2024 Annual Landfill Inspection Report

Cardinal Operating Plant
Brilliant, OH

January 6, 2025

Cardinal CCR Landfill

Prepared For:

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306 County Road 7E
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1/6/2025

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Figure 1 Annual Landfill Topographic Survey (prepared by Jack A. Hamilton & Associates, Inc., map dated 11/18/2024)
Figure 2 Cardinal FAR 1 Residual Waste Landfill Generate Development, Drawing No. 13-30100-4B-D (prepared by AEP, revision date 11/17/2006)

ACRONYM LIST

CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
FAR	Fly Ash Reservoir
FGD	Flue Gas Desulfurization
LCS	Leachate Collection System
MSL	Mean Sea Level
NPDES	National Pollutant Discharge Elimination System
Ohio EPA	Ohio Environmental Protection Agency
OSHA	Occupational Health and Safety Administration
PTI	Permit to Install
QA/QC	Quality Assurance/Quality Control
SDL	Subsurface Drainage Layer
U.S. EPA	United States Environmental Protection Agency
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

The Cardinal Power Plant is located at 306 County Road 7 East in Brilliant, Jefferson County, Ohio (Plant). It is owned by Buckeye Power, Inc. and is operated by the Cardinal Operating Company. Cardinal Operating Company also operates the Cardinal Plant FAR I Residual Waste Landfill at the Plant that is used for the management of flue gas desulfurization (FGD) gypsum material, fly ash, bottom ash, and byproduct of the power plant's flue gas scrubber system and solids from the wastewater treatment plant (WWTP).

This report was prepared to fulfill the requirements of 40 CFR 257.84 and to provide Cardinal Operating Company with an evaluation of the FAR I Residual Waste Landfill. TRC completed the annual inspection in accordance with the applicable CCR Rule requirements and prepared the following Cardinal Plant CCR Landfill Annual Inspection Report.

TRC was retained by Cardinal Operating Company to complete CCR Engineering Services, which includes the annual inspection of the above referenced landfill. The previous annual inspections were completed by Amanda Graphics, LLC.

This report contains the observations from the inspection, conclusions, and maintenance recommendations for the landfill. The inspection was performed on October 21, 2024 by Mr. Shawn McGee, P.E., TRC's Geotechnical Engineering Practice Leader, and accompanied with Mr. Nicholas Kasper C.P.G. of Buckeye Power and Mr. Zach Miller of the Cardinal Operating Company. As part of the annual landfill inspection, a field topographic survey was performed by Jack A. Hamilton & Assoc., Inc. on October 21, 2024 (see Figure 1).

2.0 FACILITY DESCRIPTION

2.1 Permit History

The Cardinal Plant FAR I Residual Waste Landfill was constructed under Permit to Install (PTI) No. 06- 07993, issued on May 11, 2007 by the Ohio Environmental Protection Agency (Ohio EPA). The landfill's initial purpose was to dispose of FGD gypsum material produced as a byproduct of the power plant's flue gas scrubber system and solids from the WWTP. As operational changes have been made at the Plant, the landfill also receives fly ash and bottom ash.

The Ohio EPA approved an alteration to the PTI on June 29, 2007, that incorporated several revisions to the Quality Assurance/Quality Control (QA/QC) Plan. A second alteration (Alteration No. 2) was approved on September 2, 2008, addressing re-sequencing plans and revisions to the preloading plans for Cells 3, 4, 5 and 6. In addition to Alterations No. 1 and 2, a modification to PTI No. 06-07993 was approved by Ohio EPA on August 10, 2011. The modification included revising the approved limits of waste by partially expanding as well as retracting the limits of waste in both the vertical and horizontal directions. The PTI modification also included the retention of the 6 existing groundwater monitoring wells at the facility.

In 2020, Cardinal Operating Company obtained two additional permit alterations. On October 27, 2020, the Ohio EPA approved an alteration to receive an additional residual solid waste stream, dry fly ash. On December 24, 2020, the Ohio EPA also approved a permit alteration to install

pretreatment settling tanks to manage the landfill leachate once the FAR II impoundment initiate closure. On July 18, 2022, Ohio EPA approved an alteration for the Landfill to receive Cooling Tower Sediment.

2.2 Landfill Components

The approximate 129.45-acre landfill consists of two phases and six cells. Phase 1 consists of Cells 1 and 2 which overlie the bench area between FAR I and a bedrock highwall that is located around a portion of the facility's perimeter on its north and west sides. Cells 1 and 2 are constructed over bedrock near the highwall interfacing with the mine spoil berm of FAR I. Phase 2 consists of Cells 3, 4, 5, and 6. Figure 1 depicts the 2024 survey for Cells 1 and 3 and Figure 2 represents the general facility and cell layout.

Cell 1 and Cell 3 (the northernmost cells of the landfill) are the only currently active cells at the facility; Cells 2, 4, 5, and 6 are inactive. Cell 1 is approximately 23 acres in size and is bound by the highwall to the south and the mine spoil berm/bench to the north. The bench area of Cell 1 was constructed and certified in 2007 and 2008. A portion of the highwall area (approximately 60 ft. in height) was built and certified.

Cell 3 is approximately 21.25 acres in area and is bound by the termination berm and landfill haul road to the north and east, the interphase berm to the west, and the Cell 3/Cell 4 inter-cell berm on the south. Cell 3 is built over a part of the former ash pond with a 10 ft thick layer of bottom ash and a soil cover layer.

At the time of this inspection Cells 2, 4, 5, and 6 are still in pre-construction condition. Earthen materials are being stockpiled in these cells to be used in future construction. Construction of a storm water pond is currently in progress in portions of Cell 2. This pond will be used to manage storm water runoff (contact water) from the landfill.

2.2.1 Active Placement Areas

The active placement areas during the recent landfill inspection include Cell 1 and Cell 3. During the past year, there has been very little placement in Cells 1 and 3 due to sales of the gypsum byproduct material. Gypsum is continuing to be reclaimed from Cell 1 for beneficial utilization. In order to continue the reclamation of gypsum from Cell 1, Cell 3 has been the primary cell for receiving other wastes, including dry fly ash and wastewater treatment plant solids.

2.2.2 Closed Areas

Closed areas include a small portion of Cell 1 (approximately one acre area along the north slope of the landfill) that was closed in 2009.

2.2.3 Inactive Areas

As mentioned in section 2.2, Cells 2, 4, 5, and 6 are in pre-construction condition. Earthen and granular drainage materials are being stockpiled in these cells to be used in future construction. The stockpiles are graded to promote positive drainage and stormwater is discharged to a permitted NPDES outfall.

2.2.4 Leachate Collection System

The leachate collection system (LCS) at FAR I Residual Waste Landfill was constructed in 2007. The LCS is constructed of granular drainage materials embedded with collection pipes connected to risers extending through the CCR fill. The landfill's LCS is graded to drain to the east side of the landfill where the leachate is then routed into collection manholes which are connected by a transmission pipe, becoming progressively larger from 24” diameter in the north to 36” diameter at the south end. The transmission pipe discharges to a collection sump, pumped to pretreatment settling tanks, prior to discharging to a permitted NPDES outfall. On the date of the inspection, the leachate effluent was observed to be flowing freely into the concrete sump without obstruction and was visually clear.

2.2.5 Subsurface Drainage Collection System

A subsurface drainage layer (SDL) was incorporated in the landfill design to prevent hydrostatic uplift conditions to the landfill liner. The system consists of a 2-foot thick (minimum) layer of free-draining material (the SDL), a geotextile placed above the SDL as a separator, 6” diameter perforated HDPE subsurface drainage pipes, 6” diameter solid HDPE transmission pipes. The subsurface drainage pipes also discharge into the leachate collection sump, and is pretreated in the settling tanks, prior to discharging to a permitted NPDES outfall.

2.3 Constructed and Available Capacity

The constructed storage capacities of Cell 1 and Cell 3 are 2.04 million cubic yards and 2.89 million cubic yards, respectively. The total permitted waste volume of the landfill is 18.95 million cubic yards. The total permitted area of the landfill is approximately 129.45 acres, and the currently constructed area of the landfill is approximately 44.28 acres (Cell 1 and Cell 3).

3.0 REGULATORY REQUIREMENTS

This Landfill Annual Inspection Report is completed to meet CCR regulatory requirements specified in CCR Rule Section 257.84(b)(1). These requirements include at a minimum:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

In addition to the annual inspections, 7-day inspections per CCR Rule Section 257.84(a)(1) are completed by Cardinal Operating Company and are documented in the facility operating record per § 257.105(g)(5).

Upon completion of the annual inspection, CCR Rule Section 257.84(b)(2) requires the qualified professional engineer to prepare a report that addresses the following:

(i) Any changes in geometry of the structure since the previous annual inspection.

(ii) The approximate volume of CCR contained in the unit at the time of the inspection.

(iii) 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,

(iv) Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

4.0 REVIEW OF AVAILABLE INFORMATION 257.84(b)(1)(i)

Pursuant to CCR Rule Section 257.84(b)(1)(i), prior to completing the visual inspection, TRC reviewed available information regarding the status and condition of the landfill, which includes files available in the operating record, such as design and construction information, previous 7-day inspection reports, and previous annual inspections. This information was referenced prior to and following the inspection, as needed.

Cardinal Operating Company personnel complete an inspection of the landfill facility every 7-days. This includes a visual inspection of the landfill components including the active areas, final cover area, culverts, drainage berms/ditches, leachate collection system, leachate pond, leachate pumps, and haul roads. The inspections are completed to comply with the requirements of CCR Rule Section 257.84(a)(1). TRC was provided access to and has reviewed the 7-day inspection reports from January 3 to November 6, 2024. These reports have noted no significant deficiencies or maintenance items.

5.0 INSPECTION (257.84(b)(1)(ii))

TRC completed the annual inspection of the landfill on October 21, 2024. The inspection was performed by Shawn McGee, P.E., TRC's Geotechnical Engineering Practice Leader, who was accompanied by Nicholas Kasper C.P.G. of Buckeye Power and Zach Miller of the Cardinal Operating Company. The weather at the time of the inspection was partly cloudy with temperatures ranging from the upper 60s to lower 70s °F. Barometric pressure slightly dropped during the time of the inspection from 29.03 to 28.97 inches. There was no precipitation reported at the site within the previous 48 hours of the inspection.

The inspection was generally completed around the perimeter of the landfill, starting on the south end Cell 1 and then walked in a clockwise direction, to ensure that visible features were observed and documented. The storm water control structures, final cover conditions, and the area surrounding the landfill was observed for surface cracks or sloughing, erosion rills, settlement/low-lying areas, and bare spots.

Any observations, evaluations, and conclusions made from the site visit were disclosed by our visual observations, where applicable. Our site reconnaissance was limited to visual observations and surface features free of obstruction at the time of the field visit. TRC's observations and/or reporting do not account for other non-visible, buried, hidden, subsurface or material condition analyses, and the professional services rendered are not guaranteed to be a representation by TRC of inaccessible and unobservable site conditions or actual conditions subsequent to the date of TRC's site visit. Our authorized scope of work did not include intrusive studies (e.g., borings, test pits, etc.), geophysical surveys, and/or collection of soil/water samples.

5.1 Definitions of Visual Observations and Deficiencies

Table 1 below contains standard terms that were used in this report to describe the condition of the observed item, activity, or structure. These terms are based on the opinion of the inspector at the time of the inspection to describe the physical condition, general appears or conditions of the identified component based on visual observations and are not intended to provide an overall assessment of safety based on engineering analyses and studies. To be consistent with previous inspections, the same terms were used when describing the different features.

Table 1: Standard Terms for Conditions of Landfill Features

Condition	Description
Good	A condition or activity that is generally better than what is minimally expected or anticipated based on design criteria and maintenance performed at the facility.
Fair/Satisfactory	A condition or activity that generally meets what is minimally expected or anticipated based on design criteria and maintenance performed at the facility.
Poor	A condition or activity that is generally below what is minimally expected or anticipated based on design criteria and maintenance performed at the facility.
Minor	An observed deficiency (e.g. erosion, seepage, vegetation, etc.) where the current maintenance conditional is below what is minimally expected but does not currently pose a threat to structural stability.
Significant	An observed deficiency (e.g. erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is minimally expected and could pose a threat to structural stability if not addressed.
Excessive	An observed deficiency (e.g. erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is minimally expected, and which the ability of the observer to properly evaluate the structure or particular area being observed or which poses a threat to structural stability.

A “deficiency” is some evidence that a landfill has developed a problem that could impact the structural integrity of the landfill. There are four general categories of deficiencies. These four categories are described below:

1. **Uncontrolled Seepage:** Uncontrolled seepage is seepage that is not behaving as the design engineer has intended. An example of uncontrolled seepage is seepage that comes through or around the exterior of the landfill and is not picked up and safely carried off by the storm water system for non-contact water or the LCS for leachate seepage. Seepage that is collected by a drain can still be uncontrolled if it is not safely collected and transported. Seepage that is not clear and is turbid would also be considered as uncontrolled. Seepage that is unable to be measured and/or observe it is considered uncontrolled seepage.

   Note: Wet or soft areas are not considered as uncontrolled seepage but can lead to this type of deficiency. These areas should be monitored more frequently.
2. **Displacement**: Displacement of berms, embankments, or waste masses is large scale movement of part of the structure. Common signs of displacement are cracks, scarps, bulges, depressions, sinkholes, and slides.

3. **Blockage of Control Features:** Blockage of Control Features is the restriction of flow at spillways, pipes or pipe outfalls, or drains.
4. **Erosion**: Erosion is the gradual movement of surface material by water, wind, or ice. Erosion is considered a deficiency when it is more than a minor routine maintenance item.

Results of the visual inspection performed on October 21, 2024 are summarized below.

5.2 FAR I Residual Waste Landfill Inspection Findings

The overall current condition of the site is shown in plan view as Figure 1. The site inspection began in the southwest corner of the landfill's Cell 1 area progressing along the highwall. The inspection then observed the condition of the active fill areas of both cells progressing to the closed and capped portions/perimeter berms of the landfill. As previously noted, Cells 2, 4, 5, and 6 have not been constructed but have been used to stockpile fill materials for future construction activities. Construction of a storm water pond is currently in progress in portions of Cell 2. This pond will be used to manage storm water runoff (contact water) from the landfill and surrounding areas. Results of the visual inspection performed on October 21, 2024, are summarized below.

The interim berm between Cells 1 and 3 and the landfill's undeveloped cells was observed to be in good condition with the slope terminating at a crest which forms a temporary ditch along the perimeter of the cell to convey contact storm water to the LCS. The interim slope is constructed with a temporary cover soil in which an established vegetation was observed to be in good condition. The slope appeared to be uniform and free of displacement or other signs of instability. The stockpiles within the future undeveloped landfill cells shows an orderly excavation of these fill materials. The stockpiles are well graded to promote drainage.

Areas within the landfill where no activity was taking place were observed to be in good condition. No fugitive dust was observed on the date of the inspection. The temporary slopes within the active waste placement areas were also observed to be in good condition exhibiting uniform slopes, nominal erosion typical of an active landfill, slumping or other signs of instability or displacement. The construction area that is currently in progress for the storm water retention pond in Cell 2 is in good condition.

The bedrock highwall located along the western perimeter of Cell 1 appeared to be stable with no significant rock overhangs. A couple localized areas along the highwall showed minor rockfall that should be monitored but does appear to pose any risk at the time due the relatively small sized rocks and area. The berm at the toe of the highwall is showing signs of minor erosion in some areas. The bedrock highwall is composed of alternating sequences of thin to thick bedded limestone interbedded with shale and siltstone reaching a height of 60 ft. No ponded water or uncontrolled seepage flows were observed at the base of the highwall, suggesting that the seepage collection system is functioning as intended.

The active fill areas within Cells 1 and 3 were observed to be well maintained and in good condition. Cell 1 did not exhibit any ponded water or erosion within the cell and appeared to be well graded to promote drainage to the LCS's risers (also referred to as chimney drains). FGD material was recently excavated from around one existing chimney drain in the southern portion of Cell 1. The existing slopes are very steep and near vertical and can create a safety concern to

workers. However, the slope does not appear to be experiencing signs of distress (e.g., cracks or seepage) or an active failure at this time. The other riser structures (exposed on account of the excavation activities) were surrounded and protected by a layer of CCR to prevent impact from heavy equipment. FGD gypsum is actively being excavated from Cell 1 for beneficial utilization. Dry fly ash is actively being landfilled in Cell 3.

A protective vegetative cover is well established in Cell 1 in the northern closed portion of the landfill showing a healthy grass stand, approximately 4 inches in height. The northern closed area was in good condition. There were some areas along the northern slope where a washout area was recently repaired, and vegetation was not yet established.

A monitoring well located at the toe of the slope in Cell 1 was observed to be in good condition. The concrete well pad was not cracked or undermined, protective bollards were adequately spaced, and the casing protector was locked.

No standing water was observed or soft/wet areas on the east slope of Cell 3 surface. The perimeter ditch to collect contact water from exposed CCR slopes was well maintained. Minor rutting and bare soil were observed along the toe of Cell 3.

The leachate collection sump structure was observed to be in good condition and with leachate flowing freely into the concrete sump on the date of the inspection.

The leachate effluent is then discharged to pretreatment settling tanks in which temperature and effluent levels are monitored with subsequent discharge through a NPDES permitted outfall.

In the east side along the access road embankment along Cell 3, there were areas of erosion observed.

5.2.1 Changes in Geometry Since Last Inspection 257.84(b)(2)(i)

No significant changes have been made to the FAR I Residual Waste Landfill facility since the 2023 inspection. The landfill was maintained during operations by placing dust suppressant on inactive slopes, mowing the vegetative cover, and other maintenance requirements, as necessary. The landfill has a maximum permitted elevation of approximately 1,180 feet above mean sea level (MSL), and the current maximum landfill elevation is approximately 1,090 feet above MSL.

5.2.2 CCR Landfill Volume 257.84(b)(2)(ii)

The plant is currently pursuing beneficial utilization of gypsum and successfully excavates and reclaims the byproduct for beneficial use. TRC completed an estimation of the volume of CCR currently in the landfill by comparing the surfaces of the top of leachate collection system (provided in AEP's Cardinal FAR 1 Residual Wate Landfill Construction Stage Leachate Management Layer, Dwg No.: 13-30103-11-AB-2, as-built dated 5/20/2015) and Jack A. Hamilton & Associates, Inc.'s recent field survey (field survey completed 10/21/2024). The total volume of waste material contained between these two surfaces was approximately 1.9 million cubic yards. This is an approximately 0.4 million cubic yards in decrease in volume since the volume reported in the 2023 Landfill Inspection Report due to reclamation activities.

5.2.3 Changes that Affect Stability or Operation 257.84(b)(2)(iii)

No appearances of actual or potential structural weakness of the CCR unit were identified during the 2024 inspection. No existing conditions were identified that were or had the potential to disrupt the operation and safety of the FAR I Residual Waste landfill. No deficiencies or disrupting conditions that would require immediate measures to remedy were identified in the inspection.

5.2.4 CCR Landfill Changes 257.84(b)(2)(iv)

The current survey indicates that all areas of active placement within Cells 1 and 3 have surface elevation that lies below the permitted top of waste grade.

6.0 CONCLUSIONS

The landfill's earthen berms, and open, closed, and inactive areas appear to be in good condition. The active disposal area of the landfill was in good condition with no evidence of significant erosion or water ponding. The closed areas of the landfill appeared to be vegetated, stable and well maintained and was in good condition. The discharge structures and pipes were in good condition.

7.0 RECOMMENDATIONS - GENERAL MAINTENANCE AND MONITERING CONDITIONS

7.1 Overall

1. Continue to mow all vegetated berms on a regular basis to prevent the growth of excess woody plants and brush.
2. Continue to complete regular maintenance of minor erosion rills and use the polymer as needed for erosion control and fugitive dust control.
3. Continue to complete weekly inspections and submit inspection reports to the operating record.
4. Any areas with erosion should be stabilized as necessary. This should include the localized areas experiencing erosion along the berm at the toe of the high wall on the west side of Cell 1 and the east side of Cell 3.

7.2 Active Areas

1. Continue to monitor the leachate collection system and spring drain collection system for unobstructed flow.
2. Continue all current maintenance and fill placement practices.
3. Continue to monitor the perimeter ditch along the toe of the active slope and regrade as necessary to maintain an unobstructed flow.
4. The steep slope of CCR around the chimney drain in the southern portion of Cell 1 should be continually monitored for stability, and if necessary, buttressed to reduce risk of threat of falling or sloughing.

7.3 Closed Areas

1. Continue current maintenance practices including but not limited to continuing to maintain the vegetative cover height at 6 inches or less and continue the 7-day inspections of the area.
2. The washout repair area along the north slope of the landfill should be stabilized as soon as practical and weather permits.
3. Continue to monitor the edge of the final cover on the north slope to ensure no CCR is transported downslope from the active fill area onto the final cover.

8.0 RECOMMENDATIONS – REMEDIAL ACTIONS/REPAIRS

8.1 Active Areas

1. There were no deficiencies, signs of structural weakness, or signs of disruptive conditions observed in the active areas of the landfill at the time of the inspection that would require additional investigation or remedial action.

8.2 Closed Areas

1. There were no deficiencies, signs of structural weakness, or signs of disruptive conditions observed in the closed areas of the landfill at the time of the inspection that would require additional investigation or remedial act.

9.0 Limitations

This work has been done in accordance with our authorized scope of work and in accordance with generally accepted practice in the fields of geotechnical and landfill engineering. This warranty is in lieu of all other warranties either expressed or implied. Our conclusions and recommendations are based on the data reviewed and the observations from our visual inspection. We are not responsible for any conclusions or opinions drawn from the data included herein, other than those specifically stated, nor are the recommendations presented in this report intended for direct use in final design or as construction specifications. This report is intended for use with regard to the specific project discussed herein and any changes in the conditions of the landfill should be brought to our attention so that we may determine how they may affect our conclusions. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction. If this should occur, or if additional or contradictory data are revealed in the future, we should be notified so that modifications to this report can be made, if necessary. If we do not review the relevant construction documents and witness the relevant construction operations, then we cannot be responsible for any problem, which may arise, from the misunderstanding or misinterpretation of this report or failure to comply with our recommendations.

FIGURES

TRC ENGINEERS, INC.

MAP SHOWING
GYPSUM & FLYASH CELL TOPOGRAPHIC SURVEY

Notes:
1. Horizontal accuracy. For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale.

2. Vertical accuracy, as applied to contour maps on all publication scales, shall be such that not more than 10 percent of the elevations tested shall be in error by more than ohe-half the contour interval.

Control Point Values provided by Buckeye Power
The topographic survey on this map has been translated to these coordinates

Point	Northing	Easting	Elevation	Description
5401	835028.310	2512948.540	1009.54	Mon 5401 fm Buckeye Power
5404	833975.600	2514249.350	1014.70	Mon 5404 fm Buckeye Power

FIGURE 1

FIELD SURVEY GYPSUM CELLS: 10-21-2024
FIELD SURVEY FLY ASH CELLS: 10-21-2024
MAP PREPARED: 11-06-2024 BY DAH
MAP CHECKED: 11-18-2024 BY PRH

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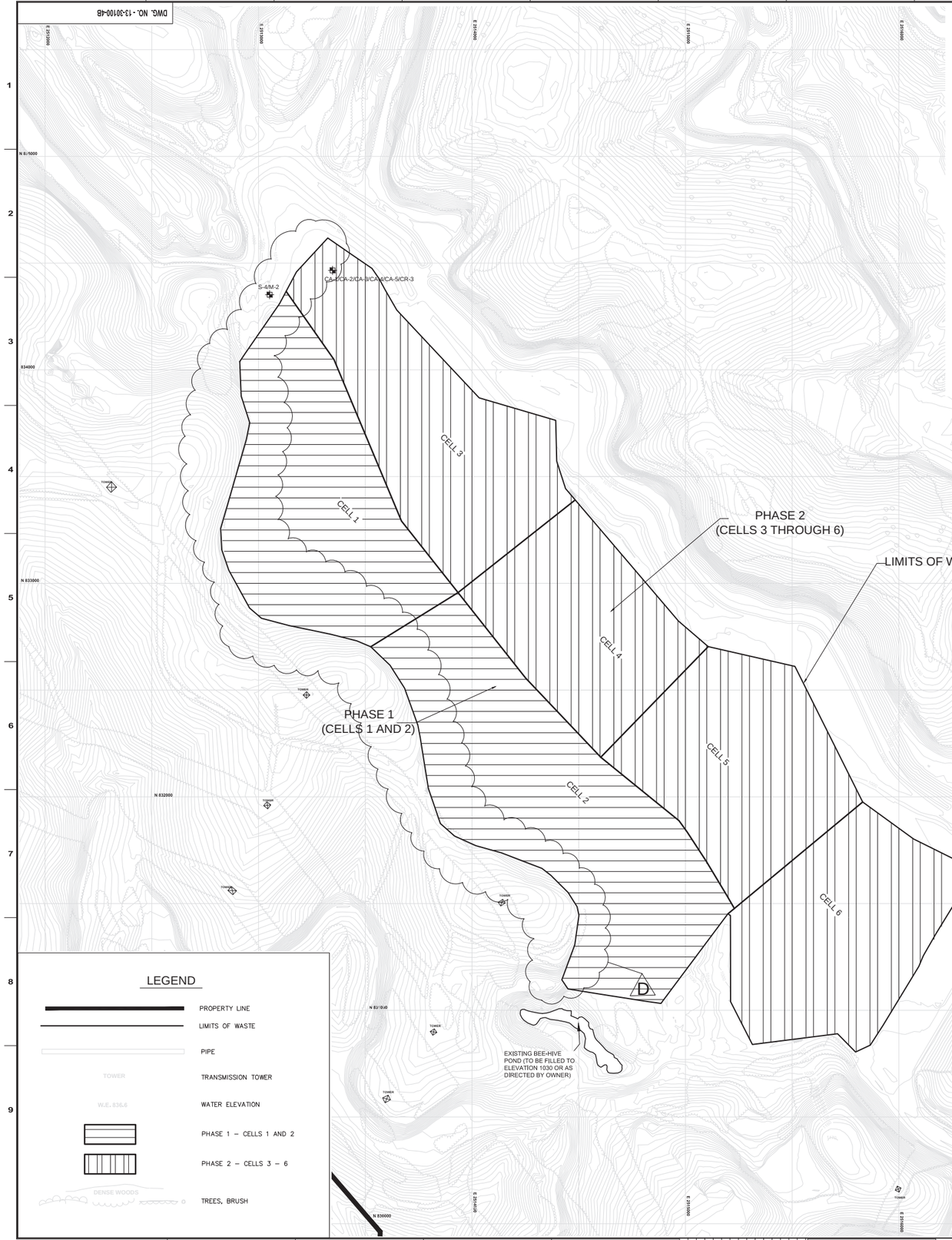
0 200 400 600

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

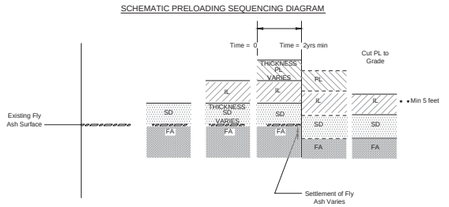
DWG. NO. - 13-30100-4B



LEGEND

- PROPERTY LINE
- LIMITS OF WASTE
- PIPE
- TOWER — TRANSMISSION TOWER
- W.E. 836.6 — WATER ELEVATION
- PHASE 1 – CELLS 1 AND 2
- PHASE 2 – CELLS 3 – 6
- DENSE WOODS — TREES, BRUSH

SCHEMATIC PRELOADING SEQUENCING DIAGRAM



SCHEMATIC LEGEND

- FA (FLY ASH)
- SD (SUBSURFACE DRAINAGE / CONTOURING FILL LAYER)
- PL (PRELOAD LAYER)
- IL (ISOLATION LAYER)

CELL #	AREA (ACRE)	WASTE VOLUME (CY)
1	23.03	2,042,000
2	31.65	3,049,000
3	21.25	2,894,000
4	15.68	4,083,000
5	18.66	4,602,000
6	19.18	2,273,000
TOTAL	129.45	18,943,000

VOLUMES GIVEN ABOVE REPRESENT VOLUMES DETERMINED FROM THE SERIES 6 CONSTRUCTION STAGING AND OPERATION DRAWINGS.

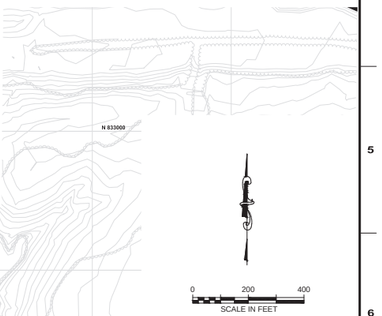
D

PHASE 1 CONSTRUCTION

1. IMPROVE EXISTING ACCESS ROADS AND CONSTRUCT LAY DOWN AREAS, STAGING AREAS, AND EROSION CONTROL STRUCTURES.
2. EXCAVATE EXISTING MINE SPOIL FROM PHASE 1 AREA. (SEE SHEET 4C FOR GRADING PLAN)
3. PROCESS MINE SPOIL FOR PLACEMENT AS ISOLATION LAYER MATERIAL FOR PHASE 1, PHASE 2, AND AS REPLACED SUBGRADE MATERIAL.
4. STOCKPILE PROCESSED MATERIAL IN PHASE 1 AREA OR ANOTHER DESIGNATED AREA.
5. PLACE PRELOAD IN PHASE 2 CELLS.
6. PLACE SUBGRADE MATERIAL ABOVE EXCAVATED AREA (SEE SHEET 4D FOR GRADING PLAN).
7. CONSTRUCT PHASE 1 SUBSURFACE DRAINAGE LAYER ABOVE SUBGRADE (MINIMUM 2 FEET THICK) (SEE SHEET 4E).
8. PLACE GEOTEXTILE ABOVE SUBSURFACE DRAINAGE LAYER AS SEPARTOR.
9. CONSTRUCT CONTOURING FILL LAYER (SEE SHEET 4F).
10. CONSTRUCT PHASE 1 ISOLATION LAYER (MINIMUM 5 FEET THICK) (SEE SHEET 4G).
11. CONSTRUCT PHASE 1 RECOMPACTED SOIL LINER ABOVE ISOLATION LAYER (MINIMUM 1.5 FEET THICK) (SEE SHEET 4I).
12. PLACE GEOMEMBRANE ABOVE RECOMPACTED SOIL LINER (PVC LINER).
13. PLACE GEOTEXTILE AS CUSHION ABOVE GEOMEMBRANE.
14. CONSTRUCT TEMPORARY LEACHATE PIPING ACROSS FAR 1 BENEATH BOTTOM OF PHASE 2 ISOLATION LAYER (SEE SHEETS 6A AND 7B).
15. CONSTRUCT LEACHATE MANAGEMENT SYSTEM COLLECTION MANHOLES, TRANSMISSION PIPING AND SAMPLING STRUCTURE.
16. CONSTRUCT PHASE 1 LEACHATE MANAGEMENT LAYER (MINIMUM 1 FOOT THICK)) AND PLACE GEOTEXTILE AS SEPARATOR AND FILTER ABOVE AND BELOW LAYER (SEE SHEET 4J).
17. PLACE PROTECTIVE COVER (MINIMUM 3 FEET THICK) ABOVE LEACHATE COLLECTION LAYER.
18. CONSTRUCT INTERPHASE BERM AND TEMPORAY LINER SYSTEM TERMINATION BETWEEN PHASE 1 AND PHASE 2.
19. BEGIN PHASE 1 WASTE PLACEMENT OPERATIONS (SEE SHEET 4K).
20. AS WASTE REACHES FINAL GRADES, BEGIN FINAL COVER PLACEMENT IN ACCORDANCE WITH FINAL COVER CONSTRUCTION STAGING AND OPERATION STAGES. (SEE SHEET 6B AND 6C).

PHASE 2 CONSTRUCTION

1. CONSTRUCT PHASE 2 SUBSURFACE DRAINAGE LAYER ABOVE EXISTING FAR 1 COVER (MINIMUM 2 FEET THICK) (SEE SHEET 4E).
2. PLACE GEOTEXTILE ABOVE SUBSURFACE DRAINAGE LAYER AS SEPARATOR.
3. CONSTRUCT CONTOURING FILL LAYER (SEE SHEET 4F).
4. CONSTRUCT PHASE 2 ISOLATION LAYER (MINIMUM 5 FEET THICK) (SEE SHEET 4G).
5. PLACE TEMPORY GEOTEXTILE LOCATOR AND CONSTRUCT MINESPOIL PRELOAD IN PHASE 2 CELLS (SEE SHEET 4H).
6. REMOVE PRELOAD AND GEOTEXTILE LOCATOR. REESTABLISH BASE GRADE AND FILL AND RECOMPACT SURFACE TO ISOLATION LAYER MINIMUM REQUIREMENTS (SEE SCHEMATIC PRELOADING PLACING DIAGRAM ON THE LEFT).
7. CONSTRUCT PHASE 2 RECOMPACTED SOIL LINER (MINIMUM 1.5 FEET THICK) ABOVE RECOMPACTED ISOLATION LAYER (SEE SHEET 4I).
8. PLACE GEOMEMBRANE ABOVE RECOMPACTED SOIL LINER (PVC LINER).
9. PLACE GEOTEXTILE AS CUSHION ABOVE GEOMEMBRANE.
10. CONSTRUCT PHASE 2 LEACHATE MANAGEMENT LAYER (MINIMUM 1 FOOT THICK) AND PLACE GEOTEXTILE AS SEPARATOR AND FILTER ABOVE. ABANDON OR REMOVE PREVIOUS TEMPORARY LEACHATE PIPING AFTER CONNECTION OF PHASE 2 PERMANENT PIPING.
11. PLACE PROTECTIVE COVER (MINIMUM 3 FEET THICK) ABOVE LEACHATE COLLECTION LAYER. REMOVE PORTION OF INTER PHASE BERM ABOVE PROTECTIVE COVER.
12. BEGIN PHASE 2 WASTE PLACEMENT OPERATIONS (SEE SHEET 4K).
13. AS WASTE REACHES FINAL GRADES, BEGIN FINAL COVER PLACEMENT IN ACCORDANCE WITH FINAL COVER CONSTRUCTION STAGING AND OPERATION STAGES. (SEE SHEET 6D THRIUGH 6G AND 4M FOR FINAL GRADES).



DATE	NO.	DESCRIPTION	APPD.
	D	PTI MODIFICATION NO. 1	
NOV 17 2003	C	REVISED - NOD 2 RESPONSE	DGB
MAY 25 2006	B	REVISED - NOD 1 RESPONSE	DGB
OCT 24 2005	A	ISSUED FOR PERMIT	DGB

REVISIONS

CARDINAL OPERATING COMPANY

CARDINAL PLANT

BRILLIANT OHIO

TITLE:

CARDINAL FAR 1
RESIDUAL WASTE LANDFILL
GENERAL DEVELOPMENT

DWG. NO. 13-30100-4B-D

SCALE:
DR:
CH:
ENGR.
PROJ. ENGR.
DATE:

CIVIL ENGINEERING DIVISION

APPROVED/DATE

AEP AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SIGNATURE

DATE

DRAWING 4B OF 39

O.E.P.A. DRAWING NO. 4B

FIGURE 2

IGS1092

SYSTEM DATE- SYSTEM TIME- 15th PLACED