STRUCTURAL STABILITY & SAFETY FACTOR ASSESSMENT

LITTLE BLUE RUN DISPOSAL AREA
BEAVER COUNTY, PENNSYLVANIA AND
HANCOCK COUNTY, WEST VIRGINIA
Prepared for:

FirstEnergy

FIRSTENERGY GENERATION, LLC
BRUCE MANSFIELD PLANT
128 FERRY HILL ROAD
SHIPPINGPORT, PENNSYLVANIA 15077

Prepared by:

CEC

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 BALDWIN ROAD
PITTSBURGH, PA 15205

October 17, 2016
TABLE OF CONTENTS

1.0 OBJECTIVE ..................................................................................................................1

2.0 BACKGROUND INFORMATION ..............................................................................2
   2.1 CCR UNIT LOCATION ..........................................................................................2
   2.2 DESCRIPTION OF THE CCR UNIT .................................................................2

3.0 §257.73(D) STRUCTURAL STABILITY ASSESSMENT ............................................4

4.0 §257.73(E) SAFETY FACTOR ASSESSMENTS ..........................................................6

FIGURES

Figure 1 Site Location Map

APPENDICES

Appendix A Professional Engineer’s Certification
1.0 OBJECTIVE

This report has been prepared for FirstEnergy Generation, LLC (FG) to demonstrate if the Little Blue Run (LBR) Disposal Area meets the requirements for the periodic Structural Stability Assessments (§257.73(d)), and Safety Factor Assessments (§257.73(e)) identified in the CFR 40, Part 257 for existing Coal Combustion Residuals (CCR) surface impoundments. The LBR Disposal Area is classified as an existing CCR surface impoundment under the rule.
2.0 BACKGROUND INFORMATION

FG owns and operates the Bruce Mansfield Plant, which is located at 128 Ferry Hill Road, Shippingport, PA 15077. All of the materials disposed in the LBR Disposal Area are non-hazardous, Class II residual wastes generated at the Bruce Mansfield Plant. The LBR Disposal Area is shown on Figure 1 – Site Location Map.

2.1 CCR UNIT LOCATION

The LBR Disposal Area is located in Greene Township, Beaver County, Pennsylvania and Grant District, Hancock County, West Virginia. The Disposal Area is bound by the Ohio River to the north, Georgetown Road (T-824) to the east, Red Dog Road (T-312) to the south, and Pyramus Road (Lawrenceville, WV) to the west. Figure 1 shows the location of the LBR Disposal Area.

2.2 DESCRIPTION OF THE CCR UNIT

The LBR Disposal Area will cease acceptance of CCR material on December 31, 2016 in accordance with a Consent Decree entered on December 14, 2012 between FG and the Pennsylvania Department of Environmental Protection (PADEP). A Major Permit Modification Application was submitted in accordance with the Consent Decree for the closure of the LBR Disposal Area and was approved by PADEP on April 3, 2014 under Solid Waste Permit No. 300558.

The Disposal Area was placed into service in 1975. The life of the facility will be approximately 41 years. FG owns approximately 3,092 acres of property in this area. The approved permit boundary is approximately 1,695 acres and the approved limit of CCR placement is approximately 936 acres. The permitted capacity of the facility is 135,418,900 cubic yards.

The LBR Disposal Area is approved to accept the following waste streams from the Bruce Mansfield Plant only, which are transferred via pipeline or otherwise conveyed to the facility with PADEP approval: Forced Oxidation Gypsum (FOG) plant low solids waters, stabilized
CCR (includes Flue Gas Desulfurization (FGD) residue with additional lime, FOG plant high solids water, fly ash, bottom ash waste streams from the former Low and High Dissolved Solids Ponds and calcilox or approved equivalent). The materials are generated continuously (e.g., CCR) or intermittently (e.g., pond cleanouts and waste material generated during unit outages).

The LBR Disposal Area is formed behind an approximately 400 ft. high earth and rock fill dam. An approximately 30 ft. high earth fill saddle dam is located on the east side of the impoundment approximately 2,500 ft from the main dam. The Little Blue Run Dam and Little Blue Run Saddle Dam are permitted by the PADEP and have been since they first impounded water in 1975. The Little Blue Run Dam (PADEP ID No. D04-049) has a Size Category A and a Hazard Potential Category 1. The Little Blue Run Saddle Dam (PADEP ID No. D04-068) has a Size Category B and Hazard Potential Category 3.

Based on the request of the PADEP, FirstEnergy submitted a Dam Permit Application to the PADEP in February 2014 prepared by GAI Consultants to re-permit the Little Blue Run Dam and Little Blue Run Saddle Dam. The purpose of the re-permitting of the dams was to address the changes in operation at the dams and their facilities that will occur as a result of the proposed closure activities. The Dam Permit Application for Little Blue Run Dam PADEP File No. 04-049 and Saddle Dam PADEP File No. 04-068, dated February 2014, was approved by the PADEP in December 31, 2014.
3.0 §257.73(D) STRUCTURAL STABILITY ASSESSMENT

Recognized good engineering practices were employed in the design and construction of LBR impoundment and are actively used in the operation and maintenance of the facility. The LBR dam embankments have stable foundations and abutments and were constructed on bedrock, after removal of all in situ soils, as indicated on drawings in Section 20 of the approved 2014 Dam Permit Application.

Slope protection is provided on the upstream face of both dams to protect against erosion. The upstream face of the Little Blue Run Dam is covered with a resistant rock protective shell and the upstream face of the Little Blue Run Saddle Dam is covered with vegetation that is maintained on a regular basis, as identified in Section 2.0 of the LBR Operation and Maintenance Manual.

The dams were designed and constructed as zoned embankments using engineered fill based on the as-built drawings in Section 20 of the approved 2014 Dam Permit Application. A detailed slope stability analysis is included in the approved 2014 Dam Permit Application and was approved by the PADEP.

Based on Section 11 of the approved 2014 Dam Permit Application, the dam spillways were designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the probable maximum flood (PMF). There are three spillways consisting of non-erodible materials that are designed to carry sustained flows. The secondary spillway consists of an HDPE pipe and the service and emergency spillways consist of concrete pipe. The combined capacity of all spillways adequately manages flow during and following the PMF (as documented in Section 11 of the approved 2014 Dam Permit Application).

According to Section 2.2 of the Operation and Maintenance Manual (Section 25 of the 2014 Permit Application), two 12-inch diameter perforated poly vinyl chloride (PVC) pipes are embedded within the foundation blanket underdrain system, which extend along the toe of the embankment on both abutments. These pipes drain the foundation blanket filter underdrain
system by gravity to a concrete sump located at the toe of the embankment. The sump drains into a solid 16-inch PVC toe drain pipe, which discharges into a stilling basin. Daily measurements are obtained from a weir in the toe drain pipe, as well as the stilling basin discharge weir.

There are three hydraulic structures that are used to convey surface water from upstream to downstream of the Little Blue Run Dam. None of these structures pass through or beneath the dam based on the as-built drawings included in the approved 2014 Dam Permit Application.

Based on our knowledge of the site, there are no water bodies that inundate the downstream slope of either dam that would result in a low pool or sudden drawdown condition.

Section III of the draft EAPs outlines FG’s surveillance and notification procedures, which include monitoring and reporting the condition of the structural elements. These conditions are reported to the appropriate FG personnel. As outlined in Section 6.0 of the Operation and Maintenance Manual, any action items that result from the daily and/or yearly inspections will be cross-referenced with appropriate EAP measures for both dams. Action items that do not trigger the activation of the EAP will be addressed via routine maintenance.

Based on the information presented herein, the approved Dam Permit Application for Little Blue Run Dam and Saddle Dam, and the draft EAPs, the Little Blue Run Dam and Little Blue Run Saddle Dam meet the requirements for the initial structural stability assessment. The required certification from a qualified professional engineer is provided in Appendix A.
4.0 §257.73(E) SAFETY FACTOR ASSESSMENTS

Based on Section 19 of the approved 2014 Dam Permit Application, the calculated static factors of safety for:

1) long-term, maximum storage pool loading condition exceeds 1.50,
2) maximum surcharge pool loading condition exceeds 1.40, and
3) seismic conditions exceed 1.00.

The rules also require that dikes constructed of soils that have susceptibility to liquefaction, must equal or exceed the liquefaction factor of safety of 1.20. The Little Blue Run Dam and Little Blue Run Saddle Dam were not constructed of soils that have susceptibility to liquefaction. Therefore, this analysis was not performed (as per Section 19 of the approved 2014 Dam Permit Application).

Based on the approved 2014 Dam Permit Application, the Little Blue Run Dam and Little Blue Run Saddle Dam meet the requirements for the initial Safety Factor assessment. The required certification from a qualified professional engineer is provided in Appendix A.
REFERENCE

1. U.S.G.S. 7.5' TOPOGRAPHIC MAP, HOOKSTOWN QUADRANGLE, PA
   DATED: 1954, PHOTOREVISED: 1979 AND EAST LIVERPOOL

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 Baldwin Road - Pittsburgh, PA 15205
412-429-2324 - 800-365-2324
www.cecin.com

FIRSTENERGY GENERATION, LLC
LITTLE BLUE RUN
DISPOSAL AREA
BEAVER COUNTY, PENNSYLVANIA
SITE LOCATION
MAP

DRAWN BY: JMB  CHECKED BY: DMT  APPROVED BY: DRL*

* HAND SIGNATURE ON FILE  FIGURE NO.: 1
APPENDIX A

PROFESSIONAL ENGINEER'S CERTIFICATION
Professional Engineer's Certification

As required by the U.S. EPA CCR Rule 40 CFR Parts 257 and 251

I, Douglas M. Clark, P.E., a registered professional engineer in the state of Pennsylvania certify that LBR Disposal Area fulfills the minimum requirements for the initial Structural Stability Assessments (§257.73(d)), and Safety Factor Assessments (§257.73(e)) identified in the CFR 40, Part 257. This certification is based on my review of the LBR Disposal Area dam permits and/or data provided (but not independently verified for accuracy) by FirstEnergy about the CCR Unit listed above.

Douglas M. Clark, P.E.
Printed Name of Professional Engineer

Signature

049186 Pennsylvania 10/7/2016
Registration No. Registration State Date

Stamp/Seal: