

PART III UNIT-SPECIFIC CONDITIONS FOR FINAL STATUS OPERATIONS
OPERATING UNIT 11
Integrated Disposal Facility

Chapter 11.0 **Closure and Financial Assurance**

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1 The selection of a final cover design has not been identified. Figure 11-1 shows an example of a typical
2 Hanford Site landfill cover design. Design(s) will include features to satisfy the minimum requirements
3 found in WAC 173-303-665(6).

4 **11.4 MAXIMUM EXTENT OF OPERATION [I-1b(1)]**

5 The maximum process design capacity of the IDF conservatively is calculated to be 100 hectare-meters,
6 which is 1,000,000 cubic meters (Chapter 1.0, Part A, Form, Section III). The IDF landfill will be
7 segregated into a RCRA permitted side of 50 hectare-meters and a non-RCRA permitted side of
8 50 hectare-meters.

9 **11.5 DECONTAMINATING EQUIPMENT AND STRUCTURES**

10 All ancillary equipment and its secondary containment, and instrumentation (e.g., level-indicating
11 devices, leak detection devices, pumps, piping) meet the definition of "debris" as defined in
12 WAC 173-303-040. Items in direct contact with mixed waste are assumed to meet the definition of
13 "hazardous debris" as defined in WAC 173-303-040.

14 Currently, three options are available for treating hazardous debris. The first option is to treat the debris
15 using one of the three debris treatment technologies-extraction, destruction, or immobilization-as
16 described in 40 CFR 268.45. If the hazardous debris is treated using approved extraction or destruction
17 technologies, the debris is no longer required to be managed as a dangerous waste as long as the debris
18 does not exhibit a characteristic of a dangerous waste. If hazardous debris contaminated with a listed
19 waste is treated using an immobilization technology, it remains a listed waste, even after the LDR
20 treatment standards are met unless Ecology makes a case-by-case determination that the debris "no longer
21 contains" a mixed waste. In effect, by making this "contained-in" determination on a case-by-case basis,
22 Ecology will be setting clean closure standards in accordance with the closure performance standards of
23 WAC 173-303-610(2)(a)(ii).

24 The second option is to treat the hazardous debris to meet the constituent-specific LDR treatment standard
25 for the waste or waste-specific constituents contaminating the debris; however, such debris, even after
26 treatment, may be considered a dangerous waste under the dangerous waste regulations and may require
27 management at a facility permitted to manage dangerous waste.

28 The third option involves obtaining a "contained-in determination" for the hazardous debris, thereby
29 rendering the waste "non-hazardous" for those waste-specific-listed constituents that fall below MTCA
30 method B risk-based health limits. Moreover, it must be proven that the debris does not designate as a
31 characteristic waste under WAC-173-303.

32 **11.5.1 CONTAMINATED SOIL**

33 Contaminated soil could be generated as a result of spill cleanup. Since the majority of IDF operations
34 will be performed within secondary containment (see Chapters 4.0 and 6.0) the potential for spilling
35 dangerous waste into the surrounding soil is low. Contaminated soil generated as a result of a dangerous
36 waste spill will be managed pursuant to WAC-173-303-200.

37 Once the soil is designated, appropriate treatment and disposal or storage options will be determined and
38 implemented.

39 A contained-in determination could also be sought for contaminated soil generated as a result of a spill.
40 For contaminated media the contained-in policy requires that a statistically based sampling plan be used

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1 for obtaining the data to support a contained-in demonstration. The contained-in policy does not require
2 that the waste be analytically nondetectable for it to be considered nondangerous. However, the
3 analytical results must prove that the listed constituents in the soil are below health-based limits as
4 provided in WAC 173-303-610(2)(b)(i) and that the soil does not exhibit any dangerous waste
5 characteristics (i.e., soil does not designate for D codes). If approved by Ecology, this could allow waste
6 that falls below specific health-based levels to be disposed of without requiring treatment

7 **11.6 CLOSURE OF LANDFILL UNITS [I-1e and I-1e(2)]**

8 Closure of the IDF will be consistent with the closure requirements specified in WAC-173-303-665(6)
9 and WAC 173-303-610. The cover design(s) will satisfy the requirements of WAC 173-303-665(6).

10 **11.6.1 Cover Design [I-1e(2), I-1e(4), I-1e(5), I-1e(7), and I-1e(8)]**

11 The cover could consist of several layers constructed on top of a native soil base. A generalized
12 cross-section of an example cover is shown on Figure 11-1. It is assumed that before construction of the
13 final cover, the waste form would be stabilized appropriately.

14 **11.6.1.1 Grade Layer**

15 The surface of the landfill would be graded and/or shaped, if necessary, to match the slope of the desired
16 low-permeability layer. Additional soil would be placed over the landfill to achieve the required cover
17 grade. This grade layer could taper from zero thickness near the edge of the cover boundary to perhaps
18 several meters at the center of the cover; the thickness would depend on the lateral dimensions of the
19 particular cover and the grade of the cover.

20 **11.6.1.2 Low-Permeability Layer**

21 The selection of an appropriate material for this layer would be based on the hazard that is to be isolated.
22 The low-permeability layer will be the primary barrier in preventing soil and/or water from migrating into
23 the waste zone and meet WAC 173-303-655 (6) (v) "Have a permeability less than or equal to the
24 permeability of any bottom liner system or natural sub soils present".

25 **11.6.1.3 Drainage Layer**

26 The drainage layer would conduct any water that percolates through the overlying layers laterally to the
27 drainage ditch. Thus, the drainage layer would prevent hydraulic pressure from building up directly on
28 the low-permeability liner, and thereby eliminate one set of forces that would drive moisture through the
29 primary moisture control barrier.

30 **11.6.1.4 Plant, Animal, and Human Intrusion Layer (optional)**

31 The performance objectives for the permanent isolation surface barrier are summarized as follows:

- 32 • Function in a semiarid to sub-humid environment
- 33 • Limit the recharge of water through the waste to near zero amounts [0.05 centimeter per year
34 (1.6x10⁻⁹ centimeters per second)]
- 35 • Be maintenance free
- 36 • Minimize the likelihood of plant, animal, and human intrusion
- 37 • Limit the exhalation of noxious gases

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- 1 • Minimize erosion-related problems
- 2 • Meet or exceed WAC 173-303-665(6) cover performance requirements
- 3 • Isolate waste for 1,000 years.

4 To satisfy the intrusion performance objective, an optional layer would be included in the design of
5 barriers that require the additional human and/or biointrusion protection to reduce either the
6 environmental or human health risk.

7 **11.6.1.5 Graded Filter Layer**

8 A graded filter consisting of crushed rock overlaid by sand would be placed on the plant, animal, and
9 human intrusion layer if incorporated into the design, or directly over the drainage layer. The graded
10 filter would serve to separate the surface soil layer from the drainage layer. A geotextile would be placed
11 on the top of the graded filter to decrease the potential for fine material to enter the filter and drainage
12 zone. The geotextile would be permeable, allowing drainage, and would not support a standing head of
13 water.

14 **11.6.1.6 Surface Soil Layer**

15 The two most important factors in engineering the surface soil thickness would be the assignment of the
16 water retention characteristics for soil and climate information. Surface soil would be placed over the
17 geotextile to intercept, store, recycle water, and prevent damage to the underlying structure from natural
18 and synthetic processes.

19 **11.6.1.7 Vegetative Cover**

20 The vegetative cover would perform three functions. First, the plants would return water stored in the
21 surface soil back to the atmosphere, significantly decreasing net infiltration and reducing the amount of
22 moisture available to penetrate the cover. Second, the vegetation would stabilize the surface soil
23 component of the cover against wind and water erosion. Finally, the vegetative cover would restore the
24 appearance of the land to a more natural condition and appearance.

25 A mixture of seeds would be used to establish vegetation. The seed types would be selected based on
26 resistance to drought, rooting density, and ability to extract water.

27 **11.6.2 Wind Erosion**

28 The principal hazard associated with wind erosion is the thinning of the cover surface soil layer. This in
29 turn potentially could lead to breaching of the moisture barriers, gradually allowing larger quantities of
30 water to reach the waste. The engineering approaches to mitigating wind erosion of the cover would be
31 (1) designing the surface soil layer with an appropriate total thickness to compensate for future soil loss
32 that might result from wind erosion, (2) establishing a vegetative cover on the surface to reduce wind
33 erosion, and (3) including an appropriate coarse material (admix) in the upper layer of the surface soil to
34 form an armor layer.

35 **11.6.3 Water Erosion**

36 The potential hazard associated with water erosion is the same as that for wind erosion, namely the loss of
37 soil from the top or surface layer.

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1 Several of the following engineering approaches could be adopted to minimize the potential for water
2 erosion:

- 3 • Limiting the surface slopes
- 4 • Providing run-on control with the sideslope drainage ditches
- 5 • Compacting the surface soil in a way that promotes significant infiltration rather than excessive
6 run-off
- 7 • Properly designing the sideslopes to prevent gulying
- 8 • Establishing a vegetative cover to slow surface run-off
- 9 • Incorporating coarse material (pea gravel admix) in the upper portion of the surface soil layer to help
10 form an erosion-resistant armor
- 11 • Limiting flow path lengths through the use of vegetation and admix.

12 The cover design would be evaluated for potential erosion damage from overall soil erodibility, sheet
13 flow, and gulying.

14 **11.6.4 Deep-Rooted Plants**

15 The following design features could minimize the potential for problems with deep-rooted plants.

- 16 • The surface soil (top two layers) would retain most of the precipitation, because the underlying
17 drainage layer would have significantly higher permeability and much less water retention capacity.
18 Therefore, it is expected that vegetation preferentially would occupy the surface soil layer and not
19 have an affinity for growing into the drier underlying layers.
- 20 • The thickness of the surface soils would be sized to promote the development of semiarid deep-rooted
21 perennial grasses and to discourage the development of deep-rooting intrusive species.

22 **11.7 SCHEDULE FOR CLOSURE [I-1f]**

23 As stated previously, closure of the IDF will be a complex process. At the time of closure, this closure
24 plan will be updated to reflect the current closure plan schedule per WAC 173-303-830, Appendix I. In
25 addition, when a closure date is established, a revised closure plan and closure schedule will be submitted
26 to Ecology that contains detailed information regarding specific activities and implementation
27 timeframes.

28 **11.8 EXTENSION FOR CLOSURE [I-1(g)]**

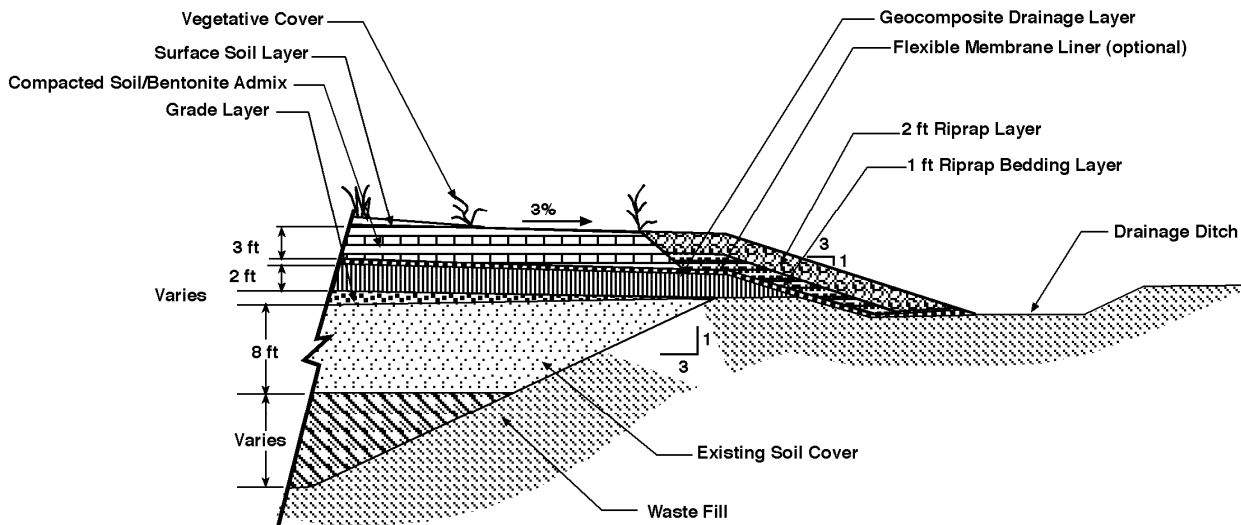
29 An extension for closure request is anticipated to complete the closure/post closure process of the IDF.

30 **11.9 POSTCLOSURE PLAN [I-3]**

31 Because of the long active life of the IDF, a comprehensive post closure plan will be developed when
32 closure becomes imminent or when 200 Areas cleanup activities prescribed by the Tri-Party Agreement
33 require integration.

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Figure 11.1. Typical Hanford Site Landfill Cover Design



Notes:

1. Drawing not to scale.
2. Cover shown for unlined trench.
Similar configuration for lined trench.

To convert feet (ft) to meters, multiply by 0.3048.

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M0105-2.1
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