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FACT SHEET
PART III, OPERATING UNIT GROUP 3, LIQUID EFFLUENT RETENTION FACILITY AND
200 AREA EFFLUENT TREATMENT FACILITY

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1 **FACT SHEET**

2 **PART III, OPERATING UNIT GROUP 3, LERF/200-AREA ETF**

3 **UNIT DESCRIPTION**

4 The purpose of the Liquid Effluent Retention Facility (LERF) and the 200 Area Effluent Treatment
5 Facility (ETF) is to treat and store liquid wastes in Hanford's 200 East Area.

6 The Permittees started building the LERF in 1990. Waste management operations began there in
7 April 1994. LERF consists of three lined surface impoundments (basins). The Permittees started
8 building the 200 Area ETF in 1992. Waste management operations began there in November 1995.

9 The LERF can receive liquid waste through four inlets.

- 10
- 11 • From a dedicated pipeline from the 200 West Area.
 - 12 • From a pipeline that connects LERF with the 242-A Evaporator.
 - 13 • From a pipeline that connects LERF to the Load-in Station at ETF.
 - 14 • Through a series of sample ports located at each basin.

14 The ETF can receive liquid waste through three inlets:

- 15
- 16 • Directly from the LERF.
 - 17 • From the Load-in Station.
 - 18 • From containers (e.g., carboys, drums) through the Secondary Waste Receiving Tanks or the Concentrate Tanks.

19 The Load-in Station is just east of ETF and consists of two 34,100-liter storage tanks and a pipeline that
20 connects to either LERF or ETF through fiberglass pipelines with secondary containment.

21 The Permittees store and treat wastewaters and contaminated groundwater in the three LERF basins.
22 Each basin has eight risers. Six risers are used for sampling. The seventh riser is for influent waste
23 receipt piping. The eighth riser contains liquid level instrumentation. Each riser extends along the sides
24 of each basin from the top to the bottom of the basin.

25 The wastewaters and contaminated groundwater are treated in the LERF basins through flow and strength
26 equalization and pH adjustment before sending them to ETF for final treatment. The treated liquid waste
27 is pumped from LERF to ETF through a double-walled fiberglass pipeline. The pipeline has leak
28 detection in the space between the inner and outer pipes.

29 The 200 Area ETF has a primary and a secondary treatment train. Each treatment train consists of a
30 series of operations.

31 The primary treatment train includes the following:

- 32
- 33 • Surge tank.
 - 34 • Filtration.
 - 35 • Ultraviolet light oxidation.
 - 36 • pH adjustment.
 - 37 • Hydrogen peroxide decomposition.
 - 38 • Degasification.
 - 39 • Reverse osmosis.
 - 40 • Ion exchange.
 - Final pH adjustment and verification.

1 The secondary treatment train provides the following processes:

- 2 • Secondary waste receiving.
- 3 • Evaporation (with mechanical vapor recompression).
- 4 • Concentrate staging.
- 5 • Thin-film drying.
- 6 • Container handling.

7 The secondary treatment train creates a dry powder waste. The secondary waste treatment system usually
8 processes waste water from the primary treatment train. Sometimes, the Permittees feed liquid wastes to
9 the secondary treatment train before the primary treatment train.

10 The Permittees discharge the treated effluent from ETF to a state-approved land disposal site (SALD)
11 north of the 200 West Area. Washington State Waste Discharge Permit (ST-4500), the Final Delisting
12 (40 CFR 261, Appendix IX, Table 2), and the related state delisting action regulate this disposal. The
13 Permittees must confirm that the effluent meets the “delisting” criteria and the requirements in ST-4500.
14 If it does, it means the treated effluent is no longer a dangerous or hazardous waste.

15 The Permittees recycle some of the treated wastewater as service water. For example, it is used to dilute
16 bulk acid and caustic, and reduce the demand for process water.

17 The Permittees periodically remove sludge that accumulates in the bottoms of ETF process tanks and
18 place it in containers. The waste is then solidified by decanting the liquid from the container and adding
19 absorbents to ensure no free liquids remain in the waste

20 **TYPE AND QUANTITY OF WASTE**

21 LERF’s capacity is 29.5 million liters in each of the three basins, for a total of 88.5 million liters.

22 LERF and ETF treat a variety of mixed wastes. The wastes LERF and ETF manage come from:

- 23 • Process condensate from the 242-A Evaporator.
- 24 • Groundwater from pump-and-treat systems in Hanford’s 200 West Area.
- 25 • Water from the spent fuel storage basins at Hanford’s old reactors
- 26 • Laboratory waste from unused samples and sample analyses
- 27 • Leachates from landfills
- 28 • Other liquid mixed wastes and liquid non-dangerous wastes from Hanford cleanup and waste
29 management work.

30 The ETF primary treatment train removes or destroys dangerous and mixed waste components from the
31 aqueous waste. The ETF secondary treatment train concentrates and dries the waste components into a
32 powder. This waste is containerized, and then sent to an approved disposal location.

33 **Sources of Liquid Waste**

34 At first, 242-A Evaporator Process Condensate was the only mixed waste identified for storage and
35 treatment in LERF and ETF. The Permittees now use LERF and ETF for liquid wastes from other
36 cleanup work at Hanford.

37 In the 242-A Evaporator, the Permittees concentrate the Double-Shell Tank (DST) System waste through
38 evaporation. They return the concentrated slurry waste to the DST System. They re-condense the
39 evaporated portion of the waste, then collect and transfer it as process condensate to LERF. The process
40 condensate is a dangerous waste because it is derived from a listed, dangerous waste in the DSTs.

1 **BASIS FOR PERMIT CONDITIONS**

2 This permit is intended to protect human health and the environment while ensuring proper management
3 of waste at LERF and ETF. The permit addenda are incorporated into this permit and are enforceable by
4 reference.

5 The Department of Ecology bases the conditions and addenda for LERF and ETF on:

- 6 • The Hanford Facility Dangerous Waste Permit, Revision 8C.
- 7 • Permit modifications to Revision 8C of the permit.
- 8 • Comment resolution meetings with the Permittees.

9 The permit includes requirements for complying with environmental standards and maintaining and
10 modifying the permit. The permit conditions address specifics such as personnel training, adequate
11 staffing, process controls, and inspection requirements.

12 **GENERAL WASTE MANAGEMENT REQUIREMENTS**

13 The general waste management standards authorize and define requirements for the following actions at
14 LERF and 200 Area ETF:

- 15 • Accepting wastes.
- 16 • Treating and storing dangerous and mixed waste tanks, containers and surface impoundments.
- 17 • Maintaining the physical structure and configuration of the LERF/200 Area ETF.
- 18 • Recycling or reusing treated effluent within the 200 Area ETF treatment systems.
- 19 • General operating requirements not specific to tank systems, container management, or surface
20 impoundments. These include requirements for non-regulated systems such as chemical feed
21 systems, cooling water systems, etc. that are not directly regulated by the dangerous waste
22 regulations, but are required for and may affect compliant and protective operation of the
23 regulated dangerous waste management systems.
- 24 • Integrating the 200 Area ETF delisting and Conditions.
- 25 • Complying with land disposal restriction (LDR) treatment standards applicable to treated effluent.
- 26 • Preventive maintenance.

27 Condition III.3.B.1 authorizes the Permittees to accept dangerous and mixed waste for treatment. The
28 wastes must satisfy the waste acceptance criteria in Addendum B.

29 Condition III.3.B.2 authorizes the wastes already being managed in LERF and ETF, since the Permittees
30 have been operating the facility well before this permit reissue. The original Hanford permit covers
31 wastes now in the facility. Condition III.3.B.2 ensures continuity of operations between the expired and
32 re-issued permit.

33 Waste must sometimes be stored in tanks and containers at LERF and ETF. For example, the Permittees
34 sometimes store treated effluent before final verification sampling. They also sometimes store powdery
35 solids from the secondary treatment train.

36 Condition III.3.B.3 has specific requirements for storage and treatment in tanks, containers, and surface
37 impoundments, and Condition III.3.B.3.a authorizes the Permittees to treat and store wastes in tanks.
38 Addendum C Sections C.2 and C.4 define the specific tanks authorized and the types of waste
39 management allowed there.

40 Condition III.3.B.3.b authorizes the Permittees to treat and store wastes in containers at the ETF. This
41 condition authorizes container storage and treatment both within the process area and within the
42 designated container storage area. This approach gives the Permittees flexibility for ETF operations, such

1 as when removing sludge or ion exchange resins from tanks within the ETF treatment process. Ecology
2 allows this because the entire process for ETF has secondary containment.

3 Condition III.3.B.3.c limits treatment in containers to decanting free liquids and adding absorbents to treat
4 free liquids.

5 Condition III.3.B.3.d authorizes the Permittees to treat wastes in the LERF basins. Ordinarily, the LDR
6 program prohibits placement of waste in a regulated unit such as surface impoundments unless the wastes
7 have satisfied applicable LDR treatment standards. But 40 CFR 268.4 allows, under certain conditions,
8 treatment in surface impoundments of wastes that have not met LDR treatment standards. It requires the
9 Permittees to remove wastes and any settled or precipitated solids at least every year. The Permittees
10 cannot do this because the LERF basins have floating covers. Therefore, Condition III.3.B.3.d.2 requires
11 the Permittees to prevent solids from getting into the LERF basins by either filtering or sampling the
12 waste before transfer into the basins.

13 Dangerous waste may not be stored in a surface impoundment for more than five years [[WAC 173-303-
14 395\(5\)\(a\)](#)]. The owner/operator of a surface impoundment is exempt from the requirement to empty the
15 impoundment every five years if they can demonstrate that the impoundment is not being used primarily
16 for storage, but is primarily used to actively and effectively neutralize, detoxify, or otherwise treat
17 dangerous waste [[WAC 173-303-395\(5\)\(c\)](#)]. Ecology has determined that this exemption applies to the
18 LERF basins, since the basins provide treatment in the form of flow equalization and pH adjustment. The
19 state-only requirement in [WAC 173-303-395\(5\)](#) to remove waste every five years from the LERF basins
20 does not apply.

21 Condition III.3.B.4 requires the Permittees to maintain the physical structure of LERF and ETF as
22 described in Addendum C. The purpose of this condition is two-fold. First, this condition establishes a
23 baseline of the facility configuration for purposes of inspection and modification. The Permittees cannot
24 change the facility without authorization through a permit modification. Second, by setting this
25 condition, we find the unit's physical structures are in compliance with WAC 173-303. The
26 administrative record also documents this point.

27 Condition III.3.B.5 authorizes the Permittees to use treated effluent from ETF final verification tanks for
28 recycle and makeup purposes. This reduces the amount of water the Permittees must add to the ETF
29 treatment process. Here are some examples of equipment that uses the verification tank water:

- 30 • 4% H₂SO₄ solution tank and ancillary equipment.
- 31 • 4% NaOH solution tank and ancillary equipment.
- 32 • Clean-in-place tank and ancillary equipment.
- 33 • 200 Area ETF evaporator boiler and ancillary equipment.
- 34 • Thin film dryer boiler and ancillary equipment.

35 Treated effluent remains a listed dangerous waste until all final verification sampling and analysis is
36 completed. In some instances, the treated effluent has undergone all required treatment, but may not have
37 fully satisfied all delisting verification requirements. The effluent remains a listed dangerous waste. But
38 it is very unlikely the treated effluent would harm human health or the environment because the
39 Permittees recycle all the treated effluent it reuses back into the ETF process for treatment so there is no
40 potential for treated effluent the Permittees uses for recycle and makeup would be released to the
41 environment or exposed to workers. Therefore, Ecology authorizes the Permittees to reuse such treated
42 effluent to minimize fresh or raw water use. This is fully protective of human health and the
43 environment.

1 Condition III.3.B.6 governs operation and maintenance of the 200 Area ETF Monitor and Control
2 System. The permit application and Addendum C document how to operate and maintain the system.
3 The Permittees must operate the system in compliance with conditions to protect human health and the
4 environment.

5 Conditions III.3.B.7 through 11 ensure full integration of the permit with the state and federal delisting
6 actions and the state discharge permit for treated effluent. The basis for these conditions is omnibus
7 authority to protect human health and the environment. Ecology uses this to ensure that treated effluents
8 resulting from the unit's operations under the permit will fully satisfy the delisting and discharge
9 requirements outside of the permit. Otherwise, it is possible that treated effluent would satisfy permit
10 requirements but not the delisting or discharge requirements, so there would be no viable disposal
11 pathway.

12 Condition III.3.B.11 is also based on [WAC 173-303-140](#), LDR requirements. This regulation ensures
13 treated effluents satisfy LDR treatment standards as well as delisting and state discharge permit
14 requirements.

15 **WASTE ANALYSIS REQUIREMENTS**

16 Conditions III.3.C.1 through III.3.C.5 require the Permittees to follow the waste analysis plan (WAP) in
17 Addendum B for all sampling and analysis. It also requires the Permittees to keep records as called for in
18 WAC 173-303-380. The WAP defines all sampling and analysis requirements for:

- 19 • Managing wastes in the LERF.
- 20 • Treatment and storage in 200 Area ETF tank systems.
- 21 • Storage of containerized wastes.
- 22 • The treated effluent discharged as a non-dangerous, delisted waste to the State-Approved Land
23 Disposal Site (SALDS).

24 **RECORDKEEPING AND REPORTING**

25 The basis of Condition III.3.D.1 is [WAC 173-303-380](#) and [WAC 173-303-810](#)(6). These regulations
26 define the recordkeeping and reporting requirements.

27 **SECURITY**

28 LERF and 200 Area ETF are within the secured area of Hanford. Access to the operating area of the
29 facility is subject to the security provisions of Attachment 3, Condition II.L, Condition III.3.E, and
30 Addendum E. These requirements fully satisfy [WAC 173-303-310](#).

31 **PREPAREDNESS AND PREVENTION**

32 Condition III.3.F.1, and Addendum F cover LERF and ETF preparedness and prevention requirements,
33 which are based on [WAC 173-303-340](#). The Permittees must store incompatible wastes in approved
34 separate secondary containment to prevent mixing.

35 **CONTINGENCY PLAN**

36 Contingency plan requirements are in Conditions II.A, III.3.G, and Addendum J.

37 **INSPECTIONS**

38 Condition II.X, Condition III.3.H, and Addendum I address inspections. Condition II.X requires the
39 Permittees to establish a written inspection schedule and inspect the unit per this schedule.
40 [[WAC 173-303-320](#)(2)(a)-(c)] Addendum I has a written schedule for inspecting monitoring, safety,
41 emergency, and security equipment. The inspections are to detect and prevent malfunctions,
42 deterioration, operator error, or discharges from the unit that could harm human health or the
43 environment.

1 Condition II.X also requires the Permittees to correct problems these inspections find. [required under
2 [WAC 173-303-320\(3\)](#)]. The basis for overall inspection recordkeeping requirements is [WAC 173-303-](#)
3 [320\(2\)\(d\)](#).

4 **TRAINING**

5 The Permittees must have written training plan to ensure employees have the skills and knowledge they
6 need to do their work safely. The Permittees must maintain the training requirements in Addendum G in
7 a training plan prepared according to Condition II.C.1. The training program and written training plan
8 must meet the requirements of [WAC 173-303-330](#).

9 **OTHER GENERAL REQUIREMENTS**

10 Since LERF and ETF manage only liquid wastes, the potential for accidental ignition slight. Condition
11 III.3.J requires the Permittees to comply with [WAC 173-303-395\(1\)](#) for management of ignitable or
12 reactive wastes. Permittees must take precautions to prevent risks from any reactive or ignitable wastes.
13 The Permittees must comply with all other environmental protection laws and regulations through
14 Condition II.Q.

15 **CLOSURE**

16 The closure plan in Addendum H complies with [WAC 173-303-610\(2\)](#) and is based on clean closure.
17 Condition III.3.K and Addendum H, call for the Permittees to clean close the LERF and 200 Area ETF by
18 removing dangerous waste contamination resulting from treatment and storage this permit authorizes.

19 The Permittees will close LERF and ETF after their projected 30-year active life. LERF will be closed
20 first. If clean closure is not possible, the Permittees will submit a modified closure plan to Ecology. The
21 revised plan must address required post-closure activities according to Condition II.J.2.

22 The LERF basins are not intended to close with waste in place. The basins meet the technical standards
23 of [WAC 173-303-650\(2\)\(a\)\(i\)](#), so no contingent post-closure plan is required. While the liner systems
24 and the leachate collection systems are expected to prevent the release of any dangerous waste or
25 dangerous constituents to underlying soils, the Permittees must examine liners and sample the underlying
26 drainage layer to verify the liners did not fail and did not release dangerous waste or dangerous
27 constituents to the ground.

28 The Permittees will leave uncontaminated structures for future use, or disassemble, dismantle, and
29 remove them for disposal. Uncontaminated equipment and structures could include

- 30 • Liquid makeup.
- 31 • HVAC and piping.
- 32 • Steam condensate and cooling water piping.
- 33 • The control room and office areas.

34 **CONTAINER MANAGEMENT STANDARDS**

35 Conditions in III.3.O apply to container management and generally follow the requirements of [WAC 173-](#)
36 [303-630](#). They either incorporate by reference the WAC regulations, closely parallel those requirements,
37 or refer to applicable sections of Addendum C.

38 Condition II.3.O.1 incorporates Addendum C requirements to ensure secondary containment prevents
39 spills or releases to the environment. The bases for container management requirements in Conditions
40 III.3.O.2.a-d are [WAC 173-303-630\(2\)](#), (3), (4), (5) and (9). Condition III.3.O.2.e authorizes limited
41 forms of treatment that will not threaten human health or the environment. Condition III.3.O.2.f requires
42 the Permittees to remove any accumulated liquids from container storage areas in 200 Area ETF to ensure
43 containers are not in contact with free liquids.

1 The permit has no conditions based on WAC 173-303-630(8), since the container management area in
2 ETF is not expected to manage ignitable or reactive wastes, and the waste analysis plan in Addendum B
3 prohibits acceptance of ignitable or reactive wastes.

4 The Permittees may manage both mixed and non-mixed wastes in the container management area of ETF.
5 Therefore, Condition III.3.O.2.g requires the Permittees to comply with the Subpart CC rules for organic
6 air emissions from containers. The Permittees can satisfy these requirement either through Level 1
7 controls or by keeping sealed lids on containers at all times except when adding or removing wastes from
8 containers.

9 **TANK MANAGEMENT STANDARDS**

10 Conditions in III.3.P for tank management generally follow [WAC 173-303-640](#). They incorporate WAC
11 regulations by reference, or closely parallel those requirements, or refer to applicable sections of
12 Addendum C.

13 The basis of Conditions III.M.1.a and b is [WAC 173-303-640](#)(2). Through Condition III.M.1.c Ecology
14 also requires the Permittees to update the integrity assessment program Condition III.M.1.a requires
15 whenever circumstances contradict or cast in doubt the initial integrity assessment program.

16 The administrative record for this draft permit shows the Permittees have discovered unexpected pit
17 corrosion in the Load-in Tanks. Based on this, Ecology requires the Permittees to update the integrity
18 assessment program to prevent unexpected corrosion and possible vessel failure. The basis for Condition
19 III.3.P.1.c is the omnibus authority of [WAC 173-303-815](#)(2)(b)(ii) to protect human health and the
20 environment.

21 Condition III.3.P.2 includes the 200 Area ETF tank system operating requirements under [WAC 173-303-](#)
22 [640](#)(5), (7), (9), and (10).

23 **SURFACE IMPONDMENT STANDARDS**

24 Conditions III.3.Q.1 through 14 address the surface impoundment requirements in [WAC 173-303-650](#) and
25 [WAC 173-303-692](#). Ecology is not establishing any conditions based on [WAC 173-303-650](#)(9), since the
26 LERF basins are not authorized to receive F020, F021, F022, F023, F026 or F027 dioxin-containing
27 wastes.

28 **GROUNDWATER MONITORING**

29 The operational history of the LERF basins supports a conclusion that there have not been releases to the
30 environment, including the groundwater, from the LERF basins. This conclusion is supported by the
31 existing, albeit incomplete, groundwater monitoring record. The record does not provide statistically
32 significant evidence of contamination of the uppermost aquifer underneath the LERF basins. Therefore,
33 Ecology is establishing a detection monitoring program pursuant to [WAC 173-303-645](#)(2)-(12). Specific
34 elements of the detection monitoring program, and the basis for them, are documented in Addendum D.

35 The LERF groundwater monitoring network consists of four existing wells and recently completed a fifth
36 well. The groundwater monitoring plan requires sampling of the four existing wells and the newly
37 completed fifth well for basic groundwater chemistry parameters and dangerous constituents. The
38 Permittees will review the adequacy of the groundwater monitoring constituents each year. The factors to
39 be considered in the review include:

- 1 • The concentration and total quantity of each constituent accepted for management in the LERF
2 basins.
3 • The environmental fate and transport of each constituent.
4 • The analytical detectability of each constituent.

5 **REQUESTED VARIANCES OR ALTERNATIVES**

6 There are no requested variances or alternatives for LERF and 200 Area ETF.

7 **STATE ENVIRONMENTAL POLICY ACT (SEPA)**

8 The SEPA determination for the LERF and 200 Area ETF is in the Hanford-Wide Permit Fact Sheet.
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