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CHAPTER 3.0
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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CHAPTER 3.0
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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1 **3.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

2 **3.1 Introduction**

3 Applicable or relevant and appropriate requirements (ARAR) are standards, requirements, criteria, or
4 limitations promulgated under federal or state environmental laws that must be met or waived for
5 remedial actions as required by Section 121 of the Comprehensive Environmental Response,
6 Compensation, and Liability Act of 1980 (CERCLA). Only the substantive provisions of ARARs must
7 be met (or waived) for actions conducted entirely on site [CERCLA 121(d)(2)] because such onsite
8 actions are exempted from obtaining federal, state, and local permits [CERCLA 121(e)(1)]. A component
9 of an action's protectiveness is its ability to comply with ARARs. The to be considered (TBC) materials
10 are other federal or state guidance, criteria, advisories, proposed regulations, or similar materials that,
11 while not enforceable, provide additional standards that may be pertinent in selecting or designing a
12 remedy.

13 Below is a listing of the major ARARs and TBCs pertinent to remediation of the 100-NR-1 and 100-NR-2
14 Operable Units. These ARARs and TBCs are further described and cited in Table 3.1 and are discussed
15 relative to each remedial alternative in Sections 3.1.1 through 3.1.7.

- 16 • The Model Toxics Control Act (MTCA) Regulations
- 17 • The Safe Drinking Water Act (SDWA) Primary and Secondary Drinking Water Standards
- 18 • Draft EPA Radiation Site Cleanup Regulations
- 19 • The Resource Conservation and Recovery Act Hazardous Waste Regulations
- 20 • State of Washington Dangerous Waste Regulations
- 21 • The U.S. Environmental Protection Agency Transportation Regulations
- 22 • Nuclear Regulatory Commission Licensing Requirements for Land Disposal of Radioactive
23 Wastes
- 24 • State of Washington Waste Discharge Permit Program
- 25 • State of Washington Underground Injection Control Program
- 26 • National Emissions Standards for Hazardous Air Pollutants
- 27 • State of Washington Radiation Protection Air Emissions
- 28 • State of Washington Control of New Sources of Toxic Air Pollutants
- 29 • The National Historic Preservation Act
- 30 • The Native American Graves Protection and Repatriation Act
- 31 • The Archeological and Historical Preservation Act
- 32 • The Endangered Species Act
- 33 • The Migratory Bird Treaty Act
- 34 • The Hanford Reach Preservation Act
- 35 • U.S. Department of Energy Occupational Radiation Protection Regulations
- 36 • Nuclear Regulatory Commission Standards for Protection Against Radiation
- 37 • U.S. Department of Energy Order - Radiation Dose Limit

38 **3.1.1 Standards for Soil, Groundwater, and River Cleanup**

39 The state MTCA is implemented by Chapter 173-340 of the Washington Administrative Code (WAC)
40 and establishes cleanup standards (including cleanup levels and points of compliance) for nonradioactive
41 contaminants in soil and groundwater. In setting standards, MTCA prescribes a methodology for
42 calculating cleanup levels based on potential land use and exposure assumptions and draws on other
43 standards, such as maximum contaminant levels (MCLs) established for drinking water under the SDWA.
44 In addition, MTCA specifies that soil and groundwater cleanup must be accomplished so that other
45 interconnected media, such as adjacent surface waters, are protected. The MTCA standards are relevant

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1 and appropriate and are incorporated into the remediation goals for all remedial alternatives evaluated in
2 this CMS.

3 Few standards exist for the cleanup of radioactive constituents at waste sites. Standards for MCLs for
4 certain radionuclides, based on an annual dose limit, are provided in [40 CFR 141](#) and are relevant and
5 appropriate and are incorporated into the remediation goals for alternatives that address groundwater.
6 Standards for remediation of radioactive constituents in soil have not been promulgated. Two agencies
7 (the U.S. Environmental Protection Agency [EPA] and the U.S. Nuclear Regulatory Commission [NRC])
8 have proposed regulations for acceptable levels of residual radioactivity for cleanup of soil. These are
9 TBC materials rather than ARARs, but in the absence of ARARs, they are incorporated into the
10 remediation goals for soil cleanup.

11 The following information provides an analysis of how each source-site and groundwater alternative
12 category is anticipated to comply with these ARARs and TBCs.

13 **3.1.1.1 100-NR-1 Source Site Alternative Compliance with ARARs/TBCs**

14 No-Action Alternative. The No-Action Alternative would not result in compliance with soil and
15 groundwater protection ARARs or TBCs.

16 Institutional Controls Alternative. Because there is a general lack of data on soils within the 100-NR-1
17 source operable unit, it is unknown whether institutional controls would be adequate to meet standards for
18 soil and groundwater cleanup. Should contaminant of concern concentrations be present at a site that
19 would contribute to an increase in groundwater contamination (i.e., cause new or expanded areas of
20 contamination above and beyond existing contaminant plumes) or a decrease in river protection, the
21 ARARs and TBCs for this alternative would not be met. The type of institutional controls that may be
22 necessary to preclude direct exposure to contaminants is also dependent upon the need for more
23 information on constituent concentrations in the soil. It is assumed, however, that controls such as access
24 controls (e.g., signs) and restrictions on groundwater usage would be adequate to meet soil and
25 groundwater standards based on direct exposure in the short term. However, because this alternative will
26 require that controls be in place for over 200 years due to Sr-90 decay, it becomes less certain that
27 institutional controls would be able to provide compliance with soil and groundwater direct exposure
28 standards. Institutional controls would preclude rural-residential use at sites where direct soil exposure
29 levels are above residential standards. At the shoreline site, contaminants would be left in place above
30 groundwater and river protection standards with this alternative until contaminated groundwater is
31 remediated. Compliance would be attained at the end of the groundwater/river protection remediation,
32 which may require 270 to 300 years.

33 Remove/Dispose Alternative. Removal, treatment where appropriate and subsequent disposal of
34 contaminated soils will provide compliance with all soil and groundwater cleanup standards. However,
35 due to the lack of data on constituent concentrations in the soil, the degree of removal that would be
36 required at a site in order to reach compliance with soil and groundwater cleanup standards cannot be
37 ascertained. A potential exists that it would become technically impracticable or cost prohibitive to
38 excavate deep vadose zone soils if large, deep areas of contamination are discovered. Removal, treatment
39 where appropriate, and subsequent disposal of contaminated shoreline site soils will provide compliance
40 with all soil and groundwater cleanup standards if contaminated groundwater is prevented from
41 recontaminating the soil through implementation of a hydraulic or physical barrier system.

42 In Situ Bioremediation of Petroleum Waste Group. In situ bioremediation is a proven technology that has
43 achieved good results at other remedial action sites. It is anticipated to achieve compliance with soil and
44 groundwater cleanup standards for total petroleum hydrocarbons (TPH). However, given the lack of data
45 identifying the extent of contamination, there is a possibility that remediation using this alternative would
46 not be practical.

47 Containment for Radioactive Waste Group. Although this alternative likely will not comply with the
48 direct soil exposure numerical cleanup standards and possibly the groundwater protection numerical

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1 cleanup standards of MTCA. MTCA considers this a compliant alternative if the compliance monitoring
2 program is designed to ensure the long-term integrity of the containment system
3 ([WAC 173-340-740](#)[4][6][d]). Without any removal of contaminants from soils, there is a potential that
4 after failure of the cap, contaminants could still be in place in the soils that could exceed the soil cleanup
5 standards and could cause exceedence of groundwater cleanup standards. Therefore, maintenance of the
6 cover is critical to maintaining compliance with these ARARs and TBCs. For the shoreline site, a cover
7 alternative would also be expected to comply with soil and groundwater cleanup standards during the
8 design life of the cover. This alternative would be in conflict with unrestricted land use.

9 In Situ Solidification for Radioactive Waste Group and Shoreline Site. In situ solidification will provide
10 compliance with soil and groundwater cleanup levels for constituents expected to be remaining in the
11 soils for the radioactive waste group. It is possible that constituents might be present in the soil that
12 cannot be immobilized through the chosen solidification technology, such as mobile inorganic
13 constituents, but this possibility is considered unlikely.

14 **3.1.1.2 100-NR-2 Groundwater Alternative Compliance with ARARs/TBCs**

15 There is a general lack of data on the impacts of aquatic organisms from Sr-90 concentrations entering the
16 river. Groundwater and river protection standards for Sr-90 are based on the MCL in this CMS.
17 However, because ecological impacts are unknown and because concentrations of Sr-90 are anticipated to
18 exceed MCL river-protection standards for 270 years for any of the alternatives, further study is
19 warranted. (Note: Modeling efforts show that manganese will require over 3,000 years to meet cleanup
20 standards based on its secondary MCL. Because of the uncertainties in modeling plume dispersion over
21 this time frame and because the standard is based on a secondary MCL, Sr-90 remediation time frames
22 are considered the primary focus.) One potential avenue for obtaining some information on impacts to
23 aquatic organisms is the pending Columbia River Comprehensive Impact Assessment study (Tri-Party
24 Agreement Milestone M-15-80, scheduled for submittal of a revised draft in March 1998). This study is
25 planned to define further ecological impacts, including aquatic ecosystems potentially impacted by Sr-90
26 along the 100-NR-2 groundwater/river interface. When this information is obtained, it will become
27 available to the public for consideration. In addition, reassessment of ecological impacts associated with
28 remediation of 100-NR-2 will be made during the CERCLA five-year review ([40 CFR 300.430](#)(f)(4)(ii)).

29 No-Action Alternative. The No-Action Alternative would not result in compliance with soil and
30 groundwater protection ARARs and TBCs.

31 Institutional Controls Alternative. Compliance with groundwater and river protection standards will be
32 attained for all contaminants of concern (COC) at the end of remediation, which is estimated to require
33 300 years under this alternative. One exception will be manganese, which may exceed secondary MCLs
34 for over 3,000 years.

35 Because of the length of time necessary to ensure that institutional controls are maintained, compliance
36 with ARARs and TBCs becomes less certain. Access controls and groundwater use restrictions would
37 restrict exposure to contaminants in groundwater until contaminant plumes decay and/or naturally
38 attenuate to concentrations below groundwater protection standards. River protection standards would
39 continue to be exceeded for Sr-90 for 270 years and would be exceeded for tritium for 10 to 15 years.
40 Groundwater protection standards would be exceeded for Sr-90 and tritium for 300 years and 25 years,
41 respectively. Except for manganese, inorganic contaminants will not meet MCLs in groundwater from a
42 few to about 30 years, depending upon the specific contaminant. Nitrates will exceed MCLs at the
43 groundwater/river interface in the future and manganese may exceed MCLs at a future date under this
44 alternative.

45 Permeable Barrier for River Protection. Compliance with groundwater and river protection standards will
46 be attained for all COCs at the end of remediation, which is estimated to require 300 years under this
47 alternative. One exception will be manganese, which may exceed secondary MCLs for over 3,000 years.

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1 The permeable wall would not allow compliance with groundwater protection standards at a significantly
2 faster rate because this alternative does not actively treat the Sr-90. River protection standards are not
3 met at a faster rate due to the continued flushing of Sr-90 into the groundwater/river interface from the
4 contaminated soils that remain in the strip of land between the groundwater/river interface and the
5 permeable wall. This alternative will reduce concentrations of Sr-90 entering the groundwater/river
6 interface, thus allowing for greater overall protection of the river, but may have no effect on the time it
7 will take to achieve compliance with groundwater and river protection standards due to the continued
8 release of Sr-90 from this strip of land. River protection standards would continue to be exceeded for
9 Sr-90 for 270 years and would be exceeded for tritium for 10 to 15 years. Tritium would continue to
10 exceed groundwater protection standards until decay decreased concentrations below MCLs (25 years).
11 "Other" inorganic contaminants will have restoration time frames for compliance with groundwater
12 protection standards as identified in Section 5.0. Most significantly, manganese may exceed groundwater
13 protection standards for over 3,000 years under this alternative.

14 Hydraulic Controls for River Protection and Pump and Treat for Sr-90 in the Aquifer. Compliance with
15 groundwater and river protection standards will be attained for all COCs at the end of remediation, which
16 is estimated to take 270 years under this alternative (except manganese, which may exceed secondary
17 MCLs for over 3,000 years).

18 Hydraulic controls would not allow compliance with groundwater protection standards at a significantly
19 faster rate because this alternative does not actively treat the Sr-90. The time necessary to achieve
20 compliance with groundwater protection standards for Sr-90 would not be significantly shortened (from
21 300 years without treatment to 270 years with treatment). River protection standards would not be met in
22 a significantly shorter time frame due to the continued flushing of Sr-90 into the groundwater/river
23 interface from the Sr-90 that remains in the aquifer sediments adjacent to the river. This alternative will
24 reduce concentrations of Sr-90 entering the groundwater/river interface, thus allowing for greater overall
25 protection of the river, but may have no effect on the time it will take to achieve compliance with river
26 protection standards due to the continued release of Sr-90 from the sediments. Tritium would not be
27 actively remediated along the entire plume (although the hydraulic controls for Sr-90 would remediate
28 much of the tritium plume), and, therefore, groundwater and river protection standards would not be met
29 until decay and natural attenuation brought concentrations below the MCL (25 and 10 to 15 years,
30 respectively). Other groundwater plumes would not be actively remediated with this alternative and,
31 therefore, would not achieve compliance with groundwater or river protection standards until decay
32 and/or natural attenuation resolved concentrations below the standards. "Other" inorganic contaminants
33 will have restoration time frames for compliance with groundwater protection standards as identified in
34 Section 5.0. Most significantly, manganese may exceed groundwater protection standards for over 3,000
35 years under this alternative.

36 Hydraulic Controls for River Protection and Pump and Treat for Aquifer Remediation. Compliance with
37 groundwater and river protection standards will be attained for all COCs at the end of remediation, which
38 is estimated to take 270 years under this alternative.

39 Hydraulic controls and pump-and-treat systems would not allow compliance with river protection
40 standards at a significantly faster rate because this alternative would reduce the time frame for Sr-90
41 remediation from 300 to 270 years. Groundwater protection standards would be met for all COCs, other
42 than tritium and Sr-90, in a much shorter time frame than could be achieved through decay and/or natural
43 attenuation. Strontium-90 groundwater protection standards would not be met in a significantly shorter
44 time frame (300 years without treatment and 270 years with treatment). Tritium would continue to
45 exceed groundwater protection standards until decay decreased concentrations below MCLs (25 years)
46 but would meet MCLs in the groundwater/river interface shortly after hydraulic controls are fully
47 operational. This alternative is anticipated to be able to reduce concentrations of Sr-90 entering the
48 groundwater/river interface, thus allowing for greater overall protection of the river (although the amount
49 may not be significant), but would have no effect on the time it will take to achieve compliance with river
50 protection standards due to the continued release of Sr-90 from the aquifer sediments near the river.

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1 Manganese will not meet MCLs in groundwater for close to 90 years using pump-and-treat technologies.
2 Other inorganic contaminants will have shortened restoration time frames for compliance with
3 groundwater protection standards as identified in Section 5.0.

4 Cryogenic Barrier for River Protection and Pump and Treat for Aquifer Remediation. Compliance with
5 groundwater and river protection standards will be attained for all COCs at the end of remediation, which
6 is estimated to take 270 years under this alternative.

7 The barrier and pump-and-treat systems would not allow compliance with river protection standards at a
8 significantly faster rate because this alternative does not actively treat the Sr-90 in aquifer sediments
9 immediately adjacent to the river. Strontium-90 would continue to cause exceedences of river protection
10 standards due to continued flushing of sediments on the riverside of the barrier. Groundwater protection
11 standards would be met with this alternative for all COCs, other than Sr-90 and tritium, in a much shorter
12 time frame than could be attained through decay and/or natural attenuation. Strontium-90 groundwater
13 protection standards would not be met in a significantly shorter time frame (300 years without treatment
14 and 270 years with treatment), and tritium would continue to exceed groundwater protection standards
15 until decay and natural attenuation decreased concentrations below MCLs (25 years). Manganese will not
16 meet MCLs in groundwater for close to 90 years using pump-and-treat technologies. Other inorganic
17 contaminants will have shortened restoration time frames for compliance with groundwater protection
18 standards as identified in Section 5.0.

19 Sheet Pile Barrier for River Protection and Soil Flushing/Pump and Treat for Aquifer Remediation.
20 Compliance with groundwater and river protection standards will be attained for all COCs at the end of
21 remediation, which is estimated to take 270 years under this alternative.

22 The barrier and pump-and-treat systems would not allow compliance with river protection standards at a
23 significantly faster rate because this alternative does not actively treat the Sr-90 in aquifer sediments
24 immediately adjacent to the river. Groundwater protection standards would be met with this alternative
25 for all COCs, other than Sr-90 and tritium, in a much shorter time frame than could be attained through
26 decay and/or natural attenuation. It is unknown how rapidly soil flushing could remediate groundwater
27 for Sr-90. Tritium would continue to exceed groundwater protection standards until decay decreased
28 concentrations below MCLs (25 years) but would meet MCLs in the groundwater/river interface shortly
29 after hydraulic controls are fully operational. Manganese will not meet MCLs in groundwater for close to
30 90 years using pump-and-treat technologies. Other inorganic contaminants will have shortened
31 restoration time frames for compliance with groundwater protection standards as identified in Section 5.0.

32 **3.1.2 Waste Management Standards**

33 The Resource Conservation and Recovery Act of 1976 (RCRA) regulates the generation, transportation,
34 storage, treatment, and disposal of solid and hazardous waste. Authority to implement much of RCRA
35 has been delegated to the state and is implemented by [WAC 173-303](#) (for dangerous waste) and
36 [WAC 173-304](#) (for solid waste that is not dangerous waste). Authority for land disposal restrictions
37 (LDR), including standards for the treatment of wastes prior to land disposal, are retained at the federal
38 level and implemented via [40 CFR 268](#). The Atomic Energy Act (AEA) establishes standards for the
39 management of radioactive wastes. Regulations pertaining to the management and land disposal of
40 low-level radioactive waste are contained in [10 CFR 61](#).

41 Alternatives that involve the removal of waste or contaminated media or in situ or ex situ treatment may
42 generate solid, dangerous, or radioactive waste. The RCRA requirements are applicable to those
43 alternatives that may generate, transport, treat, store, or dispose of solid or dangerous waste. Offsite
44 shipment of hazardous materials must comply with EPA's [49 CFR](#) transportation and packaging
45 requirements. DOE Order 1540.1A is considered a TBC for onsite waste transport. It requires
46 substantive compliance with [49 CFR](#) unless other methods allow an equivalent degree of safety. The
47 substantive requirements of [10 CFR 61](#) is relevant and appropriate to those alternatives that generate,
48 treat, or dispose of radioactive waste. All waste generated under any alternative would be evaluated and
49 managed in compliance with the appropriate waste designation. Waste disposal would be to the

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1 Environmental Restoration Disposal Facility (ERDF), which is designed to meet the requirements of both
2 RCRA and the radioactive waste standards. For alternatives that involve leaving solid or dangerous waste
3 in place, RCRA performance standards for landfill covers are applicable or relevant and appropriate
4 (depending on the date when the waste was first placed at the site) and are incorporated into the design.
5 Cover performance and boundary requirements, locators, and post-operational monitoring contained in
6 [10 CFR 61.52](#) are relevant and appropriate to the in-place disposal of radioactive waste.

7 The following information provides an analysis of how each source-site alternative category is anticipated
8 to comply with these ARARs and TBCs.

9 **3.1.2.1 100-NR-1 Source Site Alternative Compliance with ARARs/TBCs**

10 No-Action Alternative. Because the No-Action Alternative does not result in waste generation,
11 information specific to compliance with ARARs and TBCs has not been provided.

12 Institutional Controls Alternatives. Institutional controls are not anticipated to generate waste.

13 Remove/Dispose Alternative. Potentially large quantities of soil and debris (piping, structures, and
14 cleanup materials) may be generated under the alternatives requiring disposal. These wastes may or may
15 not require treatment in order to be disposed to the ERDF. Shoreline site wastes may require dewatering.
16 However, due to the lack of data on soils, the type and extent of waste treatment cannot be defined. It is
17 anticipated, however, that compliance with waste management standards will be achievable. Treatment
18 system design may be dictated by the type of wastes generated, e.g., dangerous waste treatment systems
19 would require substantive compliance with unit-specific design requirements contained in [WAC 173-303](#).
20 Because of the potential for much greater quantities of waste generated from this alternative, ARAR and
21 TBC compliance will be more difficult than the other alternatives.

22 In Situ Bioremediation of Petroleum Waste Groups. Small quantities of waste may be generated from in
23 situ bioremediation such as contaminated soils and cleanup debris during preparation of the soil surface
24 for treatment. These wastes may or may not require treatment in order to be disposed to the ERDF.
25 However, due to the lack of data on soils, the type and extent of waste treatment cannot be defined. It is
26 anticipated, however, that compliance with waste-management standards will be achievable. Treatment
27 system design may be dictated by the type of wastes generated, e.g., dangerous waste treatment systems
28 would require substantive compliance with unit-specific design requirements contained in [WAC 173-303](#).

29 Containment for Radioactive Waste Group and Shoreline Site. Small quantities of waste may be
30 generated from placement of a cap such as contaminated soils and cleanup debris during site preparation
31 and construction. Operational wastes may include run-on and run-off waters. Wastes may also be
32 generated during maintenance of the cap. These wastes may or may not require treatment in order to be
33 disposed to the ERDF; however, due to the lack of data on soils, the type and extent of waste treatment
34 cannot be defined. Treatment system design may be dictated by the type of wastes generated, e.g.,
35 dangerous waste treatment systems would require substantive compliance with unit-specific design
36 requirements contained in [WAC 173-303](#). It is anticipated, however, that treatment and subsequent
37 compliance with waste-management standards will be achievable.

38 In Situ Solidification for Radioactive Waste Group and Shoreline Site. Small quantities of waste may be
39 generated from in situ solidification such as contaminated soils and cleanup debris during preparation of
40 the soil surface for treatment. These wastes may or may not require treatment in order to be disposed to
41 the ERDF. However, due to the lack of data on soils, the type and extent of waste treatment cannot be
42 defined. Treatment system design may be dictated by the type of wastes generated, e.g., dangerous waste
43 treatment systems would require substantive compliance with unit-specific design requirements contained
44 in [WAC 173-303](#). It is anticipated, however, that compliance with waste-management standards will be
45 achievable.

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1 **3.1.2.2 100-NR-2 Groundwater Alternative Compliance with ARARs/TBCs**

2 No-Action Alternative. Because the No-Action Alternative does not result in waste generation,
3 information specific to compliance with ARARs and TBCs has not been provided.

4 Institutional Controls Alternative. Institutional controls are not anticipated to generate waste.

5 Permeable Barrier for River Protection. Construction of a permeable wall is anticipated to generate waste
6 in the form of contaminated soils and construction debris. These waste streams may or may not require
7 treatment in order to meet waste acceptance criteria for the ERDF and/or LDR requirements. Compliance
8 with waste management ARARs and TBCs are anticipated to be easily attained.

9 Hydraulic Controls for River Protection and Pump and Treat for Sr-90 in the Aquifer. Construction and
10 operation of wells and a pump-and-treat system will generate small quantities of waste in the form of
11 contaminated soils, groundwater, cleanup debris, treatment residuals, and resins. These waste streams
12 may or may not require treatment in order to meet waste acceptance criteria for the ERDF and/or LDR
13 requirements. Treatment system design may be dictated by the type of wastes generated, e.g., dangerous
14 waste treatment systems would require substantive compliance with unit-specific design requirements
15 contained in [WAC 173-303](#). Compliance with waste management ARARs and TBCs are anticipated to
16 be easily attained.

17 Hydraulic Controls for River Protection and Pump and Treat for Aquifer Remediation. Construction and
18 operation of wells and a pump-and-treat system will generate small quantities of waste in the form of
19 contaminated soils, groundwater, cleanup debris, and resins. These waste streams may or may not require
20 treatment in order to meet waste acceptance criteria for the ERDF and/or LDR requirements. Treatment
21 system design may be dictated by the type of wastes generated, e.g., dangerous waste treatment systems
22 would require substantive compliance with unit-specific design requirements contained in [WAC 173-303](#).
23 Compliance with waste management ARARs and TBCs are anticipated to be easily attained.

24 Cryogenic Barrier for River Protection and Pump and Treat for Aquifer Remediation. Construction of a
25 cryogenic barrier is anticipated to generate waste in the form of contaminated soils and construction
26 debris. Construction and operation of wells and a pump-and-treat system will generate small quantities of
27 waste in the form of contaminated soils, cleanup debris, treatment residuals, and adsorbents. These waste
28 streams may or may not require treatment in order to meet waste acceptance criteria for the ERDF and/or
29 LDR requirements. Treatment system design may be dictated by the type of wastes generated, e.g.,
30 dangerous waste treatment systems would require substantive compliance with unit-specific design
31 requirements contained in [WAC 173-303](#). Compliance with waste management ARARs and TBCs are
32 anticipated to be easily attained.

33 Sheet Pile Barrier for River Protection and Soil Flushing/Pump and Treat for Aquifer Remediation.
34 Construction of a sheet pile barrier is anticipated to generate waste in the form of contaminated soils and
35 construction debris. Construction and operation of wells and a pump-and-treat system will generate small
36 quantities of waste in the form of contaminated soils, cleanup debris, treatment residuals, and adsorbents
37 from treatment systems. These waste streams may or may not require treatment in order to meet waste
38 acceptance criteria for the ERDF and/or LDR requirements. Compliance with waste management
39 ARARs and TBCs are anticipated to be easily attained with the exception of the soil-flushing adsorbents.
40 This waste stream is anticipated to contain extremely high concentrations of Sr-90, and treatment of this
41 waste stream will be required in order to comply with the ERDF waste acceptance criteria. Management
42 of this waste stream will require careful planning in order to comply with handling treatment, packaging,
43 and transportation requirements. Treatment system design may be dictated by the type of wastes
44 generated, e.g., dangerous waste treatment systems would require substantive compliance with
45 unit-specific design requirements contained in [WAC 173-303](#).

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1 **3.1.3 Wastewater Management Standards**

2 [WAC 173-216](#) establishes requirements for discharges to waters of the state, other than discharges subject
3 to an NPDES permit under the Clean Water Act, including effluent discharges to the soil column.

4 [WAC 173-218](#) establishes requirements for injection to the underground aquifer.

5 The following information provides an analysis of how each source-site alternative category is anticipated
6 to comply with these ARARs and TBCs.

7 **3.1.3.1 100-NR-1 Source-Site Alternative Compliance with ARARs/TBCs**

8 All source-site alternatives, other than the No-Action and Institutional Controls Alternatives, could result
9 in the generation of some quantity of decontamination or dewatering wastewaters. Depending upon
10 volumes of soils, debris, and types and concentrations of contaminants, a number of treatment/disposal
11 options may be used that may result in wastewater discharges to the ground or to groundwater. Treatment
12 and disposal options that may invoke these standards include discharge of wastewaters to the ground after
13 verification that contaminant concentrations are below the substantive requirements contained in
14 [WAC 173-216](#), transport of wastewaters to a pump-and-treat system in substantive compliance with
15 [WAC 173-218](#) and designed to treat COCs in wastewaters, and transport of wastewaters to a site
16 water-treatment system in compliance, or substantive compliance depending upon operating authority,
17 with [WAC 173-216](#) or [40 CFR 122](#). Regardless of which alternative is used, compliance with these
18 ARARs and TBCs can be accomplished.

19 Remove/Dispose Alternative. Some soil treatments will produce a wastewater stream that could require
20 treatment at the end of the treatment phase. Treatment and disposal options would include trucking the
21 wash waters to a water-treatment facility within the Hanford Site or testing the waters and, if they comply
22 with ARARs associated with [WAC 173-216](#), discharging them to the ground. The ARARs associated
23 with wastewater management would be able to be complied with regardless of which treatment and
24 disposal option is chosen.

25 **3.1.3.2 100-NR-2 Groundwater Alternative Compliance with ARARs/TBCs**

26 All alternatives other than the No-Action and Institutional Controls Alternatives will require construction
27 and development of wells. This activity has the potential to require disposal of purge water from well
28 installation and development activities. Purge-water management will be accomplished in accordance
29 with the Hanford Site Purge Water Agreement. Injection of treated groundwater is considered in the
30 groundwater removal and treatment alternatives. ReInjection would be subject to the provisions of [WAC](#)
31 [173-218](#). If this cannot be accomplished, a waiver would be required.

32 **3.1.4 Standards for Protection of the Columbia River from Direct Discharges**

33 [40 CFR 122](#) addresses technology-based limitations and standards, control of toxic pollutants, and
34 monitoring for direct discharges to waters of the United States, including storm water.

35 No direct wastewater discharges to the Columbia River are planned under any of the alternatives. Use of
36 National Pollutant Discharge Elimination System-permitted water-treatment units for treatment of
37 wastewaters from source-unit cleanup may be utilized as identified above. Erosion and storm water
38 controls would be used as necessary while working near the river. A storm water management plan
39 would be prepared to prevent discharges of contaminated storm water to the Columbia River.

40 Two alternatives with remediation of the shoreline site, the Remove/Dispose and the Containment
41 Alternatives, could trigger ARARs associated with river construction activities. These ARARs include
42 the U.S. Army Corp of Engineers permitting requirements contained in [33 CFR 320-330](#), which contain
43 provisions for dredging and filling material to the Columbia River. Because the Columbia River may be
44 included in the Wild and Scenic River System, the substantive requirements associated with a Section 10
45 permit under [33 CFR 322](#) may be an ARAR for these alternatives. State ARARs associated with river
46 construction include the Shoreline Development Permits contained in [WAC 173-27](#), and Hydraulic
47 Projects Permits contained in [WAC 220-110](#).

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1 **3.1.5 Air Standards**

2 The Clean Air Act (CAA) establishes standards for the control of air emissions. Authority has partially
3 been delegated to the state. Under [40 CFR 61, Subpart H](#), and [WAC 246-247](#), radionuclide airborne
4 emissions from all combined operations at the Hanford Site may not exceed 10-mrem/yr effective dose
5 equivalent to the hypothetical offsite maximally exposed individual (MEI). For an emission unit with a
6 potential to emit less than 0.1 mrem/yr total effective dose equivalent to the MEI, [WAC 246-247](#) allows
7 for an estimate of those emissions in lieu of monitoring and requires verification of compliance through
8 periodic confirmatory measurements. An emission unit is defined as a point source, nonpoint source, or
9 source of fugitive emissions. [WAC 246-247](#) requires verification of compliance through monitoring.
10 [WAC 173-400](#) establishes requirements for the control and/or prevention of the emission of air
11 contaminants, including particulates. [WAC 173-460](#) establishes acceptable source impact levels for more
12 than 500 carcinogenic acutely toxic air pollutants. In addition, [WAC 173-480-050](#) requires that emissions
13 be kept as low as reasonably achievable (ALARA).

14 The radionuclide emission limits would apply to all fugitive, diffuse, and point source air emissions of
15 radionuclides generated by any of the removal or treatment (in situ or ex situ) alternatives. If there were
16 the potential for any non-zero radioactive emissions, best available radionuclide control technology
17 (BARCT) would be required. If the alternative would generate an increase of toxic air pollutants to the
18 atmosphere above the small-quantity emission rates, implementation of BARCT for toxics would be
19 required.

20 The following information provides an analysis of how each source-site alternative category is anticipated
21 to comply with these ARARs and TBCs.

22 **3.1.5.1 Source-Site Alternative Compliance with ARARs/TBCs**

23 No-Action Alternative. Because the No-Action Alternative would have contaminants in place,
24 compliance with ARARs and TBCs would not be achieved.

25 Institutional Controls Alternative. Institutional controls are not anticipated to generate airborne emissions
26 of radionuclides.

27 Remove/Dispose Alternative. Remove, treatment, and disposed activities have the potential to increase
28 emissions of radionuclides. If radionuclides are present in the soil at the site and there is the potential for
29 any non-zero emissions, BARCT would be required as specified in [WAC 246-247](#). No toxic emissions
30 are expected.

31 Remove/Ex Situ Bioremediation/Dispose for Petroleum Waste Group. Remove, aboveground
32 bioremediation, and dispose activities have the potential to increase emissions of radionuclides if
33 radionuclides are present in the soil. However, ex situ bioremediation would not be used if radionuclides
34 were present along with petroleum hydrocarbons. Bioremediation is not expected to increase any
35 emissions of TPH; therefore, no additional controls are required.

36 In Situ Bioremediation of Petroleum Waste Group. Preparation for in situ bioremediation may require
37 limited surface disturbance of a surface radiation area. If radionuclides are present in the surface soil at
38 the site and there is the potential for any non-zero emissions, BARCT would be required, as specified in
39 [WAC 246-247](#). Once preparation is completed, no additional emissions are expected from the activity. If
40 radionuclides were present in deep soil, then in situ bioremediation would not be selected as an
41 alternative. In addition, bioremediation is not expected to increase any emissions of TPH; therefore, no
42 additional controls are required.

43 Containment for Radioactive Waste Group and Shoreline Site. Containment is a standard practice on the
44 Hanford Site for surface contaminants. The Radiation Area Remedial Action program uses clean fill to
45 cover and stabilize surface contamination. The placement of a cover to contain radiation units is not
46 anticipated to generate airborne emissions of radionuclides. The BARCT will be required, as specified in
47 [WAC 246-247](#), to prevent the release of particulates during placement of the cover.

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1 In Situ Solidification for Radioactive Waste Group and Shoreline Site. Preparation for in situ
2 solidification may require limited surface disturbance of the surface radiation area. If radionuclides are
3 present in the surface soil at the site and there is the potential for any non-zero emissions, BARCT would
4 be required as specified in [WAC 246-247](#). Once preparation is completed, no additional emissions are
5 expected from the activity.

6 **3.1.5.2 100-NR-2 Groundwater Alternative Compliance with ARARs**

7 No-Action Alternative. Because the No-Action Alternative would not actively cause airborne emissions,
8 compliance with ARARs and TBCs will be achieved.

9 Institutional Controls Alternative. Institutional controls are not anticipated to generate airborne emissions
10 of radionuclides.

11 Permeable Barrier for River Protection. Installation of the permeable wall has the potential to encounter
12 radionuclide contaminated soil. If radionuclides are present in the soil at the site and there is the potential
13 for any non-zero emissions, BARCT would be required as specified in [WAC 246-247](#).

14 Hydraulic Controls for River Protection and Pump and Treat for Sr-90 in the

15 Aquifer. Installation of the pump-and-treat system should not generate radionuclide emissions. However,
16 if radionuclides are present in the soil at the site and there is the potential for any non-zero emissions,
17 BARCT would be required as specified in [WAC 246-247](#).

18 Hydraulic Controls for River Protection and Pump and Treat for Aquifer Remediation. Installation of the
19 pump-and-treat system should not generate radionuclide emissions. However, if radionuclides are present
20 in the soil at the site and there is the potential for any non-zero emissions, BARCT would be required as
21 specified in [WAC 246-247](#).

22 Cryogenic Barrier for River Protection and Pump and Treat Aquifer Remediation. Installation of the
23 cryogenic barrier has the potential to generate emissions of radionuclides while the installation of the
24 pump-and-treat system should not generate radionuclide emissions. However, if radionuclides are present
25 in the soil at the site and there is the potential for any non-zero emissions, BARCT would be required as
26 specified in [WAC 246-247](#).

27 Sheet Pile Barrier for River Protection and Soil Flushing/Pump and Treat for Aquifer Remediation.
28 Installation of the sheet pile barrier has the potential to generate emissions of radionuclides while the
29 installation of the pump-and-treat system should not generate radionuclide emissions. However, if
30 radionuclides are present in the soil at the site and there is the potential for any non-zero emissions,
31 BARCT would be required as specified in [WAC 246-247](#).

32 **3.1.6 Standards for the Protection of Cultural and Ecological Resources**

33 The National Historic Preservation Act of 1966 (16 USC 470 et seq, implemented in regulation by [36](#)
34 [CFR 800](#) requires federal agencies to take into account the effect of an activity on any significant cultural
35 resource, including properties listed, or eligible for inclusion, on the National Register of Historic Places.
36 The Native American Graves Protection and Repatriation Act establishes statutory provisions for the
37 treatment of inadvertent discoveries of Native American remains and cultural objects. The Archeological
38 and Historical Preservation Act of 1974 (16 USC 469a) requires action to recover and preserve
39 archaeological or historic data in areas where activity may cause irreparable harm, loss, or destruction of
40 significant data.

41 The Endangered Species Act of 1973 (16 USC 1531) is implemented by [50 CFR 402](#) and [WAC](#)
42 [232-12-297](#) WAC and prohibits activities that threaten the continued existence of listed species or
43 destroys critical habitat. The Migratory Bird Treaty Act makes it illegal to take, capture, or kill, as
44 applicable, any migratory bird or any part, nest, or egg of any such birds.

45 All National Register evaluations have been performed to determine whether the buildings in the 100-N
46 Area are eligible for inclusion on the National Register of Historic Places, and this determination may

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1 affect alternatives for nearby waste sites. The cultural resource protection requirements are applicable for
2 those properties in the 100-N Area that have been determined to be historically significant. In addition,
3 the 100 Area in general is rich in cultural resources related to Native Americans, and several of the
4 alternatives involve ground-disturbing activities. If any discoveries related to Native American remains
5 or cultural objects are made during such activities, activity in the area will cease, and appropriate
6 notifications and negotiations regarding further actions will be made.

7 Threatened and endangered species are known to be present in the 100 Area, and the area is within an
8 established migration route; however, no adverse impacts on protected species or sensitive habitat from
9 any of the alternatives are anticipated. Area-specific ecological reviews will be conducted prior to
10 implementing any alternative to identify potential adverse impacts. Mitigation plans will be prepared, as
11 necessary, and implemented.

12 The Hanford Reach Preservation Act (PL 100-605) provides for a comprehensive river conservation study
13 and prohibits the construction of any dam, channel, or navigation project by a federal agency for 8 years
14 from enactment. Projects are required to be performed under the consultation and coordination of the
15 National Park Service on any proposed remediation alternative.

16 The following information provides an analysis of how each source-site alternative category is anticipated
17 to comply with these ARARs and TBCs.

18 **3.1.6.1 100-NR-1 Source-Site Alternative Compliance with ARARs/TBCs**

19 No-Action Alternative. Because the No-Action Alternative leaves waste in place, ARARs and TBCs
20 relative to these standards may not be complied with, due to threat of contamination to the resources, or
21 relative to the use of resources.

22 Institutional Controls Alternative. Minimal or no surface disturbances are anticipated to occur utilizing
23 this alternative; therefore, ARARs/TBCs associated with preservation of cultural and ecological resources
24 would be easily followed in the short term. This alternative will also afford continued protection of
25 cultural and historical resources from public use. However, this alternative irreversibly or irretrievably
26 commits natural resources during the remediation time frame, which can be for a very long time
27 particularly, for the shoreline site. This alternative also has the potential for contaminating resources
28 adjacent to the sites from contaminants remaining in place. Therefore, long-term compliance with these
29 ARARs and TBCs cannot be ensured.

30 Remove/Dispose Alternative. This alternative will comply with all cultural and ecological resource
31 ARARs and TBCs. However, this alternative has a high potential to impact cultural, historical, or
32 traditional-use areas due to the need for extensive excavation of areas at and adjacent to the waste sites
33 (e.g., shoring side walls for worker safety) particularly at the shoreline site. Much more care will be
34 required with this alternative for completion of preconstruction surveys and development of mitigative
35 measures should cultural or natural resources be encountered. Recontouring and revegetation of the
36 disturbed areas will be required to ensure restoration of the natural resources. A benefit of this option is
37 that no future threat of recontamination of the site or contamination of adjacent areas will occur once the
38 contaminants are removed and appropriately disposed.

39 Remove/Ex Situ Bioremediation/Dispose for Petroleum Waste Group. This alternative will comply with
40 all cultural and ecological resource ARARs and TBCs. However, this alternative has a high potential to
41 impact cultural, historical, or traditional-use areas due to the need for extensive excavation of areas at and
42 adjacent to the waste sites (e.g., shoring side walls for worker safety). Much more care will be required
43 with this alternative for completion of preconstruction surveys and development of mitigative measures
44 should cultural or natural resources be encountered. Recontouring and revegetation of the disturbed areas
45 will be required to ensure restoration of the natural resources. A benefit of this option is that no future
46 threat of recontamination of the site or contamination of adjacent areas will occur once the contaminants
47 are removed and appropriately disposed. The treatment action, aboveground bioremediation, should not
48 require additional actions in order to comply with these standards.

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1 In Situ Bioremediation for Petroleum Waste Group. This alternative will comply with all cultural and
2 ecological resource ARARs and TBCs. This alternative is anticipated to cause minimal or no impacts to
3 cultural resources since the area of concern has already been previously disturbed because of operations.
4 Compliance with these standards can readily be achieved through proper preconstruction surveys and
5 mitigative measures should resources be encountered.

6 Containment for Radioactive Waste Group and Shoreline Site. This alternative will comply with all
7 cultural and ecological resource ARARs and TBCs. Placement of a cap is anticipated to cause minimal or
8 no impacts to cultural resources since the area of concern has already been previously disturbed because
9 of operations. This alternative will protect adjacent cultural resources from becoming contaminated by
10 retaining contaminants in place. Compliance with these standards can readily be achieved during
11 construction of the cap through proper preconstruction surveys and mitigative measures should resources
12 be encountered. Implementation of this alternative will most likely enhance ecological resources by
13 eliminating the exposure of contaminants and by providing an opportunity to revegetate the surface of the
14 cap with plant species that provide for a viable and sustainable ecological environment.

15 In Situ Solidification for Radioactive Waste Group and Shoreline Site. This alternative will comply with
16 all cultural and ecological resource ARARs and TBCs. This alternative is anticipated to cause minimal or
17 no impacts to cultural resources since the area of concern has already been previously disturbed because
18 of operations. Because this alternative will immobilize contaminants, protection of adjacent cultural
19 resources will be ensured by contaminants remaining in place. Recontouring and revegetation efforts that
20 could impact cultural resources would require mitigative measures. Compliance with these standards can
21 readily be achieved through proper preconstruction surveys and mitigative measures should resources be
22 encountered.

23 **3.1.6.2 100-NR-2 Groundwater Alternative Compliance with ARARs/TBCs**

24 All 100-NR-2 groundwater alternatives require very long restoration time frames for river protection (270
25 to 300 years for Sr-90 cleanup). Note: Based on modeling of current well data, manganese would require
26 over 3,000 years to meet secondary MCL standards. Because of the uncertainties with modeling to this
27 length of time and because the manganese MCL is based on a secondary drinking water standard, the
28 Sr-90 remediation time frame is considered the primary focus). Due to the length of remediation, waivers
29 from ecological resource ARARs may be required. Impacts to aquatic organisms from Sr-90 and tritium
30 contamination have not been fully defined. In order to determine whether these constituents are
31 damaging aquatic resources to the extent that they are irretrievable and irreversible, more data will need
32 to be gathered and assessed. One potential avenue for obtaining this information is the pending Columbia
33 River Comprehensive Impact Assessment study (Tri-Party Agreement Milestone M-15-80, scheduled for
34 submittal of a revised draft in March of 1998). This study is planned to define further ecological impacts,
35 including aquatic ecosystems potentially impacted by Sr-90 along the 100-NR-2 river interface. When
36 this information is obtained, it will become available to the public for consideration. In addition, all
37 100-NR-2 groundwater alternatives other than the No-Action Alternative, may temporarily (for up to 300
38 years) restrict use of the shoreline, particularly at N-Springs.

39 No-Action Alternative. ARARs and TBCs would be complied with because no surface disturbances
40 would occur with this alternative.

41 Institutional Controls Alternative. Minimal or no surface disturbances are anticipated to occur using this
42 alternative; therefore, ARARs and TBCs associated with preservation of cultural and ecological resources
43 would be easily complied with.

44 Permeable Barrier for River Protection. This alternative will cause major surface disturbances in an area
45 near the river shoreline and unrestricted land use would conflict with this option, but it is anticipated that
46 ARARs and TBCs will be complied with during implementation and after completion of this alternative.
47 Because this area is particularly sensitive from both an ecological and cultural perspective, particular
48 attention to ecological reviews will be necessary, as well as development of mitigative measures during
49 construction activities, to ensure compliance with these ARARs and TBCs.

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1 Hydraulic Controls for River Protection and Pump and Treat for Sr-90 in the Aquifer. This alternative
2 will cause minimal surface disturbance through construction and operation of well systems and the
3 pump-and-treat facility. These activities are anticipated to cause minimal disturbance to cultural and
4 ecological resources, and compliance with ARARs and TBCs is anticipated to be easily met through
5 standard Hanford practices for cultural and ecological surveys and mitigative measures.

6 Hydraulic Controls for River Protection and Pump and Treat for Aquifer Remediation. This alternative
7 will cause minimal surface disturbance through construction and operation of well systems and the
8 pump-and-treat facilities. These activities are anticipated to cause minimal disturbance to cultural and
9 ecological resources, and compliance with ARARs and TBCs is anticipated to be easily met through
10 standard Hanford practices for cultural and ecological surveys and mitigative measures.

11 Cryogenic Barrier for River Protection and Pump and Treat for Aquifer Remediation. This alternative
12 will cause major surface disturbances in an area near the river shoreline due to construction of a cryogenic
13 barrier, but it is anticipated that ARARs and TBCs will be able to be complied with during
14 implementation and after completion of this alternative. Because this area is particularly sensitive from
15 both an ecological and cultural perspective, particular attention to ecological reviews will be necessary, as
16 well as development of mitigative measures during construction activities to ensure compliance with
17 these ARARs and TBCs. Minimal surface disturbance through construction and operation of well
18 systems and the pump-and-treat facilities can be expected. These activities are anticipated to cause
19 minimal disturbance to cultural and ecological resources, and compliance with ARARs and TBCs is
20 anticipated to be easily met through standard Hanford practices for cultural and ecological surveys and
21 mitigative measures.

22 Sheet Pile Barrier for River Protection and Soil Flushing/Pump and Treat for Aquifer Remediation. This
23 alternative will cause minimal surface disturbance through construction and operation of well systems and
24 the pump-and-treat facilities. These activities are anticipated to cause minimal disturbance to cultural and
25 ecological resources, and compliance with ARARs and TBCs is anticipated to be easily met through
26 standard Hanford practices for cultural and ecological surveys and mitigative measures.

27 **3.1.7 Radiation Protection Standards**

28 The Atomic Energy Act establishes radiation protection standards, limits, and program requirements for
29 protecting individuals from ionizing radiation resulting from the conduct of DOE activities. Title [10 CFR](#)
30 [835](#) establishes limits for doses to occupational workers and visitors and requires that measures be taken
31 to maintain radiation exposure as low as reasonably achievable. Regulations regarding radiation
32 protection of the public and the environment have been promulgated by the NRC in [10 CFR 20](#) and [10](#)
33 [CFR 61](#).

34 A combination of personal protective equipment, personnel training, physical design features
35 (e.g., confinement and remote handling), and nonengineered controls (e.g., limiting time in radiation
36 zones), for example, would be used to ensure that the requirements of [10 CFR 835](#) and DOE Order
37 5400.5 are met for all alternatives.

38 The following information provides an analysis of how each source-site alternative category is anticipated
39 to comply with these ARARs and TBCs.

40 **3.1.7.1 100-NR-1 Source-Site Alternative Compliance with ARARs/TBCs**

41 No-Action Alternative. ARARs and TBCs associated with radiation protection standards may not be
42 complied with because the No-Action Alternative would leave contamination in place.

43 Institutional Controls Alternative. Compliance with radiation worker exposure standards would be easily
44 met with this alternative because it is anticipated that very little field-maintenance activities would be
45 required with this alternative. Compliance with radiation protection standards for the public can be
46 achieved with this alternative through continued control of the site under the DOE or an equivalent
47 agency. Compliance would be achieved through access prevention to areas that would result in doses that

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1 exceed radiation protection standards for the public. However, because this alternative will require that
2 controls be in place for over 200 years due to Sr-90 decay, it becomes less certain that institutional
3 controls would be able to provide compliance with radiation protection standards. A decision for rural
4 residential use at sites within 100-NR-1 is most probably precluded with the sole use of institutional
5 controls where radiation protection standards are exceeded.

6 Remove/Dispose Alternative. Compliance with radiation worker exposure standards can be attained with
7 this alternative through compliance with the substantive requirements of [10 CFR 835](#) during site
8 preparation and excavation of soils in radiologically contaminated areas. Radiation protection standards
9 for the public will be complied with during excavation of radiologically contaminated soils through
10 adequate planning and design of the excavation and disposal activities. Upon removal of soils, these
11 requirements will cease to be applicable at the site.

12 Remove/Ex Situ Bioremediation/Dispose for Petroleum Waste Group. Radiation protection standards are
13 not anticipated to be applicable to this alternative; however, due to the lack of data on soil sites, there is a
14 potential for these standards to apply should radionuclides be discovered within petroleum-contaminated
15 soils.

16 In Situ Bioremediation of Petroleum Waste Groups. Radiation protection standards for the public are not
17 anticipated to be applicable to this alternative; however, because of the lack of data on soil sites, there is a
18 potential for these standards to apply should radionuclides be discovered within petroleum-contaminated
19 soils.

20 Containment for Radioactive Waste Group and Shoreline Site. Compliance with radiation worker
21 exposure standards can be attained with this alternative through compliance with the substantive
22 requirements of [10 CFR 835](#) during site preparation and construction of a cap in radiologically
23 contaminated areas. Compliance with radiation protection standards for the public can be achieved
24 throughout construction and during operation and maintenance of the cap. Compliance would be
25 achieved through access prevention to areas that would result in doses that exceed radiation protection
26 standards for the public.

27 In Situ Solidification for Radioactive Waste Group and Shoreline Site. Compliance with radiation worker
28 exposure standards can be attained with this alternative through compliance with the substantive
29 requirements of [10 CFR 835](#) during site preparation, construction activities, and implementation of the
30 treatment activities in radiologically contaminated areas. In situ solidification by itself may not be able to
31 ensure compliance with radiation protection standards for the public. Institutional controls would be
32 required to prevent intrusion into the solidified mass and to prevent access should radiation protection
33 standards be exceeded after solidification. In this manner, compliance with these standards can be
34 achieved.

35 **3.1.7.2 100-NR-2 Groundwater Alternative Compliance with ARARs/TBCs**

36 No-Action Alternative. Because groundwater would remain accessible and contaminated, compliance
37 with ARARs and TBCs may not be achieved.

38 Institutional Controls Alternative. Compliance with radiation worker exposure standards would be easily
39 met with this alternative because it is anticipated that very little field maintenance activities would be
40 required with this alternative. Compliance with radiation protection standards for the public can be
41 achieved with this alternative through continued control of the site under the DOE or an equivalent
42 agency. Compliance would be achieved through restrictions on groundwater use. At the end of
43 remediation, radionuclide activity in the groundwater would have decayed to levels that would allow for
44 unrestricted use.

45 Permeable Barrier for River Protection. Compliance with radiation worker exposure standards can be
46 attained with this alternative through compliance with the substantive requirements of [10 CFR 835](#) during
47 site preparation and construction of the permeable barrier in radiologically contaminated areas.
48 Compliance with radiation protection standards for the public can be achieved with this alternative

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1 through continued control of the site under the DOE or an equivalent agency. Compliance would be
2 achieved through restrictions on groundwater use. At the end of remediation, radionuclide activity in the
3 groundwater would have decayed to levels that would allow for unrestricted use.

4 Hydraulic Controls for River Protection and Pump and Treat for Sr-90 in the Aquifer. Compliance with
5 radiation worker exposure standards can be attained with this alternative through compliance with the
6 substantive requirements of [10 CFR 835](#) during construction and operation of wells and the
7 pump-and-treat facility. Compliance with radiation protection standards for the public can be achieved
8 with this alternative through continued control of the site under the DOE or an equivalent agency.
9 Compliance would be achieved through restrictions on groundwater use. At the end of remediation,
10 radionuclide activity in the groundwater would have decayed to levels that would allow for unrestricted
11 use.

12 Hydraulic Controls for River Protection and Pump and Treat for Aquifer Remediation. Compliance with
13 radiation worker exposure standards can be attained with this alternative through compliance with the
14 substantive requirements of [10 CFR 835](#) during construction and operation of wells and the
15 pump-and-treat facilities. Compliance with radiation protection standards for the public can be achieved
16 with this alternative through continued control of the site under the DOE or an equivalent agency.
17 Compliance would be achieved through restrictions on groundwater use. At the end of remediation,
18 radionuclide activity in the groundwater would have decayed to levels that would allow for unrestricted
19 use.

20 Cryogenic Barrier for River Protection and Pump and Treat for Aquifer Remediation. Compliance with
21 radiation worker exposure standards can be attained with this alternative through compliance with the
22 substantive requirements of [10 CFR 835](#) during construction and operation of wells and the
23 pump-and-treat facilities. Compliance with radiation protection standards for the public can be achieved
24 with this alternative through continued control of the site under the DOE or an equivalent agency.
25 Compliance would be achieved through restrictions on groundwater use. At the end of remediation,
26 radionuclide activity in the groundwater would have decayed to levels that would allow for unrestricted
27 use.

28 Sheet Pile Barrier for River Protection and Soil Flushing/Pump and Treat for Aquifer Remediation.
29 Compliance with radiation worker exposure standards can be attained with this alternative through
30 compliance with the substantive requirements of [10 CFR 835](#) during construction and operation of wells
31 and the pump-and-treat facilities. Compliance with radiation protection standards for the public can be
32 achieved with this alternative through continued control of the site under the DOE or an equivalent
33 agency. Compliance would be achieved through restrictions on groundwater use. At the end of
34 remediation, radionuclide activity in the groundwater would have decayed to levels that would allow for
35 unrestricted use.

36

1 **Table 3.1. Applicable or Relevant and Appropriate Requirements (ARAR) and**
2 **To Be Considered (TBCs)**

Description	Citation	Requirements	Remarks	Operable Unit Affected
Atomic Energy Act of 1954, as amended	42 U.S.C. 2011 et seq.	Authorizes DOE to set standards and restrictions governing facilities used for research, development, and use of atomic energy.		100-NR-2
Department of Energy Occupational Radiation Protection (Final Rule)	10 CFR 835	Establishes occupational and visitor radiological exposure limits.	DOE Radiological Control Manual DOE/EH-02561, which is encompassed within the Hanford Site Radiological Control Manual adheres to these requirements.	100-NR-1 100-NR-2
Nuclear Regulatory Commission Standards for Protection Against Radiation	10 CFR 20 , Subpart C and D	Sets occupational dose limits for adult workers. Total effect dose equivalent equal to 5 rem/year. Sets dose limits to members of the public.	Occupational dose limits will be followed during remediation in radiological areas.	100-NR-1 100-NR-2
Nuclear Regulatory Commission Licensing Requirements for Land Disposal of Radioactive Wastes	10 CFR 61	Provides regulations for the management and land disposal of radioactive wastes.	Cover performance standards are contained in this regulation.	100-NR-1
Uranium Mill Tailings Radiation Control Act of 1978	Public Law 95-604, as amended			
Standards for Uranium and Thorium Mill Tailings	40 CFR 192	Establishes standards for control, cleanup, and management of radioactive materials from inactive uranium processing sites.	May be relevant and appropriate if any radium-226 is encountered.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Land Cleanup Standards	40 CFR 192.10-192.12	Requires remedial actions to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site, the concentration of radium-226 in land averaged over any area of 100 m ² shall not exceed the background level by more than 5 pCi/g, averaged over the first 15 cm of soil below the surface and 15 pCi/g, averaged over 150-cm-thick layers of soil more than 15 cm below the surface. In any habitable building, a reasonable effort shall be made during remediation to achieve an annual average (or equivalent) radon decay product concentration (including background not to exceed 0.02 Working Level (WL). In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL and the level of gamma radiation shall not exceed the background level by more than 20 microrentgens per hour.	May be relevant and appropriate if any above-background radium-226 or radon-222 is encountered during remediation. Radium-226 did not result from uranium processing; therefore, regulation is not applicable.	100-NR-1 100-NR-2
Implementation	40 CFR 192.20-192.23	Requires that when radionuclides other than radium-226 and its decay products are present in sufficient quantity and concentration to constitute a significant radiation hazard from residual radioactive materials, remedial action shall reduce other residual radioactivity to levels as low as reasonably achievable (ALARA).	May be relevant and appropriate if any radium-226 is encountered during remediation.	100-NR-1 100-NR-2
Archaeological and Historical Preservation Act of 1974	26 U.S.C. 469	Requires action to recover and preserve artifacts in areas where activity may cause irreparable harm, loss, or destruction of significant artifacts.	Applicable when remedial action threatens significant scientific, prehistorical, historical, or archeological data.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Archaeological Resources Protection Act of 1979	16 U.S.C. 4170aa mm (1990)	Protects archaeological and traditional cultural properties associated with archaeological sites. Requires notification of Indian Tribes of possible harm to or destruction of sites having religious or cultural significance.	Applicable when remedial action threatens archaeological and traditional cultural properties.	100-NR-1 100-NR-2
Protection of Archaeological Resources	43 CFR 7	Establishes procedures to be followed by federal land managers to protect archaeological resources on federal lands. Sets civil and criminal penalties for violations; protects confidentiality of archaeological resource information.	Applicable when remedial action threatens archaeological resources.	100-NR-1 100-NR-2
American Indian Religious Freedom Act of 1978	42 U.S.C. 1996	Provides for access by Native Americans to religious sites and development of migration measures if actions will deny such access. Requires agency to consult with traditional religious leaders regarding activities that might affect religious sites.	Applicable when remedial action threatens Native American religious sites.	100-NR-1 100-NR-2
The Religious Freedom Restoration Act of 1993	42 U.S.C. 2000bb; P.L. 103-141	Requires agency to demonstrate compelling need for a project that will deny the free exercise of religion by Native Americans. If activities threaten access to religious site, consultation with tribes will be necessary.	Applicable when remedial action threatens Native American religious sites.	100-NR-1 100-NR-2
Antiquities Act of 1906	16 U.S.C. 431-433	Protects all historic and prehistoric ruins and objects of antiquity located on federal lands. Provides for criminal sanctions against excavation, injury, or destruction of such resources.	Applicable when remedial action threatens historic or prehistoric ruins.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Migratory Bird Treaty Act	16 U.S.C. 703 et seq. 50 CFR 10-24	Makes it illegal to pursue, hunt, take, capture, kill, possess, trade, or transport any migratory bird, part, nest, or egg included in the terms of the conventions between the U.S. and Great Britain, the U.S. and Mexico, and the U.S. and Japan. Although this Act does not require ecological assessments, be done for federal agency projects, if a disturbance is expected in an area where migratory birds may be affected, such an assessment should be done to ensure the law's intent.	If remedial actions potentially impact migrating birds, this Act is applicable.	100-NR-1 100-NR-2
Endangered Species Act of 1973	16 U.S.C. 1531 et seq.	Prohibits federal agencies from jeopardizing threatened or endangered species or adversely modifying habitats essential to their survival. If waste site remediation is within sensitive habitat or buffer zone surrounding threatened and endangered species, migration measures must be taken to protect this resource.	This law is applicable, as threatened or endangered species have been identified within the 100 Area.	100-NR-1 100-NR-2
Fish and Wildlife Services List of Endangered and Threatened Wildlife and Plants	50 CFR 17, 22, 225, 226, 227, 402 and 424	Requires identification of activities that may affect listed species. Actions must not threaten the continued existence of a listed species or destroy critical habitat. Requires consultation with the Fish and Wildlife Service to determine if threatened or endangered species could be impacted by activity.	This law is applicable, as threatened or endangered species have been identified within the 100 Area.	100-NR-1 100-NR-2
Historic Sites, Buildings, and Antiques Act	16 U.S.C. 461	Establishes requirements for preservation of historic sites, buildings, or objects of minimal significance. Undesirable impacts to such resources must be mitigated.	Applicable to properties listed in the National Register of Historic Places, or eligible for such listing.	100-NR-1 100-NR-2
National Historic Preservation Act of 1966, as amended	16 U.S.C. 470 et seq.	Prohibits impacts on cultural resources. Where impacts are unavoidable, requires impact migration through design and data recovery.	Applicable to properties listed in the National Register of Historic Places, or eligible for such listing.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Protection of Historic Properties	36 CFR 800	Sets criteria to assess effects, to develop migration measures to address unavoidable adverse impacts, and to address properties discovered during implementation of an undertaking.	Applicable when remedial action threatens a historic property discovered during remedial activity.	100-NR-1 100-NR-2
Historic Sites Act of 1935	16 U.S.C. 461-467 36 CFR 65	Requires action to undertake the recovery, protection, and preservation of sites, buildings, objects, and antiquities of National significance.	Applicable when remedial action threatens sites, buildings, objects, and antiquities of National significance.	100-NR-1 100-NR-2
Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. 3001-3013 Public Law 101-601 (1993)	Requires action by federal agency when Native American human remains and associated funerary objects are inadvertently discovered during excavation. Requires work stoppage, protection of items, and notification to appropriate Indian Tribes.	Applicable if, during remedial action, Native American human remains or burial objects are discovered. Construction activities may resume 30 days after certification that agency head and Indian tribes have been notified.	100-NR-1 100-NR-2
Hanford Reach Study Act	P.L. 100-605	Provides for a comprehensive river conservation study. Prohibits the construction of any dam, channel, or navigation project by a federal agency for 8 years after enactment. New federal and nonfederal projects and activities are required, to the extent practicable, to minimize direct and adverse effects on the values for which the river is under study and to use existing structures.	This law as enacted November 4, 1988. Consultation and coordination with the National Park Service will be done to minimize and provide mitigation for any direct and adverse effects on the river.	100-NR-1 100-NR-2
Flood Plains/Wetlands Environmental Review	10 CFR 1022	Requires federal agencies to avoid, to the extent possible, adverse effects associated with the development of a floodplain or the destruction or loss of Wetlands.	Applicable if remedial activities take place in a floodplain or Wetlands.	100-NR-1 100-NR-2
Clean Air Act, as amended	42 U.S.C. 7401 et seq.	A comprehensive environmental law designed to regulate any activities that affect air quality, providing the national framework for controlling air pollution.		

Description	Citation	Requirements	Remarks	Operable Unit Affected
National Emissions Standards for Hazardous Air Pollutants (NESHAP)	40 CFR 61	Establishes numerical standards for hazardous air pollutants.		
Radionuclide Emissions from DOE Facilities (except Airborne radon-222, and radon-230)	40 CFR 61.92	Prohibits emissions of radionuclides to the ambient air exceeding an effective dose equivalent of 10 mrem/year.	Applicable to point and diffuse sources.	
Emission Standards for Asbestos for Waste Disposal Operations for Demolition and Renovation	40 CFR 61.150	States there must be no visible emissions to the outside air during either the collection, processing (including incineration), packaging, or transporting of any asbestos-containing waste material generated by the source, or specified waste treatment methods must be used.	Applicable to recovery and handling of asbestos wastes.	100-NR-1
Asbestos Standard for Active Waste Disposal Sites	40 CFR 61.154	States there must either be no visible emissions to the outside air during the collection, processing (including incineration), packaging, or transporting of any asbestos-containing waste material generated by the source, or specified waste treatment methods must be used.	Applicable to landfill disposal of asbestos.	100-NR-1
Protection of Stratospheric Ozone	40 CFR 82	Management of refrigerant systems	Applicable to all buildings/facilities containing refrigerant systems	100-NR-1
Federal Water Pollution Control Act (FWPCA), as amended by the Clean Water Act of 1988 (CWA)	33 U.S.C. 1251 et seq.	Creates the basic national framework for water pollution control and water quality management in the United States	Applicable to discharges of pollutants to navigable waters	
Water Quality Standards	40 CFR 131	Provides federal ambient water quality criteria for use in surface water cleanup	Also provides requirements for approving State water quality standards.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
NPDES Criteria and Standards	40 CFR 125.104	Best management practices program shall be developed in accordance with good engineering practices.	Applicable if remediation includes wastewater discharge; also applies to storm water runoff associated with industrial activities. Effluent limitations established by EPA are included in NPDES permit.	
Discharge of Oil	40 CFR 110	Prohibits discharge of oil that violates applicable water quality standards or causes a sheen of oil on water surface. Runoff from site will need control for oily water discharge to waters of the United States.		
Safe Drinking Water Act (SDWA)	42 U.S.C. 300 et seq.	Creates the basic framework for protection of drinking water supplies from pollutants	Applicable to remedial action objectives for soil and groundwater	100-NR-1 100-NR-2
National Primary Drinking Water Regulations	40 CFR 141	Identifies primary contaminants and concentration levels protective of drinking water supplies	Provides MCLs for medial action objective consideration	100-NR-1 100-NR-2
National Secondary Drinking Water Regulations	40 CFR 143	Identifies contaminants and concentration levels for aesthetic quality of drinking water supplies	Provides secondary MCLs for remedial action objective consideration	100-NR-1 100-NR-2
U.S. Army Corp of Engineers Permit Regulations	33 CFR 320-330	Establishes procedural and permit requirements of construction activities within the Columbia River. Permit programs include Section 10 Permits.	Substantive requirements are applicable if river construction activities will take place and would qualify under these permit programs.	NR-1 NR-2
Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA)	40 U.S.C. 6901 et seq.	Establishes the basic framework for federal regulation of solid waste. Subpart C of RCRA controls the generation, transportation, treatment, storage, and disposal of hazardous waste through a comprehensive "cradle to grave" system of hazardous waste management techniques and requirements. Subtitle D of RCRA controls the disposal of solid waste.	The State has been authorized to implement most of Subtitle C, although certain HSWA provisions (e.g., LDR requirements) have not yet been delegated. Additionally, EPA has approved the State Subtitle D Program.	

Description	Citation	Requirements	Remarks	Operable Unit Affected
Identification and Listing of Hazardous Waste	40 CFR 261 [WAC 173-303-016]	Identifies by listing and characterization, those solid wastes subject to regulation as hazardous wastes under Parts 261-265, 268, 270, 271, and 124.	Applicable if remediation techniques result in generation of hazardous wastes, Environmental media (e.g., soil and groundwater) contaminated with RCRA listed waste must be managed as RCRA listed waste unless the regulatory agencies determine that the media no longer contains the listed waste.	100-NR-1 100-NR-2
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262 [WAC 173-303]	Describes the regulatory requirements imposed on generators of hazardous wastes who treat, store, or dispose of the waste onsite.	Applicable if remediation techniques result in generation of hazardous waste.	100-NR-1 100-NR-2
Designation & Determination of LDR Status	40 CFR 262.11 (WAC 173-303-070)	Requires generator to determine waste designation and LDR Status.	Applicable if remediation techniques result in generation of solid waste.	100-NR-1 100-NR-2
Accumulation Time	40 CFR 262.34 [WAC 173-303-200]	Allows a generator to accumulate hazardous waste on site for 90 days or less without a permit, if all waste is containerized and labeled.	Hazardous waste removed from the operable units, and waste treatment residues, are subject to the 90 day generator accumulation requirements if the waste is stored on site for 90 days or less. If hazardous waste is stored on site for more than 90 days, the substantive provisions of permitting standards for TSD facilities are applicable.	100-NR-1 100-NR-2
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR 264 WAC 173-303]	Establishes requirements for operating hazardous waste treatment, storage, and disposal facilities. Applies to facilities put in operation since November 19, 1980. Facilities in operation before that date and existing facilities handling newly regulated wastes must meet similar requirements in 40 CFR 265.	Applicable if remediation technique results in onsite treatment, storage, or disposal of hazardous waste.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Closure	40 CFR 264.111-264.116 [WAC 173-303-610] Subpart G	Performance standard that controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, post closure escape of chemicals, disposal, or decontamination of equipment, structures, and soils. All contaminated equipment, structures, and soils must be properly disposed.	Substantive requirements may be relevant and appropriate during remediation activities.	100-NR-1 100-NR-2
Post closure	40 CFR 264-117-264-120 [WAC 173-303-610] Subpart G	Post closure care must begin after completion of closure and continue for 30 years. During this period, the owner or operator must comply with all post closure requirements, including maintenance of cover, leachate monitoring, and groundwater monitoring.	Applicable to waste remaining in place after closure. Requires post closure care and monitoring to ensure elimination of escape of hazardous constituents, leachate, and contaminated runoff.	100-NR-1 100-NR-2
Container Storage	40 CFR 264.170-264-178 [WAC 173-303-160-173-303-161] Subpart I	Condition of containers, comparability of waste with containers, container management, containment, special requirements for ignitable or reactive wastes.	May be applicable if container storage is to occur. Inspection requirements may be in potential conflict with ALARA requirements.	100-NR-1 100-NR-2
Miscellaneous Unit	40 CFR 264-600-603 (WAC 173-303-680) Subpart X	Requires general environmental performance standards for operations including monitoring and inspections.	May be applicable if miscellaneous units occur, i.e., thermal treatment is used.	100-NR-1 100-NR-2
Waste Piles	40 CFR 264.250-259 (WAC 173-303-660) Subpart L	Design in operating requirements: monitoring, leachate system and lines.	May be applicable if waste piles occur outside area of contamination.	100-NR-1 100-NR-2
Tanks	40 CFR 264.190-199 (WAC 173-303-640)	Design operating standards for tanks including secondary containment and leak detection systems; tank management; containment; special requirements for ignitable or reactive wastes.	May be applicable if tank storage is to occur. Inspection requirements may be potential conflict with ALARA requirements. May be applicable for soil washing process.	100-NR-1 100-NR-2
Temporary Units	40 CFR 264-553 (WAC 173-303-645 (7))	Establishes alternative performance standards for temporary tanks and containers used for treatment or storage of hazardous remediation wastes for up to one year.	Applicable if temporary unit is used.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Land Disposal Restrictions (LDR)	40 CFR 268 [WAC 173-303-140 WAC 173-303-141]	Generally prohibits placement of restricted RCRA hazardous wastes in land-based units such as landfills, surface impoundments, and waste piles.	Applicable unless waste has been treated, treatment has been waived, a treatment variance has been set for the waste, and equivalent treatment method has been established, or waste qualifies for delisting.	100-NR-1 100-NR-2
Dilution Prohibition	40 CFR 268.3 Subpart A	Requires remediation waste to be appropriately treated, which does not include dilution. Generators are required to identify applicable treatment standards at the point of generation and prior to mixing with other remediation wastes.	Applicable if RCRA hazardous waste.	100-NR-1 100-NR-2
Debris Rule	40 CFR 268.45	Establishes the alternative treatment standards of hazardous waste debris by using technologies specified in 40 CFR 268.45, Table 1.	Applicable if RCRA hazardous waste.	100-NR-1 100-NR-2
Prohibition and Treatment Standards	40 CFR 268-30-268.48 [WAC 173-303-140]	Establishes treatment standards that must be met prior to land disposal	Applicable if RCRA hazardous waste	100-NR-1 100-NR-2
Prohibition on Storage	40 CFR 268.50 [WAC 173-303-141]	The storage of nonradioactive hazardous waste restricted from land disposal under RCRA Section 3004 and 40 CFR 268, Subpart C, is prohibited unless wastes are stored in tanks and containers by a generator or the onsite operator of a TSD facility solely for the purpose of accumulation of such quantities as to facilitate proper treatment or disposal. TSD facility operators may store wastes for up to one year under these circumstances. Radioactive mixed waste is not prohibited from storage pursuant to the Tri-Party Agreement.	Applicable only to nonradioactive hazardous waste	100-NR-1 100-NR-2
Transportation	49 CFR 100-199	Establishes standards applicable to the offsite transportation and packaging of hazardous materials	Applicable requirement for offsite shipments	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Toxic Substances Control Act (TSCA), as amended	15 U.S.C. 2601 et seq.	Provides EPA with authority to regulate the production, use, distribution, and disposal of toxic substances		
Regulation of Polychlorinated Biphenyls (PCBs)	40 CFR 761	For spills, occurring after May 4, 1987, spillage or disposal must be reported to EPA. Unless otherwise approved, PCBs as concentrations of 50 ppm or greater must be treated in an incinerator. Spills that occurred before May 4, 1987, are to be decontaminated o requirements established at the discretion of the EPA.		100-NR-1 100-NR-2
Model Toxics Control Act (MTCA)	70.105 RCW	Requires remedial actions to attain a degree of cleanup protective of human health and the environment		
Cleanup Regulations	WAC 173-340	Establishes cleanup levels and prescribes methods to calculate cleanup levels for soils, groundwater, surface water, and air.	Relevant and appropriate to remediation actions where hazardous substances have been released.	100-NR-1 100-NR-2
Soil Cleanup Standards	WAC 173-340-700-760	Establishes cleanup standards for contaminated media. These levels must be protective of the groundwater if groundwater is considered a pathway of exposure.	Applicable to remediation actions where hazardous substances have been released. Levels will be calculated based on final land use decision.	100-NR-1 100-NR-2
Selection of Cleanup Actions	WAC 173-340-360	Establishes h criteria for selection of cleanup actions	Must be considered within feasibility of corrective measures studies	100-NR-1 100-NR-2
Cleanup Actions	WAC 173-340-400	Ensures that the cleanup action is designed, constructed, and operated in accordance with the cleanup plan and other specified requirements.	Cleanup must follow remedial design document and remedial action work plans.	100-NR-1 100-NR-2
Institutional Controls	WAC 173-340-440	Requires physical measures, such as fences and signs, to limit interference with cleanup.	Physical measures may be applicable if institutional controls are used.	100-NR-1 100-NR-2
Cleanup Standards	WAC 173-340-700-750	Establishes cleanup standards for remedial and corrective actions	Soil, groundwater, and surface water standards are contained in these requirements.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Radiation Protection-Air Emissions	WAC 246-247	Establishes procedures to monitor and control airborne radionuclide emissions.	Applicable if airborne radionuclide emissions are anticipated during remedial action.	100-NR-1 100-NR-2
New and Modified Sources	WAC 246-247-120 (Appendix B)	Requires the use of best available radionuclide control technology (BARCT)	Substantive requirements applicable if airborne radionuclide emissions are anticipated during remedial action.	100-NR-1 100-NR-2
Habitat Buffer Zone for Bald Eagle Rules	RCW 77.12.655			
Bald Eagle Protection Rules	WAC 232-12-292	Prescribes action to protect bald eagle habitat, such as nesting or roost sites, through the development of a site management plan.	Applicable if the areas of remedial activities include bald eagle habitat. No habitat buffer zones at the 100-N Area.	100-NR-1 100-NR-2
The Indian Graves and Records Act of the State of Washington	RCW 27.44	Prohibits the willful removal, mutilation, defacement, or destruction of any cairn, grave, or glyphic or painted record of any Native Indian or prehistoric people. Requires agency to consult with traditional religious leaders regarding activities that might affect religious sites.	There are Native American burial grounds and cultural areas within the 100 Area Operable Units; therefore, this is applicable.	100-NR-1 100-NR-2
Department of Game State Environmental Policy Act	WAC 232-012	Requires management plans if endangered, threatened, or sensitive wildlife or habitat is affected. Washington State Department of Fish and Wildlife will be consulted to minimize ecological impacts.	Upon the determination of impacts to threatened, endangered, or sensitive species or habitat by the remedial actions, this may be applicable.	100-NR-1 100-NR-2
U.S. Department of Ecology	43.12A RCW	Vests the Washington Department of Ecology with the authority to undertake the state air regulation and management program.		
Air Pollution Regulations	WAC 173-400	Establishes requirements to control and/or prevent the emission of air contaminants.	Applicable if emission sources are created during remedial action.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Standards for Maximum Emissions	WAC 173-400-040	Requires best available control technology to use to control fugitive emissions of dust from materials handling, construction, demolition, or any other activities that are sources of fugitive emissions. Restricts emitted particulates from being deposited beyond the Hanford Site. Requires control of odors emitted from the source. Prohibits masking or concealing prohibited emissions. Requires measures to prevent fugitive dust from becoming airborne.	Applicable to dust emissions from cutting of concrete and metal and vehicular traffic during remediation	100-NR-1
Emission Limits for Radionuclides	WAC 173-480	Controls air emissions of radionuclides from specific sources.	Applicable to remedial activities that result in air emissions	100-NR-1 100-NR-2
New and Modified Emission Units	WAC 173-480-060	Requires the best available radionuclide control technology be used in planning constructing, installing, or establishing a new emissions unit.	Applicable to remedial actions that result in air emissions	100-NR-1 100-NR-2
Washington Clean Air Act	RCW 70.94	Establishes a statewide framework for the planning, regulation control, and management of air pollution sources.		
Controls for New Sources of Toxic Air Pollutants	WAC 173-460	Establishes systematic control of new sources emitting toxic air pollutants	Applicable if new sources emitting toxic air pollutants are established	100-NR-1 100-NR-2
Decontaminating Ambient Impact Compliance	WAC 173-460-080	Requires the owner or operator of a new source to complete an acceptable source impact level analysis using dispersion modeling to estimate maximum incremental ambient impact of each Class A or B toxic air pollutant. Establishes numerical limits for small quantity emission rates.	Applicable to remedial alternatives with the potential to release toxic air pollutants	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Hazardous Waste Management Act of 1976, as amended in 1980 and 1983	70.105 RCW	Establishes a statewide framework for the planning, regulation, control, and management of hazardous waste.		
Dangerous Waste Regulations	WAC 173-303	Establishes the design, operation, and monitoring requirements for management of dangerous waste. Includes requirements for generators of dangerous waste. Dangerous waste includes the full universe of wastes regulated by WAC 173-303 , including extremely hazardous waste.	Applicable if dangerous or extremely hazardous waste is generated and/or managed during remedial action.	100-NR-1 100-NR-2
Waste Designation	WAC 173-303-070, 071, 080, 082, 090, 100, 110	Exceeds federal RCRA program by requiring designation of waste including additional parameters (i.e., toxicity and persistence), additional listed wastes, and PCBs.	Applicable if remediation wastes, based on process knowledge/analysis exceed the parameters.	100-NR-1 100-NR-2
Land Disposal Restrictions	WAC 173-303-140	State LDR requirements exceed the federal requirements for nonradiological extremely hazardous, organic/carbonaceous, and solid acid wastes.	Applicable if remediation wastes meet additional categories.	100-NR-1 100-NR-2
Corrective Action Management Unit (CAMU)	WAC 173-303-646(4)	Authorizes designation of a corrective action management unit, which does not constitute land disposal of dangerous waste	May be used if dangerous waste not meeting LDR standards is placed on the land	100-NR-1
Solid Waste Management Act	70.95 RCW	Establishes a statewide program for solid waste handling, recovery, and/or recycling		
Minimum Functional Standards for Solid Waste Handling	WAC 173-304	Establishes requirements to be met statewide to handle all solid waste	Applicable if management of solid waste occurs during remediation. Solid waste controlled by this Act includes garbage, industrial waste, construction waste, ashes, and swill.	100-NR-1
Onsite Containerized Storage, Collection, and Transportation Standards	WAC 173-304-200	Sets requirements for containers and vehicles to be used on site	Applicable if containers are used during remediation.	100-NR-1
Water Pollution Control Act	90.48 RCW	Prohibits discharge of polluting matter in waters		

Description	Citation	Requirements	Remarks	Operable Unit Affected
Water Quality Standards for Groundwater	WAC 173-200	Establishes groundwater standards for groundwaters of the State of Washington	Provides groundwater standards based on MCLs.	NR-1 NR-2
Water Quality Standards for Surface Waters	WAC 173-201A	Establishes water quality standards for surface waters of the State of Washington	Defines the Columbia River as a Class A river	NR-1 NR-2
State Waste Discharge Permit Program	WAC 173-216	Requires the use of all known available and reasonable methods of prevention, control, and treatment. Discharges must meet limits, which ensure that groundwater, and surface water standards are not exceeded.	Applicable for any discharges of liquids to the ground	100-NR-1
Underground Injection Control Program	WAC 173-218	Sets requirements for injection of effluents through wells that may endanger the groundwaters of the state	Applicable to any discharges of liquids through a well.	100-NR-2
Water Well Construction Act	18.104 RCW			
Standards for Construction and Maintenance of Wells	WAC 173-160	Establishes minimum standards for design, construction, capping, and sealing of all wells; sets additional requirements, including disinfection of equipment, abandonment of wells, and quality of drilling water.	Applicable if water supply wells, monitoring wells, or other wells are used during remediation.	100-NR-2
Shoreline Management Act	90.48 RCW			
Shoreline Development Permits	WAC 173-27	Requirements associated with administration and enforcement of shoreline management permits.	Substantive compliance with this ARAR and the Shoreline Management Act is required for river construction activities.	NR-1 NR-2
Hydraulic Projects Permits	WAC 220-110	Establishes regulations for construction activities that will use, divert, obstruct, or change the natural flow of the bed of the Columbia River.	Established for the protection of fish life	NR-1 NR-2
Benton Clean Air Authority	Regulation 1, Article 5	Establishes a regional program for open burning	These county regulations are authorized by the state Clean Air Act.	100-NR-1
Benton Clean Air Authority	Regulation 1, Article 8	Establishes regulations relative to asbestos	Must be considered if asbestos is found during remediation	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
A Guide on Remedial Actions at Superfund Sites with PCB Contamination	EPA Directive 9355-.4-01FS	Provides a general framework to determine cleanup levels, identify treatment options, and assess necessary management controls for residuals of PCBs.	Must be considered if PCBs are found during remediation	100-NR-1 100-NR-2
U.S. Department of Energy Orders		Select DOE Orders are contractual requirements of the ERC.		
Materials Transportation and Traffic Management	DOE Order 1540.1A	Establishes DOE requirements for transporting materials	For onsite shipments, these requirements specify compliance with 49 CFR but allow for other means of transportation and packaging if they offer an equivalent degree of safety.	100-NR-1 100-NR-2
Radiation Dose Limit (All Pathways)	DOE-5400.5, Chapter II, Section 1a	The exposure of the public to radiation sources because of all routine DOE activities shall not cause, in a year, an effective dose equivalent greater than 100 mrem from all exposure pathways, except under specified circumstances.	If remedial activities are considered "routine DOE activities", this order would be relevant and appropriate.	100-NR-1 100-NR-2
NRC Draft Radiological Criteria for Decommissioning	10 CFR 20 (proposed revision)	This rule provides a clear and consistent regulatory basis to determine the extent to which lands and structures must be remediated before a site can be considered decommissioned.	This will be applicable upon promulgation.	100-NR-1
Radioactive Waste Management	DOE Order 5820.2A	Defines waste designation for TRU, high- and low-level waste and establishes criteria for the management and disposal of LLW.		100-NR-1
Radioactive Waste Management	DOE 5820.2A Chapters III and IV	Establishes policies and guidelines by which DOE manages radioactive waste, waste byproducts, and radioactive contaminated surplus facilities. Disposal shall be on the site, which it was generated, if practical, or at another DOE facility. DOE waste containing byproduct material shall be stored, stabilized in place, and/or disposed of consistent with the requirements of the residual radioactive material guidelines contained in 40 CFR 192.	Must be met when managing radioactive waste created by remediation activities.	100-NR-1

Description	Citation	Requirements	Remarks	Operable Unit Affected
Safety Requirements for the Packaging of Fissile and Other Radioactive Materials	DOE 5480.3, Sections 7 and 8	Establishes requirements for packaging and transportation of radioactive materials for DOE facilities	Requirements must be met if radioactive material is packaged and transported to disposal facility.	100-NR-1
Draft EPA Radiation Site Cleanup Regulations	40 CFR 196 (draft notice of proposed rulemaking)	This draft notice of proposed rulemaking will set standards for the remediation of soils, groundwater, surface water, and structures at federal facilities.	These standards are intended to set limits for radiation doses to the public.	100-NR-1 100-NR-2
Draft Department of Energy Radiation Protection of the Public and the Environment	10 CFR 834	Additional requirements above 5400.5 that are more prescriptive	Substantive requirements largely the same as 5400.5	100-NR-1
Wild and Scenic Rivers Act	16 U.S.C. 1271	Prohibits federal agencies from recommending authorization of any water resource project that would have a direct and adverse effect on the values for which a river was designated as a wild and scenic river or included as a study area.	The Hanford Reach of the Columbia River is under study for inclusion as a wild and scenic river.	100-NR-1 100-NR-2
Residual Radioactive Material as Surface Contamination	U.S. NRC Regulatory Guide 1.86	Sets contamination guidelines release equipment and building components for unrestricted use, and if buildings are demolished, shall not be exceeded for contamination in the ground.	Dependent upon land use decisions, this guide may be considered.	D&D Facilities
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq.	This Act ensures that wildlife conservation is given equal consideration with other values during the planning of activities that affect water resources. The Act authorizes the Secretary of the Interior to provide assistance to federal, state, and public or private agencies in the "development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat..." The Act also requires a consultation with the U.S. Fish and Wildlife Service (USFWS) when a federal agency plans to impound, deepen, or otherwise modify a body of water.	While the recommendations by the USFWS are not legally binding, DOE is required to give them full consideration.	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Executive Orders Protection of Wetlands	EO 11990	This Executive Order requires that each federal agency "...take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of federal lands and facilities; and (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to, water and related land resources planning, regulating, and licensing activities."	Must be considered if action is taken that may impact wetland area.	100-NR-1 100-NR-2
Floodplain Management	EO 11988	This Order requires federal agencies to take floodplain management into account when formulating or evaluating water or land use plans. The Order specifies that "...each agency shall.. restore and reserve the natural and beneficial values served by Flood Plains in carrying out its responsibilities for (1) acquiring, managing, and disposing of federal land and facilities; (2) providing federally undertaken, financial, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, and licensing conducting activities. □	Must be considered if actions are taken within a floodplain	100-NR-1 100-NR-2
Protection and Enhancement of the Cultural Environment	EO 11593	Provides direction to federal agencies to preserve, restore, and maintain cultural resources.	Pertains to sites, structures, and objects of historical, archeological, or architectural significance	100-NR-1 100-NR-2

Description	Citation	Requirements	Remarks	Operable Unit Affected
Exotic Organisms	EO 11987	This Order requires federal agencies to restrict, to the extent possible, the introduction of exotic species into the lands or waters that they own, lease, or hold for purposes of administration. It also restricts the use of federal funds and programs for importation and introduction of exotic species.	Must be considered during revegetation	100-NR-1
Department of Ecology Liquid Effluent Consent Order	DE 91NM-177	Requires discharges of liquid effluent to the soil to column to be eliminated, treated, or otherwise minimized.	Must be considered if discharges of liquid effluent to the soil column are part of the remedial alternative	100-NR-1
Tri-Party Agreement		Establishes requirements, guidelines, and schedules for the environmental restoration program at the Hanford Site	Must be adhered to and complied with by all parties with regard to remedial actions at all operable units.	100-NR-1 100-NR-2

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