# ADDENDUM H

# CLOSURE PLAN

DRAFT

**This page intentionally left blank.**

DRAFT

# ADDENDUM H

# CLOSURE PLAN

## Contents



DRAFT

**This page intentionally left blank**.

DRAFT

# H CLOSURE

This addendum discusses pre-closure, closure, and post closure activities for the Low Level Burial Ground (LLBG) Trenches 31 & 34 and the associated container storage units. This closure plan complies with WAC 173-303-610 and represents the baseline for closure.

The closure process will be the same for partial closure or closure of the entire LLBG Trenches 31 & 34 and the associated container storage units. The remainder of this Addendum describes the performance standards that will be met, and the closure/post closure activities that will be conducted.

## H.1 Closure Plan

Waste containers and bulk waste that meet the LLBG Trenches 31 & 34 waste acceptance criteria will be disposed in the lined landfill that complies with WAC 173-303-665 standards (Addendum C). The LLBG Trenches 31 & 34 and the associated container storage units will be closed according to current applicable WAC 173-303 regulations, DOE requirements, best management practices, and will be integrated with the overall cleanup activities performed under the Hanford Federal Facility Agreement and Consent Order (HFFACO) (Permit Attachment 1).

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.

## H.2 Closure Performance Standards

Closure requirements found in WAC 173-303-665(6) will make up the closure performance standards for the LLBG Trenches 31 & 34.

## H.3 Preclosure Activities

Pre-closure activities will include, at a minimum, placing interim or final covers over the filled portions of Trenches 31& 34. Placement of covers over the filled portions may be deferred until final closure. Once a decision is made to construct the final covers over the landfills, closure cover designs will be used that satisfy the dangerous waste disposal requirements defined in WAC 173-303.

The selection of a final cover design has not been identified. Figure H.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).

Closure of the associated container storage units will be as described in WAC 173-303-630(10).

## H.4 Maximum Extent of Operation

The maximum process design capacities of Trenches 31 & 34 are the same; 21,408 cubic meters each trench.

## H.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,

DRAFT

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 MTCA method B risk-based health limits [WAC 173-340]. Moreover, it must be proven that the debris does not designate as a characteristic waste under WAC 173-303.

### H.5.1 Contaminated Soil

Contaminated soil may be generated as a result of spill cleanup. Since the majority of LLBG operations will be performed within secondary containment, (refer to Addendum C and Addendum F) 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 will 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 non-dangerous. 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.

## H.6 Closure of Landfill Units and Associated Container Storage Units

Closure of the LLBG Trenches 31 & 34 and the associated container storage units 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).

### H.6.1 Cover Design

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

#### H.6.1.1 Grade Layer

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

#### H.6.1.2 Low Permeability Layer

The selection of an appropriate material for this layer will 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 173-303-665(a)(v) *Have a permeability less than or equal to the permeability of any bottom liner system or natural sub soils present*.

### H.6.1.3 Drainage Layer

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

### H.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 objectives for Trenches 31 & 34, optional layers will 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.

### H.6.1.5 Graded Filter Layer

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

### H.6.1.6 Surface Soil Layer

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

### H.6.1.7 Vegetative Cover

The vegetative cover will perform three functions.

1) The plants will 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.
2) The vegetation will stabilize the surface soil component of the cover against wind and water erosion.
3) The vegetative cover will restore the appearance of the land to a more natural condition and appearance.

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

DRAFT

### H.6.2 Wind Erosion

The principal hazard associated with wind erosion is the thinning of the cover surface soil layer. This in turn potentially may 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 will 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.

### H.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 may be adopted to minimize the potential for water erosion:

- Limiting the surface slopes
- Providing run-on control with the side slope drainage ditches
- Compacting the surface soil in a way that promotes significant infiltration rather than excessive run-off
- Properly designing the side slopes to prevent gully formation
- 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 using vegetation and admix.

The cover design will be evaluated for potential erosion damage from overall soil erodability, sheet flow, and gully formation.

### H.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 will occupy the surface soil layer and not have an affinity for growing into the drier underlying layers.
- The thickness of the surface soils will be sized to promote the development of semiarid deep-rooted perennial grasses and to discourage the development of deep rooting intrusive species.

## H.7 Schedule for Closure

As stated previously, closure of the LLBG Trenches 31 & 34 and the associated container storage units 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.

## H.8 Extension for Closure

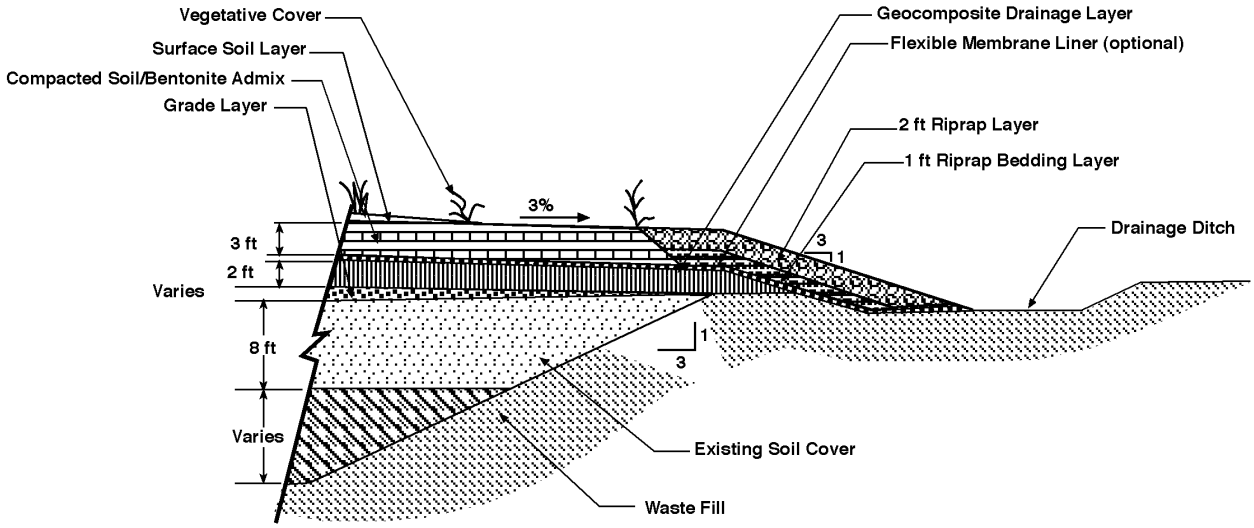
An extension for closure request is anticipated to complete the closure/post closure process of the LLBG Trenches 31 & 34.

DRAFT

## H.9 Postclosure Plan

Because of the long active life of the LLBG Trenches 31 & 34, a comprehensive post closure plan will be developed when closure becomes imminent or when 200 Areas cleanup activities prescribed by the ~~HFFACO~~ require integration.

DRAFT




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.

H00040105.2
M0105-2.1
5/31/01

**Figure H.1. Typical Hanford Site Landfill Cover Design**

DRAFT

1
2
3 **This page intentionally left blank.**

DRAFT