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Unstable Areas Assessment
GenOn Energy, Inc.
Brandywine Ash Storage Site
Prince George's County, Maryland

GAI Project Number: C140449.02

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Table of Contents

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Certification/Statement of Professional Opinion

The Unstable Areas Assessment (Assessment) for Phase 2 of the Brandywine Ash Storage Site was prepared by GAI Consultants, Inc. (GAI). The Assessment was based on information that GAI originally prepared, and information that GAI has relied on but not independently verified. This Certification/Statement of Professional Opinion is, therefore, limited to the information available to GAI at the time the Assessment 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 Maryland that the Assessment 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, at the same time, and in the same locale. It is my professional opinion the Assessment was prepared consistent with the requirements of § 257.64 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 (40 CFR 257 Subpart D).

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.

GAI Consultants, Inc.

Ryan P. Hurt, P.E.
Engineering Manager

Date 10/9/18

1.0 Introduction

The Brandywine Ash Storage Site (Site) is operated by GenOn Energy Inc. (GenOn) and is located in Prince George's County, Maryland on a 212-acre tract of land located two miles east of Brandywine, Maryland. Phase 2 of the site is currently active; remaining areas of the Site have previously been closed.

Phase 2 of the Site is a lined solid waste disposal facility that is currently being used for the long-term storage of coal combustion residuals (CCR) produced at GenOn's Morgantown and Chalk Point Generating Stations. The Site also historically received CCR from the Potomac River Generating Station.

The Site is regulated by the Maryland Department of the Environment (MDE). The Site is also regulated as an existing CCR landfill under the United States Environmental Protection Agency's (EPAs) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments" [40 CFR 257 Subpart D] published in the Federal Register on April 17, 2015 with an effective date of October 19, 2015 (CCR Rule).

2.0 Purpose

This Unstable Areas Assessment is prepared pursuant to § 257.64 of the CCR Rule [40 CFR § 257.64]. In accordance with § 257.64, a CCR landfill owner or operator must demonstrate compliance by October 17, 2018 with location restriction requirements for unstable areas.

3.0 Unstable Areas

Location restrictions for unstable areas are contained in § 257.64 of the CCR Rule [40 CFR § 257.64]. According to § 257.64, existing CCR landfills must not be located in unstable areas unless it can be demonstrated 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". At a minimum, this demonstration must consider:

- Onsite or local soil conditions that may result in significant differential settling;
- Onsite or local geologic or geomorphologic features; and
- Onsite or local human-made features or events (both surface and subsurface).

3.1 Local Soil Conditions

Phase 2 of the Site consists of 31 acres of lined CCR landfill (GAI Consultants, 2007). The erosion and sediment control plan for the site development (GAI Consultants, 2009) documents the soil types found in the Phase 2 area; these consist of silt loams with a maximum six to 12 percent slope. Boring logs (Froehling & Robertson, 1975) indicate that, throughout the Site, the surface and subsurface soils consist of silty clays, fine sands, and occasional gravel.

GAI conducted slope stability evaluations of the Phase 2 landfill (GAI Consultants, 2006) based on subgrade conditions and found the minimum factor of safety against sliding to be 40. This included considerations for groundwater levels and existing soils used for subgrade material. As part of the subgrade development, test pits were used to determine existing CCR limits so that CCR material below subgrade level could be overexcavated (GAI Consultants, 2007). The test pits showed the soil underlying the CCR material was mostly clay.

The boring and test pit data were used in calculations (GAI Consultants, 2010) to assess the potential for differential settlement of soils below the liner system. The calculations determined no adverse effects would result from differential settlement.

3.2 Local Geologic or Geomorphologic Features

Mataponi Creek and one of its tributaries are located to the west of Phase 2 of the Site. The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map for the area shows that Phase 2 of the Site is outside the mapped approximate floodplain (FEMA, 2016). Calculations (GAI Consultants, 1991) determined the 100-year flood elevation for Mataponi Creek is below the Phase 2 toe (GAI Consultants, 2008). Since Phase 2 of the Site is outside the 100-year floodplain, it is unlikely that saturation of the adjacent soils or underlying subsoils will occur and lead to instability.

The Geologic Map of Prince George's County (Glaser, 2003) states the geology of the Phase 2 Site area consists of "sand, pebbly sand, and gravel, capped by sandy pebbly loam in places." In addition, "the Upland deposits ... consist largely of poorly sorted, medium to coarse sand interbedded with pebbly sand and medium to coarse gravel. The sand is predominantly quartz, and the pebbles quartzite, sandstone, and chert. The basal beds of the deposit include scattered boulders ranging to several feet in diameter."

The Hazard Mitigation Draft Plan for Prince George's County identified several geologic or geomorphologic hazards of concern in the county (earthquakes, landslides, subsidence, and sinkholes). Earthquakes are not considered to be a viable hazard. Since 1900, there have been no recorded earthquakes with an epicenter in the county and no recorded Maryland earthquakes having a magnitude greater than 3.6 or causing any damage (Prince George's County, 2017). Similarly, land subsidence "is not known to be a significant problem in Prince George's County", and sinkholes are "not a likely hazard" (Prince George's County, 2017).

In GAI's opinion, there are no geological or geomorphological features that would classify as unstable areas.

3.3 Local Human-Made Features

The Brandywine Ash Storage Site is the only human-made feature that is present within the Phase 2 Site area. Since the Site has been designed with engineering protocols for liner stability, CCR placement stability, and stormwater runoff control, the Site meets the regulatory requirements imposed by the MDE. In GAI's opinion, there are no human-made features that would lead to the generation of unstable areas.

4.0 Conclusion

In GAI's opinion, Phase 2 of the Brandywine Ash Storage Site is in compliance with the CCR Rule location restrictions for unstable areas.

5.0 References

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Froehling & Robertson, Inc. 1975. *Subsurface Investigation, Stage 3 Test Borings – Fly Ash Disposal Area, Brandywine, Maryland.*

GAI Consultants, Inc. 1991. *100-year Floodplain Computations. Brandywine Storage Area, Mataponi Creek, Prince George's Country.*

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Glaser, John D. 2003. *Geologic Map of Prince George's County, Maryland.*

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