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FACT SHEET
PART III, OPERATING UNIT GROUP 10
WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)

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1 **FACT SHEET**

2 **PART III, OPERATING UNIT GROUP 10**

3 **WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)**

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5 **UNIT DESCRIPTION**

6 The Waste Treatment and Immobilization Plant (WTP) is a waste management unit being constructed
7 outside the eastern boundary of the 200 East Area of the Hanford Site. The WTP will chemically
8 separate, treat, and immobilize by vitrification the majority of Hanford's 56 million gallons of radioactive
9 and chemical waste currently stored in 177 underground tanks. The WTP may also treat a small volume
10 of secondary wastes generated within the WTP boundary. However, the majority of secondary wastes
11 generated at the WTP will be treated at another permitted facility prior to disposal. Current design allows
12 waste to be received only through the Double-Shell Tank (DST) System.

13 The design, permitting, and construction of these facilities are being completed concurrently in a phased
14 approach. The WTP Permit was issued in 1994, and construction began in 2001. As design is finalized
15 for a specific component, the information is submitted to Ecology for inclusion into the permit. When the
16 information has been formally incorporated into the permit, construction can occur on that specific
17 component.

18 Per the Hanford Federal Facility Agreement and Consent Order, or Tri-Party Agreement (TPA), all
19 facilities and systems will be fully operational and begin processing waste in December 2022. Please see
20 the Permitting Background on WTP and Permitting Process for WTP sections of this fact sheet for more
21 detail.

22 The WTP consists of the following permitted buildings and systems: Analytical Laboratory (Lab),
23 Pretreatment (PT) Facility, Low-Activity Waste (LAW) Facility, High-Level Waste (HLW) Facility, and
24 Balance of Facilities (BOF).

25 **Pretreatment Facility**

26 The PT Facility has over 60 regulated mixed-waste tanks, or vessels, and regulated miscellaneous unit
27 systems. The number of regulated tanks, as defined in Washington Administrative Code ([WAC 173-](#)
28 [303-640](#)), could change as more design information becomes available. The regulated tanks are identified
29 in Condition III.10.E; the miscellaneous unit systems, as defined in [WAC 173-303-680](#), are identified in
30 Condition III.10.G. The air emission treatment system, called the Pretreatment Vessel Vent Process
31 System (PVV), vents the tank systems and miscellaneous units in the PT Facility. The PVV is primarily
32 comprised of a scrubber, filters, an adsorber, and a thermal oxidizer. The PVV will treat/remove
33 contaminant contaminants in the air emissions from the mixed waste management operations prior to
34 release to the atmosphere from the PT Facility stack.

35 The PT Facility receives waste from the DST System. The DST waste will be pumped to the WTP
36 through underground pipelines with leak containment and detection. The DST waste is received in
37 batches as large as 1 million gallons and stored in four 472,900-gallon tanks with a total capacity of about
38 1.5 million gallons. These large tanks are equipped with pulse jet mixers to keep the solids suspended.
39 Pulse jet mixers are air-driven devices with no moving parts that function like large turkey basters,
40 repeatedly sucking in and expelling waste to keep solids from settling in tank bottoms.

41 The purpose of pretreatment is to divide the waste into HLW and LAW streams for vitrification in
42 separate facilities. The process is designed to remove the solids and route them to the HLW Facility. The
43 LAW waste, mainly a solids-free liquid after this pretreatment, has much lower radioactivity and will be
44 routed to the LAW Facility. The pretreatment steps include:

- 1 • Evaporation to concentrate the waste.
- 2 • Chemical precipitation of strontium in some waste feeds.
- 3 • Ultrafiltration to remove the solids.
- 4 • Ion exchange to remove cesium in solution.
- 5 • Evaporation of the remaining LAW feed to concentrate the waste.

6 The pretreatment process creates a number of secondary mixed/dangerous waste streams. The volumes
7 and compositions of the streams are being determined as part of the design process. The secondary waste
8 streams identified thus far include:

- 9 • Process condensate from evaporation (routed to the Effluent Treatment Facility [ETF], Operating
10 Unit Group 1, for treatment and disposal).
- 11 • Spent ion exchange resins (dewatered and shipped to the Central Waste Complex [CWC],
12 Operating Unit Group 4, for storage).
- 13 • Solid waste (for example, failed pumps, and other equipment) containerized and shipped to CWC.
- 14 • Liquid (for example, scrubber effluents) and solid wastes (for example, filters, spent carbon, etc.)
15 from the PVV.

16 **Low-Activity Waste Facility**

17 The LAW Facility has 12 regulated mixed-waste tanks. The number of regulated tanks could change as
18 more design information becomes available. Miscellaneous units, as defined in [WAC 173-303-680](#),
19 identified in the LAW Facility are two LAW melter systems and their associated primary and secondary
20 off-gas treatment systems. *Off-gas* is a gaseous radioactive and hazardous byproduct of tank waste
21 treatment. The primary and secondary off-gas treatment processes treat and remove contaminants in the
22 air emissions from the mixed waste management operations in the LAW Facility prior to release to the
23 atmosphere from the LAW Facility stack.

24 Each LAW melter system includes a dedicated primary off-gas treatment process consisting of wet
25 scrubbers and a wet electrostatic precipitator. The LAW melter systems share the secondary off-gas
26 treatment process with the tank ventilation systems in the LAW Facility. The secondary off-gas treatment
27 process is high-efficiency particulate air (HEPA) filters, an activated carbon adsorber, a caustic scrubber,
28 a catalytic oxidizer, catalytic reduction unit, and exhausters.

29 The LAW Facility receives waste from the PT Facility via an underground pipeline with leak containment
30 and detection. Glass formers are added and mixed with the waste, the melters vitrify the waste-glass
31 mixture, and the molten waste glass is poured into cylindrical containers for immobilized low-activity
32 waste (ILAW). After the waste glass solidifies, the container is sealed, decontaminated, and prepared for
33 transport to the Integrated Disposal Facility (IDF), Operating Unit Group 11.

34 The LAW process creates a number of secondary mixed/dangerous waste streams. The volumes and
35 compositions of the streams are being developed as part of the design process. The secondary waste
36 streams identified thus far include:

- 37 • Spent LAW melters (after openings are sealed) transported for final disposal in the IDF.
- 38 • Solid waste (for example, failed pumps and other equipment) containerized and shipped to the
39 CWC.
- 40 • Liquid (for example, scrubber effluents) and solid wastes (for example, filters, spent catalyst, etc.)
41 from the melter systems primary and secondary off-gas treatment process treated at the WTP
42 and/or sent to other Hanford permitted facilities for treatment; and then disposal in IDF.
- 43 • Condensates collected within the WTP, routed to the PTF, and recycled back into the treatment
44 process.

1 **High-Level Waste Facility**

2 The HLW Facility has 15 regulated mixed-waste tanks. The number of regulated tanks could change as
3 more design information becomes available. Miscellaneous units, as defined in [WAC 173-303-680](#),
4 identified in the HLW Facility are the two independent HLW melter systems and their associated primary
5 and secondary off-gas treatment systems. The primary and secondary off-gas treatment processes treat
6 and remove contaminants in the air emissions from the mixed waste management operations in the HLW
7 Facility prior to release to the atmosphere from the HLW Facility stack.

8 The HLW melter system's primary off-gas treatment process is submerged bed scrubbers, wet
9 electrostatic precipitators, high-efficiency mist eliminators, and HEPA filters. The HLW melter system
10 shares the secondary off-gas treatment process with the other mixed waste tank ventilation systems in the
11 HLW Facility. The secondary off-gas treatment process is an activated carbon adsorber, a catalytic
12 oxidizer, a catalytic reduction unit, and a silver mordenite column. The HLW Facility receives
13 concentrated waste from the PT Facility via an underground pipeline with leak containment and detection.
14 The concentrate is blended with glass formers and converted into molten glass in one of the two HLW
15 melters and then poured into cylindrical stainless-steel canisters for immobilized high-level waste
16 (IHLW). After cooling, the canisters are sealed and decontaminated prior to shipment to interim storage.

17 The HLW process creates a number of mixed/dangerous secondary waste streams. The volumes and
18 compositions of the streams are being developed as part of the design process. The secondary waste
19 streams identified thus far include:

- 20 • Spent HLW melters in welded overpacks will be transferred to a melter storage building (final
21 disposal pathway for spent and failed HLW waste melters has not been developed).
- 22 • Solid waste (for example, failed pumps and other equipment) containerized and shipped to CWC;
- 23 • Liquid (for example, scrubber effluents) and solid wastes (for example, filters, spent catalyst, etc.)
24 from the melter systems primary and secondary off-gas treatment process; and
- 25 • Condensates collected within the building and routed to the PTF and recycled back into the
26 treatment process.

27 **Analytical Laboratory**

28 The Lab will perform analyses in support of WTP operations. The Lab has two regulated mixed-waste
29 tanks. The number of regulated tanks could change as more design information becomes available. The
30 Lab tank system will be connected to the PT Facility by an underground pipeline with leak containment
31 and detection that will allow waste to be transferred from the Lab to the PT Facility. These transfers will
32 be a regulated activity under this Permit.

33 The Lab's key function is to analyze process samples to meet permitting, process control, authorization
34 basis, and waste form qualifications during WTP commissioning, operation, and decommissioning. Each
35 facility, including the PT Facility, operates an Autosampling System that sends waste samples to the Lab
36 for analysis. Once analyzed, the samples are collected in a tank and then transferred to the PT Facility to
37 be recycled back into the treatment process.

38 The Lab will generate secondary waste streams. The volumes and compositions of the waste streams are
39 being determined as part of the design process. The mixed-waste streams include waste from analyzing
40 process and compliance samples. Dangerous waste generated in the Lab will be transferred to a Resource
41 Conservation and Recovery Act-permitted treatment, storage, and disposal (TSD) facility. All waste-
42 generating activities within the Lab will be regulated under [WAC 173-303-170](#) through [173-303-230](#).
43 Dangerous and mixed waste management will be regulated under this Permit.

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1 **Balance of Facilities**

2 BOF provides services and utilities to support operation of the main production facilities – PT, HLW,
3 LAW, and Lab.

4 **TYPE AND QUANTITY OF WASTE**

5 The United States Department of Energy (USDOE) – Office of River Protection (ORP) has conducted a
6 limited characterization of the waste. The waste is coming from the DST System and is permitted
7 separately from the WTP. The Waste Analysis Plan in this permit will require further characterization,
8 before waste is accepted in the WTP.

9 **PERMITTING PROCESS FOR WTP**

10 Ecology believes it is in the State of Washington’s best interest to begin treating Hanford tank waste at
11 the earliest possible time. Therefore, Ecology has employed a dangerous waste permitting approach that
12 differs from the usual process. Our permitting approach allowed construction to start without the
13 complete design, subject to Ecology’s review and approval authority over future, more detailed design
14 submittals. The major policy decision, of proceeding with the Permit and construction before design was
15 complete, was made several years ago by Ecology

16 The draft Permit (Revision 9) addressed by this fact sheet will not be effective for an extended period of
17 time due to the regulatory process for issuing a new permit. In the interim, the WTP Facility will
18 continue with design and construction. Until the draft Permit (Revision 9) is implemented, the existing
19 effective Permit (Revision 8C) must be maintained through permit modification processes to reflect
20 changes made during this interim period. After issuance of the draft Permit, a Class 1 prime modification
21 will occur to incorporate all of the changes to Revision 8C during this interim period. All modifications
22 to the current Permit (Revision 8C) will be subject to public review and modification requirements.

23 Currently, the overall design of the WTP is about 81 percent complete. The Permit is being issued with a
24 compliance schedule (Appendix 1.0) to provide the additional detailed information necessary to ensure
25 compliance with the standards for a hazardous waste management facility. The compliance schedule
26 assures that even though Ecology has issued the Permit, WTP construction and operation will proceed in
27 a phased manner with our review and approval required at each stage.

28 ORP and its WTP contractor, Bechtel National, Inc., (BNI), will continue to submit design packages for
29 various WTP systems for incorporation into the Permit. Prior to construction of that portion of the WTP,
30 the design information will be reviewed by Ecology and provided for public comment before being
31 incorporated into the Permit. This allows construction to proceed only on those regulated portions of the
32 WTP that have been approved by Ecology.

33 ORP and BNI will submit a significant portion of the operating information in a major Class 3 Permit
34 modification about six months before the start of cold (non-radioactive) commissioning of the WTP. This
35 includes the operating portions of the Permit that need relatively complete design to finalize (for example,
36 training, contingency, and inspection plans).

37 After this Class 3 modification, all the information normally included in a permit application will have
38 been submitted, reviewed, and approved through public comment, and the Permit will then be considered
39 in compliance with [WAC 173-303](#). Ecology will then approve WTP cold commissioning. Part of cold
40 commissioning will be testing the melter systems to demonstrate how they will perform with respect to
41 emissions and glass production.

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1 **Permit Modifications**

2 Two slightly different modification processes are used for the WTP portion of the Permit. [WAC 173-](#)
3 [303-830\(3\)](#) allows Ecology to modify or revoke and reissue a permit based on information submitted as
4 required in the Permit.

- 5 • Because the Permit requires compliance schedule submittals, these submittals will be
6 incorporated into the Permit as agency-initiated modifications per [WAC 173-303-830\(3\)](#).
7 Agency-initiated modifications require a 45-day public comment period.
- 8 • Changes to information already in the Permit will follow a different modification process. Once
9 information has been incorporated into the Permit, changes will follow the Permittee-initiated
10 modification process for Class 1, Class 2, or Class 3 modifications, as described in [WAC 173-](#)
11 [303-830\(4\)](#). In accordance with [WAC 173-303-830\(4\)](#), Class 1 modifications will not be
12 required to undergo public comment. Ecology will incorporate the changes into the Permit
13 quarterly. Class 2 and 3 modifications require 60-day (Class 2) and 45- or 60-day (Class 3)
14 public comment periods prior to approval by Ecology. The modification process described here
15 is included in Conditions III.10.C.2.e, III.10.C.2.f, and III.10.C.2.g.

16 Permittees are allowed to request a temporary authorization to implement an agency-initiated, Class 2, or
17 Class 3 modification prior to public notice and comment, pursuant to [WAC 173-303-830\(4\)\(e\)](#). A
18 temporary authorization must meet the criteria described in [WAC 173-303-830\(4\)\(e\)\(ii\)\(A\)](#). The term of
19 a temporary authorization is limited to 180 days with the potential for Ecology to approve two terms, with
20 a maximum combined duration of 360 days. The purpose of a temporary authorization is to allow the
21 timely implementation of a permit modification. Ecology may approve the request for a temporary
22 authorization on a Class 2 modification if it meets one of the five criteria in
23 [WAC 173-303-830\(4\)\(e\)\(iii\)\(B\)](#).

24 Ecology is conducting ongoing reviews to ensure WTP design is in compliance with dangerous waste
25 regulations. We will also be conducting compliance inspections at the construction site and monitor BNI
26 and ORP inspection activities.

27 The WTP's ability to start cold commissioning and hot commissioning will be contingent upon successful
28 completion of the Compliance Schedule, Appendix 1.0. Ecology will not allow operations to start until
29 we provide written authorization (Condition III.10.C.2.a). [WAC 173-303-830](#), Appendix I, lists changes
30 to interim compliance dates, with Ecology's prior approval, as a Class 1 modification and extension of the
31 final compliance date as a Class 3 modification. The final compliance date is the date the WTP initially
32 receives dangerous or mixed waste.

33 **BASIS FOR PERMIT CONDITIONS**

34 Because facility design is not complete, not all the information needed for the permit is currently
35 available. As a result, Ecology has written conditions that require compliance with the regulations in
36 [WAC 173-303](#) and have described, in as much detail as possible at this time, the information that must be
37 submitted to supplement the Permit to allow construction and operations to begin. As design proceeds
38 and new issues arise, Ecology will modify existing conditions or add new conditions.

39 **GENERAL WASTE MANAGEMENT REQUIREMENTS**

40 Condition III.10.C.2.a does not allow the Permittees to accept dangerous or mixed waste into the WTP
41 until the Permittees have received a Permit modification allowing waste to be received and have
42 submitted to Ecology a letter stating that the facility has been constructed in compliance with this Permit.
43 The Permit modification allowing the start of operations will be processed in accordance with [WAC 173-](#)
44 [303-830\(3\)](#) and [WAC 173-303-840\(2\)](#) and (3) and will have a public comment period. Ecology reserves
45 the right to inspect the facility for compliance prior to allowing the acceptance of waste.

1 Condition III.10.C.2.b authorizes the Permittees to accept waste specified on the Part A Permit
2 Application and in accordance with the Waste Analysis Plan included in the Permit in Addendum B.
3 [WAC 173-303-806\(2\)\(a\)](#) requires the Permittees submit a Part A Permit Application with the Part B
4 Permit Application. Part A has been attached to the Permit to document waste codes and quantities to be
5 treated or stored at the WTP. [WAC 173-303-300](#) requires waste analysis prior to storage, treatment, or
6 disposal and a Waste Analysis Plan (WAP) for characterizing the waste.

7 **WASTE ANALYSIS PLAN**

8 According to [WAC 173-303-300\(5\)](#), each facility owner or operator is required to develop and maintain a
9 WAP, Addendum B, that must be kept at the facility. The WAP details how the owner or operator is
10 required to obtain a detailed chemical, physical, and/or biological analysis of a dangerous waste before it
11 is stored, treated, or disposed. The knowledge obtained through the analysis must be adequate to ensure
12 management of the waste is in compliance with all requirements specified in [WAC 173-303](#).

13 Because the design of the facility and its waste processing systems are not complete, not all the
14 information needed for the WAP is currently available. As a result, Ecology has written Conditions
15 III.10.C.3.a through III.10.C.3.e that require compliance with the regulations in [WAC 173-303-300](#) and
16 have described the information that needs to be submitted to comply with the requirements for a WAP.

17 Condition III.10.C.3.e requires the Permittees to submit a revised WAP and Waste Analysis Quality
18 Assurance Project Plan to Ecology, for approval, prior to the receipt of any waste. The revised WAP will
19 be incorporated into this Permit in accordance with the compliance schedule in Appendix 1.0.

20 **RECORDKEEPING AND REPORTING**

21 The WTP must maintain detailed operating records at the facility. These records document compliance
22 with conditions of the Permit and dangerous waste regulations. Records must also be made of spills,
23 releases, incidents of noncompliance, and emergency situations.

24 Condition II.I.2 requires the Permittees to maintain a written Facility Operating Record. Except as
25 specifically provided otherwise in this Permit, the Permittees shall also record all information referenced
26 in this Permit in the Facility Operating Record within seven (7) working days after the information
27 becomes available. This requirement applies to all Hanford final permitted units, including the WTP
28 upon issuance of the final WTP Permit to operate.

29 **SECURITY**

30 The WTP is within Hanford's secured area. Access to the facility's operating area is subject to the
31 general security provision of Condition II.I. In addition, Condition III.7.E.1 and Addendum E define
32 security provisions, access controls, and signage specific to the WTP. These requirements fully satisfy
33 [WAC 173-303-310](#).

34 **PREPAREDNESS AND PREVENTION**

35 This section of the Permit requires that the Permittees construct and operate the WTP with the security,
36 communications, and emergency equipment described in Addendum E of the Permit.
37 Condition III.10.C.5.b requires that the Permittees update this section of the Permit with additional details
38 in accordance with the compliance schedule in Appendix 1.0. Condition III.10.C.5.e requires the
39 equipment be maintained and available in case of an emergency.

40 **CONTINGENCY PLAN**

41 Each owner or operator of a dangerous waste TSD facility is required by [WAC 173-303-350](#) to have a
42 contingency plan for emergencies or releases that threaten human health and the environment. At
43 Hanford, the contingency plan consists of two parts.

1 One requirement is met by the *Hanford Emergency Management Plan* (DOE/RL-94-02, as amended).
2 This plan covers site-wide emergency requirements such as sirens, agreements with local authorities, and
3 site evacuations plans. This plan is Attachment 4 to the Hanford Facility Permit.

4 The other requirement is met by a WTP-specific contingency plan. The WTP requirements are contained
5 in the *River Protection Project – Waste Treatment Plant Emergency Response Plan* (24590-WTP-PL-OP-
6 01-003), and are included in Addendum F of this Permit. This plan includes the specific responses to
7 emergencies that may occur at the WTP. The format and level of detail of the attached WTP plan is
8 similar to that used at other Hanford TSD facilities. Because the design is not complete, all the
9 information usually available (for example, evacuation plan, list of emergency equipment, alarms, and
10 decontamination equipment) is not available at this time.

11 Condition III.10.C.6.b requires the Permittees to submit a revised and updated WTP emergency response
12 plan six (6) months before the start of cold commissioning. This revision will include the information
13 that is not currently available. The facility will not be allowed to start operating until Ecology approves
14 the plan and it is incorporated into the Permit.

15 **INSPECTIONS**

16 The facility inspection schedule is in Addendum E. The inspection schedule details the frequency and
17 method of inspecting the regulated units within the WTP as required by [WAC 173-303-395](#)(1)(d), -
18 [630](#)(6), -[640](#)(4)(a)(i), -[670](#)(7), -[680](#)(3), and [40 CFR 264.1101](#)(c)(4). In general, the regulations require
19 daily, weekly, or monthly inspections. Condition III.10.C.5.c requires that the inspection schedule be
20 updated prior to operations and in accordance with the compliance schedule in Appendix 1.0.

21 [WAC 173-303-395](#) and -[640](#)(6) requires inspections, but does not specify that the inspections must be
22 visual. At most dangerous waste facilities, visual inspections are the most convenient way to meet the
23 inspection requirement. The WTP presents some unique inspection challenges due to the extremely high
24 radiation fields surrounding many of the tanks and miscellaneous treatment units. Routine human access
25 to most of these areas is not possible while in operation.

26 The Permittees have proposed that the routine inspections for the high-radiation areas be accomplished
27 using sumps with continuous leak detection. The Permittees are required to provide calculations that
28 demonstrate all the cells containing tanks or miscellaneous units can detect a leak of 0.1 gallons per hour
29 within a 24-hour period as suggested by United States Environmental Protection Agency (EPA) guidance.
30 The equivalent of 0.1 gallons per hour is approximately 13 ounces per hour. Conditions III.10.E.9.e.ii,
31 III.10.G.10.e.ii, III.10.H.5.e.ii, and III.10.J.5.e.ii address leak rate for tanks and miscellaneous units and
32 allow the Permittees to request a case-by-case exception.

33 Ecology has accepted the continuous monitoring approach as adequate to protect human health and the
34 environment. These cells are located in a concrete building with welded stainless-steel secondary
35 containment and extensive ventilation controls. The Permittees will need to provide access to select or
36 surrogate cells for the periodic integrity assessments as described in the approved integrity assessment
37 program documents to support compliance with the requirements of [WAC 173-303-640](#) (3)(b). If unusual
38 circumstances require a visual inspection, the Permittees will need to provide access for video cameras.

39 **TRAINING**

40 Personnel training requirements are in [WAC 173-303-330](#). The personnel training requirements for the
41 WTP are included in Addendum G of this Permit modification. The program's overall goal is to train
42 personnel to:

- 43 • Comply with the facility's Dangerous Waste Regulations.
- 44 • Follow dangerous waste management procedures relevant to their position.
- 45 • Effectively respond to emergencies.

1 At Hanford, an agreement has been reached between the USDOE and Ecology to include a brief
2 description of the facility's training program in the facility-specific portion of the Permit. Condition
3 III.10.C.7.e requires the Permittees to submit the facility's entire training plan to Ecology separate from
4 the Permit. This allows Ecology to ensure that the Permittees are meeting the requirements in Addendum
5 G, but it also provides the WTP the flexibility to update the plan as needed to reflect current facility
6 operations.

7 Condition III.10.C.7.a.ii requires all personnel whose activities directly affect LAW and HLW
8 Vitrification System emissions receive specialized training. The LAW and HLW Vitrification Systems
9 included in this Permit are complex thermal treatment systems. Specialized training assures Ecology that
10 the systems are designed and operated to protect human health and the environment. This permit
11 condition is based on [WAC 173-303-680\(2\)](#).

12 Condition III.10.C.7.a requires the Permittees to submit a revised and updated WTP training plan before
13 starting cold commissioning. This revision will include the information that is not currently available.
14 Ecology must approve the plan before the facility will be allowed to start operating.

15 **CLOSURE**

16 [WAC 173-303-610](#) addresses the requirements for closing a dangerous waste TSD facility. The WTP
17 Closure Plan is included in Addendum H of this permit modification. A closure plan must address how
18 the Permittees will close each WTP dangerous waste management unit in conformance with the
19 applicable closure performance standards. These standards are defined in the closure plan and must be in
20 accordance with the requirements of [WAC 173-303-610\(2\)](#). The plan also includes methods used to
21 remove or decontaminate equipment, structures, and soils.

22 The Permit includes conditions that require the Permittees to resubmit the closure plan 180 days prior to a
23 partial closure. They must also submit a Sampling and Analysis Plan 180 days before starting closure.
24 Ecology must approve plans before the Permittees begin closure. The Permit also specifies the
25 requirements for the independent, qualified, registered professional engineer (IQRPE) when certifying
26 closure. Ecology reserves the right to require additional sampling.

27 Condition III.10.C.8.b requires the Permittees to submit an updated WTP closure plan before starting cold
28 commissioning. This revision will include the information that is not currently available. Ecology must
29 approve the plan before the facility starts operating.

30 **VARIANCES**

31 There are no requested variances or alternatives for the WTP.

32 **CRITICAL SYSTEMS**

33 The term *critical systems*, as applied to determining whether a permit modification is required, means
34 portions of a TSD unit's structure or equipment whose failure could lead to the release of dangerous
35 waste into the environment, and/or systems that treat, transfer, store, or dispose of regulated wastes. A
36 list identifying the critical systems of a TSD unit may be developed and included in Part III, V, and/or VI
37 of this Permit. In developing a critical system list, or in the absence of one, [WAC 173-303-830](#)
38 modifications shall be considered.

39 The design of WTP is categorized by facility (PT, LAW, HLW, Lab, and BOF), and each plant is broken
40 into design "systems." Each system is designated by a name and a three-letter code (for example, Waste
41 Feed Evaporation Process system [FEP]). A list of WTP critical systems was developed and included in
42 Appendix 2.0 of this Permit.

43 In addition to defining equipment that treats, transfers, stores, or disposes regulated wastes, the WTP
44 critical systems list includes the facility's structure and equipment that prevent dangerous and mixed
45 waste from escaping to the environment. These are mainly the secondary containment systems and the air

1 emissions control systems. In Section III.10 of this Permit, secondary containment, containment
2 buildings, and air emissions control equipment shall be considered part of the individual tank, container,
3 or miscellaneous unit and will be included with the appropriate critical system in Appendix 2.0. As
4 design information becomes available, Ecology reserves the right in Condition III.10.C.9.b to add
5 additional critical systems to the list.

6 This section also includes requirements for Ecology to review and approve design change notices and
7 nonconformance reports generated during construction of the WTP.

8 **EQUIVALENT MATERIALS**

9 Condition III.10.C.10.a allows the Permittees to substitute equivalent or superior equipment, materials,
10 and administrative information (such as names, phone numbers, and addresses) for those specified in this
11 Permit. Use of such equivalent or superior items are not considered a modification of the Permit as long
12 as the equipment, etc., is within the limits (for example, ranges, tolerances, and alternatives) already
13 clearly specified in sufficient detail in the attachments to this Permit. If Ecology determines that the
14 change is not equivalent, Condition III.10.C.10.b requires the Permittees use the permit modification
15 process in [WAC 173-303-830](#).

16 **RISK ASSESSMENT**

17 The Permittees are required to perform a risk assessment consistent with [WAC 173-303-680](#) and
18 [-812\(2\)\(b\)\(ii\)](#). This Permit requirement is pursuant to EPA's policy that permitting for hazardous waste
19 combustors (including incinerators) or thermal treatment processes of similar or greater complexity (for
20 example, with respect to design, operations, and potential emissions) must address site-specific risks not
21 otherwise addressed by existing regulations.

22 On July 30, 1999, EPA's Administrator signed the rule for "Final Standards for Hazardous Air Pollutants
23 for Hazardous Waste Combustors" ([40 CFR Part 63](#) Subpart EEE). As part of the preamble to the final
24 rule, EPA outlined some of the limitations of the national risk assessment that was performed for the final
25 rule, including:

- 26 • No assessment of risk from nondioxin products of incomplete combustion.
- 27 • No unique site-specific considerations due to the nature of a national risk assessment.

28 As a result of these limitations, Ecology recognizes the need for site-specific analysis. This assures that
29 all hazardous waste combustors and thermal treatment processes of similar or greater complexity are
30 operated in a manner that protects human health and the environment. Unique site-specific considerations
31 for the WTP include:

- 32 • Sensitive receptors that may have significantly different intakes/exposures (for example, Native
33 Americans).
- 34 • The presence of significant ecological considerations (proximity to particular sensitive
35 ecosystems [for example, salmon, eagles, etc.]).
- 36 • The radioactive components of emissions.

37 The assessment will include an evaluation of risks to people eating food and breathing air potentially
38 contaminated by WTP emissions. It will also examine risks to plants and animals living in areas
39 potentially contaminated by WTP emissions. The risk assessment will be used to determine if any
40 operating conditions, in addition to those specified in the regulations, are needed to ensure that the WTP
41 will protect human health and the environment.

42 **Preliminary and Final Risk Assessments**

43 The Permit requires two phases of risk assessment. The first phase is a Preliminary Risk Assessment
44 prior to WTP operation. The first phase is based on estimated emissions from the proposed waste

1 management operations. The second phase is the Final Risk Assessment after the Permittees complete
2 WTP construction and demonstration testing of the LAW and HLW Vitrification Systems. The second
3 phase incorporates the actual demonstration testing emission data with the estimated emission data from
4 other WTP waste management operations.

5 The Risk Assessment Work Plan details a procedure for both phases of the risk assessment. The
6 Preliminary Risk Assessment Report (phase one) will be used to further refine the contaminants of
7 concern (chemicals and radionuclides), exposure pathways, exposure impact locations, and potential
8 receptors (human and ecological) for incorporation into the Final Risk Assessment. The further
9 refinement of the contaminants of concerns will also be incorporated into LAW and HLW Vitrification
10 Systems' Demonstration Tests.

11 As part of the Demonstration Tests during cold commissioning, sampling will be conducted to measure
12 the concentrations of chemical contaminants in the LAW and HLW Vitrification Systems' emissions
13 under controlled conditions. The purpose of the Demonstration Test is to collect data that will be used in
14 the Final Risk Assessment Report and to demonstrate the ability of the HLW and LAW Vitrification
15 Systems to meet the performance standards specified in Conditions III.10.H.1.b, III.10.I.1.b, III.10.J.1.b,
16 and III.10.K.1.b at the outer boundaries of their operating conditions. The Final Risk Assessment Report
17 will be used to assure that Permit limits for operations of the WTP protect human health and the
18 environment.

19 Work on the Risk Assessment Work Plan has been proceeding for several years. Ecology and EPA have
20 reviewed the draft work plan, issued comments, and worked with the Permittees to resolve them. The
21 Permittees did not have sufficient time to incorporate the comments into the work plan before issuance of
22 this permit modification. The Preliminary Risk Assessment Work Plan, comments, and comment
23 resolutions are attached to the Permit in Appendices 6.1.1 and 6.1.2. Condition III.10.C.11.a requires the
24 work plan comments and the Risk Assessment Work Plan be incorporated into the Permit as a permit
25 modification with a public comment period.

26 The basis for Condition III.10.C.11 for performance of the risk assessment is [WAC 173-303-812\(2\)\(b\)\(ii\)](#)
27 and [WAC 173-303-680\(2\)](#).

28 **AIR EMISSIONS**

29 Condition III.10.C.12 requires the Permittees to obtain permit modifications prior to installing or using
30 equipment or waste management processes that are subject to the organic emissions controls requirements
31 of [WAC 173-303-690](#), [-691](#), or [-692](#).

32 **REMOTE DATA ACCESS**

33 Condition III.10.C.13 requires the Permittees to provide Ecology onsite, unrestricted 24-hour access to
34 key WTP operating, and emission monitoring data. This permit condition provides a computer station for
35 Ecology-only use to monitor WTP operations to assure that the thermal treatment systems protect human
36 health and the environment. This permit condition is based on [WAC 173-303-815\(2\)\(b\)\(ii\)](#) and [WAC](#)
37 [173-303-680\(3\)](#).

38 **PERFORMANCE DEMONSTRATION TEST**

39 The Permittees are required by Sections III.10.H and III.10.J to complete performance demonstration tests
40 prior to receiving mixed waste into the WTP Facility. The demonstration tests will collect data for use in
41 the Final Risk Assessment Report and demonstrate the HLW and LAW Vitrification Systems' ability to
42 perform as specified in Conditions III.10.H.1.b, III.10.I.1.b, III.10.J.1.b, and III.10.K.1.b at the outer
43 boundaries of their operating conditions.

44 The Permittees are required to demonstrate that the vitrification systems can achieve an organic
45 destruction and removal efficiency (DRE) of 99.99 percent. *DRE* is a system's ability to destroy through
46 combustion or remove from emissions a chosen organic contaminant. To perform the test, the Permittees

1 will have to increase the waste simulant feed to the melters during cold commissioning with a known
2 amount of organic contaminants and measure the concentration of the contaminant after treatment and
3 before discharge.

4 **CONTAINERS**

5 [WAC 173-303-630](#) addresses design and management requirements for container storage areas and
6 containers within those areas at a dangerous waste TSD facility. [WAC 173-303-630](#) requirements are
7 addressed in Addendum C, Section 4.2.1, of this permit modification. The information addresses how
8 each container storage area and containers stored within those areas are managed in compliance with the
9 dangerous waste regulations.

10 Because the design of the facility and its container storage areas is not complete, not all the information
11 needed for the container storage areas is currently available. As a result, Ecology has written a
12 compliance schedule in Condition III.10.D.10 that requires compliance with the regulations in [WAC 173-](#)
13 [303-630](#) and [WAC 173-303-806](#)(4)(a) and (b), and describes, in as much detail as possible at this time,
14 the information the Permittees need to submit to comply with container storage area requirements. The
15 engineering information required in Condition III.10.D.10.b must be incorporated into the Permit through
16 the permit modification process before construction can begin on those particular areas. The operational
17 information required in Condition III.10.D.10.c must be incorporated into the Permit through the permit
18 modification process prior to the initial receipt of dangerous or mixed waste in those container storage
19 areas.

20 **Labels**

21 [WAC 173-303-630](#)(3) requires Permittees to label dangerous waste containers in a manner that
22 adequately identifies the major risk(s) for employees, emergency response personnel, and the public.

23 The container-labeling requirement will be modified for the ILAW and IHLW containers. Due to the
24 expected high radioactivity levels of the ILAW and IHLW containers, they will be handled remotely
25 using a combination of cranes and hoists with grappling equipment that could scratch or tear a
26 conventional label, rendering it unreadable. In addition, the expected radioactivity levels of the
27 containers would eventually destroy a conventional label.

28 In place of a conventional label, a unique identifier will be welded onto the shoulder and side wall of each
29 container at the time of construction, as described in Addendum C, Section 4.2.1.3, of this permit
30 modification. Each container's unique identifier will be tracked using the plant information network, and
31 will include dangerous waste numbers and major risk(s) associated with the dangerous waste in that
32 particular container.

33 In addition, Condition III.10.D.5.c requires the Permittees to post all entrances and access points to ILAW
34 and IHLW container storage areas and any other areas where ILAW and IHLW containers are handled
35 with signs clearly identifying the major risk(s). Ecology believes this proposed alternative meets the
36 intent of the regulatory requirement, while continuing to ensure personnel safety.

37 **Storage**

38 [WAC 173-303-630](#)(5)(c) requires a minimum 30-inch separation between aisles of containers storing
39 dangerous waste(s). The purpose of this requirement is to allow an inspector access to the containers and
40 the container storage area and to ensure access in the event of a release or emergency.

41 The aisle-spacing requirement will be modified for ILAW and IHLW containers.
42 Condition III.10.D.4.b.ii requires the physical arrangement (spacing) of ILAW and IHLW containers to
43 be as described in Addendum C, Section 4.2.1.2.1, of this permit modification. This condition specifies a
44 range of 4 to 16 inches between containers. The container spacing and location of the unique identifier on
45 each container will allow an inspector to remotely identify and inspect any container stored within these

1 areas. Ecology believes the proposed alternative meets the intent of the regulatory requirement, while
2 continuing to ensure personnel safety.

3 **Inspections**

4 [WAC 173-303-630](#)(6) requires Ecology to inspect areas where containers are stored for leaking or
5 deteriorating containers and deterioration of the containment system. The ILAW and IHLW container
6 storage areas do not have containment systems pursuant to [WAC 173-303-630](#)(7)(a), as they will not be
7 storing wastes that contain free liquids, exhibit the characteristics of ignitability or reactivity as described
8 in [WAC 173-303-090](#)(5) or (7), and will not be designated as F020, F021, F022, F023, F026, or F027
9 dangerous wastes per [WAC 173-303-630](#)(7)(c).

10 Remote inspection of the ILAW and IHLW is necessary, as personnel entry is precluded due to high
11 radioactivity levels. When the ILAW and IHLW container storage areas are in use, Ecology will
12 generally inspect both the storage area and the containers with closed-circuit television cameras on a
13 weekly basis. A thorough inspection of each ILAW and IHLW container will be performed remotely
14 when they are placed into or removed from the container storage areas, as described in Addendum E,
15 Section 6.2.4.1, and Appendix 6A, Table 6A-2, of this permit modification. Prior to transferring to the
16 ILAW and IHLW container storage areas, the containers will be cooled, chemically and physically stable,
17 and have lids welded on. For the reasons above, Ecology believes the proposed alternative inspection
18 processes are reasonable and equally protective of human health and the environment.

19 **TANK SYSTEMS**

20 During the development of their permit application (Part A), ORP and BNI made several regulatory
21 interpretations that are not consistent with the regulations. One interpretation concerns the evaporation or
22 volatilization of mixed waste at the WTP in units such as evaporators and melters. ORP and BNI
23 determined that waste, once vaporized into the air emission control system, is not considered a contained
24 gas and would be a newly generated waste and no longer carry the listed codes acquired from tank farms
25 (F001 through F005).

26 Ecology has determined this interpretation is incorrect. The preamble discussion in the December 11,
27 1989, Federal Register clearly identifies condensed gases as being regulated under RCRA ([December 11,
28 1989; 54 FR 50973](#)). Residues from treating, storing, or disposing of a listed dangerous waste continue to
29 be listed as dangerous wastes under the *derived from rule* [[WAC 173-303-070](#)(2)(a)]. The only way such
30 a residue ceases to be dangerous is if the generator petitions Ecology for a delisting and is granted that
31 delisting. This is consistent with the regulation of process condensate from the 242-A Evaporator, which
32 is a listed waste until exempted after treatment at the ETF. Therefore, gases and/or process condensate
33 resulting from treatment, either in tanks or in the off-gas systems, will continue to be a listed waste until
34 delisted. As a result of this determination, tanks containing process condensate are regulated under [WAC
35 173-303](#) and need to be included in this Permit. Condition II.10.E.9.e.vi requires the Permittees to update
36 the list of tanks in Permit Tables III.10.E.A through III.10.E.D, and update Addendum C of this permit
37 modification.

38 ORP and BNI made another interpretation assuming that process water could be blended with process
39 condensate, and it would not become listed waste. Ecology has determined that if process water includes
40 recycled process condensate derived from a listed waste, the process water used in the facilities will be
41 regulated as a dangerous waste. According to [WAC 173-303-082](#)(3),

42 “If a person mixes a solid waste with a waste that would be designated as a dangerous waste source
43 under this section, then the entire mixture is designated as a dangerous waste source. The mixture has
44 the same designation (DW) and the same dangerous waste number as the dangerous waste source
45 which was mixed with the solid waste.”

1 As a result, tanks containing process water that has been blended with process condensate are regulated
2 under [WAC 173-303](#) and need to be included in this Permit.

3 Because the design of the WTP and its waste processing systems are not complete, not all the information
4 needed to permit the tank system is currently available. As a result, Ecology has written Condition
5 III.10.E.9 to require compliance with the regulations in [WAC 173-303-640](#) and [WAC 173-303-806](#)(4)(a)
6 and (c), and have described, in as much detail as possible at this time, the information that the Permittees
7 need to submit to comply with the requirements for tank systems. The submission of IQRPE
8 certifications of tank structural integrity and material compatibility required by [WAC 173-303-640](#)(3)(a)
9 must be incorporated into the Permit before the tanks can be installed. For the initial design package
10 only, the IQRPE certification for the secondary containment structures in the below-grade portions of the
11 HLW and LAW facilities will be submitted with the initial tank IQRPE certification submittal.

12 **Labels**

13 [WAC 173-303-640](#)(5)(d) requires all tank systems holding dangerous waste to be marked with labels or
14 signs to identify the waste contained in the tank. The label or sign must be legible at a distance of at least
15 50 feet. It must also have a legend that identifies the waste in a manner that adequately warns employees,
16 emergency response personnel, and the public of the major risk(s) associated with the waste being stored
17 or treated in the tank system(s). (Note: If there already is a system in use that performs this function in
18 accordance with local, state, or federal regulations, then such system will be adequate.)

19 Addendum C, Section 4.2.2.9 describes how the Permittees will mark accessible tanks.
20 Condition III.10.E.5.f requires the Permittees to mark accessible tank systems in accordance with
21 [WAC 173-303-640](#)(5)(d). Many tank systems will be routinely inaccessible to personnel (personnel are
22 unable to enter these areas while waste is being managed in them) due to expected high radioactivity
23 levels in those areas. Condition III.10.E.5.e requires the Permittees to mark routinely inaccessible tank
24 system access points in accordance with [WAC 173-303-640](#)(5)(d). In addition, Condition III.10.E.9.e.vi
25 requires the Permittees to update Addendum C of this permit modification to include a list of routinely
26 inaccessible tank systems. Ecology believes the proposed alternative meets the intent of the regulatory
27 requirement, while continuing to ensure personnel safety.

28 **Inspections**

29 [WAC 173-303-640](#)(6)(b)(i) requires above-ground portions of the tank system, if any, to be inspected at
30 least once each operating day to detect corrosion or releases of dangerous waste. While most of the tank
31 systems will be located above ground (above grade), many of them will be routinely inaccessible to
32 personnel due to expected high radioactivity levels in those areas, as discussed above. With the exception
33 of the two outside tanks at the PT Facility, the tanks will be located indoors within process cells, process
34 rooms, or caves with controlled access. Many of these areas will not have direct or remote visual
35 inspection capabilities on a daily basis.

36 For tank system areas where direct or remote daily visual inspection is not feasible, continuous leak-
37 detection systems for those areas are required pursuant to Condition III.10.E.9.b.ii. Normally, continuous
38 leak-detection systems are only required for double-walled tanks where an inspection of the tank system
39 to detect corrosion or releases of dangerous waste is not possible. Ecology believes providing these
40 inaccessible areas with continuous leak detection systems, in lieu of a daily, direct or remote visual
41 inspection, meets the intent of the regulatory requirement, while continuing to ensure personnel safety,
42 and protection of human health and the environment.

43 **Leaks and Spills**

44 [WAC 173-303-640](#)(7) requires tank systems or secondary containment systems from which there has
45 been a leak or spill, or which are unfit for use, to be removed from service immediately. The tank system

1 is to remain out of service until the owner/operator fulfills a set of requirements including identifying the
2 source of the leak or spill, cleaning up the leak or spill, and repairing the damaged tank system.

3 Condition III.10.E.5.i.i requires the Permittees (upon detection of a leak or spill of dangerous and/or
4 mixed waste), to immediately and safely stop the flow of dangerous and/or mixed waste into the tank
5 system or secondary containment system. Condition III.10.E.5.i.i was written to ensure the sequence of
6 actions taken by the Permittees are consistent with the WTP Facility safety basis, and are most protective
7 of personnel safety, human health, and the environment.

8 **CONTAINMENT BUILDINGS**

9 Regulations for containment buildings are found in [WAC 173-303-695](#), which incorporates by reference
10 federal requirements for containment buildings found in [40 CFR Part 264 Subpart DD](#). The containment
11 building designation was developed to provide a method for storing and managing dry, bulk
12 (uncontainerized) dangerous waste. The regulations are primarily designed to prevent waste and dust
13 migrating from the containment building holding the dangerous waste.

14 The Permittees have requested containment building designations within the WTP for the areas identified
15 in Table III.10.F.A. The containment building designation gives the facility more operational flexibility
16 by allowing the treatment and storage of uncontained equipment in the designated areas of the WTP.

17 During operations, routine maintenance activities, including replacing pumps, valves, melter components,
18 etc., will occur. Some equipment will need to be repaired in maintenance rooms in each of the three
19 process buildings. Before equipment can be removed from the WTP, it may need to be reduced in size,
20 decontaminated (to reduce radiation levels), and containerized for disposal. These activities are
21 considered *treatment* as defined in [WAC 173-303-040](#). The Permittees have requested that these areas be
22 classified as *containment buildings* because treatment is allowed in containment buildings. *Container*
23 *storage areas*, as defined in [WAC 173-303-630](#), are for storage of closed containerized waste, not waste
24 treatment. Containment buildings will provide the Permittees the flexibility to repair, store, or
25 containerize solid dangerous and mixed wastes as needed in the designated areas.

26 For treatment or storage of dangerous and mixed waste with free liquids (for example, as a result of
27 routine decontamination in designated areas), [40 CFR 264.1101](#) has additional requirements, including
28 primary and secondary containment barriers with leak detection. The secondary containment
29 requirements are detailed in 40 CFR 264.1101(b) (Design and Operating Standards). Decontamination or
30 other treatment with free liquids must be contained within the primary barrier. The 40 CFR 264.1101(b)
31 containment requirements are similar to the tank containment requirements in [WAC 173-303-640](#).

32 Any closed containers stored in the containment buildings that are not removed from the containment
33 building areas within 90 days of generation are required to be identified per Condition III.10.F. There are
34 no additional container requirements in 40 CFR 264.1101. Therefore, closed containers storing
35 dangerous or mixed waste within a containment building must be stored in container storage areas and
36 comply with the container requirements in [WAC 173-303-630](#). These container storage areas will be
37 identified in Section III.10.D (container conditions).

38 Regulations in 40 CFR 264.1101(c)(2) require IQRPE certification that the containment building's design
39 meets applicable requirements. These requirements include certification of the structural integrity of the
40 containment building floor, walls, and ceiling; the structure's ability to contain the waste; and the type of
41 liner in the containment building.

42 The Permittees have indicated in the permit application that some of the containment building units will
43 be certified to treat with free liquids and others will not. Condition III.10.F requires the Permittees to
44 identify areas that will treat with free liquids and will prohibit treatment with free liquids in areas not
45 certified to meet the regulatory requirements. This condition also requires the Permittees to identify
46 container storage areas within the containment buildings units.

1 **PRETREATMENT FACILITY MISCELLANEOUS UNIT SYSTEMS**

2 [WAC 173-303-680](#) addresses requirements for “miscellaneous units.” Under [WAC 173-303-040](#), a
3 *miscellaneous unit* is defined as,

4 “A dangerous waste management unit where dangerous waste is treated, stored, or disposed of and
5 that is not a container, tank, surface impoundment, pile, land treatment unit, landfill, incinerator,
6 boiler, industrial furnace, underground injection well with appropriate technical standards under 40
7 CFR Part 146, containment building, corrective action management unit, temporary unit, staging pile,
8 or unit eligible for a research, development, and demonstration permit under [WAC 173-303-809](#).”

9 The PT waste feed evaporator separator vessels, LAW evaporator separator vessel, and cesium evaporator
10 are thermal treatment units as defined in [WAC 173-303-040](#). These vessels are designed to separate the
11 incoming liquid waste stream into a vapor stream and a concentrated liquid stream. *Thermal treatment* is
12 defined in [WAC 173-303-040](#) as, “The treatment of dangerous waste in a device which uses elevated
13 temperatures as the primary means to change the chemical, physical, or biological character or
14 composition of the dangerous waste.”

15 Addendum C, Sections 4.1.2.2, 4.1.2.6, 4.1.2.9, and 4.1.2.11 of this permit modification describe each
16 evaporator’s process in more detail. The thermal treatment that will be occurring in the evaporators is
17 more complex than typical tank treatment, and as such, the Waste Feed Evaporation System, Cesium
18 Nitric Acid Recovery System, and the Treated LAW Evaporation System are properly classified as
19 “miscellaneous unit systems” under [WAC 173-303-680](#).

20 Miscellaneous unit systems include support systems, such as tanks, that share an air emission treatment
21 train, which is referred to as the PVV. The PVV is primarily comprised of scrubbers, filters, adsorbers,
22 and a catalytic oxidizer to treat/remove contaminants in the air emissions from the mixed waste
23 management operations in the PT Facility prior to release to the atmosphere from the PT Facility stack.
24 Please note Table III.10.G.A includes some tanks that are regulated in Section III.10.E, “Tank Systems.”

25 Ecology has determined the following requirements to be appropriate and included in this Permit for these
26 miscellaneous unit systems:

- 27 – General and Miscellaneous Unit System Specific Waste Management Requirements under
28 Conditions III.10.A, B, and C, and III.10.G.1, 5, and 7–9, including, but not limited to, waste
29 analysis, inspections, recordkeeping, procedures to prevent hazards, contingency planning, training,
30 and closure. The basis for these conditions is [WAC 173-303-680](#)(2) and (3).
- 31 – Conditions III.10.G.1–4 and 10 address requirements for the miscellaneous unit systems including
32 installation and certifications, secondary containment, and integrity assessments as appropriate
33 requirements from [WAC 173-303-640](#) for tanks based on [WAC 173-303-680](#)(2) and (3).
- 34 – Conditions III.10.G.5 and 6 address requirements for operating the miscellaneous unit systems
35 including, but not limited to, maintaining impermeable coatings on concrete containment systems,
36 procedures for responding to leaks and preventing release of toxic emissions into the air as
37 appropriate requirements from [WAC 173-303-640](#) and [WAC 173-303-806](#)(4)(a) and (c) based on
38 [WAC 173-303-680](#)(2) and (3).
- 39 – Conditions III.10.G.5.1 and G.6 also include requirements that assure the operation of the
40 miscellaneous unit systems (treatment effectiveness, feed rates, and operating limits) in the PT
41 Facility combined with the other mixed waste management operations in the PT Facility are
42 consistent with the assumptions and basis reflected for the Pretreatment Facility in the Risk
43 Assessment. The emission limits will be established based on the Preliminary Risk Assessment and
44 then updated based on the Final Risk Assessment. These limits will be in Table III.10.G.D. The
45 Permittees compliance with these operating requirements for miscellaneous unit systems and other
46 mixed waste management operations in the PT Facility is an essential element in Ecology’s
47 determination that the WTP, when operated in accordance with this Permit, will be protective of

1 human health and the environment. The basis for these operating requirements is [WAC 173-303-](#)
2 [815\(2\)\(b\)\(ii\)](#) and [WAC 173-303-680\(2\)](#) and (3).

3 Because WTP design is not complete, not all the information needed to permit the miscellaneous unit
4 systems is currently available. As a result, Ecology has written Condition III.10.G.10, similar to
5 Condition III.10.E.9, to require compliance with the appropriate requirements in [WAC 173-303-640](#) and
6 [WAC 173-303-806\(4\)\(a\)](#) and (c) based on [WAC 173-303-680](#) and the appropriate requirements in
7 [WAC 173-303-806\(4\)\(i\)](#), and have described, in as much detail as possible at this time, the information
8 that needs to be submitted to comply with the requirements for miscellaneous unit systems. The
9 submission of IQRPE certifications of miscellaneous unit structural integrity and material compatibility
10 must be incorporated into the Permit before the miscellaneous units can be installed. For the initial design
11 package only, the IQRPE certification for the below-grade secondary containment structures in the PT
12 Facility will be submitted with the initial miscellaneous unit IQRPE certification submittal.

13 **LOW-ACTIVITY AND HIGH-LEVEL WASTE VITRIFICATION SYSTEMS SHORT-TERM** 14 **OPERATIONS**

15 Sections III.10.H and III.10.J set forth conditions for Short Term Miscellaneous Thermal Treatment Unit-
16 Shakedown, Demonstration Test, and Post Demonstration Test as they apply to the LAW and HLW
17 Vitrification Systems. The LAW and HLW Vitrification Systems include the melter feed system (piping
18 and pumps to transfer waste from tanks to the melter), the melters and the downstream air pollution
19 control systems (for example, scrubbers, filters, coolers, oxidation units, reduction units, etc.). The LAW
20 and HLW Vitrification Systems do not fit the definition of container, tank, surface impoundment,
21 waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, or underground injection
22 well. Therefore, the LAW and HLW Vitrification systems are categorized as miscellaneous treatment
23 units under [WAC 173-303-680](#).

24 In accordance with [WAC 173-303-680](#), the requirements that are appropriate for the permitted
25 miscellaneous units are included in these sections. In determining which requirements apply to the LAW
26 and HLW Vitrification Systems, the wastes that will be treated and what happens to the contaminants in
27 the waste, are major factors. These requirements include limitations for waste management, secondary
28 containment, integrity assessments, and certifications as required under Section III.10.E. Also like an
29 incinerator, the LAW and HLW Vitrification Systems will:

- 30 • Volatilize organics.
- 31 • Breakdown (destroy) organics.
- 32 • Promote formation of products incomplete oxidation.
- 33 • Remove organics and metals and transfer to liquid, solid and/or gas media.
- 34 • Collect and remove acid gases and particulate matter.

35 Ecology has determined the following requirements as appropriate for the LAW and HLW Vitrification
36 Systems:

- 37 – General and LAW and HLW Vitrification Systems Specific Waste Management Requirements
38 under Conditions III.10.A, B, and C; III.10.H.1.d, f, and g; III.H.2.c; III.H.3.c; III.H.4.c; III.10.J.1.d,
39 f, and g; III.J.2.c; III.J.3.c; and III.J.4.c addressing, but not limited to, waste analysis, inspections,
40 recordkeeping, procedures to prevent hazards, contingency planning, training, and closure. The
41 basis for these conditions is [WAC 173-303-680\(2\)](#) and (3).
- 42 – Conditions III.10.H.1.a and III.10.J.1.a address installation and certifications, secondary
43 containment, and integrity assessments as appropriate requirements from [WAC 173-303-640](#) for
44 tanks based on [WAC 173-303-680\(2\)](#) and (3).
- 45 – Conditions III.10.H.1.a and III.10.J.1.a also address requirements for operation of the LAW and
46 HLW Vitrification Systems. These include, but are not limited to, maintaining impermeable

1 coatings on concrete containment systems and responding to leaks and preventing release of toxic
2 emissions into the air. These appropriate requirements are from [WAC 173-303-640](#) and [WAC 173-](#)
3 [303-806\(4\)\(a\)](#) and (c) are based on [WAC 173-303-680\(2\)](#) and (3).

4 – Conditions III.10.H.1.b and III.10.I.1.b require compliance with appropriate performance standards
5 for incinerators, as specified in [WAC 173-303-670](#) and [40 CFR Part 63 Subpart EEE](#) and based on
6 [WAC 173-303-680\(2\)](#) and (3). The LAW and HLW Vitrification Systems short-term performance
7 standards for incinerators include the following:

- 8 • 99.99 percent DRE for organics.
- 9 • Carbon monoxide will not exceed 100 parts per million by volume on an hourly rolling average
10 basis.
- 11 • Hydrocarbon will not exceed 10 parts per million by volume on an hourly rolling average basis.
- 12 • Particulate matter will be at or less than 0.015 grains per dry standards cubic foot.
- 13 • Hydrochloric acid and chlorine gas emissions shall not exceed 21 parts per million on a volume
14 basis.
- 15 • Mercury emissions will be at or less than 45 micrograms (μg) per dry standard cubic meter (dscm).
- 16 • Lead and cadmium emissions will be at or less than 120 $\mu\text{g}/\text{dscm}$.
- 17 • Arsenic, beryllium, and chromium emissions will be at or less than 97 $\mu\text{g}/\text{dscm}$.
- 18 • Dioxin and furan emissions will be at or less than 0.2 nanograms (ng)/dscm.

19 Air is used in the LAW and HLW Vitrification Systems to operate components, provide negative pressure
20 control, and ventilate process vessels. Compared to an incinerator, oxygen consumption in the melters is
21 not significant, as the melters use electrical heating instead of fossil fuel to process waste. The lack of
22 significant oxygen consumption in the melters combined with the large air inputs into the LAW and HLW
23 Vitrification Systems to operate components, provide negative pressure control, and ventilate process
24 vessels, results in high oxygen levels in the LAW and HLW Vitrification Systems' exhaust. Ecology is
25 not applying the standard correction of emission standards to 7 percent oxygen for incinerators to the
26 LAW and HLW Vitrification Systems, as it is technically inappropriate.

27 – Conditions III.10.H.1.b, c, and e; and III.10.J.1.b, c, and e also include requirements that assure the
28 operation of the HLW and LAW Vitrification Systems (treatment effectiveness, feed rates, and
29 operating limits) combined with the other mixed waste management operations in the HLW and
30 LAW Facilities are consistent with the assumptions and basis in the Risk Assessment. The emission
31 limits for short-term operations of the LAW and HLW Vitrifications Systems will be based on the
32 Preliminary Risk Assessment. These limits will be in Tables III.10.H.E and III.10.J.E. The
33 Permittee's compliance with these LAW and HLW Vitrification Systems operating requirements
34 and other mixed waste management operations in the LAW and HLW Facilities is an essential
35 element in Ecology's determination that the WTP, when operated in accordance with this Permit,
36 will be protective of human health and the environment. The basis for these operating requirements
37 is [WAC 173-303-815\(2\)\(b\)\(ii\)](#) and [WAC 173-303-680\(2\)](#) and (3).

38 – Conditions III.10.H.1.c and III.10.J.1.c include requirements for reporting, operating, and
39 maintaining automatic waste feed cut-off systems when the LAW and HLW Vitrification Systems
40 operating conditions deviate from those operating limits to be specified in Tables III.10.H.C and F,
41 and III.10.J.C and F. Tables III.10.H.F and III.10.J.F are currently reserved for short-term LAW and
42 HLW Vitrification Systems operations based on completed design information to be submitted to
43 Ecology under Conditions III.10.H.5 and III.10.J.5 (Compliance Schedules). The basis for these
44 requirements is [WAC 173-303-680\(2\)](#) and (3).

45 – Conditions III.10.H.2, 3, and 4 and III.10.J.2, 3, and 4 include requirements for the start-up,
46 demonstration testing, and post-demonstration testing of the LAW and HLW Vitrification Systems.

1 Ecology will finalize the operating conditions based on the Demonstration Test Report(s) and Final
2 Risk Assessment Report. These permit conditions also include requirements for stopping dangerous
3 and mixed waste feed to the LAW and HLW Vitrification Systems under operating conditions that
4 do not meet performance standards. The basis for these requirements is [WAC 173-303-680\(2\)](#) and
5 (3).

6 Because WTP design is not complete, not all the information needed to permit the LAW and HLW
7 Vitrifications Systems is currently available. As a result, Ecology has written Conditions III.10.H.5 and
8 III.10.J.5 to require compliance with the appropriate requirements in [WAC 173-303-640](#), [WAC 173-303-](#)
9 [670](#), [40 CFR Part 63 Subpart EEE](#), and [WAC 173-303-806\(4\)\(a\)](#), (c), and (f) based on [WAC 173-303-680](#)
10 and the appropriate requirements in [WAC 173-303-806\(4\)\(i\)](#). We have described, in as much detail as
11 possible at this time, the information that needs to be submitted to comply with the requirements for these
12 systems. The submission of IQRPE certifications of LAW and HLW Vitrification Systems structural
13 integrity and material compatibility must be incorporated into the Permit before the LAW and
14 Vitrification Systems can be installed. For the initial design package only, the IQRPE certification for the
15 below-grade secondary containment structures in the LAW and HLW facilities will be submitted with the
16 initial IQRPE certification submittal.

17 **LAW AND HLW VITRIFICATION SYSTEMS LONG-TERM OPERATION**

18 Sections III.10.I and K set forth conditions for normal operation of the LAW and HLW Vitrifications
19 Systems following successful operation and demonstration testing under Sections III.10.H and J.

- 20 – General and LAW and HLW Vitrification Systems Specific Waste Management Requirements
21 under Conditions III.10.A, B, and C; III.10.I.1.d, f, and g; III.10.I.2.c; III.10.I.3.c III.10.I.4.c;
22 III.10.K.1.d, f, and g; III.10.K.2.c; III.10.K.3.c; and III.10.K.4.d address, but are not limited to,
23 waste analysis, inspections, recordkeeping, procedures to prevent hazards, contingency planning,
24 training, and closure. The basis for these conditions is [WAC 173-303-680\(2\)](#) and (3).
- 25 – Conditions III.10.I.1.a and III.10.K.1.a address requirements for the LAW and HLW Vitrification
26 Systems, including maintaining design and construction, certifications, secondary containment, and
27 integrity assessments, as appropriate requirements from [WAC 173-303-640](#) for tanks based on
28 [WAC 173-303-680\(2\)](#) and (3).
- 29 – Conditions III.10.I.1.a and III.10.K.1.a also address requirements for LAW and HLW Vitrification
30 Systems operation, including, but not limited to, maintaining impermeable coatings on concrete
31 containment systems, responding to leaks, and preventing release of toxic emissions into the air as
32 appropriate requirements from [WAC 173-303-640](#) and [WAC 173-303-806\(4\)\(a\)](#) and (c) based on
33 [WAC 173-303-680\(2\)](#) and (3).
- 34 – Conditions III.10.I.1.b and III.10.K.1.b require compliance with appropriate performance standards
35 for incinerators, as specified in [WAC 173-303-670](#) and [40 CFR Part 63 Subpart EEE](#) based on [WAC](#)
36 [173-303-680\(2\)](#) and (3). The LAW and HLW Vitrification Systems long-term incinerator
37 performance standards include the following:
 - 38 • 99.99 percent DRE for organics;
 - 39 • Carbon monoxide will not exceed 100 parts per million by volume on an hourly rolling average
40 basis.
 - 41 • Hydrocarbon will not exceed 10 parts per million by volume on an hourly rolling average basis.
 - 42 • Particulate matter will be at or less than 0.015 grains per dry standards cubic foot.
 - 43 • Hydrochloric acid and chlorine gas emissions shall not exceed 21 parts per million on a volume
44 basis.
 - 45 • Mercury emissions will be at or less than 45 µg per dscm.
 - 46 • Lead and cadmium emissions will be at or less than 120 µg/dscm.

- 1 • Arsenic, beryllium, and chromium emissions will be at or less than 97 µg/dscm.
- 2 • Dioxin and furan emissions will be at or less than 0.2 ng/dscm.

3 Air is used in the LAW and HLW Vitrification Systems to operate components, provide negative
4 pressure control, and ventilate process vessels. Compared to an incinerator, oxygen consumption in
5 the melters is not significant, as the melters use electrical heating instead of fossil fuel to process the
6 waste. The lack of significant consumption of oxygen in the melters combined with the large air
7 inputs into the LAW and HLW Vitrification Systems to operate components, provide negative
8 pressure control, and ventilate process vessels, results in high oxygen levels in the LAW and HLW
9 Vitrification Systems' exhaust. Ecology is not applying the standard correction of emission
10 standards to 7 percent oxygen for incinerators to the LAW and HLW Vitrification Systems, as it is
11 technically inappropriate.

- 12 – Conditions III.10.I.1.b, c, and e and III.10.K.1.b, c, and e also include requirements that assure the
13 operation of the HLW and LAW Vitrification Systems (treatment effectiveness, feed rates, and
14 operating limits) combined with the other mixed waste management operations in the HLW and
15 LAW Facilities are consistent with the assumptions and basis reflected in the Risk Assessment. The
16 emission limits for long-term operations of the LAW and HLW Vitrification Systems will be based
17 on the Final Risk Assessment. These limits will be in Tables III.10.I.E and III.10.K.E. The
18 Permittee's compliance with these LAW and HLW Vitrifications Systems operating requirements
19 and other mixed waste management operations in the LAW and HLW Facilities is an essential
20 element in Ecology's determination that the WTP, when operated in accordance with this Permit,
21 will be protective of human health and the environment. The basis for these operating requirements
22 is [WAC 173-303-815\(2\)\(b\)\(ii\)](#) and [WAC 173-303-680\(2\)](#) and (3).
- 23 – Conditions III.10.I.1.c and III.10.K.1.c include requirements for reporting, operating, and
24 maintaining automatic waste feed cut-off systems when the LAW and HLW Vitrification Systems
25 operating conditions deviate from those operating limits to be specified in Tables III.10.I.C and F
26 and III.10.K.C and F. Operating limits will be based on the Demonstration Test and Final Risk
27 Assessment Reports. Conditions III.10.I.c.viii and III.10.K.c.viii require the Permittees to obtain
28 Ecology's approval to restart waste feed to the LAW and HLW Vitrification Systems when 30 waste
29 feed cut-offs due to deviations from Tables III.10.I.F and III.10.K.F occur within 30 calendar days.
30 Because the LAW and HLW Vitrification Systems are a complex technology, minimizing
31 operations outside the specified operating limits is critical to assuring Ecology that WTP operation
32 continues to be protective of human health and the environment. The basis for these requirements
33 are [WAC 173-303-680\(2\)](#) and (3).
- 34 – Conditions III.10.I.h and III.10.K.h include requirements for additional LAW and HLW
35 Vitrification Systems emissions testing throughout the duration of this Permit to confirm
36 conformance with performance standards. The frequency for emission testing was established based
37 on emissions retesting frequency for hazardous waste incinerators specified in Hazardous Waste
38 Combustion Maximum Achievable Control Technology (MACT) requirements under [40 CFR Part](#)
39 [63 Subpart EEE](#). The permit conditions require the Permittees to complete this additional emissions
40 testing under normal operating conditions and feeds. This is in contrast to the initial Demonstration
41 Testing under Sections III.10.H and J, which the Permittees are required to complete under worst-
42 case operating conditions and feeds. These Conditions also include requirements for stopping
43 dangerous and mixed waste feed to the LAW and HLW Vitrification Systems under operating
44 conditions when performance standards are not met. These permit conditions are based on [WAC](#)
45 [173-303-680\(2\)](#) and (3).

1 **NATIONAL AND STATE ENVIRONMENTAL POLICY ACTS**

2 In August 1996, Ecology and USDOE coauthored the *Final Environmental Impact Statement for the Tank*
3 *Waste Remediation System* ([DOE/EIS/0189](#)) (EIS). The EIS scope included tank waste retrieval,
4 continued tank operations, waste treatment, and waste disposal. The EIS was published to fulfill the
5 requirements of both the National Environmental Policy Act (NEPA) and the State Environmental Policy
6 Act (SEPA) [[WAC 197-11](#)]. The PT and vitrification activities at the WTP are covered by the analysis in
7 this EIS. A NEPA Record of Decision was issued and, following public comment, the SEPA Fact Sheet
8 was issued August 30, 1996.

9 Because this document is by both Ecology and USDOE, the EIS serves as SEPA coverage for permitting
10 activities related to the WTP, as long as the WTP stays within the bounds of the original analysis.
11 Ecology has determined that the WTP, as presently planned, is within the bounds of the original EIS.

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