APPENDIX H.11

NAVAL REACTORS TRENCH (CP-OP-9, CENTRAL PLATEAU) EVALUATION UNIT SUMMARY TEMPLATE

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PART I. EXECUTIVE SUMMARY

EU LOCATION

Naval Reactors Trench is located in the 200 East Area on the Hanford Site Central Plateau.

RELATED EUS

CP-LS-14

PRIMARY CONTAMINANTS, CONTAMINATED MEDIA AND WASTES

Trench 94 was designed for the receipt and final disposal of decommissioned, defueled reactor compartments (rcs) from submarines and surface ships. These decommissioned, defueled reactor compartments (rcs) from submarines and surface ships contain isotopes commonly found in activated metal, which is the primary waste material of naval reactor components, including cobalt-60, niobium-94, and nickel-63; the most abundant contaminants were cobalt-60 and nickel-63.[1]

BRIEF NARRATIVE DESCRIPTION

Trench 94 (218-E-12B) is dedicated to the disposal of the naval reactor compartments from defueled and decommissioned U.S. Navy vessels. To accommodate these large packages, the trench is about 15 m (50 ft) deep, 490 m (1,600 ft) long, and 120 m (400 ft) wide.[2] The first reactor compartments were received in 1986. Naval reactor compartment disposal at Trench 94 will continue until the waste stream is completely exhausted.[3] The reactor compartments are prepared for disposal at Puget Sound Naval Shipyard and Intermediate Maintenance Facility at Bremerton, Washington.

The LLBG Trench 94 uses waste tracking processes to ensure that the waste received at the Low-Level Burial ground (LLBG) Trench 94 matches the manifest papers, to ensure that the waste is tracked through the LLBG Trench 94 to final disposition, and to maintain the information required in WAC 173-303-380[4]. The waste tracking process provides a mechanism to track waste through a uniquely identified container. The unique identifier is a barcode (or equivalent) that will be recorded in an electronic data tracking system. This mechanism encompasses waste acceptance, movement, processing, and management of waste. The container identification number allows the LLBG Trench 94 to link to hard copy or electronic copy of records that are maintained as part of the operating record to retain information on the location, quantity, and physical and chemical characteristics of the waste.[5]

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[1] DOE-RL-2014-47 Page 2-1
[2] DOE-RL-2014-47 Page 1-4
[3] DOE-RL-2014-47 Page 1-6
[4] CHPRC 01909 Page 1
[5] CHPRC 01909 Page 1

SUMMARY TABLES OF RISKS AND POTENTIAL IMPACTS TO RECEPTORS

Table H.11-1 provides a summary of nuclear and industrial safety related risks to humans and impacts to important physical Hanford site resources.

Human Health

A Facility Worker is deemed to be an individual located anywhere within the physical boundaries or immediate areas around the outside the facility; a Co-located Person is an individual located 100 meters from the facility boundary; and Public is an individual located at the closest point on the Hanford Site boundary not subject to DOE access control. The nuclear related risks to humans are based on unmitigated (unprotected or controlled conditions) dose exposures expressed in a range of from "low" to "high" according to the consequence levels. The estimated mitigated exposure that takes engineered and administrative controls and protections into consideration, when this information is available, is shown in parentheses within Table H.11-1, "IS" denotes insufficient information is available to provide a rating. Only events postulated for Trench 94 in the Hazards Assessment are considered. All postulated events have low unmitigated consequences to both the co-located person and the public.

Groundwater and Columbia River

Direct impacts to groundwater resources and the Columbia River have been rated based on available information for the current status and estimates for future time periods. These impacts are also expressed in a range of from *Not Discernible* (*ND*) to *Very High*.

Ecological Resources

The risk ratings are based on the degree of physical disruption (and potential additional exposure to contaminants) in the current status and as a potential result of remediation options.

Cultural Resources[6]

No risk ratings are provided for Cultural Resources. Table H.11-1 identifies the three overlapping Cultural Resource landscapes that have been evaluated: Native American (approximately 10,000 years ago to the present); Pre-Hanford Era (1805 to 1943) and Manhattan/Cold War Era (1943 to 1990); and provides initial information on whether an impact (both direct and indirect) is KNOWN (presence of cultural resources established), UNKNOWN (uncertainty about presence of cultural resources), or NONE (no cultural resources present) based on written or oral documentation gathered on the entire EU and buffer area. Direct impacts include but are not limited to physical destruction (all or part) or alteration such as diminished integrity. Indirect impacts include but are not limited to the introduction of visual, atmospheric, or audible elements that diminish the cultural resource's significant historic features. Impacts to Cultural Resources as a result of proposed future cleanup activities will be evaluated in depth under Section 106 of the National Historic Preservation Act (16 USC 470, et. seq.) during the planning for remedial action.

[6] References throughout this Evaluation Unit Summary Template supporting analyses related to Ecological Resources and/or Cultural Resources may be found in Appendices J and K, respectively. Refer to the specific EU when searching for the reference.

Table H.11-1. Risk Rating Summary (for Human Health, unmitigated nuclear safety basis indicated, mitigated basis indicated in parentheses (e.g., "High" (Low)).

Population or Resource		Evaluation Time Period: Active Cleanup (to 2064)	
		Current Condition: Stabilization & Deactivation	**From Cleanup Actions:** Final D&D
Human Health	Facility Worker	***S&D***: Low (Low)	***Proposed method***: IS
	Co-located Person	***S&D***: Low (Low)	***Proposed method***: IS
	Public	***S&D***: Low (Low)	***Proposed method***: IS
Environmental	Groundwater[(a)]	*Not Discernible* (*ND*)	*ND*
	Columbia River[(a)]	*ND*	*ND*
	Ecological Resources[(b)]	Low	Medium
Social	Cultural Resources[(b)]	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **Manhattan/Cold War** Direct: None Indirect: None	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **Manhattan/Cold War** Direct: None Indirect: None

a. Threat to groundwater or the Columbia River from Group A and B primary contaminants (PCs) (Table 6-1, CRESP 2015) remaining in the vadose zone. There are no vadose zone inventories associated with this EU (because of the nature of the facilities comprising the EU), and thus no threat to the vadose zone, groundwater, or the Columbia River.

b. For both Ecological and Cultural Resources see Appendices J and K, respectively, for a complete description of Ecological Field Assessments and literature review for Cultural Resources. Ecological ratings are described in Table 4-11 of the Final Report. (IS = insufficient information).

SUPPORT FOR RISK AND IMPACT RATINGS FOR EACH POPULATION OR RESOURCE HUMAN HEALTH

Current

The following accidents are analyzed qualitatively in the Hazards Assessment and specifically mention reactor compartments or Trench 94[7]. Within a Hazards Assessment, only qualitative ratings of impacts are provided (no quantitative values of unmitigated and mitigated doses to receptors)

[7] HNF 15589 Pages A-96 and A-109

Spill- RC Drop- Release of surface contamination due to drop of navy ship or sub compartment in Trench 94

Unmitigated Consequences: Facility Worker – Low; Co-located Person – Low; Public – Low

Mitigation: Engineered: Container Band/Straps, Container Design, Crane and Lifting Equipment Design, Overburden, Tie Down

Administrative: Container Management, Emergency Response Plan, Hoisting and Rigging Equipment Inspection and Operator Training

Spill- Package Contamination- Exposure of worker to radiation due to external package contamination

Unmitigated Consequences: Facility Worker – Low; Co-located Worker – Low; Public – Low

Mitigation: Engineered: Compartment weld, Container Design, Overpacks, Overburden; Administrative: Container Management, Emergency Response Plan, Source Strength Control

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

The Naval Reactors Trench will continue to receive RCs until the supply is exhausted. The Trench will be covered at this time with a cover that is not yet designed. At closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[8]

Groundwater, Vadose Zone, and Columbia River

There are no reported vadose zone inventories (because of the nature of the facilities that comprise the EU) and thus no significant threats to the vadose zone, groundwater, or the Columbia River for the purposes of this Review.

Ecological Resources

Current

1% of level 3 or greater resources in the EU and 41% of level 3 or greater resources in the buffer. There is a large patch of level 4 resources in the buffer, which are continuous with similar quality habitat beyond the buffer. Currently using herbicide application within and around trench.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Assuming that remediation 59% of the buffer is level 2 resources or below, therefore, risk impacts will be reduced by putting laydown yards and other construction activities in these low resource areas and away from the level 4 resources to the north of the site. If care is not taken, then introduced and exotic species can impact the high quality resources in the vicinity of the buffer area.

Cultural Resources

Current

Much of the land within the EU is extensively disturbed. Small portions of the EU have been inventoried for cultural resources. Geomorphology indicates a moderate potential to contain intact archaeological

[8] WA7890008967, Part III, Operation Unit Group 18 Appendix H

resources on the surface and/or subsurface. Traditional cultural places are visible from EU. One archaeological isolate is located within 500 meters of the EU.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Archaeological investigations and monitoring may need to occur prior to remediation. The geomorphology indicates a moderate potential for intact archaeological resources. Remediation disturbance may result in impacts to archaeological resources if they are present in the subsurface. No cleanup decisions have been selected, however the potential range of impacts could include: Temporary indirect effects during remediation; Permanent indirect effects are possible if contamination remains after remediation and from capping.

Considerations for Timing of the Cleanup Actions

The Naval Reactors Trench will continue to receive RCs from the Navy until the Trench is full or the RC decommissioning is complete. At this time, a cover will be placed on the Trench.

Near-Term, Post-Cleanup Risks and Potential Impacts

The risks and potential impacts of the NRT post cover placement will depend on the design of the cover, which is not yet determined.

PART II. ADMINISTRATIVE INFORMATION

OU AND/OR TSDF DESIGNATION(S)

200-SW-2

COMMON NAME(S) FOR EU

Naval Reactors Trench

KEY WORDS

Burial Ground, LLW, MLLW, Decommission & Decontaminated Navy Reactor Compartments

REGULATORY STATUS:

Regulatory basis

RCRA

WAC 173-303-330

Applicable regulatory documentation

DOE/RL-91-28, Hanford Facility Dangerous Waste Permit Application, General Information Portion, Chapter 8.0

DOE/RL088-20, Hanford Facility Dangerous Waste Permit Application, LLBG, Chapter 8.0

DOE-STD-3009-94, 2002, *Preparation Guide For U.S Department Of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, U.S. Department of Energy, Washington, D.C.

DOE O 151.1C, *Comprehensive Emergency Management System,*

Applicable Consent Decree or TPA milestones

None identified

RISK REVIEW EVALUATION INFORMATION

Completed

December 2016

Evaluated by

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Ratings/Impacts Reviewed by

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PART III. SUMMARY DESCRIPTION

The Naval Reactors Trench (Trench 94) is a part of the Low Level Burial Ground 218-E-12B. Trench 94 is dedicated to the disposal of the naval reactor compartments from defueled submarine and cruiser reactor compartments (RC) from decommissioned U.S. Navy vessels.[9] The Department of the Navy and its contractors perform the RC transport and placement operations. The RC disposal trench, designated Trench 94 in the 218-E-12B Burial Ground, is located in the northeast corner of the 200E Area. The trench is managed as a mixed waste disposal unit by agreement with the Washington State Department of Ecology and has a Waste Permit (WA7890008967, Part III, Operating Unit Group 18).[10]

The reactor compartments (containing defueled compartment components from decommissioned U.S. Navy submarines and cruisers) are typically large cylindrical waste packages that range from about 9 to 13 m (30 to 42 ft) in diameter and 11 m to 17 m (37 ft to 55 ft) in length. Trench 94 (218-E-12B) is dedicated to the disposal of the naval reactor compartments from defueled submarine and cruiser reactor compartments from decommissioned U.S. Navy vessels. To accommodate these large packages, the trench is about 15 m (50 ft) deep, 490 m (1,600 ft) long, and 120 m (400 ft) wide.[11]

CURRENT LAND USE

DOE Hanford Industrial Site

[9] DOE-RL-2014-47 Page 1-4

[10] HNF 14741 Page 2-29

[11] DOE-RL-2014-47 Page 1-4

DESIGNATED FUTURE LAND USE

Industrial Exclusive[12]

PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

Not Applicable

High-Level Waste Tanks and Ancillary Equipment

Not applicable

Groundwater Plumes

Not applicable

Operating Facilities

This EU is home to the Naval Reactors Trench Operating Facility (Trench 94), where decommissioned and defueled reactor compartments from submarines and surface ships of the U.S. Navy are disposed.

Trench 94 is used for disposing of defueled RCs composed of various types of steel and contains approximately 392 tons of lead reactor shielding.[13] Through the end of FY 2014, 127 naval reactor compartments have been disposed in Trench 94. Two reactor compartments, each 1138 m3 (40,190 ft3), were disposed during FY 2014 and contain isotopes commonly found in activated metal, which is the primary waste material of naval reactor components, including cobalt-60, niobium-94, and nickel-63; the most abundant contaminants were cobalt-60 and nickel-63.[14]

The contribution from reactor compartments is not explicitly counted in the dose estimate for the 218-E-12B Burial Ground because it is calculated to be very small (less than 0.0001 mrem/yr) relative to the 4 mrem/yr dose requirement reported in the performance assessment.[15]

The primary radionuclide for dose consequence purposes is Co-60 (half-life of 5.2 years) from activation of the steel during reactor power operations. Radiological contamination levels are low, and there is some contamination from polychlorinated biphenyls (PCBs). The reactor compartments are welded closed, and there is little risk of a release except through long-term (geological time) corrosion, by which time there will be only low levels of source term remaining. The reactor compartment unit is a section of a vessel that contains the sealed, defueled reactor compartment, associated components, bulkheads,

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[12] The Naval Reactors Trench (Trench 94) is projected to be operated as long as the waste management mission requires. Thereafter, the Central Plateau is designated for Industrial-Exclusive use. This designation is defined as an area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes. It includes related activities consistent with Industrial-Exclusive uses. This designation would allow for continued Waste Management operations within the Central Plateau geographic area.

[13] HNF 14741 Page 2-35

[14] DOE-RL-2014-47 Page 2-1

[15] DOE-RL-2014-47 Page 2-5

and hull sections. Because of its structural characteristics, the reactor compartment waste package is considered impervious to the effects of wind, rain, dust, and fire.[16]

D&D of Inactive Facilities

Not Applicable

LOCATION AND LAYOUT MAPS

The following map shows the location of the Naval Reactors Trench in the Low Level Burial Grounds. The white objects inside the red outline are the reactor compartments. The smaller image to the bottom left illustrates the location of this EU within the larger Hanford Site boundaries.

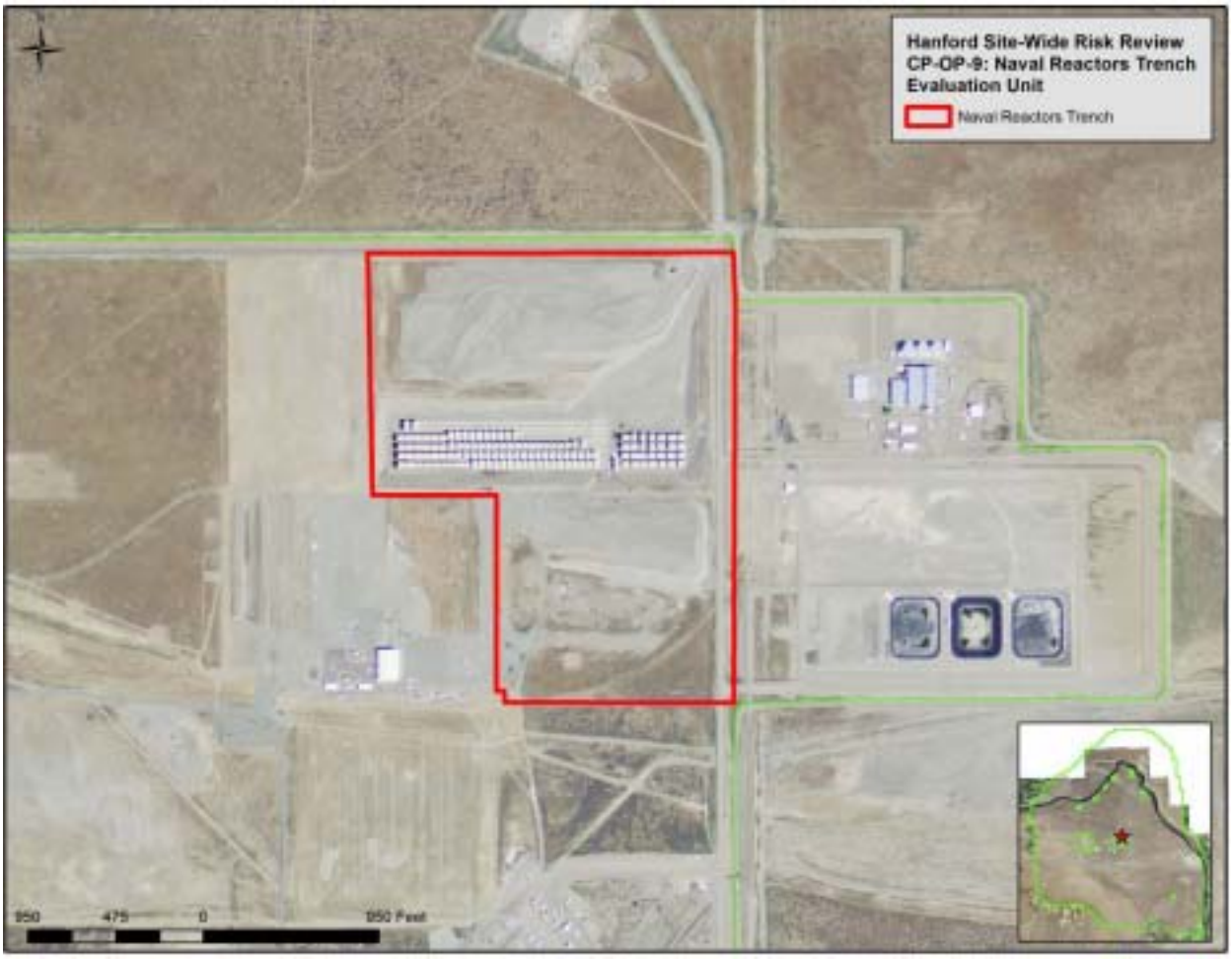

Figure H.11**-1. Map of CP-OP-9 Naval Reactors Trench Evaluation Unit.**

[16] HNF 14741 Appendix B Pages B-10-B-11

PART IV. UNIT DESCRIPTION AND HISTORY

EU FORMER/CURRENT USE(S)

The Naval Reactors Trench (Trench 94) is a part of the Low Level Burial Ground 218-E-12B. Burial Ground 218-E-12B has been in service since 1962 and contains 40 trenches, primarily for LLW, of which 39 are filled or partially filled. Two of the trenches contain TRU. Most of the waste in 218-E-12B contains waste from the 200E area facilities.[17]

Trench 94 is dedicated to the disposal of the naval reactor compartments from defueled submarine and cruiser reactor compartments (RC) from decommissioned U.S. Navy vessels.[18] The Department of the Navy and its contractors perform the RC transport and placement operations. The RC disposal trench, designated Trench 94 in the 218-E-12B Burial Ground, is located in the northeast corner of the 200E Area. The trench is managed as a mixed waste disposal unit by agreement with the Washington State Department of Ecology.[19]

OPERATING FACILITIES

1. Processes that produced the radioactive material and waste contained in the facility

U.S. Navy nuclear powered ships are defueled during inactivation. The defueling removes the nuclear fuel from the reactor vessel and consequently most of the radioactivity from the reactor plant. Defueling is routinely accomplished using established procedures at shipyards qualified to perform reactor servicing work.[20]

2. Primary radioactive and non-radioactive constituents that are considered risk drivers

The primary radionuclide for dose consequence purposes is Co-60 (half-life of 5.2 years) from activation of the steel during reactor power operations. Radiological contamination levels are low, and there is some contamination from polychlorinated biphenyls (PCBs). The reactor compartments are welded closed, and there is minimal risk of a release except through long-term (geological time) corrosion, by which time there will be only low levels of source term remaining.[21]

3. Containers or storage measures are used for radioactive materials at the facility

Current[22]: The reactor compartment waste is classified as a regulated hazardous waste due to the presence of shielding lead. The waste package is classified as a bulk waste with the characteristics of a U.S. Department of Transportation (DOT) Type B[23] container carrying highway route controlled quantities of radioactive material. The Department of the Navy has obtained a certificate of compliance

[17] HNF 14741 Page 2-35

[18] DOE-RL-2014-47 Page 1-4

[19] HNF 14741 Page 2-29

[20] Environmental Assessment for Disposal 2012 Page 1-2

[21] HNF 14741 Page B-10

[22] HNF 14741 Pages B-10-B-11

[23] NRC 10 CFR Part 71

with the Type B packaging criteria[24]. This compliance provides a high level of confidence that the reactor compartment waste will not represent a hazard to personnel or the environment.

The reactor compartment unit is a section of a vessel that contains the sealed, defueled reactor compartment, associated components, bulkheads, and hull sections. Once placed, the reactor compartments are managed in the same manner as any other LLW. Because of its structural characteristics, the reactor compartment waste package is considered impervious to the effects of wind, rain, dust, and fire.

Near-term Future: The Naval Reactors Trench will continue to receive RCs, the waste packaging is anticipated to remain the same as the current package described above. At this time there are no plans for pre-closure activities for LLBG Trench 94; in order to maximize the disposal 21 capacity of the LLBG Trench 94, it was determined that the best operating method is to delay backfilling until the LLBG Trench 94 is filled with defueled reactor compartments. The selection of a final cover design has not been identified.[25]

4. Classification of radioactive material and waste contained or stored within the facility

The material contained at the Naval Reactors Trench is classified as LLW and MLLW.

5. Average and maximum occupational radiation doses incurred at the facility

Annual dosimeter results of individual workers from 2013 and 2014 are shown below in Table H.11-2. The naval Reactors Trench is not listed below in Table H.11-2 but it could be estimated that the doses would range from lower to similar to the 200 East area dosimeter results.

[24] HNF 14741 Pages B-10-B-11 as defined by NRC 10 CFR Part 71
[25] WA7890008967, Part III, Operation Unit Group 18 Addendum H- Closure

Table H.11-2. Thermoluminescent Dosimeter Results (2013 and 2014) [26]

(millirem/year) [a]

Location	No. of Dosimeters	2013		2014		Percentage Change [e]
		Maximum [b]	Average [c, d]	Maximum [b]	Average [c, d]	
100-K	14	112 ± 12	86 ± 17	177 ± 140	89 ± 52	3
100-N	1	87 ± 13	84 ± 7	91 ± 14	82 ± 14	-2
200-East	42	230 ± 131	105 ± 56	217 ± 256	104 ± 57	0
200-West	24	158 ± 9	104 ± 41	157 ± 14	102 ± 42	-1
200-North	1	91 ± 14	86 ± 14	107 ± 16	91 ± 27	5
300 Area	8	124 ± 9	95 ± 26	114 ± 14	90 ± 20	-4
300 TEDF	6	93 ± 13	91 ± 4	91 ± 14	88 ± 8	-2
400 Area	7	100 ± 58	92 ± 9	98 ± 11	88 ± 11	-3
618-10	4	84 ± 11	83 ± 3	81 ± 8	80 ± 2	-2
CVDF	4	82 ± 13	80 ± 3	78 ± 9	77 ± 2	-2
ERDF	3	91 ± 11	88 ± 6	89 ± 22	84 ± 8	-4
IDF	1	102 ± 15	92 ± 16	97 ± 14	90 ± 13	-1

[a] To convert to international metric system units, multiply millirem/year by 0.01 to obtain millisievert/year.
[b] Maximum values are ± analytical uncertainty.
[c] ± 2 standard deviations.
[d] Each dosimeter is collected and read quarterly.
[e] Numbers indicate a decrease (-) or increase from the 2013 mean.

CVDF = Cold Vacuum Drying Facility (100-K Area).
ERDF = Environmental Restoration Disposal Facility (200-West Area).
IDF = Integrated Disposal Facility (200-East Area).
TEDF = 300 Area Treated Effluent Disposal Facility.

There is also an estimated dose to the public by shipping the RCs. It was estimated in the EIS that the preferred alternative would involve 100 reactor compartment shipments and would result in exposure to the general population of 5.8 person-rem (0.003 latent cancer fatalities) for 100 RC shipments.[27] However, 127 RCs have already been deposited in the NRT, with no access to an updated estimate.

6. Processes and operations conducted within the facility

The following processes are conducted within Trench 94:

General Waste Management Duties: Prepare and certify waste movement documentation for both onsite and offsite shipments of dangerous waste on roadways and prepare and certify waste movement documentation for both onsite and offsite shipments of mixed waste on roadways.[28]

Landfill Management Duties: Conducts weekly inspections of the landfill management and collect and transport groundwater samples.[29]

The activities at these trenches, whether for LLW or LLMW, involve several common steps[30]:

[26] DOE/RL-2014-52, Table 4.1., pg. 4.2
[27] FEIS 0259- 1996 Page S-8
[28] PRC-STD-TQ-40227 Page 7
[29] PRC-STD-TQ-40227 Page 10
[30] HNF 14741 Pages 2-72-2-73

• Waste transfer to a disposal trench area

• Waste receipt

• Container handling

• Inspection and survey

• Staging and disposal

• Trench construction, backfilling, and capping

• Stabilization and grouting

• Waste treatment

7. Process flow of material into and out of the facility

Current: The current process flow of material involves the transport of RCs into the Naval Reactors Trench. To date, no material from the RCs is anticipated to leave the trench.

Near-term: Additional RCs will continue to be transported to Trench 94.

8. What effect do potential delays have on the processes, operations, and radioactive materials in the facility?

Current: Trench 94 is the only LLBG actively in use[31]. Due to the coordination between the Department of the Navy and Department of Energy involved in the shipment of RCs to the Naval Reactors Trench, site delays have minimal impact on the operations at the Trench. At present, there is no treatment or handling of waste involved in the Naval Reactors Trench, and it is anticipated that the RCs are able to withstand weather conditions (see question 3, above).

Near-term Future: Delays in the near-term future may affect the receipt of more RCs in the Naval Reactors Trench, or the eventual closure of the burial ground.

9. What other facilities or processes are involved in the flow of radioactive material into and out of the facility?

The schedule for shipment of RCs into Trench 94 is controlled by the Department of the Navy. The D&D of the nuclear Navy fleet controls the inflow of RCs to Trench 94. Further, the Department of Transportation regulations cover shipment of the RCs to the LLBG.

10. Shipping of material

RCs are shipped to the Hanford Site LLBG as bulk waste with the characteristics of a U.S. Department of Transportation (DOT) Type B container carrying highway route controlled quantities of radioactive material. The Department of the Navy has obtained a certificate of compliance with the Type B packaging criteria.[32]

The impacts along the transport route that would be used to move reactor compartments from Puget Sound Naval Shipyard to the Hanford Site for disposal were evaluated in EIS 0259 in 1996[33].

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[31] HNF 14741 Page 2-35

[32] HNF 14741 Page B-10

[33] EIS 0259, 1996

The following Figure illustrates the transportation path of the RCs from the shipyard to the Hanford Site.

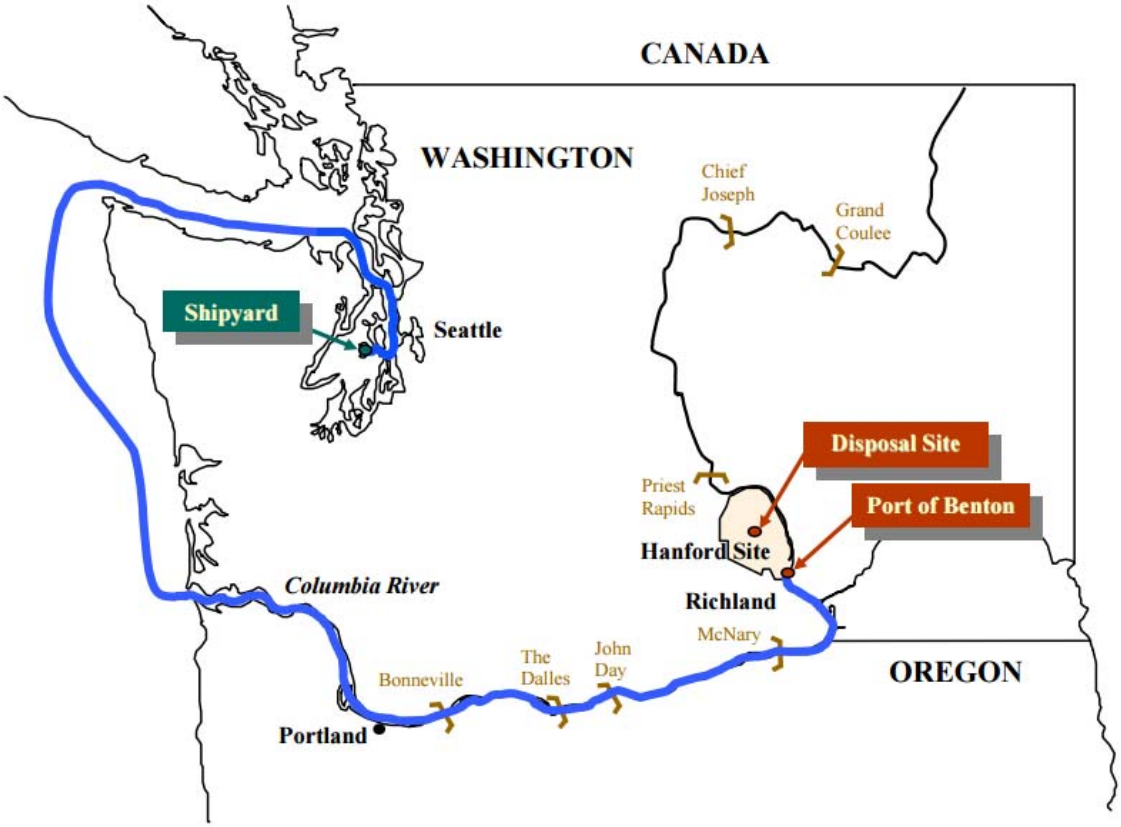

Figure H.11-**2 Reactor Compartment Package Transport Route (USS Enterprise EA, Page 2-8)**

11. Infrastructure considered a part of the facility

The Naval Reactors Trench is located in the Low-Level Burial Grounds in Burial Ground 218-E-12B. The specific Trench is Trench 94. In addition to the on-site facilities, there are several off-site facilities involved in the preparation and transport of RCs to the NRT including the Puget Sound Naval Shipyard (PSNS) in Bremerton, Washington, the barges used for transport from the Port of Benton to the Hanford Site, and the route infrastructure set up on site at Hanford to transport the RCs to Trench 94.

LEGACY SOURCE SITES

Not Applicable

GROUNDWATER PLUMES

Not applicable

D&D OF INACTIVE FACILITIES

Not Applicable

ECOLOGICAL RESOURCES SETTING

Landscape Evaluation and Resource Classification

Over 99% of the Nuclear Reactors Trench EU is classified as level 2 or below, with roughly 1/3 of the area in each of resource levels 0, 1 and 2 (Appendix J, Table J.101). The south portion of the EU contains resources classified as level 2.

The amount and proximity of biological resources surrounding the Naval Reactors Trench EU were examined within the adjacent landscape buffer area, which extends 3129 ft (954 m) from the geometric center of the EU (Appendix J, Figure J.115). The landscape west, south and east of the EU is mostly waste sites and disturbed sites, comprising 63% of the combined EU and adjacent landscape buffer area (Appendix J, Table J.101). Several other EUs (e.g., ETF, B Ponds, and 200E Burials Grounds EUs) fall within the buffer area and more details can be found on resources and plant and animal species lists in those sections of this report.

The 200-East Area fence is immediately north of the EU and marks the boundary between the industrial landscape and one that is relatively undisturbed. The northern part of the combined EU and buffer area comprises 8% level 3 and 28% level 4 biological resources that are contiguous across a large portion of the Hanford Site.

Field Survey

The Naval Reactors Trench EU encompasses a large open pit with a very large mound of soil removed from the pit to the north and a smaller pit and disturbed area on the south. The bottom and slopes of the main pit are kept free of vegetation. The mound consists of coarse gravel and cobbles with sand, but native species (i.e., Sandberg's bluegrass [*Poa secunda*] and Indian ricegrass [*Achnatherum hymenoides*]) and introduced species (i.e., cheatgrass [*Bromus tectorum*] and Russian thistle [*Salsola tragus*]) have colonized the surface of the mound and the lip of the pit.

The smaller pit in the southern part of the EU is dominated by native and introduced grasses (sand dropseed (*Sporobolus cryptandrus*) and cheatgrass, respectively) with some Russian thistle (Appendix J.100).The semi-circular patch of level 3 resource on the south edge of the EU (Appendix J, J.115) is based on a previously noted individual occurrence of a state sensitive species (Piper's daisy [*Erigeron piperianus*]).

CULTURAL RESOURCES SETTING

Two cultural resource inventory surveys cover portions of the CP-OP-9, Naval Reactors Trench EU, each with negative results. It is unknown if an NHPA Section 106 review has been completed specifically for the remediation of the CP-OP-9, Naval Reactors Trench EU. No cultural resources are known within the EU. Although the EU appears to have been inventoried for cultural resources, it is highly unlikely that intact archaeological material is present in the EU, which has been extensively disturbed by Hanford Site activities.

Cultural resources within 500 meters of the CP-OP-9 Naval Reactors Trench EU include one archaeological isolate, associated with the Native American Precontact and Ethnographic Landscape.

While this isolate has not been formally evaluated for listing in the National Register of Historic Places, it should be noted that isolates are typically considered not eligible.

Historic maps and aerial imagery of the EU suggest a low potential for the presence of archaeological resources associated with the Pre-Hanford Early Settlers/Farming Landscape within the EU. Geomorphology data suggests a moderate potential for the presence of archaeological resources associated with the Native American Precontact and Ethnographic Landscape within the CP-OP-9, Naval Reactors Trench EU. However, extensive ground disturbance within the EU further indicates a very low potential for intact cultural resources at or below ground surface. Resources, if present, would likely be limited to areas of intact or undisturbed soils.

Because only portions of the EU have been inventoried for archaeological resources, it may be appropriate to conduct surface archaeological investigations prior to the initiation of remediation activities. Indirect effects are always possible when TCPs are known to be located in the general vicinity. Consultation with Hanford Tribes (Confederated Bands of the Yakama Nation, Wanapum, Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce) and other groups associated with these landscapes (e.g. East Benton Historical Society, the Franklin County Historical Society and the Prosser Cemetery Association, the Reach, and the B-Reactor Museum Association) may be necessary to provide input on indirect effects to both recorded and potential unrecorded TCPs in the area and other cultural resource issues of concern.

PART V. WASTE AND CONTAMINATION INVENTORY

CONTAMINATION WITHIN PRIMARY EU SOURCE COMPONENTS

Vadose Zone Contamination

The reported inventories for CP-OP-9 (Table H.11-3 through Table H.11-5) are isolated from the environment because of the nature of the facilities comprising the EU. Thus there is no reported vadose zone inventory to be evaluated.

Groundwater Plumes and Columbia River

Not applicable

Operating Facilities

Trench 94 is used for disposing of defueled RCs composed of various types of steel and contains approximately 392 tons of lead reactor shielding.[34] Through the end of FY 2014, 127 naval reactor compartments have been disposed in Trench 94. Two reactor compartments, each 1138 m3 (40,190 ft3), were disposed during FY 2014 and contain isotopes commonly found in activated metal, which is the primary waste material of naval reactor components, including cobalt-60, niobium-94, and nickel-63; the most abundant contaminants were cobalt-60 and nickel-63.[35]

[34] HNF 14741 Page 2-35

[35] DOE-RL-2014-47 Page 2-1

The contribution from reactor compartments is not explicitly counted in the dose estimate for the 218-E-12B Burial Ground because it is calculated to be very small (less than 0.0001 mrem/yr) relative to the 4 mrem/yr dose requirement reported in the performance assessment.[36]

The primary radionuclide for dose consequence purposes is Co-60 (half-life of 5.2 years) from activation of the steel during reactor power operations. Radiological contamination levels are low, and there is some contamination from polychlorinated biphenyls (PCBs). The reactor compartments are welded closed, and there is little risk of a release except through long-term (geological time) corrosion, by which time there will be only low levels of source term remaining. The reactor compartment unit is a section of a vessel that contains the sealed, defueled reactor compartment, associated components, bulkheads, and hull sections. Because of its structural characteristics, the reactor compartment waste package is considered impervious to the effects of wind, rain, dust, and fire.[37]

The design basis events for the Naval Reactors Trench use a MAR estimate of 6 DE-Ci per RC[38]. With 127 RCs disposed in Trench 94 by the end of 2014, the maximum inventory could be estimated as 762 DE-Ci. The estimate for the average MAR was 2.5 DE-Ci per RC[39]. Using the average value, the total inventory is more likely around 318 DE-Ci.

[36] DOE-RL-2014-47 Page 2-5

[37] HNF 14741 Appendix B Pages B-10-B-11

[38] HNF 14741 Appendix B Page B-86

[39] HNF 14741 Appendix B Page B-86

Table H.11**-3. Inventory of Primary Contaminants** [(a)]

WIDS	Description	Decay Date	Ref	Am-241 (Ci)	C-14 (Ci)	Cl-36 (Ci)	Co-60 (Ci)	Cs-137 (Ci)	Eu-152 (Ci)	Eu-154 (Ci)	H-3 (Ci)	I-129 (Ci)
All	Sum			2.2	130	0.0056	1,000,000	50	0	0	1,100	0.0029
No WIDS	Trenches		SWITS	2.2	130	0.0056	1,000,000	50	0	0	1,100	0.0029

a. NR = Not reported

b. SWITS = HNF-9668-2014 (SWITS request 2016 05)

Table H.11**-4. Inventory of Primary Contaminants (cont)**[(a)]

WIDS	Description	Decay Date	Ref	Ni-59 (Ci)	Ni-63 (Ci)	Pu (total) (Ci)	Sr-90 (Ci)	Tc-99 (Ci)	U (total) (Ci)
All	Sum			5,100	960,000	NR	20	0.81	NR
No WIDS	Trenches		SWITS	5,100	960,000	NR	20	0.81	NR

a. NR = Not reported

b. SWITS = HNF-9668-2014 (SWITS request 2016 05)

Table H.11**-5. Inventory of Primary Contaminants (cont)**[(a)]

WIDS	Description	Ref	CCl4 (kg)	CN (kg)	Cr (kg)	Cr-VI (kg)	Hg (kg)	NO3 (kg)	Pb (kg)	TBP (kg)	TCE (kg)	U (total) (kg)
All	Sum		0	0	0	0	0	0	1.20E+07	0	0	0
No WIDS	Trenches	SWITS	0	0	0	0	0	0	1.20E+07	0	0	0

a. NR = Not reported

b. SWITS = HNF-9668-2014 (SWITS request 2016 05)

Table H.11**-6. Summary of the Evaluation of Threats to Groundwater as a Protected Resource from Saturated Zone (SZ) and Remaining Vadose Zone (VZ) Contamination associated with the Evaluation Unit**

PC	Group	WQS	Porosity[a]	K_d (mL/g)[a]	ρ (kg/L)[a]	VZ Source M^{Source}	SZ Total M^{SZ}	Treated[c] M^{Treat}	VZ Remaining M^{Tot}	VZ GTM (Mm^3)	VZ Rating[d]
C-14	A	2000 pCi/L	0.23	0	1.84	---	---	---	---	---	*ND*
I-129	A	1 pCi/L	0.23	0.2	1.84	---	---	---	---	---	*ND*
Sr-90	B	8 pCi/L	0.23	22	1.84	---	---	---	---	---	*ND*
Tc-99	A	900 pCi/L	0.23	0	1.84	---	---	---	---	---	*ND*
CCl4	A	5 µg/L	0.23	0	1.84	---	---	---	---	---	*ND*
Cr	B	100 µg/L	0.23	0	1.84	---	---	---	---	---	*ND*
Cr-VI	A	10 µg/L[b]	0.23	0	1.84	---	---	---	---	---	*ND*
TCE	B	5 µg/L	0.23	2	1.84	---	---	---	---	---	*ND*
U(tot)	B	30 µg/L	0.23	0.8	1.84	---	---	---	---	---	*ND*

a. Parameters obtained from the analysis provided in Attachment 6-1 to Methodology Report (CRESP 2015).

b. "Model Toxics Control Act—Cleanup" (WAC 173‑340) Method B groundwater cleanup level for hexavalent chromium.

c. Treatment amounts from the 2015 Hanford Annual Groundwater Report (DOE/RL-2016-09, Rev. 0).

d. Groundwater Threat Metric rating based on Table 6-3, Methodology Report (CRESP 2015).

PART VI. POTENTIAL RISK/IMPACT PATHWAYS AND EVENTS

CURRENT CONCEPTUAL MODEL

Pathways and Barriers

Briefly describe the current institutional, engineered and natural barriers that prevent release or dispersion of contamination, risk to human health and impacts to resources:

1. What nuclear and non-nuclear safety accident scenarios dominate risk at the facility? What are the response times associated with each postulated scenario?

Accidents that cause spill or release of contaminants, such as the drop of navy ship or sub compartment in Trench 94[40]

2. What are the active safety class and safety significant systems and controls?

The active safety class and safety significant systems include the hoisting and rigging equipment inspections, the container management plan, the emergency response plan, and source strength control.

3. What are the passive safety class and safety significant systems and controls?

The passive safety class and safety significant systems include the container band and straps, the container design, the crane and lifting equipment design, the overburden, the tie downs, the compartment weld, and the overpacks.

4. What are the current barriers to release or dispersion of contamination from the primary facility? What is the integrity of each of these barriers? Are there completed pathways to receptors or are such pathways likely to be completed during the evaluation period?

The barriers to release or dispersion of contamination from the Naval Reactors Trench are first and foremost the container design of the reactor compartments and the compartment welds. The integrity of these barriers is considered to be strong. Further, any leaks will have the barrier of the lining of the burial ground. There are no known completed pathways to receptors. There may be some occupational exposure to workers while placing the RCs into the trench.

5. What forms of initiating events may lead to degradation or failure of each of the barriers?

Initiating events considered at the Naval Reactors Trench include mechanical failure, human error, and external contamination.

6. What are the primary pathways and populations or resources at risk from this source?

There are two potential pathways to exposure for the Naval Reactors Trench including the Groundwater and Dispersion in the Air, although air dispersion has a current anticipated dose of Nil from 218-E-12B on the whole.[41] The groundwater dispersion could impact the ecological resources, although at present,

[40] HNF 15589 Pages A-96 and A-109

[41] DOE-RL-2014-47 Page 2-13

the performance assessment indicates it is well below the performance objective, and the Naval Reactors Trench is only a portion of Burial Ground 218-E-12B.[42]

Additional consideration is given to the lead used as shielding and polychlorinated biphenyls (PCBs). The lead is regulated as a state-only dangerous waste in accordance with WAC 173-303. The PCBs are regulated in accordance with the Toxic Substances Control Act as PCB/radioactive waste under 40 CFR 761.50(b)(7). This allows for PCB disposal without taking into account the PCBs in the waste if the PCB waste meets certain criteria for PCB Bulk Product Waste under 40 CFR 761.62(b)(1).[43]

7. What is the time frame from each of the initiating events to human exposure or impacts to resources?

The pathway considered for the initiating events is airborne exposure, and the time frame is considered immediate, on the order of hours or days.

8. Are there current on-going releases to the environment or receptors?

There are no known releases to the environment. There is one completed pathway through occupational exposure of workers placing the reactor compartments in the burial ground.

POPULATIONS AND RESOURCES CURRENTLY AT RISK OR POTENTIALLY IMPACTED

Facility Worker

Workers are the resource impacted by the only current completed pathway of occupational radiation exposure. In the instance of the initiating events described above, any exposure would likely be airborne dispersion of containerized waste and exposure via inhalation or external radiation due to proximity to contamination.

Co-Located Person (CP)

Workers are the resource impacted by the only current completed pathway of occupational radiation exposure. In the instance of the initiating events described above, any exposure would likely be airborne dispersion of containerized waste and exposure via inhalation or external radiation due to proximity to contamination.

Public

None of the postulated events have more than a low impact on the public.

Groundwater and Columbia River

Not applicable]

Ecological Resources

Summary of Ecological Review:

- Nearly 100% of the EU is characterized as level 2 resources or lower. Loss of this habitat is not expected toimpact connectivity with habitat outside the 200-East Area.

[42] DOE-RL-2014-47 Page 2-13

[43] WA7890008967, Part III, Operating Unit Group 18 Fact Sheet

Cultural Resources

The CP-OP-9, Naval Reactors Trench EU located within the 200-East Area of the Hanford Site, an area known to have low potential to contain Native American Precontact and Ethnographic archaeological resources and Pre-Hanford Early Settlers/Farming resources. Much of the 200 Areas were addressed in a cultural resources report entitled *Archaeological Survey of the 200 East and 200 West Areas, Hanford Site* (Chatters and Cadoret 1990). The focus of this archaeological survey was on inventorying all undisturbed portions of the 200-East and 200-West Areas. This report concluded that much of the 200-East and 200-West Areas can be considered areas of low archaeological potential with the exception of intact portions of an historic/ethnohistoric trail/road corridor which runs through the 200-West Area.

Small portions of the CP-OP-9, Naval Reactors Trench EU have been inventoried for archaeological resources under two cultural resource reviews: HCRC#88-300-038b (Chatters and Cadoret 1990), and HCRC#89-200-023 (Minthorn 1990). Neither of these cultural resource reviews resulted in the identification of any cultural resources within the CP-OP-9, Naval Reactors Trench EU. It is unknown if an NHPA Section 106 review has been completed specifically for the remediation of the CP-OP-9, Naval Reactors Trench EU. It is very unlikely that intact archaeological material is present in the areas that have not been inventoried for archaeological resources (both on the surface and in the subsurface), because soils in the entire EU appear to have been extensively disturbed by Hanford Site activities.

Archaeological sites, buildings and Traditional Cultural Properties (TCPs) located within the EU[44]

- No cultural resources are known to exist within the CP-OP-9, Naval Reactors Trench EU.

Archaeological sites, buildings and TCPs located within 500 meters of the EU

- One archaeological isolate, associated with the Native American Precontact and Ethnographic Landscape has been documented within 500 meters of the EU. While this isolate has not been formally evaluated for listing in the National Register of Historic Places, it should be noted that isolates are typically considered not eligible.

Closest Recorded TCPs

There are two recorded TCPs associated with the Native American Precontact and Ethnographic Landscape that are visible from the CP-OP-9, Naval Reactors Trench EU.

CLEANUP APPROACHES AND END-STATE CONCEPTUAL MODEL

Selected or Potential Cleanup Approaches

The cleanup of the Naval Reactors Trench, as it is a shallow land burial facility, will entail fill and a cover, followed by Surveillance and Maintenance Processes. The disposal trench cover will be designed and located to comply with WAC 173-303-665(6) and WAC 173-303-610. The final detailed specification and/or variation for other cover designs will be provided sufficiently ahead of the desired closure date to allow for regulatory agencies to review and approve this closure plan before the initiation of the closure activities. Although a final detailed cover design cannot be provided at this time, at closure, the

[44] Traditional cultural property has been defined by the National Park Service as "a property, a place, that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community's traditional beliefs and practices" (Parker and King 1998).

LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[45]

Contaminant Inventory Remaining at the Conclusion of Planned Active Cleanup Period

The cleanup of the Naval Reactors Trench, as it is a shallow land burial facility indicates that the current inventory will remain, but its radioactivity will decay over time.

Risks and Potential Impacts Associated with Cleanup

At this time, the risks and potential impacts have not been evaluated regarding the final cleanup stage. Although a final detailed cover design cannot be provided at this time, at closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[46]

Populations and Resources at Risk or Potentially Impacted During or as a Consequence of Cleanup Actions

Facility Worker

Yet to be determined. At closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[47]

Co-located Person

Yet to be determined. At closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[48]

Public

Yet to be determined. At closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[49]

Groundwater and Columbia River

Not applicable

Ecological Resources

Remove, Treat and Dispose of waste involves personnel through the target (remediation) area, car and pickup truck traffic through the non-target and target (remediation) area, truck, heavy equipment (including drill rigs) traffic on roads through the non-target and target area, caps (and other containment), soil removal and contamination in the soil, vegetation control, and irrigation (for revegetation) will cause the following disturbance from remediation activities: Carry seeds or propagules (pieces of vegetation or other biological parts that can grow and/or reproduce) on tires of vehicles or blowing from heavy equipment; injure or kill vegetation or small invertebrates or small

[45] WA7890008967, Part III, Operation Unit Group 18 Appendix H

[46] WA7890008967, Part III, Operation Unit Group 18 Appendix H

[47] WA7890008967, Part III, Operation Unit Group 18 Appendix H

[48] WA7890008967, Part III, Operation Unit Group 18 Appendix H

[49] WA7890008967, Part III, Operation Unit Group 18 Appendix H

animals; vehicle traffic can make paths, compact soil, scare or displace animals, can impact animal behavior or reproductive success; affect animal dispersion and habitat use (e.g., some birds avoid nesting near roads because of song masking); displacement of animals from near roads due to increased noise or other disturbances; and heavy equipment may permanently destroy areas of the site with intense activity. **S**oil removal can cause more severe effects because of blowing soil (and seeds). During remediation, radionuclides or other contaminants could be released or spilled on the surface, and depending upon the type and quantity, could have adverse effects on the plants and animals on-site. Use of non-specific herbicides for vegetation control results in some mortality of native vegetation (especially native forbes), and allows exotic species to move in; it may change species composition of native communities, but it also could make it easier for native species to move in; improved methods could yield positive results. Irrigation requires a system of pumps and water, resulting in physical disturbance; repeated irrigation from the same locations could result in some soil compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area.

Alternatively, barriers could be the remediation option and involves personnel car and pickup truck traffic through the non-target and target (remediation) area, truck and heavy equipment traffic on roads through the non-target and target area, dust suppression, and irrigation (for revegetation) will cause the following disturbance from remediation activities: Carry seeds or propagules (pieces of vegetation or other biological parts that can grow and/or reproduce) on person (boots, clothes, equipment) or tires of vehicles or blowing from heavy equipment; injure vegetation or small invertebrates or small animals (e.g., insects, snakes); make paths or compact soil; scare or displace animals. Caps and other containment can cause compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Destruction of soil invertebrates at depths of pits. Potential bringing up of dormant seeds from soil layers; disruption of ground-living small mammals and hibernation sites of snakes and other animals on-site of containment; often disrupts local aquatic environment and drainage; often non-native plants used on caps (which can become exotic/alien adjacent to the containment site). Additional water from dust suppression could lead to more diverse and abundant vegetation in areas that receive water, which could encourage invasion of exotic species; the latter could displace native plant communities; excessive dust suppression activities could lead to compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Irrigation requires a system of pumps and water, resulting in physical disturbance; repeated irrigation from the same locations could result in some soil compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. These effects will be higher in the EU itself.

Cultural Resources

Potential direct effects are possible from personnel, car, pick-up, truck and heavy equipment traffic/use through both target (remediation) and non-target areas during active cleanup. These activities may inadvertently expose resources close to the surface. Additionally, traffic through these areas may lead to the introduction of invasive species and/or a decrease in the presence of native plants used for medicinal or tribal religious purposes. Heavy equipment use for remedial activities (such as the excavation, treatment and disposal of all waste) may lead to an alteration of the landscape, and the act of soil removal may destroy resources; if resources are not destroyed, then, soil removal may disturb or adversely affect resources. Utilization of caps, barriers and/or other containments may destroy resources located close to the surface. If resources are not destroyed, containments may disturb or adversely affect resources. Lastly, during remediation, radionuclides or other contamination released or

spilled on the surface could have long-term effects if the contamination remains and resources become contaminated and/or plants having cultural importance to Tribes do no recolonize or thrive.

Potential indirect effects are possible from personnel traffic through target (remediation) areas as well as car, pick-up, truck and heavy equipment traffic/use through both target (remediation) and non-target areas. It is possible that these activities may decrease viewshed values and/or impact viewshed through the introduction of increased dust, the creation of trails, etc. Heavy equipment use for remedial actions/soil removal and the utilization of caps and/or other containments could potentially cause alterations to the landscape and impacts to viewsheds. Lastly, during remediation, radionuclides or other contamination released or spilled on the surface could have long-term effects if the contamination remains and resources become contaminated and/or plants having cultural importance to Tribes do no recolonize or thrive.

ADDITIONAL RISKS AND POTENTIAL IMPACTS IF CLEANUP IS DELAYED

The Naval Reactors Trench will continue to receive reactor compartments until the supply is exhausted. If covering the trench is delayed, the containers may be at a slightly higher risk of degradation.

NEAR-TERM, POST-CLEANUP STATUS, RISKS AND POTENTIAL IMPACTS

Naval reactor compartment disposal at Trench 94 will continue until the waste stream is completely exhausted.[50]

[50] DOE-RL-2014-47 Page iii

POPULATIONS AND RESOURCES AT RISK OR POTENTIALLY IMPACTED AFTER CLEANUP ACTIONS (FROM RESIDUAL CONTAMINANT INVENTORY OR LONG-TERM ACTIVITIES)

Table H.11-**7. Summary of Populations and Resources at Risk or Potentially Impacted after Cleanup.**

Population or Resource		Risk/Impact Rating	Comments
Human	Facility Worker	Insufficient Information (IS)	
	Co-located Person	IS	
	Public	IS	
Environmental	Groundwater	*Not Discernible* (*ND*)	No risks because of the nature of the facilities that comprise the EU.
	Columbia River	*ND*	
	Ecological Resources[(a)]	Low	Post-cleanup monitoring might pose a risk to level 3 and above resources in the buffer area.
Social	Cultural Resources[(a)]	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **Manhattan/Cold War** Direct: None Indirect: None	Permanent direct effects are possible if residual contamination remains after remediation and from capping.

a. For both Ecological and Cultural Resources see Appendices J and K, respectively, for a complete description of Ecological Field Assessments and literature review for Cultural Resources. Ecological ratings are described in Table 4-11 of the Final Report. (IS = insufficient information).

LONG-TERM, POST-CLEANUP STATUS – INVENTORIES AND RISKS AND POTENTIAL IMPACT PATHWAYS

The cleanup of the Naval Reactors Trench, as it is a shallow land burial facility indicates that the current inventory will remain, but its radioactivity will decay over time. At this time, the risks and potential impacts have not been evaluated regarding the final cleanup stage. Although a final detailed cover design cannot be provided at this time, at closure, the LLBG Trench 94 cover will be designed to adequately protect human health and the environment and meet the standards of WAC 173-303-665(6).[51]

[51] WA7890008967, Part III, Operation Unit Group 18 Appendix H

PART VII. SUPPLEMENTAL INFORMATION AND CONSIDERATIONS ~

The following diagram illustrates the dimensions of the various reactor compartment types.

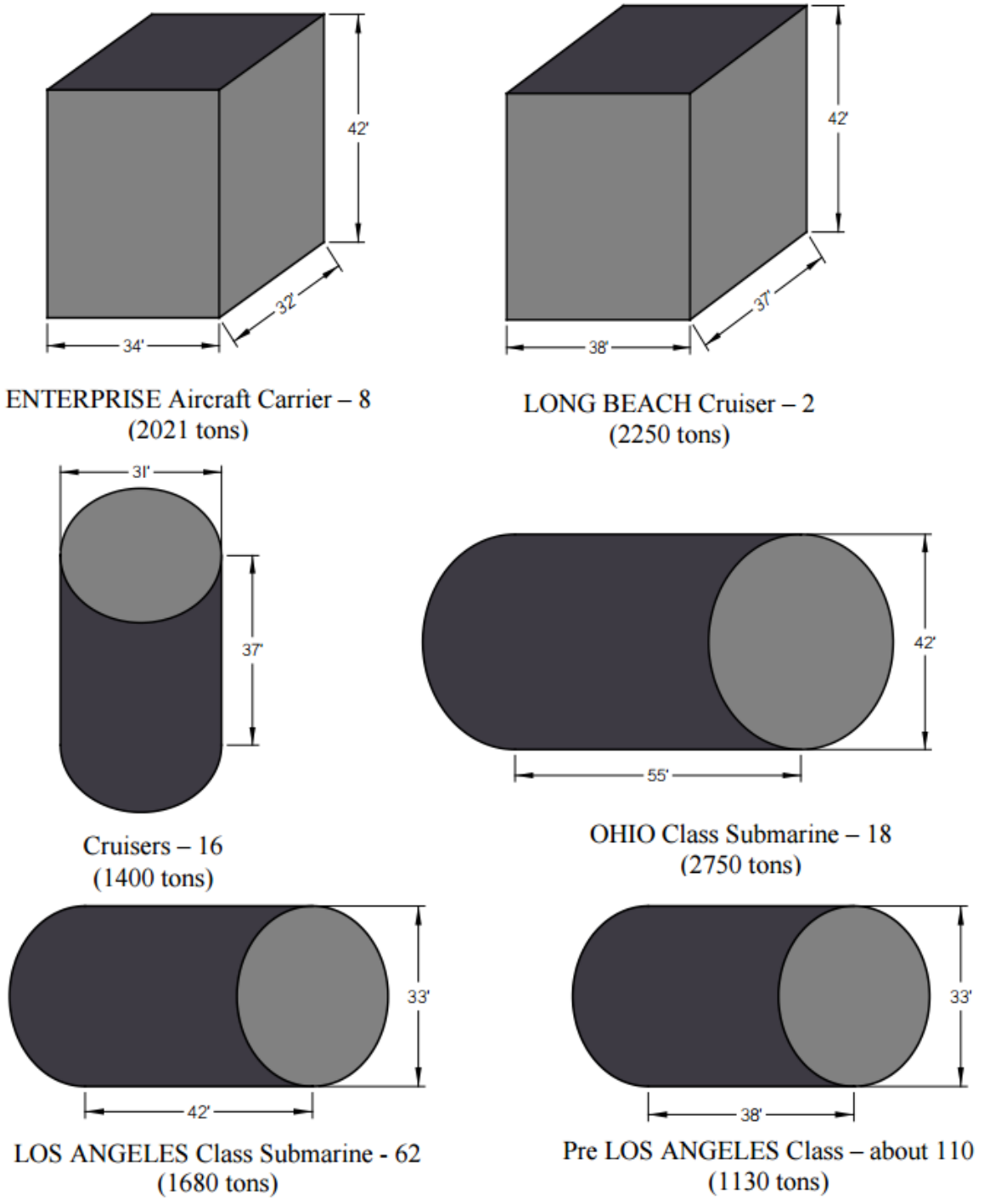

Figure H.11**-3 Dimensions of the Various Reactor Compartment Types (USS Enterprise EA, Page 2-5)**

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