

**HARRISON POWER STATION CCB LANDFILL
PHASE 7 EXPANSION AREAS-LINER DESIGN**

Prepared For:



**MONONGAHELA POWER COMPANY
A FIRSTENERGY COMPANY
HARRISON COUNTY POWER STATION
HARRISON COUNTY, WEST VIRGINIA**

Prepared By:

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
PITTSBURGH, PENNSYLVANIA**

CEC Project 302-918

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Civil & Environmental Consultants, Inc.


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Certification/Statement of Professional Opinion

The composite liner system design and leachate collection and removal system design for the FirstEnergy Harrison Power Station CCB Landfill — Phase 7 were prepared by Civil & Environmental Consultants, Inc. (CEC). The document was based on certain information that, other than for information CEC originally prepared, CEC has relied on, but not independently verified. Therefore, this Certification/Statement of Professional Opinion is limited to the information available to CEC at the time this document was written. Subject to the preceding, it is my professional opinion as a Professional Engineer licensed in the State of West Virginia, that this document has been prepared in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances, and at the time and in the same locale. It is my professional opinion that the design of the composite liner and the leachate collection and removal system was prepared consistent with the requirements of the United States Environmental Protection Agency's "Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule," published in the Federal Register on April 17, 2015, which became effective on October 4, 2016 with subsequent revisions, the final rule became effective on September 28, 2020. (40 CFR 257 Subpart D). This Certification/Statement of Professional Opinion is limited to §257.70(e) pertaining to the design of the composite liner system and leachate collection and removal systems.

The use of the words "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion and is not and shall not to be interpreted or construed as a guarantee, warranty, or legal opinion.


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1.0 Introduction

The Harrison Power Station is a coal-fired electric generating Facility located near the community of Shinnston in Harrison County, West Virginia (WV). The Harrison Power Station CCB Landfill is a captive coal combustion byproduct (CCB) facility located approximately one mile north-northeast of the Harrison Power Station. CCBs generated at Harrison Power Station are placed in the CCB Landfill. The Landfill is currently permitted for operations under WV Department of Environmental Protection Permit No. 0075795 (Permit). The design of the liner system and the leachate collection and removal system for Phase 7 of the Landfill is described in this report.

1.1 Phase 7 Application Preparation

The Phase 7 Solid Waste Permit renewal and expansion was prepared for the renewal and expansion of Permit No. WV 0075795 and has been prepared in accordance with 33CSR1, the “Solid Waste Management Rule”, Section 3.7. Permit Application Requirements, and the requirements of the United States Environmental Protection Agency’s “Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule,” 40 CFR 257 Subpart D, § 257.70 Design criteria for new CCR landfills and any lateral expansion of a CCR landfill. The permit renewal application was supplemented by previously submitted documentation for the CCB landfill including detailed information and design calculations provided in previously submitted permit application documents which were approved by WVDEP.

The Phase 7 application was prepared under the supervision of Mr. Daniel Tolmer, a licensed Professional Engineer in the State of West Virginia, registration number 23162. Mr. Tolmer is employed by:

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2.0 Composite Liner System and Leachate Collection System

CEC designed the composite liner system and leachate collection and removal system in accordance with 40 CFR § 257.70. The proposed composite liner system meets the alternate design requirements set forth in 257.70(c). The Phase 7 Expansion Area liner system is the same configuration as the previously approved liner system and consists of (from bottom to top):

- Subgrade or Subbase – six inches (minimum of compacted soil having a maximum permeability of 1×10^{-6} cm/sec).
- A Geocomposite Drainage Net (GDN)/Leachate Detection Layer.
- A Geosynthetic Clay Liner (GCL).
- A 60-mil Textured HDPE Geomembrane.
- Leachate Collection Layer – a 16 oz/sy Cushion Geotextile and 12 inches of bottom ash (or sand) having a minimum permeability of 1×10^{-3} cm/sec; and
- Protective cover layer – 12 inches of CCB material.

The composite liner is specified to be constructed of materials that are compatible with the CCB materials permitted to be placed in the landfill to meet the requirements of 40 CFR §257.70(b)(1).

Geotechnical analyses including slope stability and settlement analyses were performed as part of this and previous permit applications for the design of the landfill liner system and underlying soil components. Material testing was performed for soil strength parameters, and interface shear strength of the material components proposed for use in the landfill liner system as part of the design. The geotechnical analyses and material property testing that were performed as part of this and previous permit applications demonstrate that the Landfill liner design meets the requirements of 40 CFR §257.70(b)(2) and 40 CFR §257.70(b)(3).

The composite liner is specified to be constructed over areas of proposed placement of CCB materials to meet the requirements of 40 CFR §257.70(b)(4).

2.1 Alternative Composite Liner

An alternative composite liner must consist of two components; the upper component consisting of a geomembrane, and a lower component, that is not a geomembrane, which has a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a maximum hydraulic conductivity of 1×10^{-7} centimeters per second. The Phase 7 composite liner system design meets this requirement by using a 60-mil HDPE geomembrane and a geosynthetic clay layer (GCL). Testing performed on GCL with site specific leachate have been shown to meet the liquid flow rate equivalent to two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} centimeters per second.

The composite liner materials are compatible with the CCR materials permitted to be placed in the landfill.

Geotechnical analyses including slope stability and settlement analyses were performed as part of this and previous permit applications for the design of the landfill liner system and underlying soil components. Material testing was performed for soil strength parameters, and interface shear strength of the material components proposed for use in the landfill liner system as part of the design. The geotechnical analyses and material property testing that were performed as part of this and previous permit applications demonstrate that the Landfill liner design meets the requirements of 40 CFR §257.70(b)(2) and 40 CFR §257.70(b)(3).

2.2 Leachate Collection and Removal System

The leachate collection and removal system was designed using the Hydraulic Evaluation of Landfill Performance (HELP) model for the Landfill. The HELP model, which is included in the previous permit application documents, demonstrates that the leachate collection and removal system was designed to maintain less than 30 centimeters of head in the leachate collection layer of the composite liner system to meet the requirements of 40 CFR §257.70(d)(1). The leachate collection system was designed with materials which are compatible with the CCR materials and was designed to minimize clogging and allow for cleaning of the system during the active life and

post-closure care period to meet the requirements of 40 CFR §257.70(d)(2) and 40 CFR §257.70(d)(3).

3.0 Conclusion

Based on the material properties, laboratory testing and the analyses performed, the composite liner system and the leachate collection and removal system is designed to meet the requirements of United States Environmental Protection Agency's "Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule," 40 CFR 257 Subpart D, § 257.70 Design criteria for new CCR landfills and any lateral expansion of a CCR landfill.

4.0 References

1. GAI Consultants, Inc. January 2011. Phase 5 Permit Renewal Application, Harrison Power Station.
2. GAI Consultants, Inc. February 2016. Phase 6 Permit Renewal Application, Harrison Power Station.
3. GAI Consultants, Inc. December 2017. Phase 6A Permit Renewal Application, Harrison Power Station.
4. Civil & Environmental Consultants, Inc. March 2021. Application for Renewal Solid Waste Permit No. WV 0075795 And Proposed Phase 7 Expansion Areas, Harrison Power Station.