INTEGRATED DISPOSAL FACILITY
CHAPTER 11
CLOSURE

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The "**Modification Number**" represents Ecology's method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
09/30/2014	

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CHAPTER 11.0
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FIGURE

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11.0 CLOSURE

This chapter discusses preclosure, closure, and post closure activities for the Integrated Disposal Facility (IDF). This closure plan complies with WAC 173-303-610 and represents the baseline for closure.

The IDF has been constructed on 25 hectares of vacant land southwest of the Plutonium Uranium Extraction Facility (PUREX) Plant in the 200 East Area [see the topographic map on file at the Department of Ecology library (3100 Port of Benton Boulevard, Richland, WA 99354)]. The landfill is segregated into a Resource Conservation and Recovery Act (RCRA) permitted side and a non-RCRA permitted side. The scope of this permit is limited to the western side of the landfill where the RCRA waste will be placed. The waste containers and bulk waste that meet the IDF waste acceptance criteria will be inventoried, and disposed in this lined landfill. Leachate collected from the lined landfill will be transferred to leachate collection tanks located in proximity to the landfill for subsequent treatment.

A more detailed discussion of IDF waste types and the identification of the IDF processes and equipment are provided in Chapters 3.0 and 4.0, and attendant appendices. The IDF only will accept and dispose waste containers and bulk waste that meet the IDF waste acceptance criteria, RCRA and Land Disposal Restriction (LDR).

The closure process will be the same for partial closure or closure of the entire IDF. The remainder of this chapter describes the performance standards that will be met, and the closure/post closure activities that will be conducted.

11.1 Closure Plan

Waste containers and bulk waste that meet the IDF waste acceptance criteria will be disposed in the lined landfill that complies with WAC 173-303-665 standards (Chapter 4.0). The IDF will be closed according to current applicable WAC 173-303 regulations, United States Department of Energy (DOE) requirements, best management practices, and will be integrated with the overall cleanup activities performed under the Tri-Party Agreement (HFFACO).

The disposal landfill cover will be designed and located to comply with WAC 173-303-665(6) and WAC 173-303-610. The specification and/or variation for other cover designs will be provided at the time of closure once a hazard(s) has been defined.

11.2 Closure Performance Standards

Closure requirements found in WAC 173-303-665(6), incorporated by reference, and detailed here in Chapter 11.0 of the IDF portion of the permit, will make up the closure performance standards for the IDF.

11.3 Preclosure Activities

Preclosure activities could include, at a minimum, placing interim or final covers over the filled portions of the landfill as the landfill is expanded to accept more waste. Placement of covers over the filled portions might be deferred until closure of all the IDF. Once a decision is made to construct the final cover over the landfill, a closure cover design will be used that satisfies the dangerous waste disposal requirements defined in WAC 173-303.

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

11.4 Maximum Extent of Operation

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

11.5 Decontaminating Equipment and Structures

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

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

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

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

11.5.1 Contaminated Soil

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

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

A contained-in determination could also be sought for contaminated soil generated as a result of a spill. For contaminated media the contained-in policy requires that a statistically based sampling plan be used for obtaining the data to support a contained-in demonstration. The contained-in policy does not require that the waste be analytically nondetectable for it to be considered nondangerous. However, the analytical results must prove that the listed constituents in the soil are below health-based limits as provided in WAC 173-303-610(2)(b)(i) and that the soil does not exhibit any dangerous waste characteristics (i.e., soil does not designate for D codes). If approved by Ecology, this could allow waste that falls below specific health-based levels to be disposed of without requiring treatment

11.6 Closure of Landfill Units

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

11.6.1 Cover Design

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

11.6.1.1 Grade Layer

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

11.6.1.2 Low-Permeability Layer

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

11.6.1.3 Drainage Layer

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

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

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

- Function in a semiarid to sub-humid environment.
- Limit the recharge of water through the waste to near zero amounts [0.05 centimeter per year ($1.6x10^{-9}$ centimeters per second)].
- Be maintenance free.
- Minimize the likelihood of plant, animal, and human intrusion.
- Limit the exhalation of noxious gases.
- Minimize erosion-related problems.
- Meet or exceed WAC 173-303-665(6) cover performance requirements.
- Isolate waste for 1,000 years.

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

11.6.1.5 Graded Filter Layer

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

11.6.1.6 Surface Soil Layer

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

11.6.1.7 Vegetative Cover

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

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

11.6.2 Wind Erosion

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

11.6.3 Water Erosion

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

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

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

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

11.6.4 Deep-Rooted Plants

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

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

11.7 Schedule for Closure

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

11.8 Extension for Closure

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

11.9 Postclosure Plan

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

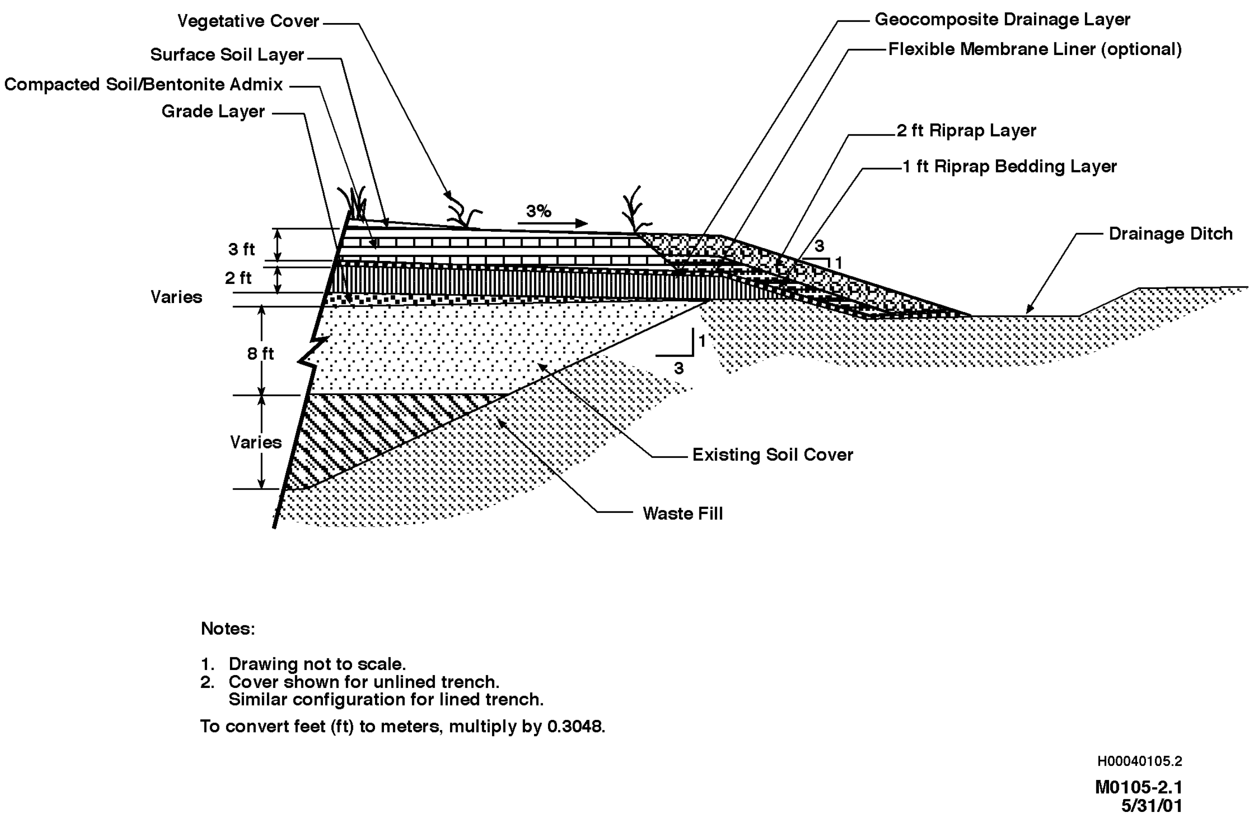

Figure 11.1. Typical Hanford Site Landfill Cover Design