUSE SCOPING MEETING TO LEARN ABOUT THE ENVIRONMENTAL IMPACT ANALYSIS BEING PREPARED FOR THE DISPOSAL OF THE DECOMMISSIONED, DEFUELED EX-ENTERPRISE AIRCRAFT CARRIER, INCLUDING ITS NAVAL REACTOR PLANTS.

THE PUBLIC MEETING CONSISTS OF AN OPEN HOUSE POSTER SESSION FROM FIVE TO EIGHT P-M ON JUNE TWENTY-SEVENTH AT THE RICHLAND PUBLIC LIBRARY IN RICHLAND. YOU CAN LEARN MORE ABOUT THE PROJECT AND SUBMIT COMMENTS AT THE PUBLIC MEETING OR AT W-W-W DOT CARRIER-DISPOSAL-E-I-S DOT COM.

-30-

Figure B-19: Puget Sound Naval Shipyard & Intermediate Facility 2019 Public Service Announcements (continued)

B.2.2 Public Scoping Meetings

The Navy held four public meetings from June 18, 2019, through June 27, 2019, at locations listed in Table B-3. 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 and oral comments. Each meeting was three hours in duration.

Staff at the welcome station greeted guests and encouraged meeting attendees to sign in to be added to the project mailing list. A fact sheet booklet and comment form were distributed to attendees, along with verbal direction on the general flow of the poster stations and commenting methods. Spanish versions of all project materials were made available for the public meeting in Brownsville, Texas. A Spanish language interpreter was also present to assist with in-person translation for any Spanish-speaking attendees.

B.2.2.1 Meetings Summary

Table B-3 summarizes the scoping meetings held from June 18, 2019, through June 27, 2019. In total, 125 people attended the four public meetings. Nine written comments and no oral comments were submitted during the public meetings.

Table B-3: Summary of Public Scoping Meetings

Site	Attendance	Oral Comments	Written Comments
Newport News, Virginia *Denbigh Community Center* 15198 Warwick Blvd. Tuesday, June 18, 2019; 5 p.m. to 8 p.m.	30	0	6
Media Attendance • WTKR News 3 (CBS affiliate) • The Daily Press			
Attendees • Modern American Recycling and Repair • Huntington Ingalls Industry (3) • Huntington Ingalls Industry Newport News Shipyard • Newport News Shipyard • SAIC • BWX Technologies • community members			
Site	**Attendance**	**Oral Comments**	**Written Comments**
Brownsville, Texas *Texas Southernmost College* *Fort Brown Memorial Center* 600 International Blvd. Thursday, June 20, 2019; 5 to 8 p.m.	30	0	2

Table B-3: Summary of Public Scoping Meetings (continued)

Site	Attendance	Oral Comments	Written Comments
Media Attendance • The Brownsville Herald			
Attendees • Texas Department of State Health Services (2) • Brownsville Police Department • Brownsville Fire Department • Texas General Land Office • City of Brownsville (3) • City of Brownsville, City Manager's Office • Port of Brownsville • Brownsville Independent School District Superintendent • International Ship Breaking Limited • Huntington Ingalls Industry • Jacobi Consulting • Scrap Metal Services (2) • Steel Coast (3) • Merlion Advisory • Atkins Engineering • Wingreen Marine • Child Care Education Institute • community members			
Site	**Attendance**	**Oral Comments**	**Written Comments**
Bremerton, Washington *Mountain View Middle School* 2400 Perry Ave. Tuesday, June 25, 2019; 5 p.m. to 8 p.m.	46	0	0
Media Attendance • The Kitsap Sun			
Attendees • Office of Congressman Derek Kilmer • General Dynamics/NASSCO • Huntington Ingalls Industry • Puget Sound Naval Association • Puget Sound Ship Repair Association • Bremerton-Olympic Peninsula Council Navy League (2) • International Federation of Professional and Technical Engineers (IFPTE) Local 12 Union (3) • community members			
Site	**Attendance**	**Oral Comments**	**Written Comments**
Richland, Washington *Richland Public Library* 955 Northgate Dr. Tuesday, Dec. 11, 2018; 5 to 8 p.m.	19	0	1
Media Attendance • KNDU 25 (NBC affiliate)			
Attendees • State of Oregon • Washington State Department of Ecology • Washington State Department of Health/Northwest Interstate Compact • AECOM • Tri-City Industrial Council • community members			

B.2.3 Public Scoping Comments

Scoping comments were submitted in the following ways:

- written or oral comments submitted in-person during the 2019 public scoping meetings
- written comment by mail
- written comments via the project website

The Navy received 120 comments from the public during the 2019 public scoping phase, and 34 comments during the 2020 public scoping phase. While public comments received during the scoping periods were considered in the development of the Draft EIS/OEIS, the Draft EIS/OEIS does not specifically respond to or address public comments individually from the public scoping periods.

Several public concerns or recommendations were not addressed in this EIS/OEIS because they did not meet the selection criteria to be carried forward as alternatives. For example, 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. This policy prohibits turning ex-Enterprise into a museum or other memorial. See Section 2.5 (Alternatives Considered but Not Carried Forward for Detailed Analysis) for other alternatives not analyzed further.

In addition to this appendix, environmental concerns are further summarized and addressed in Chapter 1 with corresponding resources sections of this EIS/OEIS that provide further analysis (see Section 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 were raised during the two scoping periods or are anticipated by the Navy:

B.2.3.1 Dismantlement/Disposal

- support for not dismantling the ex-Enterprise due to its historic significance
- recommendation to use the decommissioned, defueled ex-Enterprise for various future scientific or economic benefit, educational purposes, and tourism attraction
- concern about dismantling the ex-Enterprise due to its history with the Navy
- concern about the cost of dismantling the ex-Enterprise
- concern about dismantling the ex-Enterprise in an area that has already been impacted by natural disasters and accidents causing both environmental damage and human tragedies
- concern about dismantling the ex-Enterprise when other locations would be closer to existing, authorized disposal site(s) for reactor storage
- general support for Mobile, Alabama, as a potential location for commercial dismantlement, and support for the skilled industrial workforce in Mobile, especially steel production facilities and infrastructure required for dismantlement
- questions about whether parts of the vessel could be used as underwater artificial reef, and what will happen to the parts of the ship not containing the reactor compartment
- request for details on how the Navy would address extreme storm surges and winds during tropical and non-tropical weather events that can affect ship repairs and dismantlement

- request the Navy have measures in place to deal with the potential costs and cleanup from a worst-case scenario incident
- request preparation of a detailed plan for remediating the dismantlement site for radiation and any other hazardous materials
- general concern for contractors and sub-contractors to be hired – records of non-compliance, valid licenses, proper trainings, financial stability, insurance coverage, available technology, and industry expertise
- questions about where the dismantlement would occur
- questions about the timelines for both full and partial dismantlement
- questions about who would be responsible for altering the berth area for storage of the ex-Enterprise, if required
- questions about who would be responsible for disposing of the dismantled parts and liquid from the naval reactor plants
- request for the Navy to create a panel of local subject matter experts to provide oversight, transparency, and safety assurances
- request for auditors and other independent entities to perform quality control checks and oversight of contractors performing dismantlement and transportation work
- questions about what would be removed from the ex-Enterprise, specifically the amount of "trapped liquids"

B.2.3.2 Air Quality

- concern about controlling particulate/dust drift and spread during naval reactor dismantlement
- recommendation to implement measures, such as Best Management Practices, to reduce fugitive dust particulates and equipment emissions
- request the Navy analyze impacts on air quality, including radionuclide emissions, and identify mitigation measures to reduce air pollutants and emissions

B.2.3.3 Water Quality/Resources

- request to prohibit dewatering into Mobile Bay and any other surface waters to prevent potential for any spread of radioactivity
- questions about how the dismantlement would impact local waterways/delta and fisheries
- request the Navy include plans for groundwater contamination remedial activities to meet Washington State Model Toxics Control Act, Environmental Protection Act, and tribal standards for drinking and surface water quality
- request the Navy identify water bodies that do not meet water quality standards and develop water quality restoration plans to meet established water quality criteria and associated beneficial uses
- request the Navy identify aquatic resources, such as habitat types, wetlands, etc., analyze the potential impacts of dredged or fill materials into surface waters and floodplain impacts, and develop mitigation plans, including compensatory mitigation

B.2.3.4 Transportation

- request the Navy identify transportation routes of radioactive and hazardous materials

- questions about how transit of the ex-Enterprise through Mobile Bay would affect shipping traffic in the Bay
- questions whether specific restrictions to shipping or boating traffic would be required during transit

B.2.3.5 Public Health and Safety

- questions whether safety protocols similar to those implemented for the ex-STURGIS floating reactor barge would be followed
- questions pertaining to the integration of local first responders into the dismantling project, and whether specialized training would occur for those first responders

B.2.3.6 Radioactive/Hazardous Materials and Waste Management

- request for Navy transparency of the risks during transportation of any radioactive or hazardous material, and how those working with these materials would be protected
- concern about precautions taken to prevent the release of radioactive materials during a hurricane or tropical storm
- request for a clear plan for radiation detection
- questions about security measures to ensure no radioactive materials leave the worksite
- questions about whether an emergency response team would be established to contain and clean any unforeseen radioactive spill
- questions about the implementation of spill barriers to reduce the risk of radioactive material that may be trapped in pipes, valves, and exchangers
- questions about the measures to be implemented to alert the public if there is an incident involving radioactive parts, materials, liquids, or gases
- questions whether monitors would be installed to provide early warnings of high radioactive levels
- recommendation for the Navy to identify potential hazardous materials within the vicinity of the proposed project (Mobile Bay area contains facilities of concern with regard to hazardous materials and also has a number of underground storage tank incident sites)
- concern about additional waste disposal at already contaminated areas, which could lead to leaching and contamination of surrounding soils, groundwater, and the Columbia River
- request the Navy analyze the potential impacts from exposure to hazardous waste, potential pathways, and periods of exposure

B.2.3.7 Sediments

- request the Navy take sediment samples prior to dismantling, regularly during operations, and post-completion for radioactive contamination and that the analysis be provided to the U.S. Army Corps of Engineers

B.2.3.8 Mitigation

- request the Navy evaluate potential impacts on natural resources and identify all necessary measures to avoid, minimize, and mitigate those impacts
- request the Navy include an environmental inspection and mitigation monitoring program to ensure compliance with all mitigation measures and assess their effectiveness

B.2.3.9 Socioeconomics

- concerns that bringing in an aircraft carrier with naval reactor plants could further reduce tourism to an already impacted area
- request to use the ex-Enterprise as a museum, restaurant, or retirement home for veterans or to boost tourism in the area
- general support for the project because of the significant number of jobs it would bring to the region

B.2.3.10 National Environmental Policy Act Process/Community Involvement

- questions about how the Navy would communicate and engage with the public during the EIS/OEIS process
- questions about whether virtual meetings in Mobile, Alabama, would be considered if COVID-19 conditions continue to prohibit in-person interactions
- accolades for inclusion of the local community in the EIS/OEIS process
- request the Navy provide a detailed cumulative impacts assessment
- request the Navy clearly present the government-to-government consultation process in the Draft EIS/OEIS
- request the Navy identify environmental justice populations around or near the disposal facilities and address the potential disproportionate adverse impacts on those populations
- request the Navy provide a list of all permits/authorizations that project facilities have or will need to acquire, including modifications to any existing permits or authorizations

B.2.3.11 Other

- accolades for Navy environmental stewardship efforts, safety procedures, and safety record
- concern the proposed facility sites may be within a tectonically active area, and that the proposed activities could cause or be affected by increased seismic activity
- request the Navy include an analysis of the impacts the changing climate may have on the proposed project and areas

B.3 Draft Environmental Impact Statement/Overseas Environmental Impact Statement Public Review and Comment Period

The 45-day public review and comment period for the Draft EIS/OEIS will begin with the publication of the Notice of Availability in the FR. The Navy will also publish a Notice of Public Meetings in the FR, which will include an overview of the Proposed Action and alternatives, its purpose and need, public meeting and public commenting information, and where to access the Draft EIS/OEIS. Public comments will be accepted at the public meetings, by mail, and via the project website at www.CarrierDisposalEIS.com.

The purpose of public involvement and outreach during the public review and comment period of the Draft EIS/OEIS is to (1) notify tribes; stakeholders, including federal, state, and local officials and agencies; and the public about the Proposed Action and alternatives, 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. The Navy will consider all comments received from the public comment period in the development of the Final EIS/OEIS.

B.4 Final Environmental Impact Statement/Overseas Environmental Impact Statement

The Final EIS/OEIS public review and 30-day wait period will begin with the publication of the 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 start of the 30-day wait period, and the next steps in the NEPA process. New substantive comments received during the 30-day wait period will be addressed in the Record of Decision (ROD).

B.5 Record of Decision

The ROD phase of the NEPA process follows the Final EIS/OEIS 30-day 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 Notice of Availability of the ROD 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, and the Navy decision to implement or not implement the proposed action or selected alternative.

This page intentionally left blank.

Environmental Impact Statement/ Overseas Environmental Impact Statement

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

TABLE OF CONTENTS

List of Figures

There are no figures in this appendix.

List of Tables

This page intentionally left blank.

Appendix C Radiological Evaluation of Reactor Plant Disposal Alternatives

C.1 Introduction

The Naval Nuclear Propulsion Program (NNPP) has a history of safe operations involving reactor plant dismantlement, packaging, and shipment for disposal. This history of safe operations includes the disposition of 138 shipboard reactor packages and 3 land-based prototype reactor plants (DOE, 1997a, 1997b, 1998a, 1998b). The consequences of radiation exposure and contamination are of interest to the general public. Therefore, this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) addresses the potential radiological impacts on workers, the public, and the environment from reactor plant disposal.

Section C.2 provides information about the nature of radiation, explains the basic concepts used to evaluate radiation health effects, and provides perspective on the calculation of cancer and risk. Section C.3 describes the uncertainties associated with the radiation exposure analysis.

Some of the data in this Appendix is presented using scientific notation. Scientific notation is commonly used to represent very large or small numbers. It consists of a number multiplied by the appropriate power of 10. For example, 0.0000035 would be represented as 3.5×10^{-6} and 3,500,000 would be represented as 3.5×10^{6}. Significant digits are the number of digits needed to express the precision of the calculation. Each calculated result is rounded to two significant digits in this Appendix.

C.2 Radiation and Human Health

Since the inception of nuclear power, scientists have cautioned that exposure to ionizing radiation in addition to that from natural background may involve some risk. The National Committee on Radiation Protection and Measurements (NCRP) in 1954 (NCRP, 1958) and the International Commission on Radiological Protection (ICRP) in 1958 (ICRP, 1959) both recommended that exposures should be kept as low as practicable and that unnecessary exposure should be avoided to minimize this risk. The International Commission on Radiological Protection in 1962 (ICRP, 1962) explained the assumed risk as follows:

> "The basis of the Commission's recommendations is that any exposure to radiation may carry some risk. The assumption has been made that, down to the lowest levels of dose, the risk of inducing disease or disability in an individual increases with the dose accumulated by the individual, but is small even at the maximum permissible levels recommended for occupational exposure."

The National Academy of Sciences-National Research Council Advisory Committee (NAS-NRC) on the Biological Effects of Ionizing Radiation included similar statements in its reports in the 1956–1961 period and most recently in 1990 (NAS-NRC, 1990) and 2006 (NAS-NRC, 2006). In 1960, the Federal Radiation Council (also referred to as the FRC) stated (FRC, 1960) that its radiation protection guidance did not differ substantially from recommendations of the National Committee on Radiation Protection and Measurements, the International Commission on Radiological Protection, and the National Academy of Sciences. This statement was again reaffirmed in 1987 (EPA, 1987).

One conclusion from these reports is that radiation exposures to personnel should be minimized, but this is not a new conclusion. Minimizing radiation exposure to personnel has been a major driving force of the NNPP since its inception in 1948.

This section provides information about the nature of radiation, explains basic concepts used to evaluate radiation health effects, and provides perspective on the calculation of cancer and risk.

C.2.1 Nature of Radiation

Radiation is the emission and propagation of energy through matter or space as waves or particles. Radiation generally results from processes that occur naturally. The most commonly recognized form of radiation is electromagnetic radiation emitted over a specific range of wavelengths and energies. Visible light is part of the spectrum of electromagnetic radiation. Radiation of longer wavelengths and lower energy includes infrared radiation (known for heating material when the material and the radiation interact) and radio waves. Electromagnetic radiation of shorter wavelengths and higher energy (which are more penetrating) includes ultraviolet radiation (which causes sunburn) and forms of ionizing radiation such as x-rays and gamma radiation.

Ionizing radiation is radiation that has sufficient energy to displace electrons from atoms or molecules to produce ions. The ions have the ability to interact with other atoms or molecules; in biological systems, this interaction can cause damage in tissue or to an organism.

Radioactivity is the property or characteristic of an unstable atom to undergo spontaneous transformation (to disintegrate or decay) with the emission of energy as radiation to reach a more stable state. The result of the process, called radioactive decay, is the spontaneous transformation of an unstable atom (a radionuclide) into a different nuclide, accompanied by the release of energy (as radiation) as the atom reaches a more stable, lower energy configuration.

Radiation that originates outside of an individual's body is called external or direct radiation. Such radiation can come from an x-ray machine or from radioactive materials (materials or substances that contain radionuclides), such as radioactive waste or radionuclides in soil. When radioactive materials are deposited on a surface that surface is said to be contaminated. Contamination is material that contains radiation emitting nuclides.

Internal radiation can get inside a person's body following intake of radioactive material or radionuclides through ingestion or inhalation. Once in the body, the fate of a radioactive nuclide is determined by its chemical structure and how it is metabolized. The residence time of a radionuclide in the body is commonly called the biological half-life. If the material is soluble, it might be dissolved in bodily fluids and transported to and deposited in various body organs; if it is insoluble, it might move through the gastrointestinal tract or into the lungs.

C.2.2 Source of Radiation

The radiation discussed in this report originates from pressurized water reactors. In this type of reactor, water circulates through a closed piping system to transfer heat from the reactor core to a secondary steam system isolated from the reactor cooling water. Trace amounts of corrosion and wear products are carried by reactor coolant from reactor plant metal surfaces. Some of these corrosion and wear products are deposited on the reactor core and become radioactive from exposure to neutrons. Reactor coolant carries some of these radioactive products through the piping systems where a portion of the radioactivity is removed by a purification system. Most of the remaining radionuclides transported from the reactor core deposit in the piping systems.

The reactor core is installed in a heavy-walled pressure vessel within a primary shield. The primary shield limits radiation exposure from the gammas and neutrons produced when the reactor is operating. The reactor vessel and non-fuel components within the reactor vessel become radioactive by exposure to neutron radiation produced by the operating reactor. Reactor plant piping systems are installed primarily inside a reactor compartment that is itself surrounded by a secondary shield. Access to the reactor compartment is permitted only after the reactor is shut down. Most radiation exposure to personnel comes from inspection, maintenance, and repair inside the reactor compartment. The major source of this radiation is cobalt-60 deposited inside the piping systems. Cobalt-60 emits two high-energy gammas and a low-energy beta for every radioactive decay. Its half-life is 5.3 years.

Neutrons (produced when reactor fuel fissions) are also shielded by the primary and secondary shields. Radiation exposure to personnel from these neutrons during reactor operation is much less than from gammas. After reactor shutdown, when shipyard and other support facility work is executed, no neutron exposure is detectable. Therefore, the radiation exposures discussed in this EIS/OEIS are nearly all from gamma radiation.

C.2.3 Radiation Measuring Units

A variety of units are used to measure radiation. These units determine the amount, type, and intensity of radiation. Amounts of radiation or its effects can be measured in units of Curies, radiation absorbed dose (rad), or dose equivalent (roentgen equivalent man, or rem). The Curie describes the rate at which a material is emitting nuclear radiation (i.e., activity). The Curie is defined as exactly 3.7×10^{10} disintegrations (decays) per second. The rad is the unit that measures the amount of energy imparted to matter per unit mass. The total energy absorbed per unit quantity of matter is referred to as absorbed dose (or simply dose). One rad is equal to the amount of radiation that leads to the deposition of 0.01 joule of energy per kilogram of absorbing material. The rem is the unit that measures the absorbed dose and the relative effectiveness of the type of ionizing radiation in damaging biological systems. One rem of one type of radiation has the same biological effects as 1 rem of any other kind of radiation. This allows comparison of the biological effects of radionuclides that emit different types of radiation. The term used for reporting the collective dose (i.e., the sum of individual doses received in a given time period) by a specified population from radiation exposure to a radiation source is person-rem. For example, if 100 workers received 0.1 rem each, the collective dose would be 10 person-rem (100 people x 0.1 rem).

The average American receives a total of approximately 620 millirem (mrem) per year from natural and man-made radiation sources. Approximately 310 mrem per year are from radiation exposure to natural sources (background). The largest natural sources are radon-222 and its radioactive decay products in homes and buildings, which contribute about 230 mrem per year. Additional natural sources include radioactive material in the earth (primarily the uranium and thorium decay series, and potassium-40) and cosmic rays from space filtered through the atmosphere. Approximately 310 mrem per year are from man-made radiation sources. Man-made radiation exposure is mostly from medical procedures such as computed tomography (CT) scans and nuclear medicine which contribute approximately 300 mrem per year to the dose of an average American (NCRP, 2009).

C.2.4 Radiation Dose Definitions

In quantifying the effects of radiation on humans, other terms are used to describe the dose from exposure to radiation. For consistency, this Appendix uses terminology consistent with International Commission on Radiological Protection (ICRP) Publication 60 (ICRP, 1991). A list of the terminology used

in ICRP Publication 60 (ICRP, 1991) and the terminology used in earlier guidance is shown in Table C-1. Although the terminology has changed, the usage is unchanged.

Table C-1: Radiation Dose Terminology

ICRP 60 Terminology	*Previous Terminology*
Tissue Weighting Factor	Weighting Factor
Effective Dose Effective	Dose Equivalent
Committed Effective Dose	Committed Effective Dose Equivalent
Total Effective Dose	Total Effective Dose Equivalent

Tissue weighting factors are used for various body organs and tissues to account for that individual organ's or tissue's proportion of risk versus the total risk when the whole body is irradiated uniformly. Organ doses are calculated for individual organs such as the lungs, stomach, small intestine, upper large intestine, lower large intestine, bone surface, red bone marrow, testes, ovaries, muscle, thyroid, bladder, kidneys, and liver. The summation of each specific organ dose, weighted by the relative risk to that organ compared to an equivalent whole-body radiation exposure, is a whole body dose. To determine the overall effect from reactor plant disposal, whole body doses are presented in this Appendix.

A whole body dose from external radiation is called the effective dose (ED). The ED occurs instantaneously during the period when the body is exposed to direct radiation from an external radiation field. The estimated whole body dose over a lifetime from a single uptake of radioactive material is called the committed effective dose (CED). The CED is calculated over 50 years for adults and up to age 70 for children and accounts for radionuclides that have long half-lives and long residence times in the body. Total effective dose (TED) is the sum of the ED and CED. All estimates of dose presented in this Appendix, unless specifically noted otherwise, are TEDs quantified in terms of rem or mrem. A mrem is one one-thousandth of a rem.

The factors used to convert estimates of radionuclide intake (by inhalation or ingestion) or external radiation exposure to dose estimates are called dose conversion factors. The ICRP and federal agencies such as EPA publish these factors. The internal dose conversion factors used in this Appendix are based on recommendations made by the ICRP in 1990, published in 1991 (ICRP Publication 60 (ICRP, 1991)), and subsequent reports based on the 1990 recommendations (ICRP Publication 68 (ICRP, 1994)), ICRP Publication 71 (ICRP, 1995), and ICRP Publication 72 (ICRP, 1996)). The external dose conversion factors for dose from external, direct radiation are based on earlier ICRP and EPA Guidance (ICRP Publication 26 (ICRP, 1977), (EPA, 1993)).

C.2.5 Radiation Exposure Limits

As discussed above, the body can be exposed to radioactivity through external exposure to radiation. Radioactivity can also get inside the body through air, water, or food and through surface contamination via the mouth, skin, or a wound. The Federal limit for radiation exposure is 5 rem per year. The EPA annual dose limit for airborne radioactivity is 10 mrem (40 Code of Federal Regulations Part 61.102). The EPA Drinking water limits (40 Code of Federal Regulations Parts 8, 141, and 142) are combined radium

226/228 of 5 picoCuries per liter of water; a gross alpha standard for all alphas of 15 picoCuries per liter of water (not including radon and uranium); 4 mrem/year for beta emitters; and 30 micrograms per liter for uranium. NNPP, DOE, and Nuclear Regulatory Commission (NRC) radiation exposure limits meet or exceed applicable Federal and EPA external and internal radiation exposure limits.

C.2.6 Evaluation of Health Effects From Radiation Exposure

Radiation interacts directly and indirectly with the atoms that form cells. In a direct action, the radiation interacts directly with the atoms of the deoxyribonucleic acid (DNA) molecule or some other component critical to the survival of the cell. Since the DNA molecules make up a small part of the cell, the probability of direct action is small. Because most of the cell is made up of water, there is a much higher probability that radiation would interact with water. In an indirect action, radiation interacts with water and breaks the bonds that hold water molecules together, producing reactive free radicals that are chemically toxic and destroy the cell. The body has mechanisms to repair damage caused by radiation.

Consequently, the biological effects of radiation on living cells may result in one of three outcomes: (1) injured or damaged cells repair themselves, resulting in no residual damage; (2) cells die, much like millions of body cells do every day, being replaced through normal biological processes and causing no health effects; or (3) cells incorrectly repair themselves, which results in damaging or changing the DNA of the irradiated cell. Stochastic effects, that is, effects that may or may not occur based on chance, may occur when an irradiated cell is incorrectly repaired rather than killed. The most significant stochastic effect of radiation exposure is that an incorrectly repaired cell may, after a prolonged delay, develop into a cancer cell (NRC, 2011).

Detrimental health effects are calculated based on the radiation exposure dose results to an individual or population group. The dose-to-health effect conversion factors used for calculations of health effects are taken from ICRP Publication 103 (ICRP, 2007). Health effects from radiation exposure are used to summarize and compare results in this Appendix. Cancer is reported because cancer is the principal potential health detriment which may result from low-level radiation exposure.

In determining a means of assessing health effects from radiation exposure, the ICRP has developed detriment-adjusted factors which include both fatal and non-fatal cancers. The ICRP adjusts the incidence of non-fatal cancers upward to account for the total harm experienced as a consequence of developing the cancer. The cancer factors overstate the expected incidence of fatal cancer in the population and the use of these factors to estimate the incidence of fatal cancer is conservative for comparison.

C.2.7 Studies of the Effects of Radiation on Human Beings

Observations on the biological effects of ionizing radiation began soon after the discovery of x-rays in 1895 (NAS-NRC, 2006). Numerous references are made in the early literature to the potential biological effects of exposure to ionizing radiation. These effects have been intensely investigated for many years (Upton, 1982). Although there still exists some uncertainty about the exact level of risk, the National Academy of Sciences has stated in NAS-NRC (1980):

> "It is fair to say that we have more scientific evidence on the hazards of ionizing radiation than on most, if not all, other environmental agents that affect the general public."

A large amount of experimental evidence of radiation effects on living systems has come from laboratory studies on cell systems and on animals. However, what sets our extensive knowledge of radiation effects on human beings apart from other hazards is the evidence that has been obtained from studies of human populations that have been exposed to radiation in various ways (NAS-NRC, 1980). The health effects demonstrated from studies of people exposed to high doses of radiation (that is, significantly higher than current occupational limits) include cancer, cataracts, sterility, and developmental abnormalities (from prenatal exposure). Results from animal studies indicate the potential for genetic effects, although none have been observed in human beings (NAS-NRC, 2006).

C.2.7.1 High Dose Studies

The human study populations that have contributed a large amount of information about the biological effects of radiation exposure include the survivors of the atomic bombings of Hiroshima and Nagasaki, Japan, x-rayed tuberculosis patients, victims of various radiation accidents, patients who have received radiation treatment for a variety of diseases, radium dial painters, and inhabitants of South Pacific islands that received unexpected doses from fallout due to early nuclear weapons tests. All of these populations received high or very high exposures.

The studies of atomic bomb survivors have provided the single most important source of information on the immediate and delayed effects of whole body exposure to ionizing radiation. The studies have been supported for over 50 years by the U.S. and Japanese governments and include analysis of the health of approximately 105,000 survivors of the bombings. Continued follow-up of the Japanese survivors has changed the emphasis of concern from genetic effects to the induction of cancer (NAS-NRC, 2006; UNSCEAR, 2006).

The induction of cancer has been the major latent effect of radiation exposure in the atomic bomb survivors. The tissues most sensitive to the induction of cancer appear to be the blood-forming organs, the thyroid, and the female breast. Other cancers linked to radiation, but with a lower induction rate, include cancers of the lung, stomach, colon, bladder, liver, and ovary. A wave-like pattern of leukemia induction was seen over time beginning about 2 years after exposure, peaking within 10 years of exposure, and generally diminishing to near baseline levels over the next 40 years. For other cancers, a statistically significant excess was observed 5 years or more after exposure, and the excess risk continues to rise slowly with time (United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR, 2006).

While it is often stated that radiation causes all forms of cancer, many forms of cancer actually show no statistically significant increase among atomic bomb survivors. These cancers include chronic lymphocytic leukemia, multiple myeloma, Hodgkin lymphoma, and cancers of the rectum, pancreas, uterus, prostate, cervix, and kidney (Hsu et al., 2013; NAS-NRC, 2006; Ozasa et al., 2009; UNSCEAR, 2006).

To understand the impact of cancer induction from the atomic bombings in 1945, it is necessary to compare the number of radiation-related cancers to the total number of cancers expected in the exposed group. As of 1998, studies of approximately 105,000 survivors identified 17,448 cases (i.e., incidences) of solid cancer (cancers other than malignancies of the blood or blood-forming organs), of which an estimated 853 were in excess of expectation (Preston et al., 2007). As of December 2003, studies of over 86,000 survivors from the same population find that there have been 10,929 solid cancer deaths and of these, an estimated 527 solid cancer deaths are in excess of expectation (Ozasa et al., 2009). An updated analysis of the same population of approximately 105,000 survivors through 2009

found 22,538 cases of solid cancers, of which an estimated 992 were in excess of expectation (Grant et al., 2017). In that same population, as of December 2000 there were 310 leukemia deaths of which an estimated 103 deaths are in excess of expectation (Richardson et al., 2009). These studies did not reveal a statistically significant excess of cancer below doses of 6 Rem (UNSCEAR, 2000). The cancer mortality experience of the other human study populations exposed to high doses (referenced above) is generally consistent with the experience of the Japanese atomic bomb survivors (NAS-NRC, 2006; UNSCEAR, 2006).

About 40 years ago, the major concern of the effects from radiation exposure centered on possible genetic changes (i.e., possible effects from radiation exposure to reproductive cells prior to conception of a child). Ionizing radiation was known to cause such changes in many species of plants and animals. However, intense study of nearly 70,000 offspring of atomic bomb survivors has failed to identify any increase in genetic effects. Based on a recent analysis, human beings now appear less sensitive to the genetic effects from radiation exposure than previously thought, and at low doses the genetic risks are small compared to the baseline risks of genetic disease (NAS-NRC, 2006).

Radiation-induced cataracts have been observed in atomic bomb survivors and persons receiving high radiation doses to the eye. In 1990, the National Academy of Sciences stated the threshold for a vision-impairing cataract under conditions of protracted exposure was thought to be no less than 800 rem, which greatly exceeds the amount of radiation that can be accumulated by the lens through occupational exposure to radiation under normal working conditions (NAS-NRC, 1990). Additional epidemiological evidence evaluated by the International Commission on Radiological Protection and the National Council on Radiation Protection and Measurements since the publication of NAS-NRC (1990) suggests that the threshold dose for formation of vision-impairing cataracts may be lower than previously considered (ICRP, 2012; NCRP, 2018). The International Commission on Radiological Protection has stated that unless the exposure to the eye exceeds 50 Rem, vision-impairing cataracts should not form (ICRP, 2012). The National Council on Radiation Protection and Measurements has stated that the limitations and uncertainties of available data make it difficult to estimate the threshold dose for radiation-induced effects on the lens of the eye, but the preponderance of the evidence indicates the threshold is in the range of 100-200 Rem (NCRP, 2016). These estimates of the threshold dose for cataract formation exceed the amount of radiation that should be accumulated by the lens of the eye for occupational exposure to radiation under normal working conditions for all alternatives evaluated in this EIS/OEIS.

Radiation damage to the reproductive cells at very high doses can result in sterility. Impairment of fertility requires a dose large enough to damage or deplete most of the reproductive cells and is close to a lethal dose if exposure is to the whole body. The National Academy of Sciences estimates the threshold dose necessary to induce permanent sterility is approximately 350 Rem in a single dose (NAS-NRC, 1990). This dose far exceeds that which can be received from occupational exposure under normal working conditions.

Among the atomic bomb survivors' children who received high prenatal exposure (that is, their mothers were pregnant at the time of the exposure), developmental abnormalities were observed. These abnormalities included stunted growth, small head size, and mental retardation. Additionally, analysis suggests that during a certain stage of development (the 8th to 15th week of pregnancy), the developing brain appears to be especially sensitive to radiation. A slight lowering of intelligence quotient (IQ) might follow even relatively low doses of 10 Rem or more (NAS-NRC, 1990).

From this discussion of the health effects observed in studies of human populations exposed to high doses of radiation, it can be seen that the most important of the effects from the standpoint of occupationally exposed workers is the potential for induction of cancer (NAS-NRC, 2006).

C.2.7.2 Low Dose Studies

The cancer-causing effects of radiation on the bone marrow, female breast, thyroid, lung, stomach, and other organs reported for the atomic bomb survivors are similar to findings reported for other irradiated human populations. With few exceptions, however, the effects have been observed only at high doses and high dose rates. Studies of populations chronically exposed to low-level radiation have not shown consistent or conclusive evidence upon which to determine the risk of cancer (NAS-NRC, 2006). Attempts to observe increased cancer in human populations exposed to low doses of radiation have been difficult.

One problem in such studies is the number of people needed to provide sufficient statistics. As the dose to the exposed group decreases, the number of people needed to detect an increase in cancer goes up. For example, for a group exposed to 1 Rem (equivalent to the average lifetime accumulated dose in the NNPP), it would take more than 500,000 people in order to detect an excess in lung cancers (based on current estimates of the risk (Shore, 1990)). This is almost two times the number of people who have performed radiological work in all the naval shipyards over the last 65 years. Another limiting factor is the relatively short time since low-dose occupational exposure started being received by large groups of people. As discussed previously, data from the atomic bomb survivors indicate a long latency period between the time of exposure and expression of the disease.

There is also the compounding factor that cancer is a generalization for a group of approximately 300 separate diseases, many of which are relatively rare and have different apparent causes. With low-dose study data, it is difficult to eliminate the possibility that some factor other than radiation may be causing an apparent increase in cancer induction. This difficulty is particularly apparent in studies of lung cancer, for example, where smoking is (a) such a common exposure, (b) poorly documented as to individual habits, and (c) by far the primary cause of lung cancer. Because cancer induction is statistical in nature, low-dose studies are limited by the fact that an apparent observed small increase in a cancer may be due to chance alone.

Despite the above-mentioned problems and the lack of consistent or conclusive evidence from such studies to date, low-dose studies fulfill an important function. They are the only means available for eventually testing the validity of current risk estimates derived from data accumulated at higher doses and higher dose rates.

Low-dose groups that have been, and are currently being, studied include groups exposed as a result of medical procedures; exposed to fallout from nuclear weapons testing; living near U.S. commercial nuclear installations; living in areas of high natural background radiation; and occupational exposure to low doses of radiation. The National Academy of Sciences has reviewed a number of the low-dose studies in NAS-NRC (1990) and NAS-NRC (1980). Their overall conclusion from reviewing these studies was:

> "Studies of populations chronically exposed to low-level radiation, such as those residing in regions of elevated natural background radiation, have not shown consistent or conclusive evidence of an associated increase in the risk of cancer (NAS-NRC, 1990)."

This conclusion has been supported by studies that have been completed since NAS-NRC (1990) was published and reviewed by the National Academy of Sciences (NAS-NRC, 2006). For example, in 1990 the National Cancer Institute completed a study of cancer in U.S. populations living near 62 nuclear facilities that had been in operation prior to 1982. This study included commercial nuclear power plants and Department of Energy facilities that handle radioactive materials. The National Cancer Institute study concluded that there was no evidence that leukemia or any other form of cancer was generally higher in the counties near the nuclear facilities than in the counties remote from nuclear facilities (National Cancer Institute, 1990). At the request of the Three Mile Island Public Health Fund, independent researchers investigated whether the pattern of cancer in the 10-mile area surrounding the Three Mile Island nuclear plant had changed after the TMI-2 accident in March 1979 and, if so, whether the change was related to radiation releases from the plant. A conclusion of this study was:

> "For accident emissions, the authors failed to find definite effects of exposure on the cancer types and population subgroups thought to be most susceptible to radiation. No associations were seen for leukemia in adults or for childhood cancers as a group." (Hatch et al., 1990)

Of particular interest to workers in the NNPP are studies of groups occupationally exposed to radiation. As of 2018, there were about 800,000 radiation workers under study in the United States (Boice Jr. et al., 2019). For several decades, NNPP personnel, including those at shipyards and in the Fleet, have been included among populations being studied. These studies are discussed below.

In 1978, Congress directed the National Institute for Occupational Safety and Health (NIOSH) to perform a study of workers at Portsmouth Naval Shipyard (PNSY). Congress also chartered an independent oversight committee of nine national experts to oversee the performance of the NIOSH study in order to ensure technical adequacy and independence of the results. The following is a NIOSH summary of the study and their results. This summary was prepared by NIOSH at the conclusion of their study phase in February 1986.

> In December 1980, NIOSH researchers completed the first report on a detailed study of the mortality among employees of the shipyard. Included in the study were all those who had been employed at Portsmouth Naval Shipyard since January 1, 1952 (the earliest date that records existed that could identify former employees). In this report it was concluded that "Excesses of deaths due to malignant neoplasms and specifically due to neoplasms of the blood and blood-forming tissue, were not evident in civilian workers at Portsmouth Naval Shipyard..." in contrast to the results of the original study conducted by the physician. Later, in an investigation to determine why the physician's study results differed so greatly from the NIOSH study, a number of shortcomings in his original study were found that resulted in incorrect conclusions.
>
> To make more certain that workers who had died from leukemia did not die because of radiation exposures received at the shipyard, a second study was conducted. That study compared the work and radiation histories of persons who died of leukemia, with persons who did not. In this analysis, again, no relationship was found between leukemia and radiation, although the NIOSH researchers were unable to rule out the possibility of other occupational exposures having a role.

> In this current and third NIOSH paper, we investigated the role that radiation and other occupational exposures at the shipyard may have had in the development of lung cancer. This study is an outgrowth of an observation made in the 1980 NIOSH study referred to above. The observation was that persons with greater than 1 Rem cumulative exposure to radiation had an increase in lung cancer.
>
> In this report entitled, "Case Control Study of Lung Cancer in Civilian Employees at the Portsmouth Naval Shipyard," we compared the work and radiation histories of persons who died of lung cancer with persons who did not. We found that persons with radiation exposures in excess of 1 Rem had an excess risk of dying of lung cancer, but the radiation was in all likelihood not the cause. This was due to the fact that persons with radiation exposure tended also to have exposure to asbestos (a known lung carcinogen) and to welding by-products (suspected to contain lung carcinogens).

The NIOSH studies were published in the scientific literature in (Greenberg et al., 1985; Rinsky et al., 1988; Rinsky et al., 1981; Stern et al., 1986).

NIOSH published the results of an update to the 1980 study in the July 2004 edition of the Journal of Occupational and Environmental Medicine (Silver et al., 2004). The cohort was expanded by including all PNSY workers employed through 1992 and included worker vital statistics up to December 31, 1996. The NIOSH study found nothing to conclude that the health of shipyard workers has been adversely affected by low levels of occupational radiation exposure incidental to work on nuclear-powered ships. These findings are generally consistent with previous studies.

The study showed no statistically significant cancer risks linked to radiation exposure, when compared to the general U.S. population. Further, the overall death rate among PNSY occupational radiation workers was less than the death rate for the general U.S. population. Other key conclusions reached in the study include the following:

> The study found a slightly higher death rate for all types of cancer in personnel who were never radiation workers, when compared to the general U.S. population. Although not statistically significant, the study also found an equivalent slightly higher death rate for all types of cancer for those who received occupational radiation exposure when compared to the general U.S. population. Fewer deaths than expected were observed for tuberculosis, diseases of the heart, circulatory system, and digestive system, as well as for accidents and violence.
>
> Consistent with the 1981 NIOSH study, the current study did not find a statistically significant difference in the death rates from leukemia for shipyard personnel and the general U.S. population. Although NIOSH concludes that the result is not statistically significant, the data suggest the potential for a small increase in the low risk of leukemia for workers receiving occupational radiation exposure. The small number of leukemia cases (34 out of 11,791 workers receiving occupational radiation exposure) reflects the low risk of this disease. The researchers considered this potential relationship of radiation exposure and leukemia to be considerably uncertain and to require additional study before any conclusions can be made.

The study found a slightly higher death rate for lung cancer for workers that were never radiation workers, when compared to the general U.S. population. The study found a slightly higher death rate for lung cancer for workers receiving occupational radiation exposure, when compared to the general U.S. population. The researchers concluded that the slightly higher rates were accounted for by factors other than radiation exposure; the other factors were smoking, exposure to welding fumes, and asbestos work during the early years covered by the study when the hazards associated with asbestos were not so well understood as they are today.

Several additional analyses using the PNSY data have been performed by NIOSH and reports of the results published.

In the December 2005 issue of Radiation Research (Kubale et al., 2005) NIOSH published the results of a case-control study of leukemia mortality and ionizing radiation. The study found that although the overall risk of leukemia mortality for radiation workers was the same as the general population, a small increase in risk was noted with increasing radiation dose. NIOSH estimated that the lifetime risk for leukemia mortality would increase from 0.33% to 0.36% for workers receiving the average lifetime radiation dose for shipyard workers (1 Rem). The study also found a small increase in leukemia mortality associated with potential solvent exposure (benzene or carbon tetrachloride). NIOSH cautioned that the relatively small number of leukemia cases among radiation workers (34 cases in a population of 11,791 workers) makes it difficult to be certain of the findings. However, the risk estimate is consistent with other radiation epidemiologic study results.

The results of a much larger case-control study of leukemia mortality (excluding chronic lymphocytic leukemia [CLL]) and ionizing radiation were published in the February 2007 issue of Radiation Research (Schubauer-Berigan et al., 2007b) by NIOSH. The study included workers at four Department of Energy (DOE) facilities and PNSY. NIOSH did not find a statistically significant risk associated with occupational radiation exposure, although the results suggest the potential for a small increase in the low risk of leukemia (approximately five times less risk than the smaller 2005 case-control study of only PNSY workers discussed above). NIOSH stated that the risk estimates are consistent with the results of other studies of nuclear workers and high dose populations.

NIOSH reported the results of a lung cancer case-control study of PNSY workers in the September 2007 issue of Radiation Research (Yiin et al., 2007). In addition to occupational radiation exposure, the data analysis considered the effects of asbestos and welding fumes (confounders) on the lung cancer risk. The study found a slight non-statistically significant increase in lung cancer risk with increasing radiation exposure but the risk diminished when all confounders were considered.

In the December 2007 issue of the British Journal of Haematology (Schubauer-Berigan et al., 2007a) NIOSH published the results of a case-control study of CLL mortality and ionizing radiation. Workers at four Department of Energy (DOE) facilities and PNSY were included in the study. The results of the study, which is one

the largest studies to specifically evaluate the risk of CLL among nuclear workers, did not find a consistent association between radiation and CLL.

In the June 2015 issue of Radiation Research (Schubauer-Berigan et al., 2015), NIOSH reported the results of a pooled cohort study of PNSY and four DOE facilities. The study found a slight non-statistically significant increase in solid cancer risk and leukemia risk. The study also found a small statistically significant increase in multiple myeloma risk; the lifetime risk for multiple myeloma mortality (Howlader, 2019) would increase from 0.42% to 0.44% for workers receiving the average lifetime radiation dose for shipyard workers (1 Rem). However, the finding was based on a relatively small number of cases, included a high degree of statistical uncertainty, and is not consistent with studies of other populations exposed to ionizing radiation (e.g., Japanese atomic bomb survivors). Overall, the risk of death from multiple myeloma in the study population was less than that of the United States population in general. Data from PNSY was also included in a similar study of radiation workers from three nations (the United States, United Kingdom, and France)—the International Nuclear Workers, or INWORKS, study. The INWORKS study group found no evidence of a statistically significant increase in solid cancer risk among occupationally exposed workers (D. B. Richardson, 2015) and a small, statistically significant increase in the risk of leukemia (excluding CLL) consistent with leukemia risk estimates from studies of Japanese atomic bomb survivors (K. Leuraud, 2015).

In 1991, researchers from Johns Hopkins University, Baltimore, Maryland, completed a more comprehensive epidemiological study of the health of workers at the six naval shipyards (including PNSY, discussed above) and two private shipyards that serviced U.S. naval nuclear-powered ships (Matanoski, 1991; Matanoski et al., 2008). This independent study evaluated a population of 70,730 civilian workers over a period from 1957 (beginning with the first overhaul of the first nuclear-powered submarine, ex-Nautilus) through 1981, to determine whether there was an excess risk of leukemia or other cancers associated with exposure to low levels of gamma radiation.

This study did not show any cancer risks linked to radiation exposure. Furthermore, the overall death rate among radiation-exposed shipyard workers was actually less than the death rate for the general U.S. population. It is well recognized that many worker populations have lower mortality rates than the general population: the workers have to be healthy to do their jobs. This study shows that the radiation-exposed shipyard population falls into this category.

The death rate for cancer and leukemia among the radiation-exposed workers was slightly lower than that for non-radiation-exposed workers and that for the general U.S. population. However, an increased rate of mesothelioma, a type of respiratory system cancer linked to asbestos exposure, was found in both radiation-exposed and non-radiation-exposed shipyard workers, although the number of cases was small (reflecting the rarity of this disease in the general population). The researchers suspect that shipyard worker exposure to asbestos in the early years of the Program, when the hazards associated with asbestos were not so well understood as they are today, might account for this increase.

The Johns Hopkins study found no evidence to conclude that the health of people involved in work on U.S. naval nuclear-powered ships has been adversely affected by exposure to low levels of radiation incidental to this work.

C.2.8 Transportation of Radioactive Material

Regulations for the transportation of radioactive material apply whether the material is transported from a Naval Shipyard or a commercial dismantling facility. Shipments of radioactive materials must be

made in accordance with applicable NRC, Department of Transportation (DOT) and DOE transportation regulations. The purpose of these regulations is to ensure that shipments of radioactive material are adequately controlled to protect the environment and the health and safety of the general public. These regulations apply to all radioactive material shipments and provide requirements for container design, certification, and identification pertaining to the specific quantity, type, and form of radioactivity being shipped.

In addition to the above, requirements for certain naval shipping container designs incorporate shielding and integrity specifications. These requirements provide for container design analysis, training and qualification of workers who construct containers, and quality control inspections during fabrication to ensure the containers will meet design requirements.

Protective transportation services, such as signature security service or sealed shipping vehicles, are required for radioactive material shipments to ensure point-to-point control and traceability of each shipment from shipper to receiver. A readily accessible log of all shipments in transit is maintained to enable prompt identification and provide the basis for advice on the nature of the shipment. Receivers must make return receipts in writing to ensure that radioactive material has not been lost in shipment. Inspection of containers of radioactive material and accompanying documents is required promptly after receipt. Receivers must report even minor discrepancies from detailed shipping regulations to the shipper, so that correction can be made in future shipments. This is done to ensure compliance with shipping regulations.

Radioactive materials shipped include anticontamination clothing, small sealed sources used for calibrating radiation monitoring instruments, tools and equipment used for radioactive work, low-level radioactive waste, radioactive components, and new and spent naval fuel. Each year, nearly 3 million shipments of radioactive materials are made annually in the United States (American Nuclear Society, 2002).

In the NNPP, most radioactive shipments contain only low-level radioactivity and are classified under DOT regulations as low specific activity, surface contaminated objects, or excepted package shipments. The predominant radionuclide associated with most of these shipments is cobalt-60 in the form of insoluble metallic oxide corrosion products attached to surfaces of materials inside shipping containers.

About two-thirds of the low-level shipments are anticontamination clothing, equipment, tools, and routine waste. The anticontamination clothing is special outer clothing that becomes potentially contaminated with low levels of radioactivity while worn in controlled work areas. About one-fifth of the low-level shipments are environmental and chemistry samples en route to analytical laboratories. Less than one-tenth of the low-level radioactivity shipments are minute quantities in sealed instrument calibration check sources. These sources contain insignificant quantities of radioactivity, comparable to the radioactivity in typical household smoke detectors.

Estimates of annual radiation exposure to transportation crews and the general public from shipments of radioactive materials in the NNPP have been made in a manner consistent with that employed by the NRC in NRC (1977). Based on comparisons of the types and numbers of radioactive shipments made, the total annual radiation exposure to all transportation crews for all shipments is estimated to be approximately 3 person-rem. If one person were to receive all this exposure, that person would not exceed the annual radiation exposure permitted for an individual worker by the NRC. The total estimated radiation exposure accumulated by the public along transportation routes is 10 person-rem. The maximum exposure received by any individual member of the public from transportation of

radioactive material would be far less than the exposure that individual would receive from natural sources of radiation such as rocks, soil, and the sun.

Shipments of radioactive materials associated with naval nuclear propulsion plants have not resulted in any measurable release of radioactivity to the environment.

NNPP, NRC, and DOT requires that the carriers for all radioactive material shipments have accident plans identifying the actions to be taken in case the transportation vehicle is involved in an accident. These plans provide for notification of civil authorities and the originating facility. These plans also provide a 24-hour telephone number for emergency guidance and assistance.

C.2.9 Perspective on Calculations of Cancer and Risk

The topics of human health effects caused by radiation and the risks associated with reactor plant disposal are discussed throughout this EIS/OEIS. It is important to understand these concepts and how they are used to understand the information presented in this document. It is also valuable to have some frame of reference or comparison for understanding how the risks compare to the risks of daily life.

The method used to calculate the risk of any impact is fundamental to all of the evaluations presented and follows standard accepted practices. The first step is to determine the probability that a specific event would occur. For example, the probability that a routine task, such as operating a crane, would be performed sometime during a year of reactor plant disposal at a facility would be 1.0. Which means that the action would certainly occur. The probability that an accident would occur is less than 1.0. Accidents occur only occasionally and some of the more severe accidents, such as a catastrophic earthquake, might occur at any location only once in hundreds, thousands, or millions of years.

Once the probability of an event has been determined, the next step is to predict the consequences of the event being considered. One important measure of consequences chosen for this EIS/OEIS is cancer induced by radiation. The cancer that might be caused by reactor plant disposal can be calculated using a standard technique based on the amount of radiation exposure estimated to occur from all conceivable pathways and the number of people who could be affected.

For example, the lifetime risk of dying in a motor vehicle accident can be calculated from the likelihood of an individual being in an accident and the consequences, or number of fatalities, per accident. There were 474,549 motor vehicle accidents during 2020 in the state of Texas resulting in 3,896 deaths (Texas Department of Transportation, 2020). Assuming only one person is involved in each accident, the probability of a person in Texas being in a motor vehicle accident is 474,549 accidents divided by 29,527,941 persons in Texas (U.S. Census Bureau, 2021), or 0.016 per year. The probability of an accident causing a fatality is 0.0082 (3,896 deaths divided by 474,549 accidents). Multiplying the probability of the accident (0.016 per year) by the consequences of the accident (0.0082 deaths per accident) by the number of years the person is exposed to the risk (78.5 years is considered to be an average lifetime) (CDC, 2012)[1] gives the lifetime risk for any individual of being killed in a motor vehicle accident. From this calculation, the lifetime risk of an individual dying in a motor vehicle accident in Texas is about 0.010 or 1 percent.

Table C-2 presents the risks associated with occupational radiation exposure for the alternatives analyzed in this EIS/OEIS and other commonplace lifetime and occupational risks.

[1] CDC is an acronym for the Center for Disease Control and Prevention

Table C-2: Commonplace Lifetime and Occupational Risks

Occupational or Commonplace Fatality 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]	<0.3

[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]Alternative 3 (Preferred Alternative) is bounding of all action alternatives, and 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 3-year duration of radiological work and the ICRP conversion factor for workers (consistent with NNPP report NT-21-2, May 2021). Lifetime risk percent associated with occupational radiation exposure for the No Action Alternative is negligible.

C.3 Analysis of Uncertainties

The analyses of the impacts of reactor plant disposal presented in this EIS/OEIS are based on conservative calculations. This is necessary as a release of radioactivity to the environment has a low probability of occurrence and most of the impacts of reactor plant disposal operations are so small that they cannot be measured.

C.3.1 Conversion of Radiation Exposure to Health Effects

The conversion of amounts of radiation or radioactive material transmitted to an individual or to population groups into health effects requires the calculation of the radiation exposure or dose received by humans caused by exposure to a radiation field. Such calculations are based on a number of factors. The factors include the type of radiation involved, the sensitivity of various organs, and the age of the individuals involved. The energies, half-lives, and similar properties of radioactive material or radiation have been measured extensively and introduce little uncertainty into the calculations in this EIS/OEIS.

The numerical estimates of fatal cancer and other health effects are obtained by the practice of modeling a linear-non-threshold (LNT) dose-response relationship for the induction of fatal cancer. The LNT model assumes that the health effects from radiation increase proportionally with dose, that the effects from high doses can be extrapolated to determine the effects at low doses, and that a threshold does not exist below which no health effects occur.

However, the number of detrimental health effects which might result from exposure of a large group of people to low levels of radiation has been the subject of debate for many years and no scientific knowledge exists to confirm a quantitative model. The ICRP stated the following in its 2007 recommendations (ICRP, 2007):

> "Although there are recognised [sic] exceptions, for the purposes of radiological protection the Commission judges that the weight of evidence on fundamental cellular processes coupled with dose-response data supports the view that, in the low dose range, below about 100 mSv [10 rem], it is scientifically plausible to assume that the incidence of cancer or heritable effects will rise in direct proportion to an increase in the equivalent dose in the relevant organs and tissues…However, the Commission emphasises [sic] that whilst the LNT model remains a scientifically plausible element in its practical system of radiological protection, biological/epidemiological information that would unambiguously verify the hypothesis that underpins the model is unlikely to be forthcoming."

There is much uncertainty in the understanding of dose to health effects because the data are inconclusive at small doses, and other methods of extrapolation to the low-dose region could yield higher or lower numerical estimates of cancer. Studies of human populations exposed at low doses have not shown consistent or conclusive evidence upon which to determine the incidence of cancer from radiation exposure. Attempts to observe increased cancer in human populations exposed to low doses of radiation have been difficult. There is scientific uncertainty about cancer incidence in the low-dose region below the range of epidemiologic observation (observations having to do with the branch of medicine that studies events that affect many people throughout an area at the same time), and the possibility of no incidence cannot be excluded. The reason low-dose studies cannot be conclusive is that the incidence rate, if it exists at these low levels, is too small to be seen in the presence of all the other risks of life (NNPP, 2011). However, the NNPP has always assumed that radiation exposure, no matter how small, may involve some consequence (e.g., cancer). For this Appendix, the recommendations from the ICRP (ICRP, 2007) based on the LNT model are used to evaluate health effects.

The calculations of health effects performed in this EIS/OEIS use the relation recommended by the ICRP because it is well documented and kept up to date by the ICRP. It is also consistent with the preferred model identified by the National Academy of Sciences in the BEIR VII report (NAS-NRC, 2006), the United Nations Scientific Committee (UNSCEAR, 2000) and the National Council on Radiation Protection (NCRP, 2001) and is widely accepted by the scientific community as representing a method which produces estimates of health effects which would not be exceeded. However, a number of researchers believe that the ICRP relation overestimates the number of detrimental health effects produced by low levels of radiation and, in fact, the possibility of no effect cannot be excluded. Conversely, there are some who believe that exposure to low levels of radiation can produce more health effects than would be estimated using the ICRP relations.

Clearly, using a relationship developed by one or the other of these groups would produce a larger or smaller estimate of the number of health effects than the values presented in this EIS/OEIS, but a factor of two change in the small risks calculated for all of the alternatives would still leave them as small risks. All of the results of analyses of reactor plant disposal in this EIS/OEIS include the calculated radiation exposure in addition to the number of health effects to enable independent calculations using any relation between radiation exposure and health effects judged appropriate.

The radiation exposures reported in this EIS/OEIS are chronic radiation exposures based on the committed dose (50 or more years of internal dose delivery) from an annual dose from reactor plant disposal.

The increased number of fatal cancers is based on the calculated increase in exposure to radiation that would be seen by the general public. The average annual dose received by a member of the population of the United States from background radiation is approximately 310 mrem. When people are exposed to additional radiation, the number of radiation-induced cancer and other health effects increase. In a typical group of 10,000 persons who do not work with radioactive material, a total of about 2,000 (20 percent) will normally die of cancer. If each of the 10,000 persons received an additional 1 rem of radiation exposure (10,000 person-rem) in their lifetime, then an estimated 5 additional cancer deaths (0.05 percent) might occur. Therefore, the likelihood of a person contracting fatal cancer during their lifetime could be increased nominally from 20 percent to 20.05 percent by receiving a dose of 1 additional rem of radiation. The factor used in this EIS/OEIS to obtain fatal cancers is 0.00041 fatal cancers per person-rem for workers and 0.00055 fatal cancers per person-rem for the general public (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 cancer health conversion factors overstate the expected incidence of fatal cancer in the population, and the use of these factors to estimate the incidence of fatal cancer is conservative.

C.3.2 Summary of Uncertainties

As discussed in the preceding portions of this section, the calculations in this EIS/OEIS have generally been performed in such a way that the estimates of annual risk provided are unlikely to be exceeded. For reactor plant disposal operations, monitoring of actual operations combined with projections for future operations provide realistic but conservative source terms, which, when combined with conservative estimates of the effects of radiation, produce estimates of risk which are very unlikely to be exceeded. The effects for all alternatives have been calculated using the same source terms and other factors, so this EIS/OEIS provides an appropriate means of comparing potential impacts on human health and the environment.

The use of conservative analyses is not a problem or disadvantage in this EIS/OEIS since all of the alternatives are evaluated using the same methods and data, allowing a fair comparison of all of the alternatives on the same basis. Furthermore, even using these conservative analytical methods, the annual risks for all of the alternatives are small, which greatly reduces the significance of any uncertainty analysis parameters.

C.4 Radiation Exposure Analysis for Alternatives Analyzed in this Environmental Impact Statement/Overseas Environmental Impact Statement

C.4.1 Occupational Radiation Exposure

For Alternatives 1 and 2 (the reactor compartment packaging alternatives), the estimated cumulative Shipyard occupational exposure to prepare the reactor compartment packages for disposal at the DOE Hanford Site (the reactor compartment packaging alternatives) is 300 rem over five years (potential risk of 0.12 additional latent cancer fatalities for workers, or approximately 0.025 additional latent cancer fatalities annually at 60 rem per year for a five-year project duration). For Alternative 3 (Preferred Alternative), the estimated cumulative occupational exposure to entirely dismantle the reactor plants is 540 rem over three years (potential risk of 0.22 additional latent cancer fatalities for workers, or approximately 0.074 additional latent cancer fatalities annually at 180 rem per year for a three-year project duration).

If Alternatives 1, 2, or 3 are not chosen, the No Action Alternative would occur by default. The disadvantage of this option is that it only delays ultimate permanent disposal. At the end of protective storage, the radioactive inventory (primary radionuclides such as nickel-63 and nickel-59) would still require permanent disposal of the reactor compartments as radioactive waste. The potential benefit would be lower radiation exposure to occupational workers. For example, a delay of 15 years would reduce the total radiation dose to shipyard workers such that the estimated cumulative Shipyard occupational exposure to prepare the reactor compartment packages for disposal at the DOE Hanford Site (the reactor compartment packaging alternatives) would be 37.5 rem over five years (potential risk of 0.015 additional latent cancer fatalities for workers, or approximately 0.003 additional latent cancer fatalities annually at 7.5 rem per year for a five-year project duration). With the 15-year delay, the estimated cumulative occupational exposure to entirely dismantle the reactor plants (Alternative 3 [Preferred Alternative]) would be 67.5 rem over three years (potential risk of 0.028 additional latent cancer fatalities for workers, or approximately 0.009 additional latent cancer fatalities annually at 22.5 rem per year for a three-year project duration). Deferral of Alternatives 1, 2, and 3 would not result in any significant reduction in radioactive waste volume. Deferral would require placement of ex-Enterprise in protected waterborne storage as described in the No Action Alternative at a substantial cost for storage and inflated future costs for disposal.

C.4.2 Transportation-Related Radiation Exposure

See Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants) for a detailed discussion of radiation exposure risks from transportation associated with the Preferred Action and alternatives.

C.5 Conclusions

The information presented in this appendix demonstrates that occupational radiation exposure risk to individuals working within federal radiation limits to perform reactor plant dismantlement activities are small when compared to other hazards and commonplace lifetime risks.

A comparison of the No Action Alternative, the reactor compartment packaging alternatives, and the dismantlement (preferred) alternative is provided in Table ES-1 of the Executive Summary.

REFERENCES

American Nuclear Society. (2002). *Report "The Safety of Transporting Radioactive Materials," Position Statement*.

Boice, J. D., Jr., , S. S. Cohen, M. T. Mumma, & E. D. Ellis. (2019). The Million Person Study, whence it came and why. *International Journal of Radiation Biology*.

Bureau, U. S. C. (2021). *Fact Finder 2020 Population Estimates*. Washington, DC: U.S. Department of Commerce, U.S. Census Bureau.

Center for Disease Control and Prevention. (2011). *Vital Signs*. Washington, DC: Center for Disease Control and Prevention.

Centers for Disease Control and Prevention. (2012). *Life Expectancy*. Retrieved from http://www.cdc.gov/nchs/fastats/lifeexpec.htm.

D. B. Richardson, e. a. (2015). "Risk of cancer from occupational exposure to ionizing radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS),". *The BMJ, 351*(h5359), 67.

Federal Radiation Council. (1960). *Radiation Protection Guidance for Federal Agencies*. Washington, DC: Federal Radiation Council.

Grant, E. J., A. Brenner, H. Sugiyama, R. Sakata, A. Sadakane, M. Utada, E. K. Cahoon, C. M. Milder, M. Soda, H. M. Cullings, D. L. Preston, K. Mabuchi, & K. Ozasa. (2017). Solid Cancer Incidence among the Life Span Study of Atomic Bomb Survivors: 1958-2009. *Radiation Research, 187*(5), 513–537.

Greenberg, E. R., B. Rosner, C. Hennekens, R. Rinsky, & T. Colton. (1985). An investigation of bias in a study of nuclear shipyard workers. *American Journal of Epidemiology, 121*(2), 301–308.

Hatch, M. C., J. Beyea, J. W. Nieves, & M. Susser. (1990). Cancer near the Three Mile Island nuclear plant: Radiation emissions. *American Journal of Epidemiology, 132*(3), 397–412.

Howlader, e. a. (2019). *"SEER Cancer Statistics Review, 1975-2016"*. Bethesda, MD: National Cancer Institute.

Hsu, W.-L., D. L. Preston, M. Soda, H. Sugiyama, S. Funamoto, K. Kodama, A. Kimura, N. Kamada, H. Dohy, M. Tomonaga, M. Iwanaga, Y. Miyazaki, H. M. Cullings, A. Suyama, K. Ozasa, R. E. Shore, & K. Mabuchi. (2013). The incidence of leukemia, lymphoma and multiple myeloma among atomic bomb survivors: 1950-2001. *Radiation Research, 179*(3), 361–382.

International Commission on Radiological Protection. (1959). *Pubication 1, "Recommendations of the International Commission on Radiological Protection"*. Pergamon Press.

International Commission on Radiological Protection. (1962). *Publication 6, "Recommendations of the International Commission on Radiological Protection"*. Permagon Press.

International Commission on Radiological Protection. (1977). *Recommendation of the International Commission on Radiological Protection* (ICRP Publication 26, Ann. ICRP 1 [Vol. 3]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (1991). *Publication 60, "1990 Recommendations of the International Commission on Radiological Protection"* (ICRP Publication 60, Ann. ICRP 21 [Vol. 1–3]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (1994). *Dose Coefficients for Intakes of Radionuclides by Worker* (ICRP Publication 68, ICRP 24 [Vol. 4]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (1995). *Age-Dependent Doses to Members of the Public from Intake of Radionuclides: Part 4 Inhalation Dose Coefficients* (ICRP Publication 71, Ann. ICRP 25 [Vol. 3-4]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (1996). *Age-Dependent Doses to Members of the Public from Intake of Radionuclides: Part 5 Compilation of Ingestion and Inhalation Dose Coefficients.* (ICRP Publication 72, Ann. ICRP 26 [Vol. 1]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (2007). *The 2007 Recommendation of the International Commission on Radiological Protection* (ICRP Publication 103, Ann. ICRP 37 [Vol. 2-4]). Ottawa, Canada: International Commission on Radiological Protection.

International Commission on Radiological Protection. (2012). *Publication 118, "ICRP Statement on Tissue Reactions and Early and Late Effects of Radiation in Normal Tissues and Organs – Threshold Doses for Tissue Reactions in a Radiation Protection Context"* Elsevier.

K. Leuraud, e. a. (2015). "Ionizing radiation and risk of death from leukemia and lymphoma in radiation-monitored workers (INWORKS): an international cohort study,". *The Lancet Haematology, 2*, e276-e281.

Kubale, T. L., R. D. Daniels, J. H. Yiin, J. Couch, M. K. Schubauer-Berigan, G. M. Kinnes, S. R. Silver, S. J. Nowlin, & P. H. Chen. (2005). A nested case-control study of leukemia mortality and ionizing radiation at the Portsmouth Naval Shipyard. *Radiation Research, 164*(6), 810–819.

Matanoski, G. M. (1991). *"Health Effects of Low-Level Radiation in Shipyard Workers,"*. Baltimore, MD: Johns Hopkins University Department of Epidemiology School of Hygiene and Public Health.

Matanoski, G. M., J. A. Tonascia, A. Correa-Villasenor, K. C. Yates, N. Fink, E. Elliott, B. Sanders, & D. Lantry. (2008). Cancer risks and low-level radiation in U.S. shipyard workers. *Radiation Research, 49*(1), 83-91.

Measurements, N. C. o. R. P. a. (1958). *Report 17, "Permissible Dose from External Sources of Ionizing Radiation," including April 15, 1958 Addendum "Maximum Permissible Radiation Exposures to Man"*. Washington, DC: National Committee on Radiation Protection and Measurements.

National Academy of Sciences-National Research Council. (1980). *The Biological Effects of Low Level Ionizing Radiation* (Report of the Committee on the Biological Effects of Ionizing Radiations). Washington, DC: National Academy of Sciences-National Research Council.

National Academy of Sciences-National Research Council. (1990). *Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V* (Report of the Committee on the Biological Effects of Ionizing Radiations). Washington, DC: National Academy of Sciences-National Research Council.

National Academy of Sciences – National Research Council. (2006). *Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII-Phase 2* (Report of the Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation). Washington, DC: National Academy of Sciences – National Research Council.

National Cancer Institute. (1990). *Cancer In Population Living Near Nuclear Facilities* (NIH Publication No. 90-874). Washington, DC: National Cancer Institute.

National Cancer Institute. (2021). *Surveillance, Epidemiology, and End Results Program "SEER Cancer Stat Facts: Cancer of Any Site"* Retrieved from https://seer.cancer.gov/archive/csr/1975_2018/results_merged/sect_01_overview.pdf.

National Center for Health Statistics. (2021). *Deaths: Final Data for 2019* (Volume 70, Number 8). Hyattsville, MD: Centers for Disease Control and Prevention, National Center for Health Statistics.

National Council on Radiation Protection and Measurements. (2001). *Evaluation of the Linear-Non-threshold Dose-Response Model for Ionizing Radiation* (NCRP Report No. 136). Bethesda, MD: National Council on Radiation Protection and Measurements.

National Council on Radiation Protection and Measurements. (2009). *Ionizing Radiation Exposure of the Population of the United States* (NCRP Report No. 160). Bethesda, MD: National Council on Radiation Protection and Measurements.

National Council on Radiation Protection and Measurements. (2016). *Commentary No. 26, "Guidance on Radiation Dose Limits for the Lens of the Eye"*. Washington, DC: National Council on Radiation Protection and Measurements.

National Council on Radiation Protection and Measurements. (2018). *Report 180, "Management of Exposure to Ionizing Radiation: Radiation Protection Guidance for the United States"*. Washington, DC: National Council on Radiation Protection and Measurements.

Naval Nuclear Propulsion Program. (2011). *Occupational Radiation Exposure from Naval Reactors' Department of Energy Facilities* (Report NT-11-3). Washington, DC: Office of Naval Reactors.

Ozasa, K., Y. Shimizu, A. Suyama, F. Kasagi, M. Soda, E. J. Grant, R. Sakata, H. Sugiyama, & K. Kodama. (2009). Studies of the mortality of atomic bomb survivors, Report 14, 1950-2003: an overview of cancer and noncancer diseases. *Radiation Research, 177*(3), 368–243.

Preston, D. L., E. Ron, S. Tokuoka, S. Funamoto, N. Nishi, M. Soda, K. Mabuchi, & K. Kodama. (2007). Solid cancer incidence in atomic bomb survivors: 1958-1998. *Radiation Research, 168*(1), 1–64.

Richardson, D., H. Sugiyama, N. Nishi, R. Sakata, Y. Shimizu, E. J. Grant, M. Soda, W.-L. Hsu, A. Suyama, K. Kodama, & F. Kasagi. (2009). Ionizing radiation and leukemia mortality among Japanese Atomic Bomb Survivors, 1950-2000. *Radiation Research, 172*(3), 368–382.

Rinsky, R. A., J. M. Melius, R. W. Hornung, R. D. Zumwalde, R. J. Waxweiler, P. J. Landrigan, P. J. Bierbaum, & J. Murray, W. E.,. (1988). Case-control study of lung cancer in civilian employees at the Portsmouth Naval Shipyard, Kittery, Maine. *American Journal of Epidemiology, 127*(1), 55–64.

Rinsky, R. A., R. D. Zumwalde, R. J. Waxweiler, W. E. Murray, P. J. Landrigan, P. J. Bierbaum, M. Terpilak, & C. Cox. (1981). Cancer Mortality at a Naval Nuclear Shipyard. *The Lancet, 317*, 231–235.

Schubauer-Berigan, M. K., R. D. Daniels, S. J. Bertke, C.-Y. Tseng, & D. B. Richardson. (2015). Cancer Mortality through 2005 among a Pooled Cohort of U.S. Nuclear Workers Exposed to External Ionizing Radiation. *Radiation Research, 183*(6), 620-631.

Schubauer-Berigan, M. K., R. D. Daniels, D. A. Fleming, A. M. Markey, J. R. Couch, S. H. Ahrenholz, J. S. Burphy, J. L. Anderson, & C.-Y. Tseng. (2007a). Chronic lymphocytic leukaemia and radiation: findings among workers at five US nuclear facilities and a review of the recent literature. *British Journal of Haematology, 139*(5), 799-808.

Schubauer-Berigan, M. K., R. D. Daniels, D. A. Fleming, A. M. Markey, J. R. Couch, S. H. Ahrenholz, J. S. Burphy, J. L. Anderson, & C. Y. Tseng. (2007b). Risk of chronic myeloid and acute leukemia mortality after exposure to ionizing radiation among workers at four U.S. nuclear weapons facilities and a nuclear naval shipyard. *Radiation Research, 167*(2), 222-232.

Shore, R. E. (1990). Occupational Radiation Studies, Status, Problems, and Prospects. *Health Physics, 59*, 63–68.

Silver, S. R., R. D. Daniels, T. D. Taulbee, D. D. Zaebst, G. M. Kinnes, J. R. Couch, T. L. Kubale, J. H. Yiin, M. K. Schubauer-Berigan, & P. H. Chen. (2004). Differences in mortality by radiation monitoring status in an expanded cohort of Portsmouth Naval Shipyard workers. *Journal of Occupational and Environmental Medicine, 46*(7), 677–690.

Stern, F. B., R. A. Waxweiler, J. J. Beaumont, S. T. Lee, R. A. Rinsky, R. D. Zumwalde, W. E. Halperin, P. J. Bierbaum, P. J. Landrigan, & J. Murray, W. E. (1986). A case-control study of leukemia at a naval nuclear shipyard. *American Journal of Epidemiol, 123*(6), 980–992.

Texas Department of Transportation. (2020). *Texas Motor Vehicle Crash Statistics - 2020*. Retrieved from https://www.txdot.gov/inside-txdot/forms-publications/drivers-vehicles/publications/annual-summary.html.

U.S. Department of Energy. (1997a). *The Hanford Site Historic District* (DOE/RL-97-1047). Richland, WA: U.S. Department of Energy.

U.S. Department of Energy. (1997b). *Record of Decision for the Disposal of the S1C Prototype Reactor Plant, signed by Admiral F.L. Bowman December 30 1996*. Washington, DC: U.S. Department of Energy.

U.S. Department of Energy. (1998a). *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan* (DOE/RL-97-56, Rev. 1). Richland, WA: U.S. Department of Energy.

U.S. Department of Energy. (1998b). *Record of Decision on the Disposal of the Defueled S3G and D1G Prototype Reactor Plant signed by Admiral F.L. Bowman January 20 1998*. Washington, DC: U.S. Department of Energy.

U.S. Department of Labor & U.S. Bureau of Labor Statistics. (2022). *Number and Rate of Fatal Work Injuries, by Industry Sector, 2022*. Retrieved from https://www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm.

U.S. Environmental Protection Agency. (1987). *Protection Guidance to Federal Agencies for Occupational Exposure*. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. (1993). *External Exposure to Radionuclides in Air, Water, and Soil* (Federal Guidance Report Number No. 12. EPA-402-R-93-081). Washington, DC: U.S. Environmental Protection Agency.

U.S. Nuclear Regulatory Commission. (1977). *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes*. Rockville, MD: U.S. Nuclear Regulatory Commission Office of Standards Development.

U.S. Nuclear Regulatory Commission. (2011). *Environmental Impact Statement for the Proposed Eagle Rock Enrichment Facility in Bonneville County, Idaho* (NUREG-1945. Vol. 1). Washington, DC: U.S. Nuclear Regulatory Commission.

U.S. Nuclear Regulatory Commission. (2018). *Occupational Radiation Exposure at Commercial Nuclear Power Reactors and other Facilities 2016: Forty-Ninth Annual Report* (NUREG-0713 Vol. 38). Washington, DC: U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research.

United Nations Scientific Committee on the Effects of Atomic Radiation. (2000). *Sources and Effects of Ionizing Radiation*. New York, NY: United Nations Scientific Committee on the Effects of Atomic Radiation.

United Nations Scientific Committee on the Effects of Atomic Radiation. (2006). *Effects of Ionizing Radiation*. New York, NY: United Nations Scientific Committee on the Effects of Atomic Radiation.

Upton, A. C. (1982). The Biological Effects of Low Level Ionizing Radiation. *Scientific American, 246*(2), 41–49.

Yiin, J. H., S. R. Silver, R. D. Daniels, D. D. Zaebst, E. A. Seel, & T. L. Kubale. (2007). A nested case-control study of lung cancer risk and ionizing radiation exposure at the portsmouth naval shipyard. *Radiation Research, 168*(3), 341-348.

This page intentionally left blank.

Environmental Impact Statement/ Overseas Environmental Impact Statement

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

TABLE OF CONTENTS

List of Figures

There are no figures in this appendix.

List of Tables

This page intentionally left blank.

Appendix D Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants

D.1 Purpose

This appendix describes the analysis used to estimate radiation dose and associated health risks to the public and transportation crews from transportation of low-level radioactive waste associated with the Preferred Action and alternatives. The analysis considers transportation by rail, truck, and barge consistent with expected waste shipments for alternatives described in this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS). The analysis produced conservative estimates of radiation exposures in normal conditions of transport (incident-free) and accident scenarios for each of the alternatives, as detailed below:

- No Action Alternative: No transportation analysis is necessary for the No Action Alternative. Low-level radioactive waste for the No Action Alternative would be very low volume and consistent with ongoing, routine nuclear shipyard work.
- Alternative 1: Transport of eight single ex-Enterprise naval reactor compartment disposal packages by barge from Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) to the Port of Benton, followed by transport by multiple-wheel, high-capacity transporter to the Department of Energy (DOE) Hanford Site near Richland, Washington.
- Alternative 2: Transport of four dual-reactor ex-Enterprise naval reactor compartment disposal packages by barge from PSNS & IMF to the Port of Benton, followed by transport by multiple-wheel, high-capacity transporter to the DOE Hanford Site near Richland, Washington.
- Alternative 3 (Preferred Alternative): Transport by barge, rail, or truck of 88 larger packages and about 352 container express (CONEX) boxes or similar-sized packages of low-level radioactive waste (e.g., piping, components) to one or more of the following low-level radioactive waste disposal facilities (EnergySolutions in Clive, Utah; the DOE Savannah River Site near Aiken, South Carolina; and Waste Control Specialists, LLC in Andrews, Texas).

D.2 Analysis Model

The computer code used for transportation analysis is Radioactive Material Transportation (RADTRAN). RADTRAN (Weiner et al., 2014) is considered the standard for radiological transportation analysis by DOE and the Nuclear Regulatory Commission. The program Web Transportation Routing Analysis Geographic Information System (WebTRAGIS) was used to perform the routing analysis to determine route length and population density.

The radiological health risks (i.e., increase in potential of cancer fatalities) from transport of radioactive waste generated for the Proposed Action and alternatives were analyzed for the general public, the transport crew, and hypothetical maximum exposed individuals (MEIs). Gamma radiation emanating directly from the shipment during normal transport conditions, as well as accident scenarios, were modeled. The accident scenario also models airborne release of radioactive material from a postulated severely damaged shipment.

The transportation analysis model requires defining the number of shipments and expected radiological dose rate on the exterior of those shipments; types of transportation used (such as barge, rail, and

highway); and routes traveled. Normal conditions of transport and accident scenarios are analyzed. Accident scenarios require estimating total activity for radionuclides included in the shipments. Finally, the locations and exposure durations for both members of the public and transportation crew are used to estimate cumulative exposure and exposure to MEIs. Details of these aspects of the model are presented below.

D.2.1 Number of Shipments and Estimated Radiation Dose Exterior to Packages

The estimated radiation dose rate on the exterior of each package containing low-level radioactive waste is defined as the Transportation Index (TI). TI is the highest radiation dose rate in mrem/hr expected to be measured at any location at 3.3 feet (ft.) from the shipment. TI values assigned are TI-2 (2 mrem/hr) for shipments with lower expected external radiation levels and TI-10 (10 mrem/hr) for shipments with higher expected external radiation levels. 10 mrem/hr is the maximum level allowed by Department of Transportation Regulations in 49 CFR Part 173, and therefore is considered bounding for the purposes of analysis.

- Alternative 1: Eight reactor compartment packages would be shipped to the DOE Hanford Site. Each package would consist of one reactor compartment for a total of eight shipments with transport index TI-2 for each shipment. For Alternatives 1 and 2 (the reactor compartment packaging alternatives), TI-2 is used as a conservative assumption based on measured radiation levels from past reactor compartment package shipments. For perspective, ex-Enterprise reactor compartment packages are expected to be less than 1 mrem/hr (TI-1) due to differences in internal activity and plant/package design as compared to past reactor compartment package shipments.
- Alternative 2: Four reactor compartment packages would be shipped to the DOE Hanford Site. Each package would consist of two reactor compartments, for a total of four shipments with transport index TI-2 for each shipment.
- Alternative 3 (Preferred Alternative): Alternative 3 was estimated to result in 440 packages for the eight ex-Enterprise naval reactor compartments. Of these 440 packages, TI-10 was applied to 96 packages and TI-2 was applied to 344 packages. Each reactor plant was assumed to consist of 55 total packages. These 55 packages would contain the same material as a single reactor compartment package as described for Alternative 1. TI-10 was applied for one CONEX box shipment per reactor plant, and TI-2 was applied for the remaining 43 CONEX box packages. TI-10 was applied to the additional 11 larger packages per reactor plant not suitable for CONEX box package. The TI difference in CONEX boxes was applied to provide a conservative result and provide flexibility in determining how packages are shipped within a bounding analysis.

D.2.2 Types of Shipments

Shipments by rail, ocean barge, river barge, and highway were modeled as appropriate for the alternative analyzed. For the reactor compartment packaging alternatives, the inland waters transit (including Puget Sound and lower Columbia River) was conservatively modeled as river barge transportation. The remaining transport from the Port of Benton to the DOE Hanford site was modeled as highway transportation. For Alternative 3 (Preferred Alternative), combinations of rail, ocean barge, river barge, and highway transportation were modeled to account for all possible transport routes. Land routes utilize interstate highways where possible and avoid secondary routes and tribal lands, and therefore may not represent the shortest drivable distance.

Table D-1 details the number of shipments, transportation index, and types of shipments for the alternatives analyzed.

Table D-1: Shipments

Mode	Shipment Type	MEI Estimate Assumptions	Total Number of Shipments (For Cumulative Estimates)	Package Size[1] (feet)	Transportation Index (mrem/hr)
Alternative 1		**Number of Reactor Compartments per Shipment**			
Reactor Compartment Package to the DOE Hanford Site	Single Reactor Compartment Package	1	8	39.8 W x 46.6 H x 35.5 L	2
Alternative 2		**Number of Reactor Compartments per Shipment**			
Reactor Compartment Package to the DOE Hanford Site	Dual Reactor Compartment Package	2	4	39.8 W x 46.6 H x 71.0 L	2
Alternative 3 (Preferred Alternative)		**55 Total Packages[2]**			
Commercial Dismantlement	Reactor Vessel	1	8	15 D x 21 L	10
Commercial Dismantlement	Other Large Reactor Plant Components	10	80	Max. 10 D x 25 L	10
Commercial Dismantlement	Remainder of Reactor Compartment in CONEX boxes	44	352	8 W x 8 H x 40 L	10 (8 boxes) 2 (344 boxes)

[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: D = Depth, H = Height, W = Width, L = Length, mrem = millirem (rem = Roentgen equivalent man), DOE = Department of Energy

D.2.3 Transportation Routes

Transportation routes for all waste shipments described in each of the proposed Alternatives are shown in Table D-2. The WebTRAGIS routing code provides population densities for segments along the transportation route and subdivides each of these into rural, suburban, and urban population density segments. WebTRAGIS incorporates population data for all transportation segments using the LandScan™ USA 2012 population distribution data model (Oak Ridge National Laboratory, 2018).

Table D-2: Distance by Route and Transportation Mode (Miles)

Origin	Destination	Rail	Ocean Barge	River Barge	Highway	Total
Brownsville, Texas (TX)	Waste Control Specialists (WCS) via Andrews	0	0	0	729	729
Brownsville, TX	WCS	0	0	0	729	729
Brownsville, TX	WCS	1,010	0	0	0	1,010
Brownsville, TX	DOE Savannah River Site (SRS) via Mobile	0	0	0	1,422	1,422
Brownsville, TX	SRS/Birmingham	0	0	0	1,422	1,422
Brownsville, TX	SRS	1,599	0	0	0	1,599
Brownsville, TX	SRS	0	1,668	187	58	1,913
Brownsville, TX	EnergySolutions (ES) via Midland	0	0	0	2,205	2,205
Brownsville, TX	ES via Lubbock	0	0	0	2,461	2,461
Brownsville, TX	ES	2,120	0	0	0	2,120
Newport News, Virginia (VA)	SRS via Charlotte	0	0	0	492	492
Newport News, VA	SRS via Richmond	0	0	0	545	545
Newport News, VA	SRS	605	0	0	0	605
Newport News, VA	SRS	0	0	599	0	599
Newport News, VA	WCS via Little Rock	0	0	0	1,806	1,806
Newport News, VA	WCS	0	0	0	1,806	1,806
Newport News, VA	WCS	2,271	0	0	0	2,271
Newport News, VA	WCS via Galveston-Houston	0	2,020	0	653	2,673
Newport News, VA	WCS via Beaumont	0	1,980	0	685	2,665
Newport News, VA	ES via Louisville	0	0	0	2,271	2,271
Newport News, VA	ES via Dayton	0	0	0	2,323	2,323
PSNS & IMF	DOE Hanford Site	0	208	502	26	736
Mobile, Alabama (AL)	WCS	0	0	0	819	819
Mobile, AL	WCS	1,259	0	0	0	1,259
Mobile, AL	SRS	0	0	0	490	490
Mobile, AL	SRS	748	0	0	0	748
Mobile, AL	SRS	0	1,263	187	58	1,508
Mobile, AL	ES	0	0	0	2,309	2,309
Mobile, AL	ES	2,034	0	0	0	2,034

Notes: (1) DOE = Department of Energy, PSNS & IMF = Puget Sound Naval Shipyard and Intermediate Maintenance Facility. (2) Barge transit from Newport News to SRS applies to Alternative 3 (Preferred Alternative). The barge is assumed to travel close to the shore and is treated as river barge transportation. (3) Some land routes have identical calculated mileages after rounding but are analyzed separately due to the potential for different population densities.

D.3 Normal Conditions of Transport General Public Exposure and Transportation Crew Exposure

D.3.1 Members of the General Public

Exposures received by the general public during normal conditions of transport are attributed to gamma radiation emanating from the shipments. Included in the RADTRAN analysis for normal conditions of transport are models predicting the following:

- exposure to persons within about one-half mile of each side of the transport route,
- exposures to persons (e.g., passengers on passing trains or vehicles) sharing the transport route, and
- exposures to persons at stops (e.g., residents or rail and truck crew not directly involved with the shipment).

D.3.2 Transportation Crew

The transportation crew exposure is associated with exposure directly from the shipment package during transit, including inspection periods. For truck shipments, RADTRAN assumes crew exposure is entirely from exposure during the transit period and no inspections occur. For both waterway and rail shipments, RADTRAN assumes crew exposure is from exposure during periods of package inspections and negligible during the transit time due to relatively long separation distances and shielding of intervening structures.

D.4 Accident Analysis

RADTRAN was used to calculate the radiological health consequences from a postulated and low probability severe accident. The RADTRAN model assumes the package is damaged and corrosion products are released into the atmosphere. The accident was modeled to occur at the location with the largest exposed population. Total activity in the package used in the model was bounding and higher than what would be expected for an actual accident. Worst-case accident severity and probability were applied to present a bounding radiation exposure value.

D.4.1 Individual Definitions, Exposure Pathways, and RADTRAN Formula

Accident doses include the following two exposure groups:

- General Public Exposure: exposure to all individuals within 50 miles for each of the three population densities (i.e., rural, suburban, and urban)
- Accident MEI Exposure: the highest accident dose to a member of the general public; the transportation crew is considered to be part of the General Public under accident conditions

The following four dose pathways are considered for accident analysis:

- Inhalation: inhalation of air containing radiation in gases or particles
- Re-suspension: direct exposure to radiation from resuspension of contamination deposited onto the ground surface
- Cloud Shine: direct exposure to radiation from the material suspended in the plume
- Ground Shine: direct exposure to radiation from contamination deposited on the ground

A specific formula is used to determine an estimate of the radiological exposure from that particular pathway with the total radiation exposure equal to the sum of the exposure for each pathway. The inhalation exposure is based on a committed effective dose to the body over a 50-year period. The dose

conversion factors are based on the International Commission on Radiological Protection (ICRP) 72 methodology for inhalation; external dose conversion factors are based on Federal Guidance Report 12 (FGR 12) using the ICRP 26 methodology.

The accident dose is integrated over the population at isopleths of increasing distance from the package. The basic formula used for accident dose calculations is:

$$DR = \mathrm{A(r)} * ARF * DCF * Pathway\ Factors$$

Where,

DR: Population exposure to receptor

A(r): Activity in the package; activity is calculated for each radionuclide in the package

r: Perpendicular distance of the individual receptor from the shipment path

Note: r is set to the lower limit for the MEI; population doses are integrated over 50 miles

ARF: Airborne Release Fraction; amount of material released into the air from an accident

DCF: Dose Conversion Factor; dependent on the dose pathway and the radionuclide

Pathway factors are specific to each exposure pathway and define the amount of exposure. They include factors such as exposure time, breathing rate, and unit conversions.

The calculated exposure is used to calculate the accident consequences expressed as radiation exposure.

D.4.2 Accident Risk

The radiological risk to the population considers the probability of the accident occurring and the probability of an accident of a particular severity damaging the package. Accident risk is calculated with the following generic formula:

$$Accident\ Risk = \mathrm{DR} * AP * ASF * RL * N$$

Where,

DR: Population exposure to receptor; formula provided in Section D.4.1

AP: Accident Probability; dependent on the transportation mode

ASF: Accident Severity Fraction; probability of damage to the package during an accident; dependent on the transportation mode

RL: Route Length; used to calculate the probability of occurrence of an accident

N: Number of individuals exposed to an accident; based on the population density; dependent on the route and the population density segment (i.e., rural, suburban, urban)

D.4.3 Total Activity

Total activity was calculated per reactor plant applying conservative estimates for radioactive material inventory from plant components. Additionally, total activity from that of the reactor vessel internal structure (used in Section 3.2 [Hazardous and Radioactive Waste Management]) was increased by a factor of 1.05 to conservatively account for activity outside the internal structure, but within the inner surfaces of the reactor vessel itself and into the body of the vessel. This 5 percent increase is applied for

radiation exposure modeling but is not used for waste classification. If this activity were included in a waste classification calculation, the increased volume of the additional material included would lower the curies per cubic meter fractions calculated.

Table D-3 shows estimated ex-Enterprise reactor vessel corrosion product activity for the radionuclides of relevance for the RADTRAN analysis.

Table D-3: Corrosion Product Radionuclide Inventory per Reactor Plant

Radionuclide Inventory	Total Activity (Ci)
C-14	4.44×10^{-1}
Co-58	1.30×10^{-3}
Co-60	2.28×10^{3}
Cs-134	8.48×10^{-3}
Cs-137	3.95×10^{-4}
Fe-55	1.13×10^{3}
H-3	2.24×10^{-1}
I-129	4.04×10^{-10}
Mn-54	6.00×10^{0}
Nb-94	1.64×10^{-1}
Ni-59	8.11×10^{1}
Ni-63	9.23×10^{3}
Pu-240	1.39×10^{-6}
Sr-90	3.27×10^{-4}
Ta-182	3.09×10^{-3}
Tc-99	7.31×10^{-3}
Y-90	3.27×10^{-4}
Zr-93	1.21×10^{-5}

Notes: C = Carbon, Ci = curie, Co = Cobalt, Cs = Cesium,
Fe = Iron, H = Hydrogen, I = Iodine, Mn = Manganese,
Nb = Niobium, Ni = Nickel, Pu = Plutonium,
Sr = Strontium, Ta = Tantalum, Tc = Technetium,
Y = Yttrium, Zr = Zirconium

Since the total activity and its assumed dispersion used in the hypothetical accident analyses are for scenarios which have never occurred, there is a large possibility of uncertainty in the calculated results. The total activity and its dispersion for the hypothetical accident analyses is dependent upon multiple factors. These factors for developing the total activity are chosen to ensure that the release to the environment is calculated to be conservative for the hypothetical accident scenarios. For example, the radiological material the accident scenarios is calculated on is considered to be conservative, and it is assumed that all released material is respirable (in the breathable range). The amount of damage to the package is dependent upon the nature and severity of the accident. This damage is represented by the airborne release fractions. The most conservative airborne release fraction based on historical operations, 40 percent, was applied. In the hypothetical accident analyzed, the assumptions concerning

the extent of damage to the package and airborne release fraction are expected to provide a conservative evaluation whose results would not be exceeded by reasonably foreseeable accidents of a similar type. The source term released to the environment is judged to be conservative for the hypothetical accident scenarios. The actual magnitude of the release from a transportation accident is expected to be between the value assigned in this EIS/OEIS and zero.

A deliberate destruction scenario is not considered reasonably foreseeable. As discussed above, the activity of concern is within metal structures that would resist destruction. The radioactivity is contained within packages containing higher activity components, such as the reactor vessels which contain many inches of durable corrosion resistant metal alloy up to 6 inches thick. Additionally, the radioactivity is contained within internal piping, components, and built-in shielding of the components within each package.

D.5 Calculated Radiation Exposure and Associated Health Risks

The analyses of the impacts from both normal transportation and hypothetical accidents associated with transportation presented in this analysis are based on conservative calculations. This is necessary because the transportation accidents analyzed have a low probability of occurrence and most of the impacts of normal transportation operations are so small that they cannot be measured. Cumulative exposures are from the entire dismantlement (i.e., all radioactive waste shipments considered). MEI exposures are from shipment of one reactor compartment package (Alternatives 1), a dual reactor compartment package (Alternative 2), or total packages associated with a single reactor plant (Alternative 3).

Table D-4 presents a summary of the highest reasonably foreseeable radiation exposure and estimated health risks based on the RADTRAN and WebTRAGIS analyses. Calculated total effective exposure is presented for general public (person-rem), transportation crew (person-rem), and maximum exposed individuals (rem).

The calculated total exposures were converted to hypothetical health effects expressed in terms of latent cancer fatalities (LCF). In determining a means of assessing health effects from radiation exposure, the ICRP has developed a weighting method for lethal and life-impairing cancers. The ICRP health risk conversion factors specify 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. Adults over the age of 65 are also included in the ICRP factors for the general public. The risks associated with population exposure (person-rem) and maximum exposed individual (rem) are equivalent for equal exposure levels. For example, the risk associated with 0.1 rem exposure to a population of 10 persons (1.0 person-rem) is equivalent to the risk from exposure of 1 rem to 1 individual (1 person-rem).

D.5.1 Cumulative Normal Transport

The Cumulative Normal Transport radiation exposure values are the total exposure (as person-rem) for the entire population affected over the entire dismantlement (i.e., all radioactive waste shipments considered).

For Alternative 1, the Cumulative Normal Transport values represent radiation exposure associated with all reactor compartment packages, for a total of eight shipments. For Alternative 2, the Cumulative Normal Transport values represent radiation exposure associated with all dual reactor compartment packages, for a total of four shipments. For Alternative 3 (Preferred Alternative), the Cumulative Normal Transport values represent radiation exposure associated with 55 packages per reactor compartment as shown in Table D-1, for a total of eight reactor compartments (440 packages). Due to restricted access, no general public radiation exposure is accumulated for the transporter route from the Port of Benton to the DOE Hanford Site.

Table D-4: Summary of Radiation Exposure and Cancer Risk

Scenario Analyzed:	Alternative 1: General Public	Alternative 2: General Public	Alternative 3 (Preferred Alternative): General Public	Alternative 1: Transport Crew	Alternative 2: Transport Crew	Alternative 3 (Preferred Alternative): Transport Crew
Cumulative Normal Transport (person-rem, LCF)	5.4×10^{-3}, 2.9×10^{-6}	4.9×10^{-3}, 2.7×10^{-6}	2.5×10^{1}, 1.4×10^{-2}	4.2×10^{0}, 1.7×10^{-3}	3.6×10^{0}, 1.5×10^{-3}	8.7×10^{-1}, 3.6×10^{-4}
MEI (Normal Transport) (rem, LCF)	1.6×10^{-3}, 8.6×10^{-7}	2.8×10^{-3}, 1.5×10^{-6}	1.3×10^{-1}, 7.0×10^{-5}	9.6×10^{-2}, 3.9×10^{-5}	1.4×10^{-1}, 5.7×10^{-5}	5.5×10^{-2}, 2.2×10^{-5}
Cumulative Accident (person-rem, LCF)	1.8×10^{-3}, 9.8×10^{-7}	1.8×10^{-3}, 9.8×10^{-7}	2.8×10^{0}, 1.5×10^{-3}	see general public	see general public	see general public
MEI Accident (rem, LCF)	3.4×10^{-7}, 1.9×10^{-10}	6.8×10^{-7}, 3.7×10^{-10}	1.4×10^{-4}, 7.5×10^{-8}	see general public	see general public	see general public

Notes: (1) Rem to LCF data will not convert exactly due to rounding. (2) For Alternative 3 (Preferred Alternative), long-distance highway routes (such as to Utah) generally produce the largest radiation exposures. For some locations, summing multiple highway routes ensures a bounding estimate. For example, to ensure a bounding estimate for Alternative 3 in the event Mobile, Alabama was selected as a potential site for commercial dismantlement, the transportation route from Brownsville, Texas, to the DOE Savannah River Site near Aiken, South Carolina, that includes Mobile, Alabama, was added to the worst case route from Hampton Roads, Virginia, to Clive, Utah, and is presented as the bounding case in the table. (3) For Alternative 3 (Preferred Alternative), the MEI for highway transport to WCS in Texas is comparable to that for transport to EnergySolutions in Utah. The highway route MEI is provided for Alternative 3 rather than the barge transport MEI because barge transport is unlikely to be used for the majority of the shipments.

D.5.2 Maximum Exposed Individuals Normal Transport

Two types of single individual radiation exposures for MEIs were evaluated, general public MEI Exposure and Transportation Worker MEI Exposure. General Public MEI radiation exposure value is the maximum radiation exposure to a single member of the public from shipment of one reactor compartment package (Alternatives 1), a dual reactor compartment package (Alternative 2), or total packages associated with a single reactor plant (Alternative 3) (i.e., 55 packages as shown in Table D-1). Transportation Worker MEI exposure value is the maximum radiation exposure to a single member of the Transportation Crew, assuming a single crew member travels the entire route and is exposed at all stops. This is a conservative assumption as most shipments will not expose a single individual (the same person) to the highest radiation exposure for the entire shipment duration.

To evaluate the maximum individual exposure for both the general public and the transport crew, the following scenarios were analyzed:

For exposure to the general public during rail shipments, three scenarios were analyzed:

- Railyard Worker: a railyard worker working 33 ft. from the shipment for two-hours
- In-Transit MEI: a resident living 99 ft. from the rail line as the shipment is being transported
- Rail Stop Resident: a resident living 656 ft. from a stop where the shipment is located for 20 hours

The maximum occupational exposure during rail shipments was assumed to be that occurring from inspections of the package as calculated by RADTRAN.

For exposure to the general public for truck shipments via highway, three scenarios were analyzed:

- Motorist in Traffic: a motorist who is caught in traffic and located 3.3 ft. away from the shipment for 30 minutes
- In-Transit MEI: a resident living 99 ft. from the highway while the shipment is being transported
- Service Station Worker: a service station worker working at a distance of 66 ft. from the shipment for two hours

For truck shipments, the maximum exposed transportation worker was assumed to be the driver of the truck as calculated by RADTRAN.

For exposure to the general public for barge shipments via waterway, two scenarios were analyzed:

- Bridge Worker: a bridge workman located 33 ft. above the centerline of the shipment for two hours while the barge is stopped
- Disabled Motorist, Barge In-Transit MEI: a motorist who is disabled on a bridge above the water route during the total time the radiation exposure could be received by the motorist as the shipment is beneath the bridge; the motorist is positioned 33 ft. from the top of the package when the package is directly below

For barge shipments, the maximum exposed transportation worker was assumed to be a barge transportation crew member during transit as calculated by RADTRAN.

D.5.3 Cumulative Accident Dose Risk

The Cumulative Accident dose risk radiation exposure values are the total exposure (as person-rem) for the entire population affected based on the probability of an accident. Cumulative Accident values include radiation exposure to all individuals within 50 miles for each of the three population densities

(i.e., rural, suburban, and urban). For Cumulative Accident data, the transport crew is considered part of the general public in the vicinity of the accident affecting the population. To provide comparison between alternatives, the Cumulative Accident radiation exposure assumes the accident involves releases of radioactivity from all eight reactor compartments over the entire dismantlement (i.e., all radioactive waste shipments considered) for each alternative.

D.5.4 Maximum Exposed Individual Accident Dose Risk

The MEI Accident dose risk radiation exposure values are the radiation exposure (in rem) associated with release of corrosion products hypothetically released from one reactor compartment (for Alternatives 1 and 3) or two reactor compartments (for Alternative 2), based on the probability of an accident. The MEI for accident conditions is assumed to be a member of the public located 108 ft. from the accident. The MEI analysis does not consider dilution of the plume with distance.

D.6 Summary of Results

The results of the evaluation for shipments of low-level radioactive waste associated with Alternatives 1, 2, and 3 are summarized in Table D-4. While the reactor compartment packaging alternatives have lower calculated latent cancer fatalities (LCF) for the General Public than Alternative 3 (Preferred Alternative), the LCF totals for all Alternatives are low. For example, in Table D-4, the LCF results for the cumulative normal transport and accident scenarios combined is a potential risk of 0.016 additional cancer fatalities for the entire population exposed over the full transportation route for disposal of all eight reactor compartments. The calculated doses and probabilities are conservative and there is a low probability of a severe accident for the various transportation modes of interest. The dose risk calculated is considered bounding for normal conditions of transport and accident conditions for all alternatives analyzed and is consistent with the expected result given the low level of exposure to the population within prescribed federal limits for safe transport of radioactive material.

REFERENCES

International Commission on Radiological Protection. (2007). *The 2007 Recommendation of the International Commission on Radiological Protection* (ICRP Publication 103, Ann. ICRP 37 [Vol. 2-4]). Ottawa, Canada: International Commission on Radiological Protection.

Oak Ridge National Laboratory. (2018). *WebTRAGIS: Transportation Routing Analysis Geographic Information System User's Manual* (ORNL/TM-2018/856). Oak Ridge, TN: Oak Ridge National Laboratory.

U.S. Department of the Navy & U.S. Department of Energy. (2012). *Final Environmental Assessment on the Disposal of Decommissioned Defueled Naval Reactor Plants from USS ENTERPRISE (CVN 65)*. Washington, DC: U.S. Department of Defense.

Weiner, R. F., K. S. Neuhauser, T. J. Heames, B. M. O'Donnell, & D. M. L. (2014). *RADTRAN 6 Technical Manual* (SAND2014-0780). Albuquerque, NM: Sandia National Laboratories.

Environmental Impact Statement/ Overseas Environmental Impact Statement Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) and Its Associated Naval Reactor Plants

TABLE OF CONTENTS

List of Figures

There are no figures in this appendix.

List of Tables

This page intentionally left blank.

Appendix E Air Quality Emissions Calculations and Record of Non-Applicability

E.1 Emission Estimates

E.1.1 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 United States (U.S.) Environmental Protection Agency (EPA) *Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emission Inventories Draft Report* (EPA, 2020). Lead emissions were estimated using the EPA speciation ratio relative to particulate matter less than or equal to 10 microns in diameter (PM_{10}) (SNC-Lavalin Environment, 2012). Larger vessels also have generators operating onboard to provide electricity for non-propulsion functions and may also have separate bow thruster engines used in berthing. Each of these vessels incorporates different propulsion methods such as marine outboard engines, diesel engines, and gas turbines. 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. 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 nautical miles (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. One-way trips were analyzed for commercial tugboats, anticipating that they would be used for other non-project related activities on their trip. Return trips for tugboats that would be used to return the Navy barge to Navy facilities were analyzed.

E.1.2 Construction Activities

Emissions factors for construction activities (barge slip and road modifications) were developed using the EPA Motor Vehicle Emission Simulator (MOVES), version 2014. The Non-ROAD module of MOVES 2014 was used for anticipated off-road vehicles and equipment. Emission factors from the EPA MOVES are in grams/operating hour, which were then converted to pounds/operating hour. The following formula is 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

E.1.3 Vehicle Transport Activities

EPA Heavy-Duty Highway Compression-Ignition Engines and Urban Buses: Exhaust Emission Standards (EPA, 2018) were used to estimate the emissions from vehicle transport of reactor plant components from commercial dismantlement facilities to disposal facilities. For a conservative estimate of emissions from vehicle transport, the longest land transport route was selected, as that would represent the highest level of emissions. Based on Table D-2 in Appendix D (Radiological Transportation Analyses for the Disposal of Decommissioned, Defueled Ex-Enterprise Naval Reactor Plants), the longest route via highway was 2,461 miles. At an average speed of 50 miles per hour and approximately 10 hours of

driving per day, a single transport could travel approximately 500 miles a day. This results in an average trip duration of five days, traveling 10 hours per day. As a conservative estimate, the total number of transits by semi-truck was assumed equal to the estimated maximum number of container express (commonly known as CONEX) boxes for radioactive waste associated with the reactor plants, or 440 transits.

E.2 Alternative 1 Vessel Emissions

The table below presents distances used in calculating vessel emissions.

Table E-1: Single Trip Distances to Calculate Vessel Emissions

Vessel	Notes	Approximate Total Mileage (miles)	Average Speed (kts) (River Speed is mph)	Single Trip Distance (miles)				
				Total Miles Within 3 nm	Total Miles Between 3 and 12 nm	Total Miles Within 9 nm (Texas)	Total Miles Between 9 and 12 nm (Texas)	Total Miles Greater than 12 nm
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	1,911	9	28	18	9.1	3.28	1,865
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	23,646	9	50	93	9.1	3.28	23,503
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	371	9	233	31	0	0	107
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	240	8	240	0	0	0	0

Notes: (1) PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, kts = knots, mph = miles per hour, nm = nautical miles

Table E-2: Single Trip Durations Used to Calculate Vessel Emissions

Vessel	Notes	Approximate Total Mileage (miles)	Average Speed (kts) (River Speed is mph)	Single Trip Duration					
				Total Duration (hour)	Total Hours (0–3 nm)	Total Hours (3–12 nm)	Total Hours (0–9 nm) Texas	Total Hours (9–12 nm) Texas	Total Hours (>12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	1,911	9	212.3	3.1	2.0	1.0	0.36	207.2
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	23,646	9	2,627.3	5.6	10.3	1.0	0.36	2,611.4
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	371	9	41.2	25.9	3.4	0.0	0.00	11.9
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	240	8	30.0	30.0	0.0	0.0	0.00	0.0

Notes: PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, kts = knots, mph = miles per hour, nm = nautical mile(s)

Table E-3: Number of Vessels and Total Trip Durations Within 0–3 Nautical Miles, 3–12 Nautical Miles, and Beyond 12 Nautical Miles Under Alternative 1

Vessel	Notes	Number of Vessels	Number of One Way Trips Per Package	Number of Packages	Total Duration			
					Total Duration (hour)	Total Hours (0–3 nm)	Total Hours (3–12 nm)	Total Hours (>12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	637.0	9.3	6.0	621.7
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	1	1	1	2,627.3	5.6	10.3	2,611.4
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	2	1.5	8	989.3	621.3	82.7	285.3
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	2	1.5	8	720.0	720.0	0.0	0.0

Notes: (1) PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, nm = nautical mile(s)
(2) Towing ex-Enterprise from existing location to commercial dismantlement facility: Three Commercial Ocean Tugs (one-way trip is analyzed)
(3) Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF: One Commercial Heavy Lift Ship (one-way trip is analyzed)
(4) Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington: two tugs to Vancouver, one to bring the Navy barge back (1.5 one-way trip analyzed for two tugs)
(5) Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip: two river tugs to barge slip, one to bring the Navy barge back (1.5 one-way trip analyzed for two tugs)

Table E-4: Number of Vessels and Total Trip Durations in Texas Within 9 Nautical Miles and Between 9 and 12 Nautical Miles Under Alternative 1

Vessel	Notes	Number of Vessels	Number of One Way Trips Per Package	Number of Packages	Total Duration (Texas)	
					Total Hours (0–9 nm)	Total Hours (9–12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	3.0	1.1
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	1	1	1	1.0	0.4

Note: PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, nm = nautical mile(s)

Table E-5: Vessel Emissions Factors for Propulsion Engines and Generators Under Alternative 1

Vessel	Notes	Emissions Factors (lb/hr) Propulsion Engines + Generators (>20% Load)						
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	25.08	104.32	1.85	0.52	3.74	3.63	8,554.33
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	75.87	838.99	31.72	2.43	11.44	10.52	39,856.11
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	25.08	104.32	1.85	0.52	3.74	3.63	8,554.33
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	12.23	41.61	0.63	0.26	1.81	1.76	4,317.46

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, lb/hr = pounds per hour

Table E-6: Estimated Vessel Emissions from 0 to 3 Nautical Miles Under Alternative 1

Vessel	Notes	Vessel Emissions 0–3 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06	36.22
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.21	2.33	0.09	0.01	0.03	0.03	4.45E-07	100.44
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	7.79	32.41	0.57	0.16	1.16	1.129	1.75E-04	2,410.89
River Tug	Shipment of reactor compartment packages 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	1,410.03
	Totals	**12.52**	**50.21**	**0.90**	**0.27**	**1.86**	**1.81**	**2.75E-04**	**3,957.56**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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 mile(s), PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility

Table E-7: Estimated Vessel Emissions from 0 to 9 Nautical Miles (Texas) Under Alternative 1

Vessel	Notes	Vessel Emissions 0–9 nm (tons per year) Texas						
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.04	0.16	0.003	0.001	0.006	0.006	8.52E-07
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.04	0.42	0.016	0.001	0.006	0.005	8.10E-08
	Totals	**0.08**	**0.58**	**0.019**	**0.002**	**0.011**	**0.011**	**9.33E-07**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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 mile(s), PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility

Table E-8: Estimated Vessel Emissions from 3 to 12 Nautical Miles Under Alternative 1

Vessel	Notes	Vessel Emissions 3–12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.08	0.31	0.01	0.002	0.01	0.01	1.69E-06	23.28
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.39	4.33	0.16	0.01	0.06	0.05	8.27E-07	186.81
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	1.04	4.31	0.08	0.02	0.15	0.15	2.32E-05	320.76
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00
	Totals	**1.50**	**8.96**	**0.25**	**0.04**	**0.23**	**0.22**	**2.57E-05**	**530.85**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

Table E-9: Estimated Vessel Emissions from 9 to 12 Nautical Miles (Texas) Under Alternative 1

Vessel	Notes	Vessel Emissions 9–12 nm (tons per year) Texas						
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.01	0.06	0.001	0.000	0.002	0.002	3.07E-07
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.01	0.15	0.006	0.000	0.002	0.002	2.92E-08
	Totals	**0.03**	**0.21**	**0.007**	**0.001**	**0.004**	**0.004**	**3.36E-07**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

Table E-10: Estimated Vessel Emissions Beyond 12 Nautical Miles Under Alternative 1

Vessel	Notes	Vessel Emissions >12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04	2,412.18
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	99.07	1,095.49	41.42	3.17	14.93	13.74	2.09E-04	47,210.87
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	3.58	14.88	0.26	0.07	0.53	0.52	8.01E-05	1,107.15
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00
Totals		**110.44**	**1,142.80**	**42.26**	**3.41**	**16.63**	**15.39**	**4.64E-04**	**50,730.19**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

E.3 Alternative 1 Ground Transport Emissions

Table E-11: Equipment Type and Number of Trips for Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 1

Transportation Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment	Days of Use	Hours Per Day	Number of Trips	Total Hours
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple-Wheel High-Capacity Transporters Off-Road Truck	3000	MOVES 2014	Diesel	3	1	10	8	240

Notes: (1) DOE = Department of Energy
(2) One-way trips are analyzed. The vehicles are not Navy owned; therefore, it assumed that they would go on to other jobs unrelated to the Proposed Action after drop off.

Table E-12: Emissions Factors from Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 1

Transportation Activity	Equipment/Vehicles	Emissions Factors, (lb/hr)						
		VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple-Wheel High-Capacity Transporters Off-Road Truck	1.03	3.08	13.41	0.01	0.33	0.32	2,866

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, lb/hr = pounds per hour

Table E-13: Estimated Annual Emissions from Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 1

Transportation Activity	Equipment/Vehicles	Annual Emissions, (tons)							
		VOC	CO	NOx	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple-Wheel High-Capacity Transporters Off-Road Truck	0.12	0.37	1.61	0.002	0.04	0.04	1.67E-06	311.966

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

E.4 Alternative 2 Vessel Emissions

The distances, single trip durations, and vessel emission factors used in calculating the vessel emissions under Alternative 2 are the same as those used under Alternative 1.

Table E-14: Number of Vessels and Total Trip Durations from 0 to 3 Nautical Miles, 3 to 12 Nautical Miles, and Beyond 12 Nautical Miles Under Alternative 2

Vessel	Notes	Number of Vessels	Number of One Way Trips Per Package	Number of Packages	Total Duration			
					Total Duration (hour)	Total Hours (0–3 nm)	Total Hours (3–12 nm)	Total Hours (>12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	637.0	9.3	6.0	621.7
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	1	1	1	2,627.3	5.6	10.3	2,611.4
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	2	1.5	4	494.7	310.7	41.3	142.7
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	2	1.5	4	360.0	360.0	0.0	0.0

Notes: PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility, nm = nautical mile(s)

Table E-15: Estimated Vessel Emissions from 0 to 3 Nautical Miles Under Alternative 2

Vessel	Notes	Vessel Emissions 0–3 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.12	0.49	0.01	0.00	0.02	0.017	2.62E-06	36.22
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.21	2.33	0.09	0.01	0.03	0.03	4.45E-07	100.44
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	3.90	16.20	0.29	0.08	0.58	0.564	8.73E-05	1,205.44
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	2.20	7.49	0.11	0.05	0.33	0.316	4.89E-05	705.01
	Totals	**6.42**	**26.51**	**0.50**	**0.14**	**0.96**	**0.93**	**1.39E-04**	**2,047.11**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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 mile(s), PSNS & IMF = Puget Sound Naval Shipyard & Intermediate Maintenance Facility

Table E-16: Estimated Vessel Emissions from 3 to 12 Nautical Miles Under Alternative 2

Vessel	Notes	Vessel Emissions 3–12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.08	0.31	0.01	0.00	0.01	0.01	1.69E-06	23.28
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	0.39	4.33	0.16	0.01	0.06	0.05	8.27E-07	186.81
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	0.52	2.16	0.04	0.01	0.08	0.08	1.16E-05	160.38
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00
Totals		**0.99**	**6.80**	**0.21**	**0.02**	**0.15**	**0.14**	**1.41E-05**	**370.47**

Notes: Estimated emissions from 9 to 12 nm (Texas) are the same as those analyzed under Alternative 1. CO = carbon monoxide, CO_2 = carbon dioxide, 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

Table E-17: Estimated Vessel Emissions Beyond 12 Nautical Miles Under Alternative 2

Vessel	Notes	Vessel Emissions >12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04	2,412.18
Heavy Lift Ship	Shipment of the propulsion space section from commercial dismantlement facility to PSNS & IMF	99.07	1,095.49	41.42	3.17	14.93	13.74	2.09E-04	47,210.87
Ocean Tug	Shipment of reactor compartment packages via ocean tug from PSNS & IMF to Vancouver, Washington	1.79	7.44	0.13	0.04	0.27	0.26	4.01E-05	553.57
River Tug	Shipment of reactor compartment packages via river tug from Vancouver, Washington, to Port of Benton barge slip	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00
	Totals	**108.66**	**1,135.36**	**42.12**	**3.37**	**16.37**	**15.13**	**4.24E-04**	**50,176.62**

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

E.5 Alternative 2 Ground Transport Emissions

Table E-18: Equipment Type and Number of Trips for Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 2

Transportation Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment	Days of Use	Hours Per Day	Number of Trips	Total Hours
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple Wheel High-Capacity Transporters Off-Road Truck	3000	MOVES 2014	Diesel	3	1	10	4	120

Notes: DOE = Department of Energy

Table E-19: Emissions Factors from Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 2

Transportation Activity	Equipment/Vehicles	Emissions Factors (lb/hr)						
		VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple Wheel High-Capacity Transporters Off-Road Truck	1.03	3.08	13.41	0.01	0.33	0.32	2,865.65

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, lb/hr = pounds per hour

Table E-20: Estimated Annual Emissions from Land Transport from Port of Benton Barge Slip to Trench 94 at the Department of Energy Hanford Site Under Alternative 2

Transportation Activity	Equipment/Vehicles	Annual Emissions (tons)							
		VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2
Land transport from Port of Benton barge slip to Trench 94 at the DOE Hanford Site	Multiple Wheel High-Capacity Transporters Off-Road Truck	0.06	0.18	0.80	0.00	0.02	0.02	8.37E-07	155.98

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

E.6 Alternative 2 Construction Emissions

Table E-21: Construction Equipment and Estimated Hours Per Equipment Under Alternative 2

Construction Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment	Days of Use	Hours Per Day	Total Hours
Barge Slip Modification								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Crane	Grove GMK3060	410	MOVES 2014	Diesel	1	10	1	10
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Pile Driver (Vibratory)	Hammer & Steel HVR60	134	MOVES 2014	Diesel	1	10	5	50
Pile Drive (Impact)	APE Model 500u	700	MOVES 2014	Diesel	1	4	2	8
Concrete Truck	International HV	360	MOVES 2014	Diesel	2	2	8	32
Loader	Caterpillar 906M	73	MOVES 2014	Diesel	1	5	4	20
Bulldozer	Deere 550K	92	MOVES 2014	Diesel	1	5	4	20
Compressor	Central Pneumatic	2	MOVES 2014	Gasoline	0	0	0	0
Pump		60	MOVES 2014	Diesel	0	0	0	0
Road Modification Location 1								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 2								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 3								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1

Table E-21: Construction Equipment and Estimated Hours Per Equipment Under Alternative 2 (continued)

Construction Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment	Days of Use	Hours Per Day	Total Hours
Road Modification Location 4								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 5								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 6								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 7								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Paver	Volvo P5170B	173	MOVES 2014	Diesel	0	0	8	0
Road Modification Location 8								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1

Table E-21: Construction Equipment and Estimated Hours Per Equipment Under Alternative 2 (continued)

Construction Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment	Days of Use	Hours Per Day	Total Hours
Road Modification Location 9								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 10								
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1
Road Modification Location 11								
Excavator	Caterpillar 352F	417	MOVES 2014	Diesel	2	7	4	56
Backhoe	Caterpillar 420XE	92	MOVES 2014	Diesel	2	7	4	56
Dump truck	Komatsu HM400-2	438	MOVES 2014	Diesel	2	6	8	96
Soil Compactor/Roller	Case SV208D	74.3	MOVES 2014	Diesel	1	1	1	1

Table E-22: Estimated Emissions from Proposed Construction Activities Under Alternative 2

Construction Activity	Emissions (tons)							
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	Pb	CO_2 (MT)
Barge Slip Modification								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Crane	7.45E-04	2.46E-03	9.36E-03	1.37E-05	3.70E-04	3.59E-04	3.70E-09	2.19E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Pile Driver (Vibratory)	2.02E-03	6.54E-03	2.39E-02	2.31E-05	1.44E-03	1.39E-03	1.44E-08	3.49E+00
Pile Drive (Impact)	1.36E-03	7.03E-03	2.03E-02	1.93E-05	9.23E-04	8.95E-04	9.23E-09	2.93E+00
Concrete Truck	1.99E-03	3.33E-03	9.80E-03	3.93E-05	3.90E-04	3.78E-04	3.90E-09	7.21E+00
Loader	2.36E-04	1.81E-03	4.31E-03	4.48E-06	1.83E-04	1.77E-04	1.83E-09	7.35E-01
Bulldozer	1.22E-03	8.15E-03	6.39E-03	7.87E-06	1.13E-03	1.09E-03	1.13E-08	1.21E+00
Compressor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pump	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Road Modification Location 1								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 2								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 3								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 4								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 5								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02

Table E-22: Estimated Emissions from Proposed Construction Activities Under Alternative 2 (continued)

Construction Activity	Emissions (tons)							
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	Pb	CO_2 (MT)
Road Modification Location 6								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 7								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Paver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Road Modification Location 8								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 9								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 10								
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02
Road Modification Location 11								
Excavator	3.61E-03	1.18E-02	3.01E-02	7.18E-05	1.74E-03	1.69E-03	1.74E-08	1.23E+01
Backhoe	8.23E-04	5.63E-03	5.84E-03	1.67E-05	6.11E-04	5.93E-04	6.11E-09	2.93E+00
Dump truck	5.98E-03	9.98E-03	2.94E-02	1.18E-04	1.17E-03	1.13E-03	1.17E-08	2.16E+01
Soil Compactor/Roller	1.61E-05	1.37E-04	1.37E-04	3.00E-07	1.69E-05	1.64E-05	1.69E-10	5.05E-02

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, MT = metric tons

E.7 Alternatives 1 and 2 Trench 94 Rail System Construction Emissions

Table E-23: Trench 94 Construction Equipment and Estimated Hours and Fuel Consumption

Equipment Activity	Equipment/ Vehicles	Model Year	Horsepower	Source	Fuel	Load Factor	Number of Equipment	Days of Use	Hours Per Day	Total Hours	Total Fuel Consumed, Gal
Excavator	Excavator	2017	117	CARB 2017 Off-Road Diesel Emission Factors and CARB 2017 Off-Road CI Engine Standards (Diesel)	Diesel	0.38	1	5	8	40	92
Rough Terrain Forklift	Forklift	2017	100	CARB 2017 Off-Road Diesel Emission Factors and CARB 2017 Off-Road CI Engine Standards (Diesel)	Diesel	0.4	1	5	8	40	92
Motor Grader	Grader	2017	139	CARB 2017 Off-Road Diesel Emission Factors and CARB 2017 Off-Road CI Engine Standards (Diesel)	Diesel	0.41	1	5	8	40	118

Notes: (1) CARB = California Air Resources Board, CI = Compression Ignition, gal = gallons
(2) Fuel consumption was calculated by CARB 2017 Off-Road Diesel Emission Factors and CARB 2017 Off-Road CI Engine Standards (Diesel) for equipment size, fuel, load factor, and total hours of operation (https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road).
(3) Load Factors are based on CARB 2017 Off-Road Diesel Emission Factors and CARB 2017 Off-Road CI Engine Standards (Diesel) for equipment types.

Table E-24: Trench 94 Rail System Construction-Related Emission Estimates

Equipment Activity	Annual Emissions (tons)							
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	Pb	CO_2 (MT)
Excavator	1.09E-04	1.90E-02	2.17E-03	1.79E-05	4.79E-05	4.79E-05	4.79E-10	0.937
Rough Terrain Forklift	9.77E-05	1.63E-02	1.95E-03	1.40E-05	4.31E-05	4.31E-05	4.31E-10	0.938
Motor Grader	1.39E-04	2.26E-02	2.78E-03	1.79E-05	6.14E-05	6.14E-05	6.14E-10	1.202

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, MT = metric tons

E.8 Alternative 3 (Preferred Alternative) Vessel Emissions

Table E-25: Single Trip Distances for Ocean Tugs Under Alternative 3

Vessel				Single Trip Distance (miles)				
	Notes	Approximate Total Mileage (miles)	Average Speed (kts) (River Speed is mph)	Total Miles Within 3 nm	Total Miles Between 3 and 12 nm	Total Miles Within 9 nm (Texas)	Total Miles Between 9 and 12 nm (Texas)	Total Miles Greater than 12 nm
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	1,911	9	28	18	9.1	3.28	1,865

Note: nm = nautical miles, kts = knots, mph = miles per hour

Table E-26: Single Trip Durations for Ocean Tugs Under Alternative 3

Vessel			Single Trip Duration					
	Notes	Approximate Total Mileage (miles)	Total Duration (hours)	Total Hours (0–3 nm)	Total Hours (3–12 nm)	Total Hours (0–9 nm) Texas	Total Hours (9–12 nm) Texas	Total Hours (>12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	1,911	212.3	3.1	2.0	1.0	0.36	207.2

Note: nm = nautical mile(s)

Table E-27: Total Duration for Ocean Tugs Under Alternative 3

Vessel	Notes	Number of Vessels	Number of One Way Trips Per Package	Number of Packages	Total Duration			
					Total Duration (hours)	Total Hours (0–3 nm)	Total Hours (3–12 nm)	Total Hours (>12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	637.0	9.3	6.0	621.7

Note: nm = nautical mile(s)

Table E-28: Total Duration for Ocean Tugs Under Alternative 3 (Texas)

Vessel	Notes	Number of Vessels	Number of One Way Trips Per Package	Number of Packages	Total Duration (Texas)	
					Total Hours (0–9 nm)	Total Hours (9–12 nm)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	3.0	1.1

Note: nm = nautical mile(s)

Table E-29: Emissions Factors for Ocean Tugs Under Alternative 3

Vessel		Emissions Factors (lb/hr) Propulsion Engines + Generators (>20% Load)						
	Notes	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	25.08	104.32	1.85	0.52	3.74	3.63	8,554.33

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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, lb/hr = pounds per hour

Table E-30: Vessel Emissions from 0 to 3 Nautical Miles for Ocean Tugs Under Alternative 3

Vessel	Notes	Vessel Emissions 0–3 nm (tons per year)							
		CO	NOx	VOC	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.12	0.49	0.01	0.002	0.02	0.017	2.62E-06	36.22

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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 mile(s)

Table E-31: Vessel Emissions from 0 to 9 Nautical Miles for Ocean Tugs Under Alternative 3 (Texas)

Vessel	Notes	Vessel Emissions 0–9 nm (tons per year) Texas						
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.04	0.16	0.00	0.00	0.01	0.01	8.52E-07

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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 mile(s)

Table E-32: Vessel Emissions from 3 to 12 Nautical Miles for Ocean Tugs Under Alternative 3

Vessel	Notes	Vessel Emissions 3–12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.08	0.31	0.01	0.00	0.01	0.01	1.69E-06	23.28

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

Table E-33: Vessel Emissions from 9 to 12 Nautical Miles for Ocean Tugs Under Alternative 3 (Texas)

Vessel	Notes	Vessel Emissions 9–12 nm (tons per year) Texas						
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	0.01	0.06	0.00	0.00	0.00	0.00	3.07E-07

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

Table E-34: Vessel Emissions Beyond 12 Nautical Miles for Ocean Tugs Under Alternative 3

Vessel	Notes	Vessel Emissions >12 nm (tons per year)							
		CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2 (Metric tons/year)
Ocean Tug	Towing ex-Enterprise from existing location to commercial dismantlement facility	7.80	32.43	0.57	0.16	1.16	1.13	1.75E-04	2,412.18

Notes: CO = carbon monoxide, CO_2 = carbon dioxide, 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

E.9 Alternative 3 (Preferred Alternative) Ground Transport Emissions

Table E-35: Vehicle Information, Fuel Consumption, and Total Trip Hours Under Alternative 3

Transportation Activity	Equipment/Vehicles	Horsepower	Source	Fuel	Number of Equipment/Trips	Miles per trip	Miles per gallon	Gallons of Fuel Used, Total	Days of Use	Hours Per Day	Total Hours
18-wheeler Truck	Mack Semi with MP8 Engine (example)	505	Heavy-Duty Highway Compression-Ignition Engines and Urban Buses: Exhaust Emission Standards	Diesel	440	2,461	8	308	5	10	22,000

Table E-36: Estimated Total Emissions Under Alternative 3

Transportation Activity	Equipment/Vehicles	Total Emissions (tons)										
		VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4 (MT)	N_20 (MT)	CO_2e (MT)
18-wheeler Truck	Mack Semi with MP8 Engine (example)	1.71	189.82	2.45	0.01	0.12	0.12	5.14E-06	1,381.975	0.010	0.047	1,396.140

Notes: CH4 = Methane, CO = carbon monoxide, CO_2 = carbon dioxide, CO_{2e} = carbon dioxide equivalent, N_2O = Nitrous Oxides, 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, MT = metric tons

E.10 Record of Non-Applicability for Clean Air Act Conformity

The Proposed Action falls under the Record of Non-Applicability (RONA) category and is documented with this RONA.

E.10.1 Introduction

The EPA published Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, in the November 30, 1993, Federal Register (40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). On April 5, 2010, the EPA finalized revisions to the General Conformity Rule (75 Federal Register 17253–17279). The U.S. Department of the Navy (Navy) published Navy Guidance for Compliance with the Clean Air Act (CAA) General Conformity Rule (July 30, 2013), as referenced in Chief of Naval Operations Manual M-5090.1, Environmental Readiness Program Manual dated June 25, 2021. These publications provide implementing guidance to document CAA Conformity Determination requirements. This RONA is provided to document compliance of the Proposed Action.

Federal regulations state that "no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity that does not conform to an applicable State Implementation Plan." It is the responsibility of the federal agency to determine whether a federal action conforms to the applicable State Implementation Plan before the action is taken (40 CFR Part 51.850[a]).

Federal actions may be exempt from conformity determinations if their emissions do not exceed designated *de minimis* levels for the criteria pollutants of nonattainment or maintenance in the areas of the federal action (40 CFR Part 51.853[b]).

E.10.2 Proposed Action

Action Proponent: U.S. Department of the Navy

Locations: Newport News, Virginia, located within Hampton Roads Air Quality Control Region (AQCR) No. 223, designated as maintenance for the 1997 8-hour ozone National Ambient Air Quality Standards; Columbia River, portions within the Wallula PM_{10} Maintenance Area.

Proposed Action Name: Disposal of Decommissioned, Defueled Ex-Enterprise and its Associated Naval Reactor Plants

Proposed Action and Emissions Summary:

Alternative 1 or Alternative 2 (the reactor compartment packaging alternatives) or Alternative 3 (Preferred Alternative) 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 National Ambient Air Quality Standards. 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) (Table E-37).

Table E-37: Criteria Pollutants *de minimis* levels for 1997 8-hour Ozone Maintenance Area

Criteria Pollutant/Precursor	*de minimis levels (tons/year)*
Oxides of Nitrogen (NO_x)	100
Volatile Organic Compounds (VOC)	100

The methods for estimating vessel emissions involve generating the average running hours for vessels in the maintenance area. Vessel emissions from river tugboats were calculated using *Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emission Inventories Draft Report* by the EPA 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. 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. Transit distance, time within three nautical miles, and NO_x and VOC emission factors are shown in Table E-38.

Table E-38: Transit Information and Emission Factors

Vessel	Approximate Single Trip Total Mileage (miles)	Single Trip Miles Within 3 nm	Single Trip Hours (0–3 nm)	Emission Factor (lb./hr) Propulsion Engines + Generators	
				NO_x	VOC
Ocean Tug Towing ex-Enterprise from existing location to commercial dismantlement facility	1,911	28	3.1	104.32	1.85

Notes: nm = nautical mile(s), lb./hr = pounds per hour, NO_x = nitrogen oxides, VOC = Volatile Organic Compound

Based on the air quality analysis for the reactor compartment packaging alternatives and Alternative 3 (Preferred Alternative) (Table E-39), the maximum estimated emissions of applicable pollutants would be well below the conformity *de minimis* levels for the Hampton Roads Ozone Maintenance Area. Therefore, emissions from the Proposed Action would show conformity under the CAA.

Table E-39: Emissions in Hampton Roads AQCR Ozone Maintenance Area Under All Alternatives

Vessel	Number of Vessels	Number of One-Way Trips Per Package	Number of Packages	Total Hours (0–3 nm)	NO_x Emissions (tons/year)	VOC Emissions (tons/year)
Ocean Tug Towing ex-Enterprise from existing location to commercial dismantlement facility	3	1	1	9.3	0.49	0.01

Notes: nm = nautical mile(s), NO_x = nitrogen oxides, VOC = Volatile Organic Compound

The reactor compartment packaging alternatives of the Proposed Action involves operation of vessels moving and supporting movement of barges containing reactor compartment packages from Puget Sound Naval Shipyard & Intermediate Maintenance Facility, Washington for final disposal via the Columbia River to the Port of Benton barge slip. Vessels performing this action would transit through the Wallula PM_{10} Maintenance Area. As a result, Proposed Action emissions were evaluated to assess compliance with the General Conformity Rule *de minimis* thresholds for PM_{10} (Table E-40).

Table E-40: Criteria Pollutants *de minimis* levels for Wallula PM_{10} Maintenance Area

Criteria Pollutant/Precursor	*de minimis levels (tons/year)*
Particulate Matter ≤ 10 microns in diameter (PM_{10})	100

The methods for estimating vessel emissions involve generating the average running hours for vessels in the maintenance area. Vessel emissions from river tugboats were calculated using the EPA *Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emission Inventories Draft Report* 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. 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. Transit distance and PM_{10} emission factors are shown in Table E-41.

Table E-41: Transit Information and PM_{10} Emission Factor

Vessel	Approximate Single Trip Total Mileage (miles)	Average Speed (miles per hour)	Single Trip Duration (hrs)	PM_{10} Emission Factor (lb./hr) Propulsion Engines + Generators
River Tug through Wallula PM_{10} Maintenance Area	12	8	1.5	1.81

Notes: PM_{10} = Particulate Matter ≤ 10 microns in diameter, hrs = hours, lb./hr = pounds per hour

Based on the air quality analysis for Alternative 1 (Table E-42) and Alternative 2 (Table E-43), the maximum estimated emissions of applicable pollutants would be well below the conformity *de minimis* levels for the Wallula PM_{10} Maintenance Area. Therefore, emissions from the Proposed Action would show conformity under the CAA.

Table E-42: Emissions in Wallula PM_{10} Maintenance Area Under Alternative 1

Vessel	Number of Vessels	Number of One-Way Trips Per Package	Number of Packages	Total Duration (hrs)	PM_{10} Emissions (tons/year)
River Tugs through Wallula PM_{10} Maintenance Area	2	1.5	8	36	**0.03**

Notes: PM_{10} = Particulate Matter ≤ 10 microns in diameter, hrs = hours

Table E-43: Emissions in Wallula PM_{10} Maintenance Area Under Alternative 2

Vessel	Number of Vessels	Number of One-Way Trips Per Package	Number of Packages	Total Duration (hrs)	PM_{10} Emissions (tons/year)
River Tugs through Wallula PM_{10} Maintenance Area	2	1.5	4	18	**0.02**

Notes: PM_{10} = Particulate Matter ≤ 10 microns in diameter, hrs = hours, lb./hr = pounds per hour

Affected Areas: Hampton Road AQCR No. 223 1997 8-hour Ozone Maintenance Area; Wallula PM_{10} Maintenance Area

Date RONA Prepared: June 6, 2022

RONA Prepared by: ManTech International

E.10.3 Proposed Action Exemptions

The Proposed Action is exempt from the General Conformity Rule requirements based on the determination that the emissions are well below the *de minimis* threshold for all applicable pollutants.

E.10.4 Emissions Evaluation Conclusion

The Navy concludes that *de minimis* thresholds for affected pollutants would not be exceeded as a result of implementation of the Proposed Action. The emissions data supporting that conclusion is shown in Table E-39, Table E-42 and Table E-43 above. The calculations, methodology, data, and references are contained in Section 3.6 (Air Quality) and in this appendix. Therefore, the Navy concludes that further formal Conformity Determination procedures are not required, resulting in this RONA.

E.10.5 RONA Approval

Signature:_____

Name / Rank:_____ Date:_____

Position:_____

REFERENCES

SNC-Lavalin Environment. (2012). *National Marine Emissions Inventory for Canada*. Montreal, Canada: SNC-Lavalin Environment.

U.S. Environmental Protection Agency. (2018). *Heavy-Duty Highway Compression-Ignition Engines and Urban Buses: Exhaust Emission Standards*. Washington, DC: U.S. Environmental Protection Agency, Office of Transportation and Air Quality.

U.S. Environmental Protection Agency. (2020). *Methodologies for Estimating Port-Related and Goods Movement Mobile Sources Emission Inventories: Draft*. Washington, DC: U.S. Environmental Protection Agency, Office of Transportation Air Quality.

This page intentionally left blank.

Environmental Impact Statement/ Overseas Environmental Impact Statement

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

TABLE OF CONTENTS

List of Figures

There are no figures in this appendix.

List of Tables

This page intentionally left blank.

Appendix F ESA-Listed Species at Virginia, Alabama, Texas, and Washington Port Locations and Along Transportation Routes

F.1 Overview

In support of this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS), the United States (U.S.) Department of Navy (Navy) completed a literature review to accurately describe biological resources potentially impacted by the Proposed Action. This appendix describes the process of identifying Endangered Species Act (ESA)-listed species that may potentially be affected by the Proposed Action, and lists these species in Table F-1.

Species that are described in more detail in Section 3.5 (Biological Resources) are species that are known to occur (or may have the potential to occur) within the origin and destination port locations analyzed in this Environmental Impact Statement/Overseas Environmental Impact Statement (see Table 3.5-1). These species are indicated in bold in Table F-1.

The Navy has completed prior consultations with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) for some activities as part of the Proposed Action. Species listed in Table F-1 that are not presented in boldface are not analyzed in detail because (1) they were analyzed previously, and (2) they may occur in the general area of elements of the Proposed Action, but those elements would be part of normal facility or transportation operations and effects would not exceed impacts above the existing baseline.

F.2 Endangered Species Act-Listed Species at Project Areas

Table F-1 provides a list of ESA-listed species that are known to occur, or have the potential to occur, at shipyard locations in Virginia (Hampton Roads Metropolitan Area), Alabama (Port of Mobile), Texas (Port of Brownsville), and Washington (Puget Sound Naval Shipyard and Intermediate Maintenance Facility [PSNS & IMF]), as well as the Port of Benton barge slip in Richland, Washington. ESA-listed species that may occur along transportation routes are also included in the table.

To compile a list of ESA-listed species, the Navy reviewed available documentation relevant to each port location and transit route described in Section 2.1 (Proposed Action). Sources of information include National Environmental Policy Act documentation, Integrated Natural Resource Management Plan documents (relevant only to Department of Defense-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, technical surveys for flora and fauna specific to Project Areas, and other literature available through academic research institutions. These descriptions are included in Section 3.5.2 (Affected Environment).

F.3 Endangered Species Act-Listed Species Along Transportation Routes

Species that likely occur along transportation routes (such as the tow routes proposed for the 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 Table F-1. To construct these lists, the Navy conducted a detailed review of the following consultations:

2019 NMFS Programmatic Biological Opinion. In 2019, 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). In this consultation, NMFS evaluated

towing of inactive Navy ships from several origin and destination ports. Potential effects to ESA-listed species resulting from dismantlement activities at destination ports were also analyzed in the 2019 NMFS Programmatic Biological Opinion. NMFS concluded that the towing of inactive Navy ships and their dismantlement would not likely adversely affect ESA-listed species potentially occurring at Norfolk Naval Shipyard, Port of Brownsville, or PSNS & IMF. Newport News Shipbuilding (located in the Hampton Roads Metropolitan Area, Virginia) and the Port of Mobile, Alabama, were not analyzed in this Programmatic Biological Opinion. Some species analyzed in the 2019 NMFS Programmatic Biological Opinion do not overlap with the shipyard facilities or transportation routes. These species include the Hawaiian monk seal (*Neomonachus schauinslandi*), black abalone (*Haliotis cracherodii*), and white abalone (*Haliotis sorenseni*). The Hawaiian monk seal occurs in nearshore and coastal waters of Hawaii, which is outside any of the transportation routes analyzed in this EIS/OEIS. Black and white abalone occur in shallow waters along the Californian coast, which would not overlap with transportation routes for the heavy-lift ship up the coastline. The 2019 NMFS Programmatic Biological Opinion also analyzed potential impacts on the Gulf of Mexico Bryde's whale (*Balaenoptera edeni*). At the time of publication, this species was proposed for ESA listing. This species has since gone through a taxonomic revision and is now named Rice's whale (*Balaenoptera ricei*) (Rosel et al., 2021), and is listed in Table F-1 as such.

Informal Consultations with USFWS Regarding Inactive Ship Towing and Dismantlement. Parallel with Navy obligations to consult with NMFS under section 7 of the ESA, the Navy also consulted with USFWS Ecological Services Field Offices for potential effects to ESA-listed species under the management of the USFWS. In 2018, the Navy requested concurrence from the USFWS that towing and dismantlement of inactive Navy ships would not adversely affect the Florida subspecies of the West Indian manatee (*Trichechus manatus latirostris*). The ports analyzed in this request included Mayport, Florida; New Orleans, Louisiana; and Beaumont, Texas. The Louisiana Ecological Services Field Office concurred with the Navy determination that manatees would not be adversely affected, citing slow ship speeds as not presenting a likely strike risk, and that ship sound would not cause discernable impacts (USFWS, 2018). In 2019, the Navy requested a concurrence from USFWS for towing and dismantling inactive ships at PSNS & IMF and their potential effects on the ESA-listed bull trout (USFWS, 2019). In response, USFWS provided a letter of concurrence to the Navy, agreeing that the proposed activities would not likely adversely affect the bull trout. Informal consultations with USFWS have not yet occurred for inactive ship towing and dismantlement at a shipyard facility within the Hampton Roads Metropolitan Area, Virginia, or the Port of Mobile, Alabama. Accordingly, the Navy will consult with USFWS for species under their jurisdiction if the Preferred Alternative (Alternative 3) includes activities that may affect species at these locations

Previous Consultations at PSNS & IMF. PSNS & IMF will be consulting with USFWS for dry dock operations, such as for flooding and draining of dry docks to dock and re-float ships. PSNS & IMF has also consulted on pile replacement and maintenance activities. The current operating permit for dry dock activities was renewed in January 2021 (NMFS, 2021).

Consultations for the Port of Benton Barge Slip Improvements. In 2018, U.S. Army Corps of Engineers Walla Walla began early coordination with NMFS and USFWS regarding potential impacts of barge slip improvements at the Port of Benton barge slip modification area.

1 **Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes**

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metropolitan Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Marine Mammals											
Blue Whale	*Balaenoptera musculus*	-	Endangered						x	x	x
Sei Whale	*Balaenoptera borealis*	-	Endangered						x	x	x
Fin Whale	*Balaenoptera physalus*	-	Endangered						x	x	x
Rice's Whale	*Balaenoptera ricei*	-	Endangered						x	x	
North Atlantic Right Whale	*Eubalaena glacialis*	-	Endangered						x	x	
North Pacific Right Whale	*Eubalaena japonica*	-	Endangered						x	x	x
Southern Right Whale	*Eubalaena australis*	-	Endangered						x	x	
Humpback Whale	***Megaptera novaeangliae***	**Central America DPS**	**Endangered**				**x**		**x**	**x**	**x**
		Mexico DPS	**Threatened**				**x**		**x**	**x**	**x**
False Killer Whale	*Pseudorca crassidens*	Main Hawaiian Islands Insular DPS	Endangered						x	x	
Killer Whale	***Orcinus orca***	**Southern Resident DPS**	**Endangered**				**x**		**x**	**x**	**x**
Sperm Whale	*Physeter macrocephalus*	-	Endangered						x	x	x
Guadalupe Fur Seal	*Arctocephalus townsendi*	-	Threatened						x	x	x
West Indian Manatee[7]	***Trichechus manatus latirostris***	**-**	**Endangered**		**x**				**x**	**x**	

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Reptiles											
Green Sea Turtle	***Chelonia mydas***	East Pacific DPS	Threatened						x	x	
		North Atlantic DPS	**Threatened**	**x**	**x**	**x**			**x**	**x**	
		South Atlantic DPS	Threatened						x	x	
Hawksbill Sea Turtle	***Eretmochelys imbricata***	-	**Endangered**		**x**				**x**	**x**	
Kemp's Ridley Sea Turtle	***Lepidochelys kempii***	-	**Endangered**	**x**	**x**				**x**	**x**	
Leatherback Sea Turtle	***Dermochelys coriacea***	-	**Endangered**	**x**	**x**	**x**			**x**	**x**	**x**
Loggerhead Sea Turtle	***Caretta caretta***	North Pacific Ocean DPS	Endangered						x	x	
		Northwest Atlantic Ocean DPS	**Threatened**	**x**	**x**				**x**	**x**	
		South Atlantic Ocean DPS	Endangered						x	x	
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	Mexico's Pacific Coast Breeding Colonies	Endangered						x	x	
		All other areas	Threatened						x	x	
Alabama red-bellied turtle	***Pseudemys alabamensis***	-	**Endangered**		**x**				**x**	**x**	

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Fishes											
Alabama Sturgeon[7]	*Scaphirhynchus suttkusi*	-	Endangered		x				x	x	
Atlantic Sturgeon[7]	*Acipenser oxyrinchus*	Carolina DPS	Endangered	x					x	x	
		Chesapeake Bay DPS	Endangered	x					x	x	
		Gulf of Maine DPS	Threatened	x					x	x	
		New York Bight DPS	Endangered	x					x	x	
		South Atlantic DPS	Endangered	x					x	x	
Gulf Sturgeon[8]	*Acipenser oxyrinchus desotoi*	-	Threatened		x				x	x	
Green Sturgeon	*Acipenser medirostris*	Southern DPS	Threatened						x	x	x
Shortnose Sturgeon	*Acipenser brevirostrum*	-	Endangered	x					x	x	
Bocaccio Rockfish	*Sebastes paucispinis*	Puget Sound/Georgia Basin DPS	Endangered				x		x	x	x
Yelloweye Rockfish	*Sebastes ruberrimus*	Puget Sound/Georgia Basin DPS	Threatened				x		x	x	x
Bull Trout[9]	*Salvelinus confluentus*	Coastal-Puget Sound DPS	Threatened				x		x	x	x
		Columbia River DPS	Threatened					x		x	x

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Chinook Salmon	*Oncorhynchus tshawytscha*	California Coastal ESU	Threatened						x	x	x
		Central Valley Spring-Run ESU	Threatened						x	x	x
		Lower Columbia River ESU	Threatened						**x**	**x**	**x**
		Puget Sound ESU	**Threatened**				**x**		**x**	**x**	**x**
		Sacramento River Winter-Run ESU	Endangered						x	x	x
		Snake River Spring/Summer Run ESU	Threatened					x	x	x	x
		Snake River Fall-Run ESU	Threatened					x	x	x	x
		Upper Columbia River Spring-Run ESU	**Endangered**					**x**	**x**	**x**	**x**
		Upper Willamette River ESU	Threatened						x	x	x
Chum Salmon	*Oncorhynchus keta*	Columbia River ESU	Threatened					x	x	x	x
		Hood Canal Summer-Run ESU	Threatened						x	x	x

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Coho Salmon	*Oncorhynchus kisutch*	Central California Coast ESU	Endangered						x	x	x
		Lower Columbia River ESU	Threatened						x	x	x
		Oregon Coast ESU	Threatened						x	x	x
		Southern Oregon and Northern California Coasts ESU	Threatened						x	x	x
Steelhead	***Oncorhynchus mykiss***	California Central Valley DPS	Threatened						x	x	x
		Central California Coast DPS	Threatened						x	x	x
		Lower Columbia River DPS	Threatened						x	x	x
		Middle Columbia River DPS	**Threatened**					**x**	**x**	**x**	**x**
		Northern California DPS	Threatened						x	x	x
		Puget Sound DPS	**Threatened**				**x**		**x**	**x**	**x**
		Snake River Basin DPS	Threatened						x	x	x

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
		South-Central California Coast DPS	Threatened						x	x	x
		Southern California DPS	Endangered						x	x	x
		Upper Columbia River DPS	**Threatened**					**x**	**x**	**x**	**x**
		Upper Willamette River DPS	Threatened						x	x	x
Sockeye Salmon	*Oncorhynchus nerka*	Ozette Lake ESU	Threatened						x	x	x
		Snake River ESU	Endangered					x	x	x	x
Eulachon	*Thaleichthys pacificus*	Southern DPS	Threatened						x	x	x
Giant Manta Ray	*Manta birostris*	-	Threatened						x	x	
Largetooth Sawfish	*Pristis microdon*	-	Endangered						x	x	
Nassau Grouper	*Epinephelus striatus*	-	Threatened						x	x	
Oceanic Whitetip Shark	*Carcharhinus longimanus*	-	Threatened						x	x	
Scalloped Hammerhead Shark	*Sphyrna lewini*	Central and Southwest Atlantic DPS	Threatened						x	x	
		Eastern Pacific DPS	Endangered						x	x	
Smalltooth Sawfish	*Pristis pectinate*	U.S. portion of range DPS	Endangered						x	x	

Table F-1: ESA-Listed Species at Project Areas and Along Transportation Routes (continued)

Common Name[1]	Scientific Name	Distinct Population Segment (DPS)[2]/ Evolutionarily Significant Unit (ESU)[3]	Status	Portion of the Study Area[4]							
				Virginia	Alabama	Texas	Washington		Towing Route[5]	Heavy Lift Ship Route[6]	Barge Route[7]
				Hampton Roads Metro Area	Port of Mobile	Port of Brownsville	PSNS & IMF	Port of Benton			
Birds											
Marbled Murrelet	***Brachyramphus marmoratus***	-	**Threatened**				x		x	x	x
Marine Invertebrates											
Boulder Star Coral	*Orbicella franksi*	-	Threatened						x	x	
Elkhorn Coral	*Acropora palmata*	-	Threatened						x	x	
Lobed Star Coral	*Orbicella annularis*	-	Threatened						x	x	
Mountainous Star Coral	*Orbicella faveolate*	-	Threatened						x	x	
Rough Cactus Coral	*Mycetophyllia ferox*	-	Threatened						x	x	
Pillar Coral	*Dendrogyra cylindrus*	-	Threatened						x	x	
Staghorn Coral	*Acropora cervicornis*	-	Threatened						x	x	

[1]Species in **bold** are analyzed in detail in Section 3.5 (Biological Resources) of this EIS/OEIS.
[2]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.
[3]ESU is a population of organisms that is considered distinct for purposes of conservation.
[4]Species marked with an "**x**" indicates that the species is found within a specific Project Area or along a transportation route segment between Project Areas analyzed in Section 3.5 (Biological Resources).
[5]The towing route would begin at Newport News, Virginia, and end at either the Port of Brownsville, Texas; or the Port of Mobile, Alabama. Transit between Newport News, Virginia, and another location in the Hampton Roads Metropolitan Area, Virginia, would be a local tow consistent with normal operations in the area.
[6]The heavy-lift ship route would begin at the Hampton Roads Metropolitan Area, Virginia; the Port of Brownsville, Texas; or the Port of Mobile, Alabama, and end at PSNS & IMF.
[7]The barge route would begin at PSNS & IMF, exit Puget Sound into the Pacific Ocean, travel down the coastline and enter the mouth of the Columbia River, terminating at the Port of Benton barge slip.
[8]These species potentially occur within Mobile Bay along the Mobile Harbor Federal Navigation Channel during a ship's tow approach into the Port of Mobile or on a heavy-lift barge departure route from the Port of Mobile. Because the Port of Mobile was not included in the 2019 NMFS Programmatic Biological Opinion, these species were not analyzed for potential effects of inactive ship towing.
[9]The Gulf sturgeon was included in the 2019 NMFS Programmatic Biological Opinion, however, a tow route to or from the Port of Mobile was not analyzed. NMFS determined that towing inactive ships may affect, but *not likely adversely affect this species*.
[10]In a letter dated July 22, 2019, the USFWS concurred that the towing of inactive Navy ships into and out of Puget Sound may affect, but is *not likely to adversely affect*, bull trout, a fish species under the USFWS regulatory authority.
Notes: ESA = Endangered Species Act, PSNS & IMF = Puget Sound Naval Shipyard and Intermediate Maintenance Facility

This page intentionally left blank.

REFERENCES

National Marine Fisheries Service. (2019). *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 Sites*. Silver Spring, MD: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources.

National Marine Fisheries Service. (2021). *US Navy Request for extension of NMFS Biological Opinion (2009/06414) for the Navy's Drydock Operations Activities*. Lacey, WA: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, West Coast Region, Oregon and Washington Coastal Area Office.

Rosel, P. E., L. A. Wilcox, T. K. Yamada, & K. D. Mullin. (2021). A new species of baleen whale (*Balaenoptera*) from the Gulf of Mexico, with a review of its geographic distribution. *Marine Mammal Science, 37*(2), 577–610.

U.S. Fish and Wildlife Service. (2018). *Letter of Concurrence dated 15 May 2018 to Mr. C.M. Donohue, U.S. Department of the Navy, Naval Sea Systems Command*. Lafayette, LA: U.S. Fish and Wildlife Service, Louisiana Ecological Services Field Office.

U.S. Fish and Wildlife Service. (2019). *Towing of Inactive Ships Consultation. Consultation number: 01EWFW00-20180I-0918*. Lacey, WA: Washington Fish and Wildlife Office.

This page intentionally left blank.