

CCR DESIGN CRITERIA DEMONSTRATION

**MITCHELL LANDFILL
MITCHELL POWER GENERATION PLANT
MARSHALL COUNTY, WEST VIRGINIA**

Prepared For:

**KENTUCKY POWER COMPANY
d/b/a AMERICAN ELECTRIC POWER, INC.
COLUMBUS, OHIO**

Prepared By:

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
CINCINNATI, OHIO**

CEC Project 110-416

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Civil & Environmental Consultants, Inc.

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1.0 OBJECTIVE

This report has been prepared for Kentucky Power Company (KPC) d/b/a American Electric Power, Inc. (AEP) to demonstrate that the Mitchell Landfill, a Coal Combustion Residuals (CCR) Unit by definition of the United States Environmental Protection Agency (EPA) CCR Rule which has been published in the Federal Register (FR) on April 17, 2015 and is an extension of the current Code of Federal Rules (CFR) Title 40, Part 257 (§257), meets or exceeds the requirements Design Criteria as defined in §257.70 for a composite liner and a leachate collection and removal system. While it is recognized that Phases 1 and 2 of the Mitchell Landfill are considered to be part of an “Existing Landfill” by definition of the CCR Rule, this report addressed compliance for both the existing landfill phases (Phase 1 and 2) and future landfill phases (Phases 3 through 5). Because the future landfill phases have not begun construction prior to promulgation of the referenced Rule, they will be considered “Lateral Expansions” which must demonstrate compliance with §257.70 and be certified⁽¹⁾ by a qualified professional engineer.

⁽¹⁾ The terms certify and certification, as used herein, is defined as follows: “An Engineer’s Certification of Conditions is a declaration of professional judgment. It does not constitute a warranty or guarantee expressed or implied, nor does it relieve any other party of their responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances.”

2.0 BACKGROUND INFORMATION

KPC, a subsidiary of AEP, owns and operates the Mitchell Power Generation Plant. This facility is located along West Virginia Route 2 near the City of Cresap, West Virginia (WV) as shown on Figure 1 – Site Location Map.

The Mitchell Power Generation Plant uses bituminous coal as the primary fuel source for its two steam-turbine electric generating units. Processes and equipment that control air emissions from the coal fired units generate CCRs comprised of fly ash, bottom ash, Chloride Purge Stream (CPS) Filter Cake material, and Flue Gas Desulfurization (FGD) gypsum. CCRs that are not beneficially used, primarily fly ash and gypsum, are disposed of at an off-site CCR Unit identified as the Mitchell Landfill, which is a Class F solid waste landfill that is owned and operated by KPC. Mitchell Landfill is classified as a Class F Industrial Landfill Facility by the WV Department of Environmental Protection (WVDEP) Division of Water and Waste Management (DWWM). The landfill was designed, permitted and operates in accordance with the WV Code of State Rules, Title 33, Series 1-Solid Waste Management Rule (33CSR1) and a NPDES Permit that was approved by the WVDEP on May 29, 2013 (Permit No. WV0116742). In addition, the WVDEP issued a State 401 Water Quality Certification (No. 12011) on January 10, 2013 and the U.S. Army Corps of Engineers (USACE) issued a Clean Water Act Section 404 permit (No. 2011-1499) on February 25, 2013. These permits provide the regulatory authority to impact aquatic resources including wetlands, streams and a pond.

The following subsections provide a summary of the Mitchell Landfill CCR Unit.

2.1 CCR UNIT LOCATION

Mitchell Landfill is located along Gatts Ridge Road (Marshall County Road 72), approximately 2 miles north of the intersection with County Road 74 (about 2 miles due east of the Mitchell Power Generation Plant). The approximate location of Mitchell Landfill is depicted on Figure 1 – Site Location Map and Figure 2 – Plant and CCR Unit Location Map. The center of Mitchell

Landfill is located at the following coordinates:

- Latitude: 39 degrees, 49 minutes, 37 seconds North.
- Longitude: 80 degrees, 46 minutes, 32 seconds West.

2.2 DESCRIPTION OF CCR UNIT

Mitchell Landfill provides a maximum disposal capacity of about 10 million cubic yards of excess CCR produced from the Mitchell Power Generating Plant that is not beneficially reused. The overall landfill boundary comprises about 169.6 acres with CCR being placed within a footprint of 57.6 acres (the CCR Unit disposal area is depicted on Figure 2 – Plant and CCR Unit Location Map). The landfill will be operated in 5 phases with Phases 1 through 4 completing the maximum CCR Unit disposal footprint and Phase 5 comprising CCR placement atop the first four phases. Figure 3 – CCR Unit and Monitoring Wells, depicts the approximate boundary of the 5 phases. The expected total life of the landfill is 24 years, based on the current estimated average yearly CCR production rates and beneficial use quantities.

In addition to the CCR disposal footprint, the CCR Unit includes several appurtenant structures that include: 1) a perimeter haul road; 2) a leachate storage pond; 3) three stormwater ponds (identified as South, West and North Ponds); and, 4) a Maintenance Building. Figure 3 – CCR Unit and Monitoring Wells, depicts the CCR Unit boundary, the landfill disposal footprint, and the associated appurtenant structures.

2.2.1 Engineering Systems

The landfill was designed and constructed to protect the environment in accordance with the WVDEP Class F Industrial Landfill and has demonstrated compliance with the CCR Rule requirements. To meet these requirements, Mitchell Landfill includes several engineering controls which include: 1) a groundwater interceptor drainage system; 2) a composite liner system; 3) a leachate collection system; and, 4) a surface water management system. These engineering systems are summarized below.

2.2.1.1 Groundwater Interceptor Drainage System

The groundwater interceptor drainage system for the landfill is a combination of pipes and aggregate drains that collect and direct groundwater from beneath the liner system to a discharge point beyond the landfill limits. This system is designed to accommodate natural groundwater volumes and the potential increased groundwater volume that may result from future hydrostatic conditions associated with future pool level increases for the Conner Run Impoundment that is positioned in the adjacent valley west of the landfill.

2.2.1.2 Composite Liner System

An impermeable barrier is located at the base of the Mitchell Landfill CCR Unit that is protective of groundwater and complies with the applicable WVDEP performance standards for a Class F Industrial Landfill Facility and the CCR Rule. The bottom elevations of the impermeable barrier/composite liner provide the required separation from bedrock, the seasonal high water table, and the uppermost significant aquifer. The composite liner system is comprised of the following (from top to bottom):

- 30-mil PVC geomembrane;
- Geosynthetic Clay Liner (GCL);
- A minimum 6-inch thick layer of compacted subbase soil; and,
- Structural fill or isolation layer soil as needed to provide the minimum separation from groundwater and bedrock.

2.2.1.3 Leachate Collection System

Mitchell Landfill has a leachate collection system that conveys leachate collected above the composite liner system via gravity flow to a lift station that pumps the leachate to a storage pond (denoted as the Leachate Storage Pond) via a force main. Stormwater runoff from within active landfill areas is directed to the leachate collection layer within the landfill via vertical aggregate drains (denoted as chimney drains). The leachate collection layer conveys both stormwater from

the chimney drains and leachate that seeps through the CCR placed in the landfill and transports the combined flow to the lift station. The leachate collection system maintains a leachate head on the composite liner system of 10 inches or less. The locations of the lift station and Leachate Storage Pond are identified on Figure 3 - CCR Unit and Monitoring Wells.

The leachate collection system within the waste placement limits for (leachate collection layer) consists of the following:

- Permeable Drainage Layer – comprised of a drainage geocomposite that covers the entire bottom of Phase 1 and 2 of the landfill and an 18-inch thick Granular Drainage Layer covers the bottom of Phases 3 and 4 of the landfill. Both drainage layers are to be constructed directly above the composite liner system.
- Leachate Collection Pipes – perforated HDPE pipes, surrounded by non-calcareous coarse aggregate and nonwoven, needle-punched geotextile, are constructed atop the drainage geocomposite or within the Granular Drainage Layer. These leachate collection pipes convey leachate collected at the base of the landfill to the lift station via gravity drainage, which is then pumped (via a force main) to the Leachate Storage Pond.

Leachate collected and transferred to the Leachate Storage Pond is beneficially reused for dust suppression within landfill waste limits, moisture conditioning of fly ash during compaction procedures or moisture conditioning at the fly ash silo storage facility. Any leachate that is not beneficially reused is transported to the Mitchell Plant Wastewater Treatment Bottom Ash Pond Complex for treatment prior to discharge into the Ohio River.

2.2.1.4 Surface Water Management System

Management of surface water that is not in contact with CCR placed in the landfill is accomplished by collection and conveyance of runoff to three stormwater detention basins: 1) South Pond; 2) West Pond; and, 3) East Pond. The South and West Ponds are utilized through all phases of the landfill life, and the East Pond is utilized in Phase 3 through Phase 5. The three ponds are depicted on Figure 3 - CCR Unit and Monitoring Wells.

Site runoff generated from both un-stabilized and stabilized constructed areas (i.e., construction areas, stockpiles, temporary landfill cover, and permanent landfill cover) is conveyed to the

stormwater detention basins via drainage channels and pipes. The collection, conveyance and basins are designed to meet the required criteria in the referenced WVDEP regulations. The stormwater conveyed to the basins is detained and released through a non-clogging dewatering skimmer device that allows settling of suspended solids and evacuation of the stored volume of water within a seven to eight day period.

2.2.2 Construction and Operational History

2.2.2.1 Landfill Construction

Construction of Mitchell Landfill was initiated in 2013 and Phases 1A, 1B, 2A, and 2B have been completed. The landfill construction was performed in accordance with the NPDES/Solid Waste Permit, the construction drawings, technical specifications, and the Quality Assurance and Quality Control (QA/QC) Plan. Certification Reports were prepared and submitted to WVDEP that provide confirmation and documentation that the construction of Phases 1A, 1B, 2A, and 2B was performed in accordance with the design and permit requirements.

Construction of the Phase 3 liner system is tentatively scheduled to begin in 2019.

2.2.2.2 Landfill Operations

Mitchell Landfill began operation in July 2014 and is currently receiving CCRs from Mitchell Power Generation Plant. Landfill operations, construction and monitoring are being performed in accordance with the NPDES/Solid Waste Permit.

2.2.2.3 Groundwater Monitoring

Background groundwater quality monitoring began in February 2012 and was completed in December 2014. Operational groundwater monitoring is conducted semi-annually in accordance with the Mitchell Landfill Operating Record and Groundwater Monitoring Plan. Groundwater quality results for key indicator parameters are statistical analyzed as part of each semi-annual groundwater monitoring event and included as part of the Annual Operation Report.

2.3 SUPPORTING INVESTIGATIONS AND DOCUMENTS

CEC has reviewed the following documents for evaluation of compliance with the CCR Rule Design Criteria:

1. Solid Waste/NPDES Permit Application, Mitchell Landfill, Mitchell Plant, Cresap, West Virginia, Prepared for American Electric Power, Prepared by Civil & Environmental Consultants, Inc., CEC Project No. 110-416, April 12, 2012.
2. CCR Landfill Restriction Demonstration, Mitchell Landfill, Marshall County, West Virginia, Report to Kentucky Power Company d/b/a/ American Electric Power, 1 Riverside Plaza, Columbus, Ohio 43215, Prepared by Civil & Environmental Consultants, CEC Project No. 110-416, November 2015.
3. Letter - Leachate Collection Layer Design Alternate, AEP / Mitchell Landfill, prepared by Civil & Environmental Consultants, Inc., CEC Project No. 110-416-7522, February 8, 2019.

3.0 §257.70 DESIGN CRITERIA FOR NEW CCR LANDFILLS AND ANY LATERAL EXPANSION OF A CCR LANDFILL

3.1 §257.70 RULE DESCRIPTION

40 CFR 257.70(a)(1) states:

New CCR landfills and any lateral expansion of a CCR landfill must be designed, constructed, operated, and maintained with either a composite liner that meets the requirements of paragraph (b) of this section or an alternative composite liner that meets the requirements in paragraph (c) of this section, and a leachate collection and removal system that meets the requirements of paragraph (d) of this section.

3.2 INFORMATION SUPPORTING RULE COMPLIANCE

3.2.1 Composite Liner

The composite liner system for Phases 1 through 4 of Mitchell Landfill consists of an upper and lower impermeable component. The upper component consists of a 30-mil PVC geomembrane and the lower component consists of a GCL with a hydraulic conductivity of no more than 3.4×10^{-9} cm/sec. The upper component will be installed in direct and uniform contact with the lower component. In accordance with §257.70 (c) (1) and (2), a Liner Hydraulic Equivalency Demonstration Calculation was prepared by a professional engineer to confirm that the liquid flow rate through the lower component of the alternative composite liner is no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec. The design calculations supporting the WVDEP PTI and the construction documents, including the QA/QC Plan, include design criteria and material specifications necessary to meet §257.70 (b) (1-4). Based on this demonstration, the composite liner system meets the design requirements for an alternate composite liner as outlined in §257.70 (c) (1-3).

3.2.2 Leachate Collection System

The leachate collection and removal system for the Mitchell Landfill consists of a permeable drainage layer and pipe network directly atop the 30-mil PVC liner/GCL composite liner system.

The drainage layer is comprised of: 1) a drainage geocomposite (Phases 1 and 2); and, 2) an 18-inch thick drainage aggregate layer (Phases 3 and 4). Perforated HDPE pipes are installed atop the drainage geocomposite and within the aggregate drainage layer at designated spacing and low points to collect and convey leachate from the permeable drainage layer(s) to the landfill waste limits, at which solid HDPE pipes convey the collected leachate to the designated leachate storage and treatment. Chimney drains, directly connected into the HDPE collection pipe system, are also included to collect surface water and better promote drainage of the waste materials during the active life of the landfill. The leachate collection system design, including the material specifications and QA/QC Plan, establishes a permeable collection layer and piping network that will collect and remove leachate from the landfill during the active life and post-closure care period meeting the design requirements outlined in §257.70 (d) (1-3).

4.0 SUMMARY AND PROFESSIONAL ENGINEER CERTIFICATION

This CCR Design Criteria Demonstration addresses compliance with both the existing (Phase 1 and 2) and future landfill phases (Phases 3 through 5) that have not begun construction prior to promulgation of the referenced CCR Rule and are be considered “Lateral Expansions”. In summary, Mitchell Landfill has been designed and constructed to meet the CCR Rule Design Criteria requirements included in §257.70. Section 3.0 of this report provides supporting information and conclusions demonstrating the design criteria has been met.

In accordance with §257.70 (e), this CCR Design Criteria Demonstration provides confirmation by a qualified professional engineer and that there is sufficient information to demonstrate that the existing Mitchell Landfill, and future expansion phases, meet the Design Criteria requirements stated in 40 CFR 257.70 (a) through (e).

Professional Engineer's Certification

Anthony P. Amicon
Printed Name of Professional Engineer

Anthony Amicon
Signature

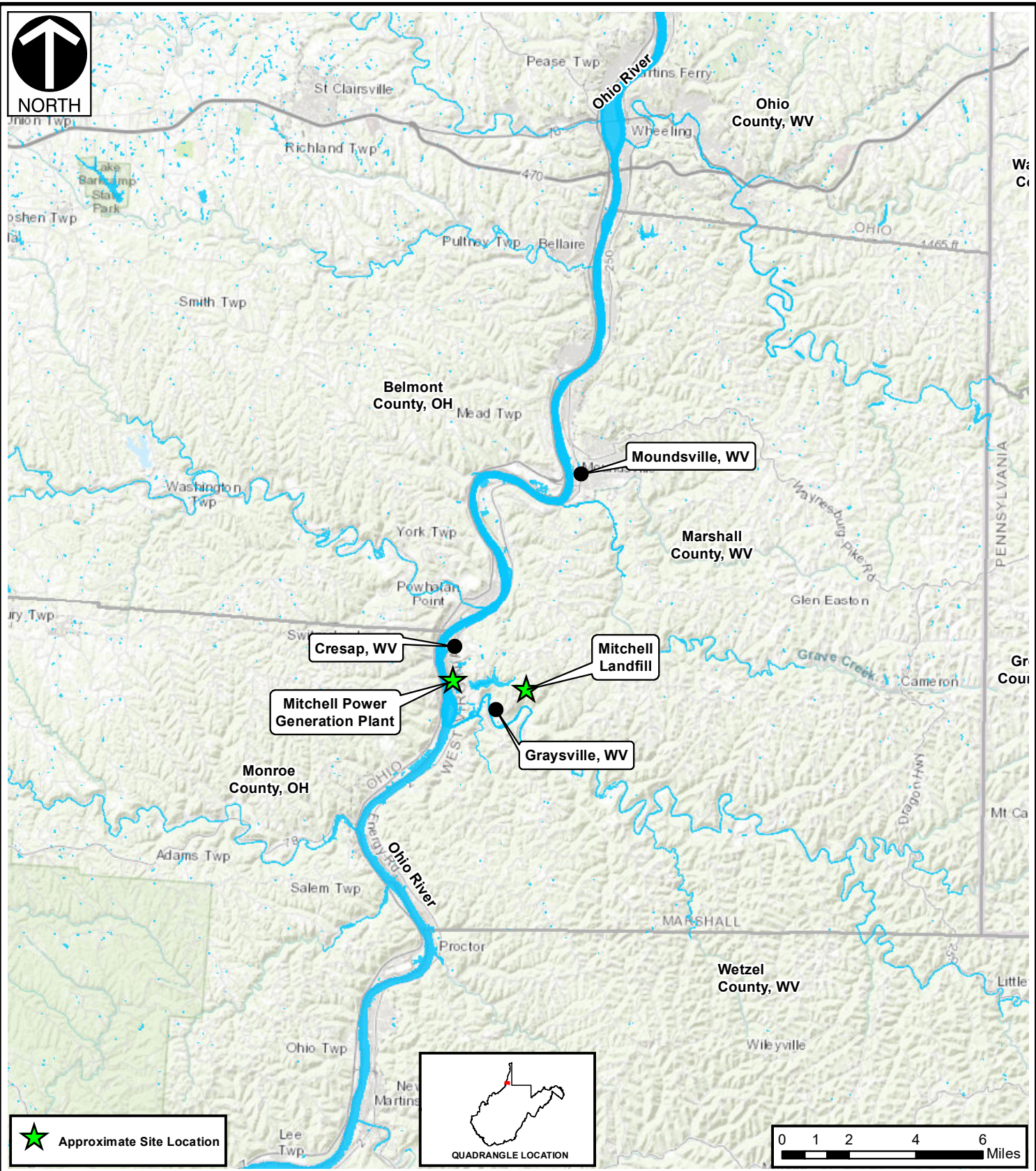


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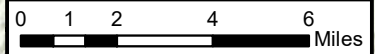
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FIGURES



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 Approximate Site Location



SOURCE: ARCGIS ONLINE MAP SERVICE: [HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS](http://gto.arcgis.com/maps/usa_topo_maps), LAST ACCESSED: 1/3/2019



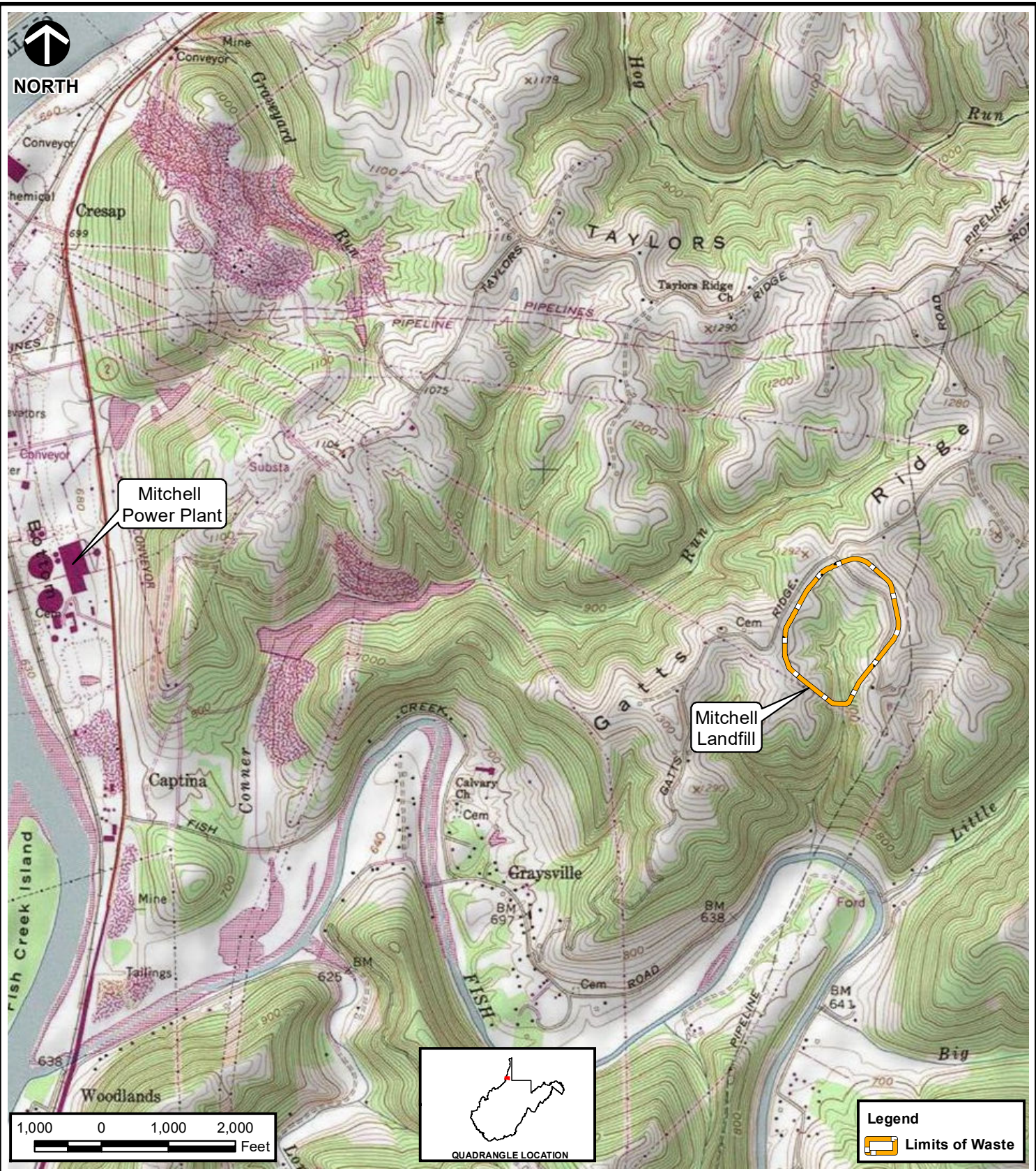
Civil & Environmental Consultants, Inc.
5899 Montclair Boulevard - Cincinnati, OH 45150
513-985-0226 - 800-759-5614
www.cecinc.com

AMERICAN ELECTRIC POWER
MITCHELL LANDFILL
MITCHELL POWER GENERATION PLANT
MARSHALL COUNTY, WEST VIRGINIA
CCR DESIGN CRITERIA DEMONSTRATION
SITE LOCATION MAP

DRAWN BY:	MHS	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	1
DATE:	JANUARY 03, 2019	DWG SCALE:	1" = 4 miles	PROJECT NO:	110-416-7522		

Signature on File *

\\svr-cinc\projects\2011\110-416-GIS\110416 MitchellLandfill.t7522 Figure2.mxd - 1/3/2019 - 11:26:01 AM



SOURCE: PORTION OF THE USGS 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAP - GLEN EASTON, WV - 1978 AND POWHATAN POINT, WV - 1978.



Civil & Environmental Consultants, Inc.

5899 Montclair Boulevard - Cincinnati, OH 45150
513-985-0226 - 800-759-5614
www.cecinc.com

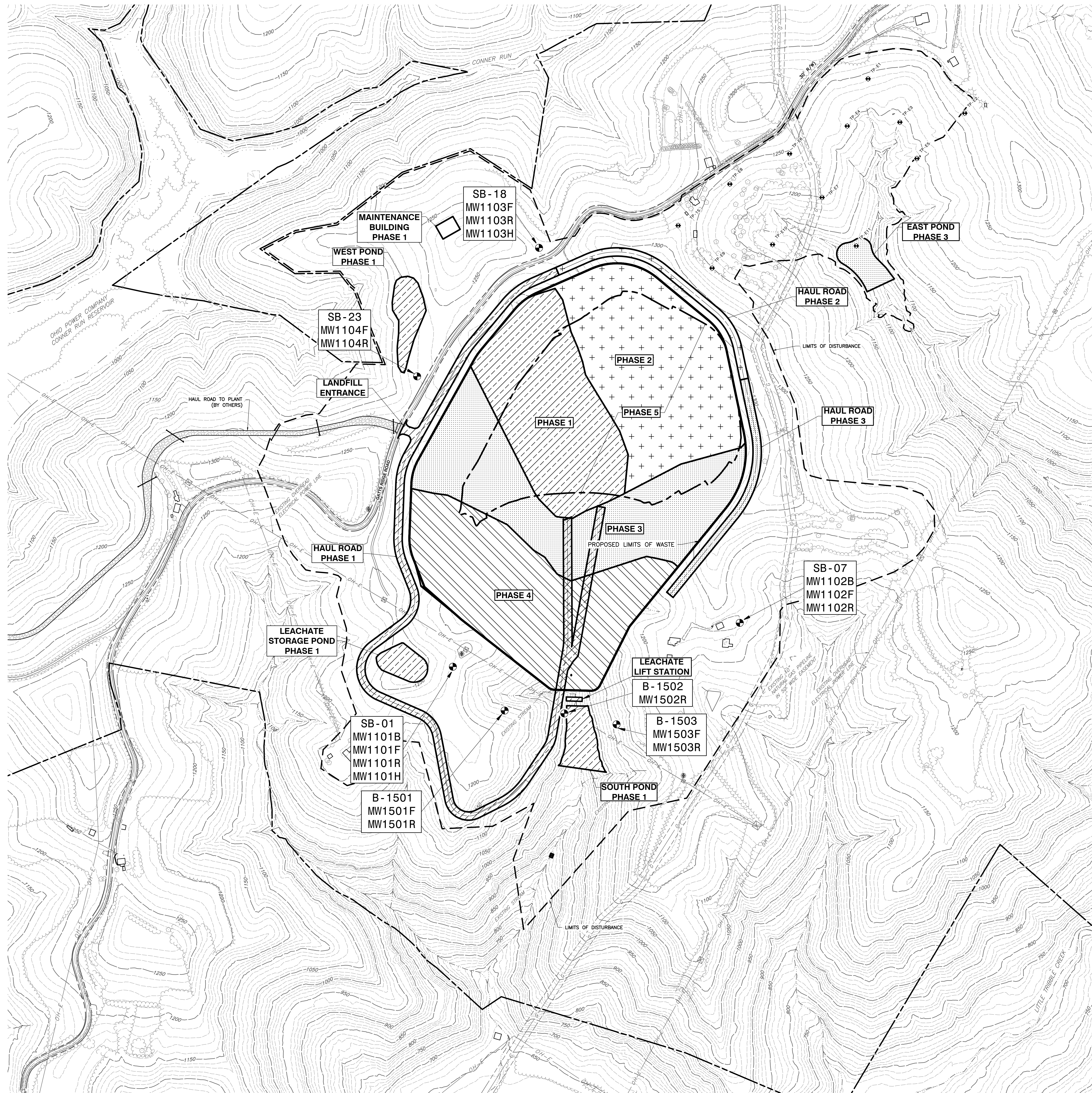
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MITCHELL LANDFILL
MITCHELL POWER GENERATION PLANT
MARSHALL COUNTY, WEST VIRGINIA

CCR DESIGN CRITERIA DEMONSTRATION
PLANT AND CCR UNIT LOCATION MAP

DRAWN BY:	MHS	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	2
DATE:	JANUARY 03, 2019	DWG SCALE:	1" = 2,000'	PROJECT NO:	110-416-7522		

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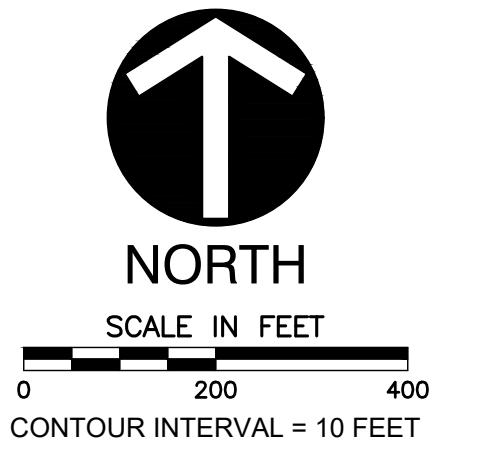


LEGEND

- FACILITY BOUNDARY (AEP OWNED)
- - - EXISTING RIGHT-OF-WAY
- - - EXISTING EASEMENT
- - - EXISTING CONTOURS
- - - EXISTING STREAM
- - - EXISTING GAS PIPELINE
- - - EXISTING OVERHEAD ELECTRICAL POWER LINES
- - - EXISTING ELECTRICAL POLE AND TOWER
- - - EXISTING VEGETATION
- - - EXISTING ROADS
- - - EXISTING STRUCTURE
- - - LIMITS OF EARTHWORK
- - - LIMITS OF WASTE
- ▭ HAUL ROAD
- ▨ LIMITS OF PHASE 1 DEVELOPMENT
- ▩ LIMITS OF PHASE 2 DEVELOPMENT
- ▧ LIMITS OF PHASE 3 DEVELOPMENT
- ▦ LIMITS OF PHASE 4 DEVELOPMENT
- ▥ LIMITS OF PHASE 5 DEVELOPMENT (TO BE LOCATED ABOVE PHASES 1 THRU 4)
- ⊕ SOIL BORING/MONITORING WELL LOCATION

PHASE	WASTE CAPACITY (Cubic Yards)	ACRES
1	556,000	12.1
2	1,829,000	15.1
3	2,540,000	14.8
4	3,524,000	15.6
5	1,469,000	24.3
TOTAL	9,918,000	57.6

1. ACRES ARE PROJECTED ONTO HORIZONTAL PLANE
 2. PHASE 5 IS ABOVE THE OTHER PHASES AND NOT INCLUDED IN THE TOTAL FOOTPRINT ACREAGE



NO.	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
 5899 Montclair Blvd. • Cincinnati, OH 45210
 513-985-0226 • 800-759-5614
 www.cecinc.com

**AMERICAN ELECTRIC POWER
 MITCHELL LANDFILL
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 MARSHALL COUNTY, WEST VIRGINIA**

**CCR DESIGN CRITERIA DEMONSTRATION
 CCR UNIT AND MONITORING WELLS**

DATE: JANUARY 2019 DRAWN BY: ZJJ
 DWG SCALE: AS NOTED CHECKED BY: APA
 PROJECT NO: 110-416
 APPROVED BY: APA

FIGURE NO: **3**