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**ADDENDUM H
CLOSURE PLAN**

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ADDENDUM H
CLOSURE PLAN

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1 **H CLOSURE**

2 This addendum describes the planned activities and performance standards for closing Dangerous Waste
3 Management Units (DWMUs) at T-Plant.

4 **H.1 Closure Plan**

5 T-Plant consists of the dangerous waste management units (DWMUs) where dangerous and mixed waste
6 is treated or stored in containers, tanks, containment buildings, and miscellaneous units. Refer to
7 Addendum C for the DWMU locations and descriptions.

8 Closure of the T-Plant Dangerous Waste Management Units (DWMUs) may proceed independently of
9 one another. The closure approach will be closure by removal or decontamination (“clean close”) as
10 required by [WAC 173-303-610](#)(2) and unit specific requirements with the exception of the DWMUs that
11 are located within the 221-T Canyon Building: 221-T Canyon Deck (S01 and S06), 221-T Tank System
12 (S02), and the 221-T Cells (S06). When the 221-T Canyon Building is closed, the Tri-Party Agreement
13 (Attachment 1) is anticipated to contain a milestone related to a past practice and TSD unit disposition
14 similar to what has been established for B Plant and PUREX. Post closure requirements for DWMUs
15 outside the 221-T Canyon Building are not anticipated, as clean closure is expected to be obtained. Post-
16 closure requirements for DWMUs in the 221-T Canyon Building may be required. The Permittees will
17 submit a permit modification to amend Addendum H to coincide with coordination activities with past
18 practice disposition under the Tri-Party Agreement.

19 Records of the DWMUs in the T-Plant Complex identify the materials stored, as well as records of any
20 spills, releases, and related cleanups at T-Plant dangerous waste management units. The permit
21 conditions authorizing storage of containerized waste at T-Plant DWMUs help ensure that spills or
22 releases will not occur. Should spills or releases occur, permit conditions ensure that they are cleaned up
23 and documented in compliance with the final closure performance standards.

24 Dangerous waste management units at T-Plant will be closed by removal or decontamination with respect
25 to dangerous waste contamination that resulted from operations. If it is determined that closure by
26 removal or decontamination is not possible, the closure plan will be modified in accordance with Permit
27 Condition II.J.2 to address closure of the affected unit (s) as a landfill and post-closure activities including
28 groundwater monitoring.

29 Uncontaminated or decontaminated structures and equipment will be left in place for future use, or
30 disassembled, dismantled, and removed for disposal. Decisions regarding disposal or future use of
31 equipment and structures will be made at the time of closure. Equipment and structures subject to
32 requirements of this closure plan include those that have been used for the treatment and/or storage of
33 dangerous or mixed waste, or which may reasonably be expected to be or have been contaminated by
34 dangerous or mixed waste.

35 221-T Building cells, in which treatment, storage, or disposal of dangerous/mixed waste did not occur, are
36 not subject to the requirements of this closure plan.

37 **H.2 Closure Performance Standard**

38 Closure by removal or decontamination requires the decontamination or removal and disposal of all
39 dangerous waste, waste residues, contaminated equipment, soil or other material established in
40 accordance with the removal or decontamination performance standards established in this closure plan
41 pursuant to [WAC 173-303-610](#)(2). This and future closure plan revisions will document closure
42 activities necessary to achieve compliance with these performance standards.

43 Closure by removal or decontamination, based on the requirements established in this closure plan
44 pursuant to [WAC 173-303-610](#)(2), will eliminate the need for future maintenance and will be protective
45 of human health and the environment by removing and reducing the chemical contamination (resulting
46 from operations) at T-Plant DWMUs to levels that are below concern with respect to human health and
47 the environment.

1 Clean closure of soils underlying the structures and soils surrounding the outdoor storage area will be
2 accomplished by demonstrating that there are no pathways for dangerous waste to the underlying soils.
3 Operating records will be checked to verify that cleanup of any spills within the WRAP dangerous waste
4 management units was performed, and that these cleanups satisfied the closure performance standards at
5 the time of the cleanup.

6 Clean closure will be to standards specified in this closure plan pursuant to [WAC 173-303-610\(2\)\(b\)\(ii\)](#)
7 for all structures, equipment, floors, containment area, sumps, liners, grates, storage pads, etc. Except for
8 the asphalt surface located at the 2706-T Asphalt Pad, the performance standard for structures, equipment,
9 bases, liners, etc, will be a clean debris surface in 40 CFR 268.45, Table 1, Footnote 3, incorporated by
10 reference in [WAC 173-303-140\(2\)](#). For equipment, a closure performance standard of removal or
11 disposal can be applied. For the asphalt surface area identified above, the closure performance standard
12 will be removal of the asphalt surface, treatment as necessary, and disposal.

13 Although not anticipated, any contaminated soils will be subject to numeric cleanup levels in [WAC 173-](#)
14 [303-610\(2\)\(b\)\(i\)](#). If contaminated soils are encountered, or if it is not possible to demonstrate there are no
15 pathways for dangerous wastes or constituents to underlying soils, this circumstance will be considered an
16 unexpected event for closure requiring a modification to the plan pursuant to Permit Condition II.J.2.

17 Any previously designated dangerous/mixed waste or debris removed from T-Plant permitted storage will
18 be managed in accordance with this Permit. Newly or generated dangerous/mixed waste from
19 decontamination or removal efforts will be designated in accordance with [WAC 173-303-070](#) through -
20 100 and managed accordingly.

21 **H.2.1 Closure Standards for Metal Surfaces, Tanks, Concrete**

22 This closure plan proposes the use of a 'clean debris surface' (defined in the following paragraph) as the
23 clean closure performance standard for metal surfaces, tanks, and concrete surfaces that will remain after
24 closure. This approach is consistent with Ecology guidance for achievement of clean closure (Publication
25 #94-111, Ecology 2005).

26 The clean debris surface standard is verified visually. *“A clean debris surface means the surface, when
27 viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except
28 residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations
29 and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and
30 soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area”*
31 [[40 CFR 268.45](#)].

32 Metal surfaces, except piping, requiring decontamination based on visual examination will be
33 decontaminated using an appropriate physical or chemical extraction technology from the alternative
34 treatment standards for hazardous debris [[40 CFR 268.45](#), incorporated by reference by [WAC 173-303-](#)
35 [140](#)]. Piping will be rinsed to achieve a clean debris surface.

36 When a physical extraction method is used on concrete, the performance standard is based on removal of
37 the contaminated layer of debris. The physical extraction performance standard for concrete is removal of
38 0.6 centimeter of the surface layer and treatment to a clean debris surface.

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

40 The internal and external piping of the 2706-T Tank System that has contacted dangerous waste will be
41 flushed and drained as part of closure. When practical, ancillary equipment, which has contacted
42 dangerous waste will also be flushed and drained. For piping and ancillary equipment where the
43 contaminated surface can be inspected, an inspection will be performed to see if the surfaces meets the
44 clean debris standard in [40 CFR 268.45](#), incorporated by reference by [WAC 173-303-140](#) and can be
45 declared non-dangerous in accordance with [WAC 173-303-071\(3\)\(qq\)](#). If it is not possible to inspect the
46 contaminated surfaces or meet the clean debris surface performance standard, the particular piping or
47 ancillary equipment of concern will be removed, designated, and disposed of accordingly.

1 Dangerous and/or mixed-waste materials generated during closure activities will be managed in
2 accordance with [WAC 173-303-610](#)(5). Removal of any dangerous wastes or dangerous constituents
3 during partial or final closure will be handled in accordance with applicable requirements of
4 [WAC 173-303-610](#)(5).

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

6 **H.2.3.1 2706- T (TA) (TB), 214-T, 221-T Canyon**

7 Clean closure of the soil under the T-Plant buildings (221-T Canyon Building, 2706-T Buildings, and
8 214-T Building) will be accomplished by demonstrating that the coated concrete floors kept
9 contamination from reaching the soil. The coated concrete floors provided secondary containment for the
10 storage and treatment areas of T-Plant. Unless inspections have identified potential through-thickness
11 cracks in the concrete or containment system indicating containment failure and a subsequent potential for
12 soil contamination from the TSD unit operations, the soil will be considered clean closed. Should
13 inspections identify such cracks, and there have been documented spills in the vicinity, potential soil
14 contamination will be investigated. In this circumstance, a sampling and analysis plan for characterizing
15 the nature and extent of soil contamination will be prepared following the completion of a data quality
16 objectives process in accordance with EPA/600/R-96/055 (QA/G-4), *Data Quality Objectives Process*, as
17 amended. The data quality objectives process will be initiated prior to closure on a schedule to ensure
18 timely closure of T-Plant. The sampling and analysis plan will be submitted to Ecology as part of a
19 permit modification pursuant to Permit Condition II.J.2. This permit modification request will also
20 establish constituents of concern, soil remediation requirements, soil closure performance standards, and
21 associated sampling, analysis, and QA/QC requirements necessary to demonstrate compliance with
22 closure performance standards. The sampling and analysis plan will be prepared consistent with
23 EPA/240-B-01/003 (EPA/QA R-5), *EPA Requirements for Quality Assurance Project Plans*, as amended.

24 Clean closure of soils underlying piping encased in secondary containment with leak detection will be
25 accomplished by demonstrating that there are no pathways for dangerous waste to the underlying soil.
26 The T-Plant Operating Record will be checked to verify that the primary piping has not leaked. If records
27 indicate that no leaks from the primary piping have occurred, the soil will be considered clean closed. If
28 leaks in the primary pipe occurred and inspection reveals no through thickness cracks in the secondary
29 pipe, the soil will be considered clean closed.

30 If the investigation above identifies potential soil contamination, those soils will be sampled and
31 analyzed for constituents of concern according to the sampling and analysis plan. The sampling and
32 analysis plan will be prepared following the completion of a data quality objectives process in accordance
33 with EPA/600/R-96/055 (QA/G-4), *Data Quality Objectives Process*, as amended. The data quality
34 objectives process will be initiated prior to closure on a schedule to ensure timely closure of T-Plant. The
35 sampling and analysis plan will be submitted to Ecology as part of a permit modification request in
36 accordance with [WAC-173-303-830](#). The sampling and analysis plan will be prepared consistent with
37 EPA/240-B-01/003 (EPA/QA R-5), *EPA Requirements for Quality Assurance Project Plans*, as amended.

38 The soil will be considered clean closed if the soil analytical results determine that the constituents of
39 concern are either:

- 40 • Below the levels in [WAC 173-303-610](#)(2)(b)(i).
- 41 • Below background levels in the Hanford soil if background is greater.

42 If the constituents of concern exceed background levels, the soil will be closed per the standards of [WAC](#)
43 [173-303-610](#)(2)(b).

44 **H.2.4 Closure Standards for Gravel, Asphalt and Concrete in Outside Areas**

45 Clean closure of the gravel, asphalt and concrete surfaces will be accomplished by checking the T-Plant
46 operating records to verify that cleanup of any spills within the T-Plant was performed. This applies to all
47 the outside storage and shipment pads. It applies as well to the gravel surface under the Dangerous and/or

1 Mixed Waste Storage Modules listed. If the closure standards are not met in these outside areas at T-
2 Plant, the gravel, asphalt or concrete will be removed, treated as necessary, and disposed.

3 **H.3 Closure Activities**

4 Clean closure will be accomplished with the proper implementation of this plan. At the time of closure,
5 the closure plan will be modified, as necessary, to reflect current regulation or informational revisions in
6 accordance with [WAC 173-303-610\(3\)\(b\)](#). If it is determined that clean closure is not possible, the
7 closure plan will be modified to address post closure activities.

8 **H.3.1 General Closure Activities**

9 The approach to the closure of T-Plant is to remove all dangerous waste, send the dangerous waste for
10 final disposition at an appropriate facility, evaluate the T-Plant's operating record for spill history, and
11 verify that equipment, metal, concrete, and asphalt meets clean debris surface as described in Section H.2.

12 The T-Plant operating record will be reviewed to identify any previous spills and releases that occurred at
13 T-Plant. The review will also verify the cleanup of spills was performed and that these cleanups satisfied
14 the closure performance standards at the time of the cleanup.

15 Attainment of a clean debris surface is verified visually in accordance with the performance standard.
16 When the performance standard is not met, decontamination of concrete will be accomplished using
17 physical extraction methods from the alternative treatment standards for hazardous debris [[40 CFR](#)
18 [268.45](#), incorporated by reference by [WAC 173-303-140](#)]. Inspections to verify achievement of a clean
19 debris surface will be performed and documented.

20 The concrete will be reexamined visually after decontamination. Areas that do not satisfy the clean debris
21 closure performance standard will be reevaluated for more rigorous decontamination or removal,
22 designation, and disposal. If this circumstance is encountered, it will be considered an unexpected event
23 during closure, and this closure plan will be modified according to Permit Condition II.J.2.

24 Closure activities will include the following:

- 25 • Document review to determine spill history.
- 26 • Inventory removal.
- 27 • Visual inspection and survey.
- 28 • Process equipment decontamination and/or removal.
- 29 • Structure decontamination and/or removal.
- 30 • Designation of wastes generated during closure.
- 31 • Obtain independent registered professional engineer certification that closure activities were
32 completed in accordance with the approved closure plan (to include any approved permit
33 modifications).

34 Additional details for closure activities are provided below.

35 All waste inventories at T-Plant at the start of closure will be processed as part of closure. No waste will
36 remain at T-Plant at the completion of closure. Residue remaining in process lines and equipment will be
37 removed during decontamination as necessary to achieve a clean debris surface. All containers of waste
38 will be removed from the storage structures and will be transferred to another permitted onsite TSD unit
39 or offsite TSD facility. Equipment used in performing closure activities may be decontaminated as
40 necessary to meet the closure performance standards for equipment in Section H.2. Equipment that is not
41 or cannot be decontaminated, as well as materials used in performing closure activities, will be disposed
42 at an on-site TSD unit, an off-site TSD facility, or another approved facility.

43 **H.3.2 Removing Dangerous Waste from Tank Systems**

44 The mixed waste inventory contained within the 2706-T Tank System will be removed using the existing

1 process equipment and pumps to the extent practical. Piping may be rerouted and temporary piping may
2 be installed to allow the isolation of tanks and ancillary equipment for draining, decontamination, and
3 closure. Rerouted and temporary piping will be closed in the same manner as process piping. All
4 structures and equipment will be decontaminated to the closure standards in Section H.2.1 and H.2.2 or
5 disposed. Piping that meets the closure standard in Section H.2.2 may be left in place. Piping that does
6 not meet the closure standard, or cannot be inspected, or determined to be non-dangerous, will be
7 disposed of accordingly. Decontamination of the tanks including removal of tank heel and residues will
8 occur pursuant to [WAC 173-303-610\(5\)](#) and [WAC 173-303-640\(8\)\(a\)](#), as necessary, to meet the clean
9 debris surface closure performance standard according to [40 CFR 268.45](#), incorporated by reference by
10 [WAC 173-303-140](#). The mixed waste inventory so removed will be transferred to an appropriately
11 authorized facility for disposition. All of the waste inventory will be removed before closure. Any
12 residue remaining in piping, equipment, or liner will be removed to an appropriate unit for final
13 disposition.

14 **H.3.3 Removing Other Dangerous Waste**

15 T-Plant provides storage capacity for both onsite- and offsite-generated waste. Dangerous waste will be
16 transferred for disposition at the start of T-Plant closure. Containerized waste will be designated (if
17 required) and transferred to an appropriately authorized facility for final disposition. All of the waste
18 inventory will be removed before closure.

19 **H.3.4 Decontamination and Closure of Tanks**

20 The following general steps will be performed to close the 2706-T Tank System and ancillary equipment:

- 21 • Piping and ancillary equipment associated with the tank will be flushed with water and drained to
22 the tank being closed, to another tank, or to containers.
- 23 • The tank will be flushed as necessary to facilitate visual inspection.
- 24 • Wastewater will be removed from the tank and transferred to another tank or containers.
25 Additional pumps and piping may be installed to empty the tank as low as practical.
- 26 • Rinsing may be performed to facilitate removal of residue.
- 27 • An initial visual inspection of the tank's interior and exterior surfaces will be performed to
28 determine the type of flushing that will allow the tank to be cleaned closed, or whether the tank
29 cannot be clean closed.
- 30 • The tank's surfaces, piping and ancillary equipment may be cleaned by chemical or physical
31 extraction techniques described in [40 CFR 268.45](#). Flush solution will be transferred to another
32 tank or containers. All flush solution at the bottom of the tank will be removed (to the extent
33 practical) before visual inspection.
- 34 • The tank, piping, and ancillary equipment will be inspected visually for compliance with the
35 performance standard in Section H.2.1 and H.2.2. Visual inspections may be made using a
36 camera or other device that allows verification of meeting the performance standard.

37 If any areas are found not meeting the clean debris surface performance standard, these areas will be:

- 38 • decontaminated in-place, or
- 39 • the contaminated portions will be removed, designated, and disposed accordingly, or
- 40 • the tank may be found to be non-dangerous in accordance with [WAC 173-303-071\(3\)\(qq\)](#).

41 Only removal of contaminants from the surface layer is necessary for metal surfaces [[40CFR 268.45](#),
42 Table 1, incorporated by reference at [WAC 173-303-140](#)].

43 The outside of the tanks also will be inspected for compliance to the performance standard. Any areas
44 found not to meet this performance standard will be decontaminated in -place, or the contaminated
45 portions will be removed, designated, and disposed accordingly. If tanks are removed from the stainless
46 steel lined vault for inspection, the tanks will be either placed on engineered containment devices (e.g.,

1 portable catch basins, liners, etc.) to collect and contain solutions or the surface on which the tanks rest
2 will be inspected for cracks or other openings that could provide a pathway to soil. This inspection will
3 be performed as described in Section H.2.1. The cracks will be sealed before beginning the
4 decontamination.

5 Piping embedded within the concrete walls of the structure will be left in place until removal of the
6 concrete and then examined, as possible, for a clean debris surface.

7 Decontamination residues will be collected, designated, and managed as appropriate. If it is not possible
8 to meet clean debris surface performance standard, these areas will be:

- 9 • decontaminated in-place, or
- 10 • the contaminated portions will be removed, designated, and disposed accordingly, or
- 11 • the tank may be found to be non-dangerous in accordance with [WAC 173-303-071](#)(3)(qq).

12 **H.3.5 Decontamination and Closure of Process Equipment**

13 Equipment containing or contaminated with dangerous/mixed waste or waste residue will be managed by
14 one of the following methods:

- 15 • Decontamination.
- 16 • Disposal as dangerous waste.
- 17 • Disposal as mixed waste.

18 The method to be used will be determined based on the specific piece of equipment, the level of
19 contamination, the ease with which the equipment can be decontaminated, the waste designation
20 performed in accordance with [WAC 173-303-070](#) through -100, and the estimated quantity of waste to be
21 generated during decontamination. Final disposal will be determined using appropriate techniques
22 available at the time of closure.

23 **H.3.6 Visual Inspection and Survey and Clean Debris Surface Performance Standards**

24 After all waste and equipment has been removed from T-Plant, a visual inspection and survey will be
25 performed to identify areas of potential contamination. The visual inspection will evaluate the equipment
26 and structures, including interior walls, containment areas, grates, floors, and storage pads. For areas that
27 do not satisfy closure performance standards, field personnel will determine whether to remove and
28 dispose or to decontaminate.

29 **H.3.7 Closure of Structures**

30 Any structures, including interior walls, containment areas, including, sumps, grates and, floors will be
31 decontaminated if they contain or have contaminated dangerous/mixed waste or waste residue in excess
32 of the clean debris surface performance standard. The method of decontamination used will depend on
33 the nature of the structure and the extent and type of contamination. Decontamination methods might
34 include wiping, washing, brushing, or scrubbing, and rinsing with water or other appropriate media.
35 Decontamination procedures will address minimization of decontamination waste, measures to contain
36 and collect such waste. Decontamination waste will be designated in accordance with [WAC 173-303-070](#)
37 through -100 and managed appropriately.

38 **H.3.8 Designation of Waste Generated During Closure**

39 During closure, waste could be generated. Any waste generated during closure will be designated in
40 accordance with [WAC 173-303-070](#) through -100. Following designation as dangerous and/or mixed
41 waste, the waste will be managed under the generator provisions of [WAC 173-303-200](#), an on-site
42 dangerous waste management unit at which closure has not yet begun, or at an off-site TSD facility.

43 In the unlikely event that contaminants are suspected to have penetrated the unit's containment, sampling
44 will be performed as necessary to determine the extent of contamination. If sampling is necessary to
45 achieve clean closure, the closure plan will be amended via permit modification.

1 **H.4 Schedule for Closure**

2 The actual year of closure is unknown but will be based on the availability of waste requiring processing,
3 operational requirements, and aging effects on T-Plant Complex, among other considerations. When a
4 definite closure date is established, notification of closure will be provided in accordance with Permit
5 Condition II.J.3.

6 The closure schedule is based on the time required to perform applicable closure activities described in
7 Sections H.1.2. When closure begins, the inventory of dangerous waste will be removed within 90 days
8 from the receipt of the final volume of waste. All closure activities will be completed within 180 days
9 after the last shipment of waste is received at each T-Plant dangerous waste management units
10 [\[WAC 173-303-610\(4\)\(b\)\]](#). Ecology will be notified by DOE on when closure is expected to begin in
11 accordance to Permit Condition II.J.3 [\[WAC 173-303-610 \(3\)\(c\)\]](#). Closure activities are summarized in
12 Table H.1. A detailed schedule of closure activities is provided in Table H.2.

13 **H.5 Certification of Closure**

14 Within sixty days of completion of closure activities at each T-Plant dangerous waste management unit
15 according to this plan, the Permittees will submit to Ecology by registered mail a certification that the
16 corresponding dangerous waste management units have been closed in accordance with the specifications
17 in this plan. The certification will be signed by the Permittees and by an independent registered
18 professional engineer.

Table H.1. Summary of Closure Activities	
Closure Activity Description	Expected Duration
Receipt of final volume of dangerous waste	N/A
Notify Ecology that closure will begin	45 days
Remove waste inventory – package all dangerous waste, manifest, and transfer to permitted facility for further storage, treatment and/or disposal	90 days
Decontaminate structural surfaces and equipment.	45 days
Analyze decontamination waste to determine proper methods of treatment/disposal	25 days
Dispose of decontamination waste based on results of waste analysis	20 days

19

Table H.2. Detailed Schedule of Closure	
Action	Schedule
Pre-Closure Activities	
Date of receipt of last volume of waste	Day 0
Closure Activities	
Removal of Waste Inventory	Day 75
Removal of equipment and components	Day 95
Decontamination of Unit	Day 135
Management of Decontamination Waste	
Waste Analysis	Day 160
Waste Disposal	Day 180
Other Activities	
Certification of Closure to Ecology	Day 240
Delay of closure justified by alara concerns and documented in the final disposition of the 221-T canyon Section 8 criteria.	

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