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ADDENDUM H
CLOSURE

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ADDENDUM H

CLOSURE

1
2
3 H CLOSURE..... H.1
4 H.1 Closure Plan H.1
5 H.2 Closure Performance Standard..... H.1
6 H.2.1 Closure Standards for Tanks H.2
7 H.2.2 Closure Standards for Piping and Ancillary Equipment H.2
8 H.2.3 Closure Standards for Underlying Soils H.2
9 H.3 Closure Activities..... H.3
10 H.3.1 General Closure Activities H.3
11 H.3.2 Constituents of Concern for Closure for 242-A Evaporator H.3
12 H.3.3 Decontaminating Structures, Equipment, and Soils H.3
13 H.3.4 Tanks H.3
14 H.3.5 Internal and/or External Piping and Ancillary Equipment..... H.4
15 H.3.6 Concrete/Liner..... H.4
16 H.3.7 Structures..... H.5
17 H.3.8 Underlying Soils..... H.5
18 H.4 Maximum Waste Inventory..... H.6
19 H.5 Closure of Tanks H.6
20 H.6 Schedule for Closure H.6
21
22

DRAFT

1
2
3

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1 **H CLOSURE**

2 This chapter describes the planned activities and performance standards for closing the 242-A Evaporator.
3 Final closure will begin when the 242-A Evaporator and 222-S Complex complete their mission of
4 supporting single-shell tank (SST) system retrieval and closure and optimization of double-shell tank
5 (DST) System storage space and waste feed.

6 **H.1 Closure Plan**

7 The 242-A Evaporator shall be clean closed with respect to dangerous waste contamination that resulted
8 from operation as a TSD unit. To facilitate closure, the 242-A Evaporator is being viewed as consisting
9 of six components: tanks, ancillary equipment, piping, concrete floors/liners, structures, and underlying
10 soil. Only areas that have treated, stored, or handled dangerous waste will undergo closure activities.
11 Contaminated equipment, tanks, and piping removed from the 242-A Evaporator shall be considered
12 "debris" as defined in [WAC 173-303-040](#) and transported to an appropriate onsite dangerous waste
13 management unit, other onsite approved disposal facility, or offsite permitted disposal facility for final
14 disposition. Uncontaminated structures will be left for future use or disassembled, dismantled, and
15 removed for disposal. Uncontaminated equipment and structures may include areas such as the aqueous
16 makeup, HVAC and piping, steam condensate and cooling water piping, the control room, change rooms
17 and administrative/office areas.

18 The pipes located west and north of the 242-A Evaporator, which connect to A Farm and AW Farm, are
19 in the same bundles with pipes used for transfers between tanks in the Double Shell Tank (DST) System.
20 These pipes shall be closed under the DST System Closure Plan.

21 Clean closure will require decontamination or removal and disposal of all dangerous waste, waste
22 residues, contaminated equipment, soil, or other material established in accordance with the clean closure
23 performance standards of [WAC 173-303-610\(2\)](#). This and future closure plan revisions shall provide for
24 compliance with the required closure performance standards. All work shall be performed according to
25 ALARA with respect to worker exposure to dangerous and/or any other workplace hazards. Activities
26 that are planned to achieve clean closure are presented in the following sections.

27 To clean close the 242-A Evaporator, it will be demonstrated that dangerous waste has not been left onsite
28 at levels above the closure performance standard for removal and decontamination. If it is determined
29 that clean closure is not achievable, the closure plan will be modified to address required post closure
30 activities. [[WAC 173-303-610](#)]

31 **H.2 Closure Performance Standard**

32 Closure by removal or decontamination as provided for in this plan based on the requirements of [WAC](#)
33 [173-303-610\(2\)](#), will eliminate future maintenance and will be protective of human health and the
34 environment by removing or reducing contamination at the 242-A Evaporator to levels that are below
35 concern with respect to human health and the environment.

36 This closure plan proposes use of a 'clean debris surface' (defined in the following paragraph) as the clean
37 closure performance standard for the metal surfaces, and concrete that will remain after closure. Clean
38 closure decontamination standards for structures, equipment, bases, liners and metals, will be those
39 specified for hazardous debris in [40 CFR 268.45](#), Table 1. The 'clean debris surface' will be the
40 performance standard for metal and concrete surfaces. This standard is consistent with Ecology guidance
41 (*Guidance for Clean Closure of Dangerous Waste Units and Facilities*, Ecology Publication #94-111,
42 May 2005) for achieving clean closure.

43 Attainment of a 'clean debris surface' will be verified by a visual inspection in accordance with the clean
44 debris surface standard:

45 After closure, the appearance of the land where the 242-A Evaporator is located will be consistent with
46 the appearance and future use of the surrounding land areas. This closure plan proposes to leave clean

1 structures and equipment in place after closure for potential future operations. This need shall be
2 evaluated at the time of closure. Some unit equipment such as pumps, filters, and pipes may not be
3 sufficiently visible for in-place contamination evaluation and waste designation. Equipment that cannot
4 be designated in-place must be removed and then designated. Any waste disposed of during closure
5 activities will meet the waste acceptance criteria for the accepting facility.

6 **H.2.1 Closure Standards for Tanks**

7 Using water, the 242-A Evaporator's tank system shall be flushed and decontaminated. The rinsate shall
8 be sampled and analyzed. Results of the analysis with less than designation limits for the constituents of
9 concern shall be accepted as indicating that the tanks are clean with respect to dangerous waste residues.
10 An alternative to decontaminating the tanks is to remove and dispose of the tanks. Any waste disposed of
11 during closure activities will meet the waste acceptance criteria for the accepting facility.

12 **H.2.2 Closure Standards for Piping and Ancillary Equipment**

13 The internal and/or external piping of 242-A Evaporator will be flushed and drained as part of closure.
14 When practical, ancillary equipment, which has contacted dangerous waste shall also be flushed and
15 drained. For piping and ancillary equipment where the contaminated surfaces can be inspected, an
16 inspection will be performed to see if the piping meets the clean debris surface standard in [40 CFR 268.45](#)
17 incorporated by reference by WAC 173-303-140, and can be declared non-dangerous in accordance with
18 [WAC 173-303-071\(3\)\(qq\)](#). If it is not possible to inspect the contaminated surfaces or meet the clean
19 debris surface performance standard, the particular piping of concern will be removed, designated, and
20 disposed of accordingly. Note that for the 242-A Evaporator, when piping lines leave the 242-A
21 Evaporator structure, they become part of the DST system with the exception of the PC 5000 transfer line.
22 The PC 5000 transfer line is part of the 242-A Evaporator up to the external fence lines, where it then
23 becomes part of the LERF/ETF system.

24 Dangerous and/or mixed-waste materials generated during closure activities shall be managed in
25 accordance with [WAC 173-303-610\(5\)](#). Removal of any dangerous wastes or dangerous constituents
26 during partial or final closure shall be handled in accordance with applicable requirements of
27 [WAC 173-303-610\(5\)](#).

28 **H.2.3 Closure Standards for Underlying Soils**

29 Clean closure of soil under the 242-A Evaporator shall be accomplished by demonstrating that the coated
30 concrete floor and stainless steel liners, kept contaminants from reaching the soil. The coated concrete
31 and liners provided secondary containment for all the tanks, process piping, and ancillary equipment
32 within the building. Unless inspections identify potential through-thickness cracks indicating
33 containment failure and a subsequent potential for soil contamination from 242-A Evaporator unit
34 operations, the soil will be considered clean closed. However, if inspections identify such cracks, and
35 there have been documented spills in the vicinity, potential soil contamination shall be investigated. Soils
36 shall be sampled and analyzed for constituents of concerns according to the sampling and analysis plan.
37 If the soil analytical results determine that the constituents of concern are at or below the levels in [WAC](#)
38 [173-303-610\(2\)\(b\)\(i\)](#), or background levels in the Hanford soil if background is greater, the soil will be
39 considered clean closed. If the constituents of concern exceed background levels, the soil will be closed
40 per the standards of [WAC 173-303-610\(2\)\(b\)](#).

41 A sampling and analysis plan shall be prepared following the completion of a data quality objectives
42 process in accordance with EPA/600/R-96/055 (QA/G-4), *Data Quality Objectives Process*, as amended.
43 The data quality objectives process will be initiated prior to closure on a schedule to ensure timely closure
44 of the 242-A Evaporator. The sampling and analysis plan will be submitted to Ecology as part of a permit
45 modification request meeting the requirements of [WAC 173-303-830](#). The sampling and analysis plan
46 will be prepared consistent with EPA/240/B-01/003 (EPA/QA R-5), *EPA Requirements of Quality*
47 *Assurance Project Plans*, as amended.

1 H.3 Closure Activities

2 At the time of closure, removal and disposal of most of the components will be determined and the
3 closure plan will be modified as necessary to reflect current regulations and information. If it is
4 determined that clean closure is not possible, the closure plan will be modified to address required post-
5 closure activities in accordance with [WAC 173-303-610](#) and [WAC 173-303-830](#).

6 H.3.1 General Closure Activities

7 Closure of the 242-A Evaporator will include removal of accumulated liquid waste (i.e., liquid remaining
8 from evaporator campaigns) by transferring the waste to the DST System and/or LERF. After the waste
9 has been removed, clean closure of the tanks, process equipment, the piping, concrete/liners, and the
10 structures will be accomplished by decontaminating the components, if required and demonstrating that
11 clean closure performance standards are met in accordance with [WAC 173-303-610](#). Clean closure of the
12 soil shall be accomplished by demonstrating that the concrete and liners kept the contaminants from
13 reaching the soil.

14 Equipment or materials (personnel protective equipment, steam cleaners, etc.) used in performing closure
15 activities will be decontaminated or disposed of at an onsite and/or offsite facility.

16 H.3.2 Constituents of Concern for Closure for 242-A Evaporator

17 Based on process knowledge and the risk to human health and the environment, the constituents of
18 concern for closure will be selected from the list of dangerous waste numbers in the Part A Form and
19 process history through the data quality objective process.

20 H.3.3 Decontaminating Structures, Equipment, and Soils

21 Before closure activities begin, all waste inventories shall be removed and transferred to an appropriate
22 onsite and/or offsite facility. To facilitate closure, tanks, internal and/or external piping, ancillary
23 equipment, concrete floors/liners, structures, and soil directly beneath the structure shall be as necessary,
24 to demonstrate that the clean closure performance standards are met.

25 H.3.4 Tanks

26 In accordance with [WAC 173-303-640](#)(8) at closure all pumpable waste will be removed from the interior
27 of the tanks, including the internal components such as the process condensate agitator. Both interior and
28 exterior tanks surfaces will be decontaminated by flushing or spraying with steam, a water-soluble
29 cleaner, or other Ecology approved method, or removed as debris and disposed appropriately.

30 If the tanks are decontaminated, the tanks will be inspected visually for compliance with the clean debris
31 surface standard ([40 CFR 268.45](#), incorporated by reference in [WAC 173-303-140](#)). If any areas are
32 found not to meet the clean debris surface performance standard, these areas will be decontaminated
33 in-place. Per the debris rule, only removal of contaminants from the surface layer is necessary for metal
34 surfaces. Contamination shall be removed as specified in [40 CFR 268.45](#), Table 1, incorporated by
35 reference in [WAC 173-303-140](#).

36 If the decontamination option is used, the outside of the tanks also shall be inspected for compliance to
37 the clean debris surface standard. Any areas found not to meet this performance standard shall be
38 decontaminated in place. Contamination will be removed from the surface layer using any of the methods
39 described for internal tank decontamination as specified in *Alternate Treatment Standards for Hazardous*
40 *Debris* ([40 CFR 268.45](#), incorporated by reference in [WAC 173-303-140](#)). Before using decontamination
41 solutions on the outside of the tanks, the floor shall be inspected for cracks or other openings that could
42 provide a pathway to soil. This inspection shall be performed as described in Section H.2 of this chapter
43 in conjunction with mapping of potential through-thickness cracks. The cracks shall be sealed before
44 beginning treatment or other engineered containment devices (e.g., collection basins) shall be used to
45 collect and contain solutions.

1 Any waste and/or residues generated during decontamination activities shall be collected, designated, and
2 disposed of accordingly. If it is not possible to meet the closure by removal or decontamination (clean
3 closure) performance standard, contaminated portions of the tanks shall be removed, designated, and
4 disposed of in accordance with [40 CFR 268](#), incorporated by reference by [WAC 173-303-140](#) as
5 appropriate. The inspections for a clean debris surface will be documented on an inspection record.

6 **H.3.5 Internal and/or External Piping and Ancillary Equipment**

7 The internal piping and ancillary equipment for the 242-A Evaporator will be flushed and drained as part
8 of closure. For piping and ancillary equipment where the contaminated surfaces can be inspected, an
9 inspection will be performed to see if the piping and ancillary equipment meets the clean debris surface
10 standard in [WAC 173-303-140](#), adopted by reference from [40 CFR 268.45](#) and can be declared non-
11 dangerous. If it is not possible to meet the clean debris surface standard or the piping cannot be
12 inspected, portions of the internal piping and ancillary equipment shall be removed, designated, and
13 disposed of as dangerous waste.

14 External piping (transfer lines) and ancillary equipment between 242-A and LERF consists of below
15 grade and above grade piping. Below grade piping will be dispositioned at closure either by removal,
16 designation and disposal in accordance with [WAC 173-303-610\(5\)](#) and [40 CFR 268](#) or closed in
17 accordance with another Ecology approved process. For above grade piping, it shall be dispositioned
18 consistent with the provisions for internal piping.

19 Rinsate from the external piping and internal piping shall be processed through ETF. Details regarding
20 the process for rinsing any internal and external piping and ancillary equipment will be provided in the
21 closure plan in accordance with [WAC 173-303-610\(3\)\(a\)\(v\)](#) upon modification . Removal of any
22 dangerous wastes or dangerous constituents during partial or final closure shall be handled in accordance
23 with applicable requirements of [WAC 173-303-610\(5\)](#).

24 If the performance standards are not met, the interior surfaces will be cleaned using an appropriate
25 decontamination method and the method repeated until the surfaces meet the clean closure performance
26 standard.

27 The 207-A pump pit, located east of the 242-A Evaporator, shall be closed using the performance
28 standards for pipes and concrete (e.g., [WAC 173-303-610\(5\)](#) and [40 CFR 268.45](#), Table 1). A visual
29 inspection will be performed. If the interior surfaces meet the performance standards (clean debris
30 surface), the 207-A pump pit will be considered clean closed.

31 **H.3.6 Concrete/Liner**

32 The coated concrete floor and the pump room sump liner provide secondary containment for all the tanks,
33 process piping, and ancillary equipment. All concrete and liners shall be inspected visually and surveyed
34 radiologically before any decontamination. The purpose of the inspection will be twofold: to identify
35 and map any cracks in the concrete that might have allowed contaminants a pathway to the soil below and
36 to identify areas that potentially are contaminated with dangerous waste or dangerous waste residues. The
37 inspection standard will be a clean debris surface as defined in Section H.2. The inspection of the
38 concrete for a clean debris surface shall be documented on an inspection record. Those areas already
39 meeting the standard shall be clean closed as is.

40 Those potentially contaminated areas shall undergo decontamination to meet the clean closure standard of
41 a clean debris surface. The concrete shall be washed down; the rinsate collected, designated, and
42 disposed of accordingly. The concrete will be re-inspected for a clean debris surface. Concrete surfaces
43 indicated by visual examination, as potentially still being contaminated will have the surface layer
44 removed to a depth of 0.6 centimeter by scabbling or other approved methods. This will not threaten the
45 environment, even if potential through-thickness cracks had been found during the inspection, because
46 concrete decontamination (scabbling) will not employ liquid solutions that could enter cracks and because
47 scabbling residues will be vacuumed away from cracks as any residue is generated.

1 Achievement of a clean debris surface shall be documented on an inspection record. Decontamination
2 residues will be collected, designated, and managed as dangerous waste. Decontamination of concrete, per
3 the 'debris rule' is based on a physical extraction method [[40 CFR 268.45](#), Table 1]. The performance
4 standard is based on removal of the contaminated layer of debris. The physical extraction performance
5 standard for concrete is removal of 0.6 centimeter of the surface layer and treatment to a clean debris
6 surface.

7 **H.3.7 Structures**

8 If contaminated with either dangerous or mixed waste constituents, structures will be decontaminated
9 and/or disassembled, if necessary, packaged, and disposed in accordance with existing land disposal
10 restrictions. [[WAC 173-303-140](#)]

11 Closure steps may include but not limited to the following activities:

- 12 • Containerize (as necessary and practicable) and remove any remaining waste.
- 13 • Review operating records for spillage incidents and visually inspect area surfaces for evidence of
14 contamination or for cracks that could harbor contamination or allow the escape of decontamination
15 solutions. Inspect storage area surfaces for visible evidence of contamination (e.g., discoloration,
16 material degradation, wetness, and odor). If contamination is evident, the affected area(s) will be
17 decontaminated.
- 18 • Decontaminate walls and floors to minimize the potential for loose contamination and to facilitate any
19 required radiation surveys and/or chemical field screening. Wash down could be by water rinse or
20 high-pressure, low-volume steam cleaning coupled with a detergent wash. After decontamination, the
21 building walls and floor will be compared to closure performance standards.
- 22 • Collect rinsate and manage as dangerous waste for appropriate disposal.
- 23 • Secure (lock) personnel entries into building and post doors with appropriate warning signs.

24 Clean closure of structures will occur in accordance with [WAC 173-303-610](#). Remediation of soil
25 contamination beneath or around containment buildings shall be performed in conjunction soil closure
26 requirements.

27 **H.3.8 Underlying Soils**

28 Clean closure of soil under the 242-A Evaporator shall be accomplished by verifying that the coated
29 concrete floor and stainless steel liners kept contaminants from reaching the soil. The coated concrete
30 floor provided secondary containment for all the tanks, process piping, and ancillary equipment. Unless
31 inspections identify potential through-thickness cracks indicating containment failure and a subsequent
32 potential for soil contamination from 242-A Evaporator operations, the soil shall be considered clean
33 closed. However, if inspections identify such cracks, and there have been documented spills in the
34 vicinity, potential soil contamination shall be investigated. This verification will consist of several key
35 steps as follows:

- 36 • Review inspection records in the 242-A Evaporator section of the Hanford facility operating
37 record to evaluate the significance of any cracks or conditions that may previously have
38 compromised the integrity of the floor or liners.
- 39 • Review overall unit-specific operating records, Independent Qualified Registered Professional
40 Engineer (IQRPE) Integrity Assessment Report, log books and operating round sheets.
- 41 • Inspect all coated floors and stainless steel liners serving as secondary containment for 242-A
42 Evaporator dangerous waste management units for the presence of through-thickness cracks or
43 other conditions that might compromise integrity of the floor or liners.
- 44 • Review records of any spills and the corresponding spill cleanup reports associated with 242-A
45 Evaporator dangerous waste management units to ensure that any cleanup was sufficient to
46 satisfy the closure performance standard documented in Section H.2.

1 Where it is possible to perform a visual inspection beneath the tanks, a visual inspection shall be
2 performed. Where it is not possible to inspect visually beneath the tanks, an evaluation of the tank
3 integrity shall be made. The condition of the tank shall be evaluated to determine if there was any
4 potential for leakage. If no cracks, severe corrosion, or evidence of leaks is observed, it will be reasoned
5 that mixed or dangerous waste solutions could not have penetrated to the soil directly below the tank.

6 **H.4 Maximum Waste Inventory**

7 The 242-A Evaporator is used to treat mixed waste from the DST System by removing water and most
8 volatile organics. Two waste streams leave the 242-A Evaporator following the treatment process. The
9 first waste stream, the concentrated slurry (in which approximately half the water content is removed and
10 a portion of the volatile organics), is pumped back into the DST System. The second waste stream,
11 process condensate (containing a portion of the volatile organics removed from the mixed waste during
12 the evaporation process), is routed through condensate filters before being transferred to LERF. The
13 242-A Evaporator is used to treat up to 870,642 liters of mixed waste per day.

14 Tank C-100 receives process condensate and potentially contaminated drainage from the vessel vent
15 system. The maximum design capacity for the C-100 tank is 67,380 liters.

16 Vapor-liquid separator, C-A-1, is located in the evaporator room and is used to separate vapor from the
17 boiling slurry solution and deentrain liquid from the vapor before it enters the condensers in the condenser
18 room. The maximum design capacity of C-A-1 is 103,217 liters.

19 **H.5 Closure of Tanks**

20 Clean closure of 242-A Evaporator will consist of the removal and disposal of all dangerous waste and
21 the decontamination and/or removal and disposal of contaminated equipment, including tanks.

22 **H.6 Schedule for Closure**

23 Closure of 242-A Evaporator is not anticipated to occur within the next 15 to 20 years. The actual date of
24 last receipt of waste that triggers the notice of closure requirements in [WAC 173-303-610\(3\)\(c\)](#) will
25 depend on the time required for current waste to be processed and what role the 242-A Evaporator will
26 play in processing additional waste generated during future activities in the 200 Areas. Other factors
27 affecting the last receipt of waste include changes in operational requirements, lifetime extension
28 upgrades, and unforeseen factors. When a final closure date is established, a revised closure plan that
29 includes a detailed closure schedule shall be submitted to Ecology in accordance with [WAC 173-303-](#)
30 [610\(3\)\(a\)\(vii\)](#).

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