

Harrison Power Station Landfill Phase 6a – Liner Design

Monongahela Power Company
A FirstEnergy Company
Harrison Power Station
Harrison County, West Virginia

April 2018

Prepared for:
Monongahela Power Company
A FirstEnergy Company
5001 Nasa Boulevard
Fairmont, West Virginia 26554

Prepared by:
GAI Consultants, Inc.
Murrysville Office
4200 Triangle Lane
Export, Pennsylvania 15632-1358

Table of Contents


Certification/Statement of Professional Opinion	ii
1.0 Introduction	1
2.0 Composite Liner System and Leachate Collection System.....	1
2.1 Alternative Composite Liner	1
2.2 Leachate Collection and Removal System	1
3.0 Conclusion	2
4.0 References	3

© 2018 GAI CONSULTANTS

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 6A were prepared by GAI Consultants, Inc. (GAI). The document was based on certain information that, other than for information GAI originally prepared, GAI has relied on, but not independently verified. Therefore this Certification/Statement of Professional Opinion is limited to the information available to GAI at the time this document was written. On the basis of and subject to the foregoing, 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 (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.


James F. Shields, P.E.
Assistant Engineering Manager



1.0 Introduction

The Harrison Landfill (Landfill) is a captive coal combustion residuals (CCR) facility located approximately one mile north-northeast of the Harrison Power Station in Shinnston, West Virginia (WV). The Landfill is composed of three areas, referred to as the Lower Area; Main Area; and Upper Area. 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 6A of the Landfill is described in this report.

2.0 Composite Liner System and Leachate Collection System

GAI Consultants, Inc. (GAI) 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), and consists of the following layers (listed from the bottom of the composite layer to the top of the protective cover):

- ▶ Geosynthetic Drainage Net or Sand.
- ▶ Enhanced Geosynthetic Clay Liner (GCL).
- ▶ 60-mil Textured High Density Polyethylene (HDPE) Geomembrane.
- ▶ 16-ounce per square yard cushion geotextile.
- ▶ 12-inch layer of bottom ash or sand leachate collection layer.
- ▶ 12-inch minimum layer of stabilized Flue Gas Desulfurization material (FGD).

2.1 Alternative Composite Liner

The alternative composite liner system must consist of two components: a geomembrane and a non-geomembrane, which has a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. The Phase 6a composite liner system design meets this requirement by using a 60-mil HDPE geomembrane and a GCL. The design allows for use of GSE CAR FL or CETCO Resistex 200 GCL, which have been tested with site specific leachate and 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.

Slope stability modeling was performed as part of the state Permit application for the design of the Landfill liner system. Material testing was performed for interface shear and to develop material properties of the materials chosen for use in the landfill liner system as part of the design. The slope stability and material properties are part of the Permit application and 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 Permit application, 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. 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.

3.0 Conclusion

Based on the material properties, laboratory testing and the analyses performed by GAI, the composite liner system and the leachate collection and removal system is designed to meet the requirements of 40 CFR § 257.70.

4.0 References

GAI Consultants, Inc. 2017.

Application for Phase 6A Expansion, Harrison Power Station, November 2017.

GAI Consultants, Inc. 2016.

Application for Renewal, Phase 6 Expansion, Harrison Power Station, February 2016.

United States Environmental Protection Agency. 2015.

40 CFR Part 257, Hazardous and Solid Waste Management Disposal System; Disposal of Coal Combustion Residual from Electric Utilities, Final Rule April 2015.