Coal Combustion Residual Landfill
Annual Inspection Report

Boardman Generating Facility

Prepared by: Mathew Quigley, P.E.

December 2016
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Introduction
This Coal Combustion Residual (CCR) Annual Inspection Report fulfills the requirements of 40 CFR §257.84(b)(2) for a qualified professional engineer to prepare a report following each annual inspection. The report must address any changes in geometry of the structure since the previous annual inspection; the approximate volume of CCR contained in the unit at the time of the annual inspection; any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and any other changes which may have affected the stability or operation of the CCR unit since the previous annual inspection.

Field Observations
An annual inspection of the Boardman Generating Facility CCR landfill was conducted by Mathew Quigley, P.E., on December 7th, 2016. Site conditions were clear skies and cold with light wind. No precipitation had fallen on the landfill site in the days immediately prior to the inspection. An inspection was conducted of the landfill perimeter roads, perimeter ditches, ash disposal area, and stormwater retention area. Inspections consisted of visual observations only; no other metrics are available in the field for review. Reference Appendix A for photos taken during the inspection.

The CCR landfill was observed to contain fly ash, economizer ash, and bottom ash. The fly and economizer ashes occupy approximately 80 percent of the landfill area, with the bottom ash occupying approximately 20 percent along the southern edge of the area. All ash was observed to be relatively compacted and wetted from watering operations used as the ash is placed. The perimeter roadway serving as impoundment of the landfill appears to be in acceptable condition with only one location of minor stormwater erosion observed.

Stormwater conveyance systems appear to be generally functioning as required with some minor deficiencies requiring action observed and noted below. The landfill stormwater retention area located at the western side of the landfill appears to be in acceptable condition and fit for continued use.

The following deficiencies requiring corrective action were noted:

- The southwest vehicle entrance to the landfill site appears to have some obstructions that may disrupt stormwater flows from reaching the site stormwater retention area.
- The stormwater ditch between the western dike of the stormwater retention area and the western perimeter roadway appears to have some locations that may not fully convey stormwater runoff to be retained within the ditch.
- A ditch between the bottom ash and fly/economizer ash is forming as the three materials are added to the site. This ditch has several locations that will not drain to the site stormwater retention area. However, this potentially accumulated stormwater does not appear to pose a
risk of stormwater runoff from the site or risk the stability of other stormwater conveyance systems. The ditch does pose a risk to vehicles depositing ash upon the site.

- Minor erosion was observed in the side of the perimeter roadway at the northwest corner of the site.
- Minor brush has built up in some ditches.

**Evaluation of Monitoring Methods**

PGE implements a weekly visual inspection of the CCR landfill by trained PGE staff present at the Boardman Generating Facility. The weekly inspection logs are designed to itemize key areas to be reviewed and easily list deficiencies noted.

As part of this annual inspection, previous weekly inspection logs available for 2016 have been reviewed. For 2016, the most notable observation made was the presence of juniper trees growing in the exterior of the roadway embankment along the perimeter of the landfill. These trees were noted in the 2015 weekly and annual inspections and do not appear to pose a hazard to the integrity of the landfill impoundment but could be cleared for improved visibility of the roadway embankment. As stated in the 2015 Annual Inspection Report, removal of the trees is at the discretion of the plant management.

The weekly visual inspection form and inspection process is sufficient for proper monitoring of the CCR landfill pursuant to 40 CFR §257.84.

**Corrective Actions**

The following corrective actions need to be undertaken by PGE in 2017.

- The southwest vehicle entrance to the landfill site should be surveyed and graded as necessary to insure a stormwater discharge path to the stormwater retention area.
- The stormwater ditch between the western dike of the stormwater retention area and the western perimeter roadway should be surveyed and graded to insure stormwater runoff from the roadway and dike is contained within the site.
- Efforts should be undertaken to grade existing bottom ash material and fly/economizer ash material, if possible, to infill the ditch formed between the materials in a manner that establishes a stormwater ditch to convey runoff flows to the stormwater retention area. As more ash is added to the site, the ditch should either be maintained or completely infilled to convey stormwater runoff to the site perimeter ditches. Should the ditch be maintained, it should maintain a minimum depth of 1.5 feet, utilize side slopes of 4H:1V maximum to prevent hazards to site vehicles grading the ash, and be graded with a slope of at least 0.30 percent toward the retention area.
- A granular backfill, such as 3/4 inch minus material, should be added and compacted within the erosion observed in the side of the perimeter roadway at the northwest corner of the site.
- As seasonal restrictions permit, brush should continue to be burned from the perimeter ditches.
CCR Quantities

Appendix B contains figures of the CCR landfill depicting the previous and current topography of the landfill as recorded on November 2\textsuperscript{nd}, 2016. The previous survey of the landfill topography was completed on October 8\textsuperscript{th}, 2015. From October 8\textsuperscript{th}, 2015 to November 2\textsuperscript{nd}, 2016, approximately 69,927 cubic yards of material have been deposited on the landfill. Original landfill site topography data from 1980 is incomplete but has been approximated to estimate that to date around 652,116 cubic yards of deposited material are present within the landfill. The aerial extents of the landfill have not increased. Ash disposition has generally increased the surface elevation of the landfill in the southeast quarter and along the southern side.

PGE intends to conduct ongoing annual topographic surveys of the landfill to monitor any changes in geometry of the landfill.
Certification
This report is prepared by Mathew Quigley, a Civil Engineer in Portland General Electric’s Power Supply Engineering Services (PSES). Licensed as a Professional Engineer in 2014, Mathew has over 6 years of civil engineering experience and has provided civil engineering support of PGE’s CCR landfill at the Boardman Generating Facility since 2011.

Expires: 12/31/2016

Prepared by: Mathew Quigley, P.E.
Civil Engineer

Date: 12/25/2016
Appendix A: Inspection Photos
CCR landfill at northeast corner, viewing southwest. Entrance to northeast side of landfill.

CCR landfill at northeast corner, viewing east. Entrance to northeast side of landfill.
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CCR landfill at northeast corner, viewing north. Entrance to northeast side of landfill.

CCR landfill at north side, viewing east. North perimeter ditch.
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CCR landfill at north side, viewing east. North perimeter ditch entrance to stormwater retention area.

CCR landfill at west side, viewing southwest. Stormwater retention area.
Minor erosion observed at side of perimeter roadway at northwest corner of the landfill site.
CCR landfill west side, viewing southeast. South perimeter ditch entrance to stormwater retention area.

CCR landfill south side, viewing east. South perimeter ditch.
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CCR landfill south side, viewing west. South perimeter ditch.

CCR landfill, viewing northwest. Bottom ash (left, black) and fly/economizer ash (right, white) stored in landfill site.
CCR landfill, viewing west. Ditch between bottom ash and fly/economizer ash.

CCR landfill, viewing east. Ditch between bottom ash and fly/economizer ash.
Appendix B: Supporting Drawings/Figures