

Harrison Landfill Unstable Areas Demonstration

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

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Certification/Statement of Professional Opinion

The Unstable Areas Demonstration (Demonstration) for the Harrison Landfill was prepared by GAI Consultants, Inc. (GAI). The Demonstration 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 the Demonstration 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 the Demonstration 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 Location Restrictions Demonstration was prepared consistent with the requirements of the United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," published in the Federal Register on April 17, 2015 with an effective date of October 19, 2015.

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 be interpreted or construed as a guarantee, warranty or legal opinion.



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1.0 Introduction

The Harrison Power Station (Station) is a coal-fired electric generating station located near the community of Shinnston, in Harrison County, West Virginia (WV). Coal combustion residuals (CCRs) generated at the Station are placed in the captive CCR landfill (Landfill), which is located approximately one-mile north-northeast of the Station. Approximately 95 percent of the waste consists of fixated flue gas desulfurization material. Fly ash, bottom ash, and miscellaneous wastes compose the remaining five percent.

According to the WV Department of Environmental Protection (WVDEP), the landfill is a Class F CCR Solid Waste Disposal Facility. The approximate center of the landfill is located at coordinates 39° 24' 16" north latitude, and 80° 19' 56" west longitude. Approximately 250 acres are currently permitted for landfill operations under WVDEP Permit No. WV0075795. The landfill is divided into three areas, referred to as the Lower Area, Upper Area, and Main Area.

This Demonstration was prepared in accordance with the applicable requirements [§ 257.64(a)] of the United States Environmental Protection Agency's 40 Code of Federal Regulations (CFR) Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices (CCR Rule).

2.0 Unstable Areas Demonstration

Pursuant to 40 CFR § 257.64, an existing CCR unit must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. This Demonstration will be maintained in the facility's operating record in accordance with § 257.64(e).

2.1 Demonstration Overview

The Demonstration includes descriptions of the following factors used to determine that the CCR unit is not located in an unstable area:

- on-site or local soil conditions that may result in significant differential settlement;
- on-site or local geologic or geomorphic features; and
- on-site or local human-made features or events (both surface and subsurface).

These factors were evaluated based on the following information:

- United States Geological Survey (USGS) topographic maps (current and historic);
- landslide maps;
- geologic maps;
- mine maps;
- coal resource maps;
- United States Department of Agriculture (USDA) soil reports;
- karst maps;
- aerial photographs (current and historic); and
- as-built construction and permit documents.

The documents were reviewed to determine if the CCR unit is located in an unstable area. The following sections provide evaluation of on-site and local conditions related to the Landfill.

2.1.1 On-Site or Local Soil Conditions

No unanticipated settlement nor significant differential settlement of the Landfill was observed during the annual (2015, 2016, and 2017) and weekly (April 2016 through September 2018) inspections, both of which are required by the CCR Rule. Historically, no unanticipated settlement nor significant differential settlement has been reported in past documented Landfill inspections. CCR placement techniques typically used reduce the likelihood of differential settlement.

The on-site presence of landslide prone soils was researched by reviewing available USDA Soil Reports. The USDA Soils Report for Harrison County, West Virginia defines the existing on-site soils by origin. The majority of the existing site soils are residual in nature. Residual soils are soils that form in-situ by weathering of bedrock. One on-site soil was classified as colluvium, which was formed by down slope movement of existing soils via landslides, soil creep, etc., and can generally be considered slide-prone. According to the USDA Soils Report, the colluvium accounted for approximately ten percent of the total site soil. However, the majority of the colluvium was located higher in elevation, thus having no impact on the Landfill. One colluvium deposit was located below the Upper Area, but the colluvium was removed prior to liner construction in accordance with construction documents. Therefore, based on site research, the Landfill area should not be prone to significant differential settlement nor landslides.

The Landfill was designed based on numerous subsurface investigations and on the results of stability analyses for this site. Calculations are located in the permit applications for the Lower Area, and Phases IV, V, and VI.

2.1.2 On-Site or Local Geologic or Geomorphologic Features

A review of the *August 2016 West Virginia Tax Districts Containing Karst Terrain* map reveals that the Landfill resides in an area with no sinkholes, subsidence, caverns, nor karstic rock formations. Furthermore, the Geologic Map of West Virginia shows that the rocks below the Landfill are comprised of the Monongahela and Conemaugh Groups, both of which do not contain rocks associated with karst terrain formation.

Current and historic topographic maps and aerial photographs were reviewed to determine whether on-site or local geomorphic features exist or existed in the past that could create an unstable area. The documents evaluated did not identify any of these features.

2.1.3 On-Site or Local Human-Made Features or Events (both Surface and Subsurface)

Permit documents, geologic maps, USGS topographic maps, mine maps, and coal resources maps were reviewed for evidence of surface and deep mining. Mine maps from the West Virginia Geologic and Economic Survey (WVGES) show that surface mining and deep mining were performed in areas of the site.

The Pittsburgh coal seam has been deep mined underneath the site, and crops out in limited areas of the Main Area and Lower Area where it was also surface mined. The WVGES mine maps show the Pittsburgh coal structure contours are approximate elevation (El.) 920 feet mean sea level (MSL) to the east of the Landfill and El. 1,020 feet MSL to the west. Existing ground (i.e. prior to CCR placement) in the Main and Lower Areas where CCR depth is the greatest is approximate El. 1,100 feet MSL; therefore, soil and rock overburden exceeds 120 and 160 feet thick, respectively, where the ground pressure would be the greatest. The minimum overburden thickness is 40 feet near the toe of the landfill where the ground

pressure from the Landfill would be the least. Prior to landfill construction, the areas where surface mining occurred were reclaimed to provide for a stable foundation. According to permit documents, investigations have determined that subsidence has not occurred at the Landfill. Mine stabilization and other preventive measures have been implemented to mitigate subsidence impacts. To mitigate for mine subsidence impacting the Landfill, the portions of the Pittsburgh coal seam mine workings where the rock overburden was less than 100 feet thick were filled with grout; for the portions of the mine workings where rock overburden was between 100 and 150 feet thick, a geosynthetic reinforcement liner support system was installed at the ground surface. Site areas where the overburden above deep mine workings is greater than 150 feet thick should not be impacted by mine subsidence.

The Redstone coal is typically of poor quality or absent and has not been deep mined below the landfill. The Waynesburg coal occurs only in the higher elevations along drainage divides. There is no recorded mining of Waynesburg coal on site.

3.0 Conclusion

Recognized and generally accepted good engineering practices have been incorporated into the design and construction of the Landfill to reduce the potential for disruption of the structural components of the Landfill. GAI Consultants, Inc. reviewed the available documents to determine if the existing Landfill was constructed in an unstable area. The soil, geologic, geomorphologic, and human-made features evaluated show that the Landfills are not located in an unstable area, or were addressed as part of the engineering design and construction of the Landfills.

4.0 References

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