Closure Plan
Limited Purpose Landfill
TransAlta Centralia Mine

Prepared for

TransAlta Centralia Mining LLC

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This document was prepared under direct supervision of Travis Pyle, PE, a registered civil engineer in the State of Washington, in accordance with 40 *Code of Federal Regulations* 257.102.

Contents

Acronyms and Abbreviations

§	section of the Final CCR Rule
CCR	Coal Combustion Residual
cm/sec	centimeter(s) per second
Ecology	Washington State Department of Ecology
LPLF	Limited Purpose Landfill
Rule	U.S. Environmental Protection Agency Final CCR Rule
TCM	TransAlta Centralia Mining LLC
TCG	TransAlta Centralia Generation LLC (or “Plant”)
yd^3	cubic yard(s)

SECTION 1

Introduction

This *Closure Plan* presents the activities that will be conducted and the procedures that will be followed to close the Limited Purpose Landfill (LPLF) at TransAlta Centralia Mining LLC (TCM) in Centralia, Washington. Closure will occur in accordance with the U.S. Environmental Protect Agency's Final Coal Combustion Residual (CCR) Rule (Rule). The Rule was published in the Federal Register on April 17, 2015 and became effective on October 19, 2015. The Rule regulates the disposal of CCR as solid waste under Subtitle D of the Resource Conservation and Recovery Act. The Rule sets forth national minimum criteria for existing and new CCR landfills and surface impoundments, and lateral expansions to landfills and impoundments.

This closure plan becomes effective once it is finalized, sealed by a qualified professional engineer, and placed, by TCM, in the facility's operating record. In accordance with Section 257.105(i) of the Rule, the plan must be placed in the operating record as it becomes available, but not later than October 17, 2016, per 257.102(b)(2). Additionally, within 30 days of placing the plan in the operating record, TCM must post the plan on a publicly accessible Web site and notify the State Director (Washington State Department of Ecology [Ecology]) in accordance with Section (§) 257.106(i) and §257.107(i) of the Rule, respectively.

1.1 Closure Criteria

The Rule includes the following closure criteria for CCR landfill units: (1) requirements for preparing closure plans; (2) requirements for clean closure and closure in place of a CCR unit, including design criteria for final cover systems; (3) timeframes for commencing and completing final closure activities; and (4) closure certification requirements. Specific closure requirements for CCR landfills are listed in §257.101 to §257.103 of the Rule.

Solid waste handling is governed by Washington State regulations under Chapter 173-350 WAC, Solid Waste Handling Standards, and the Lewis County Board of Health Solid Waste Rules and Regulations, Ordinance No. H-94-0302. The LPLF is currently permitted by Washington State (Permit No. 16_TransAlta LPLF). The permit covers the design, operation, closure, and post-closure care of the landfill.

All mining operations are governed by the regulations of the Surface Mining Control and Reclamation Act of 1977. The mining permit issued to TCM by the Office of Surface Mining, Reclamation and Enforcement (OSM) contains detailed operational descriptions for the Centralia Mine, including coal mining, backfill and grading, solid waste disposal, and reclamation operations (closure). The document containing this information is referred to as the Permit Application Package (PAP) (TransAlta, 2003).

1.2 Site Description

TCM (referred herein also as the Centralia Mine), a wholly owned subsidiary of TECWA Fuels, Inc., owns the mine in an area northeast of Centralia, Washington. TransAlta owns and operates the adjacent coal-fired steam-electric generation plant known as TransAlta Centralia Generation LLC (TCG) (referred herein also as the Plant). The Plant generates ash (bottom ash and fly ash) and flue gas desulfurization (FGD) process wastes that are being disposed in the landfill at the Centralia Mine.

The LPLF is located southeast of the Plant on a bench area of the TCM property, and north of Pit 7 (Exhibit 1-1). The LPLF comprised of two development stages. Stage 1 was constructed in 2009 and consists of three fill phases in the northern half of the landfill – Phases A-1, A-2, and A-3a. Stage 2 is in the southern half of the landfill and was constructed between 2011 and 2013. Stage 2 consists of three phases – Phases A-3b, A-4, and A-5. The total area of the LPLF is approximately 18 acres.

Exhibit 1-1. Site Map

Stage 1 is lined with a barrier soil layer that provides a stable engineered surface for waste placement while being relatively impervious to retain leachate, and consists of 12-inches of prepared, native soil (scarified and recompacted close to optimum moisture content to achieve a low permeability of no more than 1x10-6 centimeters per second [cm/sec]). The soil barrier is overlaid by a leachate collection layer consisting of 24 inches of bottom ash supplemented with strip drains.

Stage 2 of the LPLF contains the same soil barrier in Stage 1 but also includes a 60-mil high-density polyethylene (HDPE) geomembrane liner deployed over the top of the soil barrier. Twenty-four inches of bottom ash supplemented with strip drains also covers the base liner of Stage 2 for leachate collection.

SECTION 2

Closure Plan

The LPLF will be closed by leaving the CCR in place in accordance with the closure performance standards, as specified in §257.102(d). The landfill will be closed in a manner that will achieve the following:

1. *Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated runoff to the ground, surface waters or to the atmosphere*
2. *Preclude the probability of future impoundment of water, sediment, or slurry*
3. *Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and post-closure care period*
4. *Minimize the need for further maintenance of the CCR unit*
5. *Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices*

2.1 Closure Process Narrative Description

2.1.1 Final Cover System

The final cover system for LPLF will be designed and constructed to minimize infiltration and erosion. §257.102(d)(3)(i) of the Rule requires that the final cover system meet the following minimum requirements:

1. The permeability of the final cover system be less than or equal to the permeability of the bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ centimeters per second (cm/sec), whichever is less.
2. Minimum 18-inch-thick soil infiltration layer of select earthen materials.
3. Minimum 6-inch-thick erosion layer of earthen material capable of sustaining plant growth.

The final cover system for the LPLF will require a permeability less than or equal to the permeability of the bottom liner systems because both bottom liner systems, a soil barrier and a soil barrier overlaid with an HDPE geomembrane liner, have a permeability of less than the $1x10^{-5}$ cm/sec.

An alternative final cover system may be used if it meets the following minimum requirements:

- The alternative cover design must contain an infiltration layer that provides an equivalent reduction in infiltration in accordance with the minimum requirement.
- The alternative cover design must contain an erosion layer that provides equivalent protection from wind or water erosion as the prescriptive erosion layer.
- The disruption of the integrity of the final cover system must also be minimized through a design that accommodates settling and subsidence.

To meet the Rule minimum cover system requirements, the two alternative final cover systems will be installed as allowed by §257.102(d)(3)(ii). Over the Stage 1 area, which has a bottom liner of 12 inches of low permeability soil with a permeability of $1x10^{-6}$ cm/sec, the cover will be the same final cover system as currently permitted by the State of Washington. The LPLF is permitted under Washington State rules (WAC 173-350-400), with a final cover system consisting of (from bottom to top):

- Minimum 12-inch-thick layer of intermediate soil cover (native soil placed for cover and contouring),

- Minimum 24-inch-thick layer infiltration layer (mine spoils consisting of low-permeability native silt stone and claystone from the Skookumshuck Formation that is typically fine-grained and when compacted close to optimum moisture content having a permeability of $1x10^{-6}$ cm/sec). (The overall thickness of the final cover system allows for the 24 inches of mine spoils to be out of the frost zone and functioning as a infiltration layer.)
- Minimum 12-inch thick erosion layer (topsoil) capable of sustaining plant growth.

Over the Stage 2 area, which has a bottom liner consisting of 12 inches of low permeability soil (with a permeability of $1x10^{-6}$ cm/sec) AND a 60-mil HDPE geomembrane, the landfill will be capped with the following (from bottom to top):

- 12 inches of low permeability soil (mine spoils) with a permeability of no more than $1x10^{-6}$ cm/sec
- 60-mil HDPE geomembrane liner
- Drainage layer consisting of drain sand or a composite drainage net (CDN)
- 12 inches cover soil (mine spoils)
- 6 inches of topsoil (erosion layer) capable of sustaining plant growth

It is expected that the alternative cover systems listed in this plan will satisfy the performance criteria of the Rule. A written certification will be provided by a qualified professional engineer certifying that the design meets the requirements of the Rule at the time of final closure design as required by §257.102(d)(3)(iii).

2.1.2 Methods and Procedures

Final Grading

The final cover will be graded to drain surface water from the cover, and the top slope will have a grade of not less than 3.5 percent. The proposed final grades will be designed to accommodate surface water drainage from the completed landfill after anticipated settlement and to minimize erosion of the final cover soil. The final grading plan for the LPLF is shown in Figure 1 (attached).

Final Cover System Installation

Final cover installation generally will be completed in the following steps:

1. Preparing the site, equipment mobilization, and installing temporary facilities and controls
2. Installing temporary sediment and erosion control measures
3. Preparing the subgrade (top of waste) and intermediate soil cover layer in areas identified for closure to shape slopes and grades and to facilitate construction of subsequent closure activities
4. Placing the infiltration layer soils and geomembrane (Stage 2) to meet the minimum requirements
5. Placing the erosion layer and seeding and planting of native vegetative cover including applying fertilizer and implementing weed deterrent control measures (as necessary)
6. Installing permanent drainage control features (for example, stormwater control berms/ditches)
7. Final cleanup and contractor demobilization

2.2 Estimate of Largest Area of Required Closure

In accordance with §257.102, the estimated largest area that would require final cover at any time during the active life of the landfill if the site was closed is approximately 18 acres. Figure 1 shows a site plan with the final closure cover grades and stormwater features. This acreage corresponds to the maximum area of the site planned for waste fill (that is, the entire landfill footprint already in use).

2.3 Coal Combustion Residual Waste Inventory

In accordance with §257.102(b), the estimated maximum inventory of CCR waste that would ever be present onsite during the active life of the LPLF is approximately 994,000 cubic yards (yd^3). The current estimate of waste in-place is 490,178 yd^3 based on TCM's September 2015 ground survey. The closure grades as shown in Figure 1 (attached) accommodate an additional 503,822 yd^3 of airspace available, for a total estimate of 994,000 yd^3. A final volumetric waste survey will be conducted as part of the final closure design.

2.4 Slope Stability

The design for the LPLF final cover system consists of side slopes of 4H:1V (horizontal to vertical) for the Stage 1 area and 3H:1V for the Stage 2 area, and a top deck slope of 5 percent. These slopes are consistent with good engineering practice for these types of cover systems and are expected to be stable, and to accommodate settling and subsidence. The final design certification for closure of the LPLF will ensure that it is closed in a manner that will provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and throughout the post-closure care period.

2.5 Stormwater Management and Control

Drainage control at the landfill during closure will be achieved by the proposed final grading plan and stormwater control features as shown in Figure 1. The grades have been designed to drain surface water from the cover to the perimeter stormwater ditch system surrounding the landfill. Stormwater will be conveyed in the ditches to Pond 44. These control measures will reduce the probability of future impoundment of water, sediment, or slurry within the LPLF.

2.6 Schedule

In accordance with §257.102(e), closure must commence no later than 30 days after the date that the landfill receives the known final receipt of waste or 2 years after not receiving any waste (although extensions are possible). Closure construction must be completed within 6 months of commencing closure activities as required by the Rule. Extensions for closure may be allowed if it can be demonstrated that closure is not feasible within the required timeframes because of factors beyond the facility's control. If such a demonstration is necessary, a demonstration narrative will be placed into the operating record.

Closure is anticipated to occur in 2026, following retirement of the Plant. A preliminary closure construction schedule, illustrating the sequencing and anticipated duration of closure activities, is shown in Table 2-1.

Table 2-1. Preliminary Closure Construction Schedule – Ash Disposal Area
TransAlta Centralia Mining LLC, Limited Purpose Landfill – Closure Plan

Task	Task Completion Timeframe[a]
Last Known Receipt of Waste	TBD
Preparation of Notification of Intent to Close Landfill[b]	+30 days
Commence Closure: Site Preparation and Mobilization (Set Temporary Controls)	+30 days
Waste Contouring and Intermediate Cover Placement	+15 days
Final Cover Infiltration Soil Layer Placement/Geomembrane (Stage 2)	+30 days
Final Cover Erosion Protection Layer	+15 days
Installation of Permanent Drainage Structures	+15 days
Seeding/Planting of Vegetation (as applicable)[c]	+10 days
Closure Certification/Notification and Deed Notation	+30 days [d, e]

[a] Timeframes are provided in approximated calendar days. Expected Last Known Receipt of Waste is "to be determined" (TBD) based on the final waste placement in the LPLF as part of the Plant's retirement schedule. Plant retirement is scheduled for December 31, 2025. Actual dates and durations for construction will depend on weather, contractor availability, and other such variables.

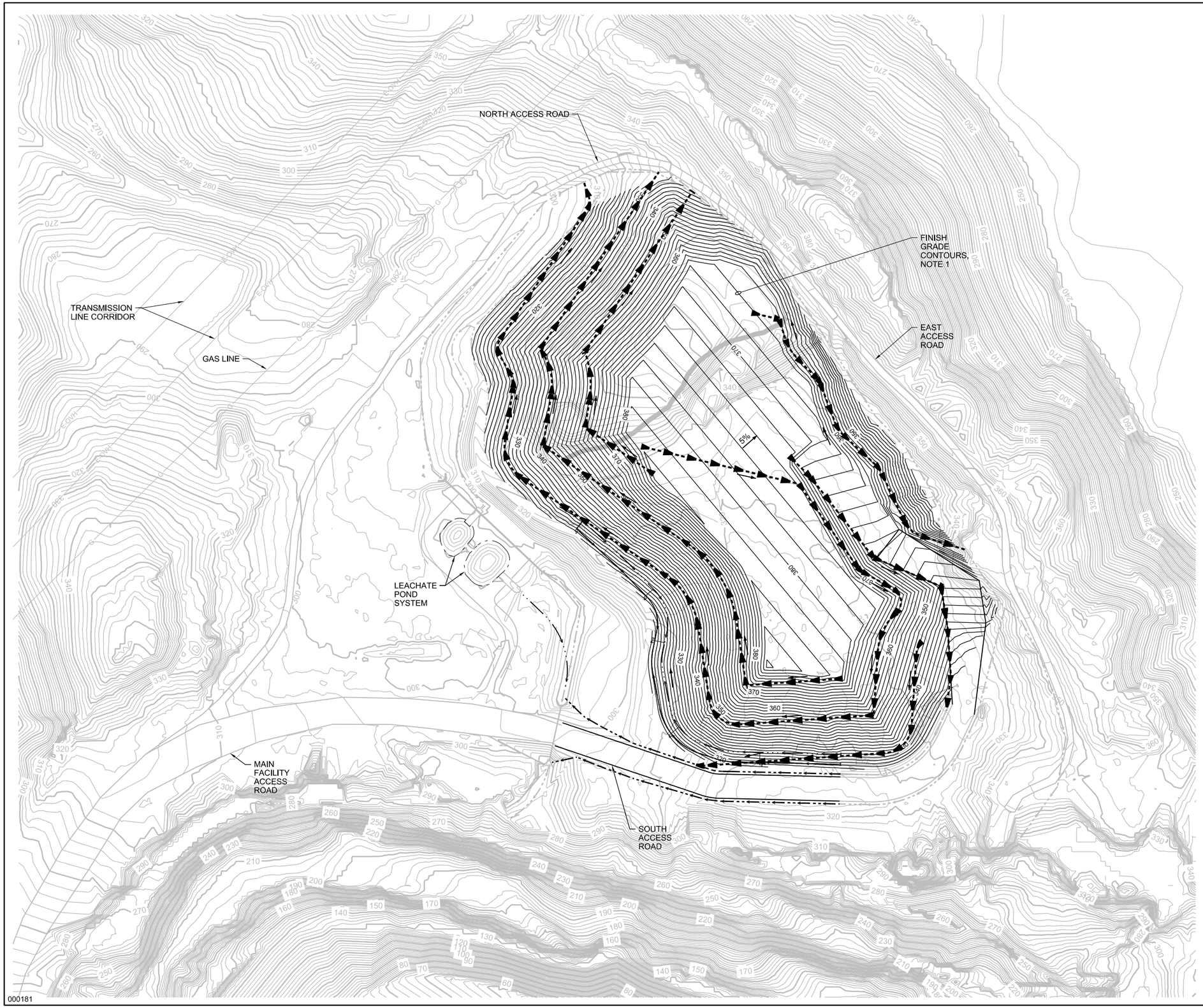
[b] Notification of intent to close is required no later than the date closure is initiated. Notification must include the certification from the qualified professional engineer for the design of the final cover system as required by §257.102(d)(3)(iii). Notification must be placed in the facility's operating record, and within 30 days posted on the publicly accessible Web site and notice sent to the State Director.

[c] Seeding and vegetation establishment will be adjusted to align with the growing season. Temporary erosion controls will be used as needed to prevent erosion of the erosion protection layer.

[d] Per §257.102(h), within 30 days of completing closure, TCM must complete a certified notice of closure completion by a qualified professional engineer and place it in the facility's operating record. The notification is complete once it has been placed in TCM's operating record. The State Director must be notified (§257.106(i)) and the notification must be placed on the publicly accessible Website (§257.107(i)) within 30 days of placement in the operating record.

[e] Notation on the deed of the property in perpetuity to notify any potential purchaser that the property has been used as a CCR unit and its use is restricted under the post-closure care requirements in accordance with §257.104(d)(1)(iii). Notation of deed must be done following completion of closure. Within 30 days of recording the notation on the deed to the property, TCM must prepare a notification stating that the notation has been recorded. The notification is completed when it has been placed in the facility's operating record. Notification to the State Director is required within 30 days of recording the notation on the deed. TCM must also post this on their publicly accessible Web site within 30 days.

Figure



NOTES:

1. FINAL TOP DECK GRADES ARE APPROXIMATE AND ARE SUBJECT TO VARY SLIGHTLY DEPENDING ON FINAL WASTE FILL VOLUMES AS THE PLANT NEARS SHUTDOWN.

LEGEND

- STORMWATER COLLECTION DITCH (WITH FLOW DIRECTION)
- CULVERT
- STORMWATER CONTROL BERMS

FIGURE 1
LIMITED PURPOSE LANDFILL FINAL CLOSURE GRADES
TRANSALTA CENTRALIA MINING LLC

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