



**OHIO VALLEY ELECTRIC CORPORATION**

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WRITER'S DIRECT DIAL NO:  
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January 17, 2018

Mr. Bruno Pigott, Commissioner  
Indiana Department of Environmental Management  
100 N. Senate Avenue  
Mail Code 50-01  
Indianapolis, IN 46204-2251

Dear Mr. Pigott:

**Re: Indiana-Kentucky Electric Corporation  
Clifty Creek Station's 2017 Annual Landfill Inspection**

As required by 40 CFR 257.106(g)(7), the Indiana-Kentucky Electric Corporation (IKEC) is providing notification to the Commissioner (State Director) of the Indiana Department of Environmental Management that a qualified professional engineer has completed the 2017 CCR annual landfill inspection for IKEC's Clifty Creek Station. The inspection report has been placed in the facility's operating record as well as on the company's publically accessible internet site, which can be viewed at <http://www.ovec.com/CCRCompliance.php>

If you have any questions, or require any additional information, please call me at (740) 897-7768.

Sincerely,

A handwritten signature in black ink that reads "Tim Fulk".

Tim Fulk  
Engineer I

TLF:klr

cc: J. M. Brown  
G. S. Coriell  
B. S. Canter – Clifty  
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P. A. de Lamerens – Clifty  
J. S. Harmon – Stantech  
D. L. Hunt – Clifty  
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Stantec Consulting Services Inc.  
11687 Lebanon Road, Cincinnati OH 45241-2012

January 11, 2018

File: 175534018, 200.209

Ohio Valley Electric Corporation  
Indiana-Kentucky Electric Corporation  
Attention: Mr. Gabriel Coriell  
3932 U.S. Route 23  
P.O. Box 468  
Piketon, Ohio 45661

**Reference: 2017 CCR Rule Inspection  
Annual Landfill Inspection  
Clifty Creek Generating Station  
Madison, Indiana**

Dear Mr. Coriell,

Attached is the 2017 annual landfill inspection for the Clifty Creek Generating Station's Type I Restricted Waste Landfill. The site visit was performed on November 13, 2017. Rainfall was not observed near the site on the day of the inspection and was minimal for the three days prior (0.08 inches on November 12, 2017). As a summary:

- In general, the slopes of the active coal combustion residual (CCR) landfill were uniform and well vegetated. Some areas of the northern slope appear to be covered with temporary fill soil containing gravel and cobbles. These areas generally were thinly vegetated. The vegetation height was relatively uniform and maintained, although was relatively tall on the top surface of Subphases 1A1/1B1.
- Surface water channels were riprap lined with some maintenance needed to reduce vegetation obscuring visual inspection; however, flow was not impeded. Pipes and culverts were actively flowing during the inspection with the exception of the western end of Subphase 1C. The two surface water collection pipes there appeared to be filled or blocked by sediment accumulation.
- Erosion and sediment control measures such as rock check dams were in place. Continue maintenance as needed for the best management practices. Address erosion features as part of the maintenance activities.
- Signs of slope instability or excessive ponding within the active cells were not noted during the site visit.



January 11, 2018  
Mr. Gabriel Coriell  
Page 2 of 2

**Reference: 2017 CCR Rule Inspection  
Annual Landfill Inspection  
Clifty Creek Generating Station  
Madison, Indiana**

Observations and recommendations are detailed in the associated annual landfill inspection report. A figure is included accompanied with a GPS location table to assist in addressing the observations and a photographic log.

Please contact us with any questions or concerns. We appreciate the opportunity to continue to work with the Clifty Creek Generating Station and the Indiana-Kentucky Electric Corporation.

Regards,

**Stantec Consulting Services Inc.**

Handwritten signature of Kyle Blakley in blue ink.

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Attachment: 2017 Annual Landfill Inspection Report

c. Stan Harris

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**2017 CCR Rule Inspection  
Clifty Creek Landfill**



Clifty Creek Generating Station  
Madison, Indiana  
Jefferson County

January 11, 2018

Prepared for:

Indiana-Kentucky Electric Corporation  
Piketon, Ohio

Prepared by:

Stantec Consulting Services Inc.  
Cincinnati, Ohio

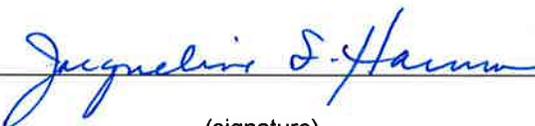
# Sign-off Sheet

This document entitled 2017 CCR Rule Inspection Clifty Creek Landfill was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Indiana-Kentucky Electric Corporation (IKEC) (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule, and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 

(signature)

**Kyle R. Blakley, P.E.**

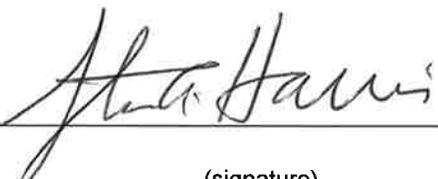
Reviewed by 

(signature)

**Jacqueline S. Harmon, P.E.**



*1/11/2018*

Reviewed by 

(signature)

**Stan A. Harris, P.E.**

## Table of Contents

<b>1.0</b>	<b>OVERVIEW</b> .....	<b>1</b>
<b>2.0</b>	<b>DESCRIPTION OF CLIFTY CREEK LANDFILL</b> .....	<b>2</b>
<b>3.0</b>	<b>OBSERVATIONS</b> .....	<b>3</b>
3.1	SURFACE CHANNELS TO WEST BOILER SLAG POND .....	3
3.2	FINAL GRADE SURFACE/STORM WATER CHANNELS – EAST OF PHASE I TYPE I LANDFILL .....	4
3.3	PHASE I TYPE I LANDFILL .....	5
<b>4.0</b>	<b>RECOMMENDATIONS</b> .....	<b>7</b>
<b>5.0</b>	<b>REFERENCES</b> .....	<b>8</b>

## LIST OF APPENDICES

- APPENDIX A     **FIGURE 1 - PLAN VIEW**
- APPENDIX B     **PHOTOGRAPHIC LOG**
- APPENDIX C     **REFERENCE DRAWINGS**

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Overview

January 11, 2018

## 1.0 OVERVIEW

Stantec Consulting Services Inc. (Stantec) performed the annual inspection of the existing coal combustion residuals (CCR) landfill at the Clifty Creek Generating Station in Madison, Indiana on November 13, 2017.

This annual landfill inspection is intended to fulfill the requirements of 40 CFR 257.84(b) for the Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule) signed by the U.S. Environmental Protection Agency (EPA) Administrator on December 19, 2014 and published in the Federal Register on April 17, 2015.

The landfill is a Restricted Waste Site Type I, operating permit number 39-04, managed in accordance with the Indiana Department of Environmental Management's (IDEM's) regulations. Below is a summary of conditions for the day of the inspection:

Date performed:	November 13, 2017
Weather:	Overcast, breezy, 41°F - 48°F
Rainfall over previous 72 hours:	November 10, 2017 – 0.00 inches November 11, 2017 – 0.00 inches November 12, 2017 – 0.08 inches November 13, 2017 – 0.00 inches

Precipitation data was collected from the weather station at Bowman Field in Louisville, Kentucky (KLOU), which is located approximately 36.5 miles from the landfill.

Stantec's team that performed the fieldwork included:

- Jacqueline S. Harmon, P.E., Senior Associate/Geotechnical Engineer  
20 years of experience in geotechnical engineering, including dams, levees, and CCR storage facility closure.
- Kyle R. Blakley, P.E., Senior Project Engineer/Geotechnical Engineer  
8 years of geotechnical engineering experience for supervision of geotechnical field explorations, design of dams, landslide remediation, and CCR storage facility design, closure, and operation.

The estimated volume of CCRs contained in the landfill is 2,101,000 cubic yards.

IDEM regulations require monthly inspections of the landfill facility, which are performed by plant personnel. Inspections of the landfill facility have commenced in accordance with the CCR Rule as of October 17, 2015 and are being conducted at least once every seven days. Weekly and monthly inspection reports encompassing the 2017 calendar year were provided for review.

IDEM routinely inspects the facility throughout the year. IDEM inspection reports were available for February 7<sup>th</sup>, May 23<sup>rd</sup>, and July 28<sup>th</sup> in IDEM's online virtual filing cabinet (IDEM, 2017). The IDEM inspection report for October 18,

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

Description of Clifty Creek Landfill  
January 11, 2018

2017 was not yet available in IDEM's online system, and a copy was provided by site personnel. Annual submittals to IDEM include drawings showing existing conditions and a five-year estimate of site conditions (Stantec, 2017).

Fieldwork was coordinated with Mr. Danny Hunt, Clifty Creek Station's Landfill Operator. Observations were briefly discussed with onsite personnel during and after completion of the field activities.

## 2.0 DESCRIPTION OF CLIFTY CREEK LANDFILL

The Clifty Creek Generating Station is a coal-combustion generating station located in Madison, Jefferson County, Indiana. It is owned and operated by Indiana-Kentucky Electric Corporation (IKEC), a wholly-owned subsidiary of Ohio Valley Electric Corporation (OVEC). The Clifty Creek Generating Station began operating in 1955 and currently consists of six generating units with a total generating capacity of 1,304 megawatts.

In the late 1980s, IKEC converted ash sluicing to dry fly ash collection facilities at the plant and transitioned to a dry ash landfill. IKEC submitted a restricted waste construction/operation permit application to IDEM in 1986 to begin landfilling boiler slag and fly ash produced by the Clifty Creek Station. IDEM approved the fly ash landfill permit application as a Type III restricted waste landfill in 1988, and operations began in 1991.

In December 2006, IKEC applied for a major modification to its landfill permit to modify the existing Type III landfill to a Type I landfill. The modification would enable the landfill to accept synthetic gypsum materials generated by the flue gas desulfurization (FGD) systems that were being constructed at that time. IKEC's major permit modification application proposed repurposing 109 acres of the originally permitted 200-acre Type III facility as a Type I facility to accept fly ash, boiler slag, synthetic gypsum, and other miscellaneous gypsum related materials. IDEM approved IKEC's major permit modification in April 2008.

The landfill has a capacity of 13.9 million cubic yards (FMSM, 2006) and includes:

- A composite liner system consisting of a Type 3 geosynthetic clay liner and a 30-mil flexible polyvinyl chloride (PVC) geomembrane in all phases;
- A leachate collection system, directing flow eastward from part of Phase 1 to the West Boiler Slag Pond and the remainder flowing westward to the Landfill Runoff Collection Pond;
- A contact and non-contact surface water management system, including sedimentation ponds, multiple sediment traps, drainage channels, and chimney drains that segregates water that comes into contact with the CCRs and water that does not encounter the CCRs;
- A groundwater monitoring system, and
- A final closure cap design.

Initial site development and construction activities for Phase 1 of the new Type I landfill began in May 2008. The original Type III facility was soil capped during the site development. Subphases IA, 1B, and portions of 1C were constructed and certified for waste by late 2012. See Appendix A for a plan view of the CCR facility and final cover topography for the current constructed footprint. Other features associated with the landfill include:

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Observations

January 11, 2018

- West Boiler Slag Pond – a permanent pond accepting sluiced boiler slag, which is periodically dredged and transported to the landfill for beneficial re-use. The pond also accepts most of the leachate from Subphases 1A and 1B, as well as surface water from the landfill.
- Landfill Runoff Collection Pond – a permanent pond at the southwestern end of the landfill that accepts the remainder of the leachate and surface water from Subphases 1A, 1B, 1C, and the area between Phase I and the pond.

At the time of this annual inspection, the landfill consisted of Subphases 1A, 1B, and 1C. Subphases 1A and 1B are subdivided into Areas 1A1, 1A2, 1B1, and 1B2. Areas 1A1 and 1B1 were approved for waste placement in 2008; Areas 1A2 and 1B2 were approved for waste placement in 2013. IKEC notified IDEM in August 2016 of the intent to open Cell 1C for waste placement.

According to the third quarter waste placement survey plot for 2017, Subphases 1A and B are near permitted grade for CCRs and have been covered with temporary soil and vegetation. The southwestern end of Subphase 1B2 and all of 1C are currently active and receiving CCRs, which are being placed in one-foot lifts in accordance with the facility's Construction Quality Assurance/Quality Control Plan (FMSM, 2008). Bottom ash is being stockpiled southwest of the active cell to prepare for Phase 2 construction planned in 2019. Appendix C includes figures showing the recent survey plot and the final cover topography for the current constructed landfill.

## 3.0 OBSERVATIONS

The following observations were made during the site visit within the Type I active subphase I (A through C) footprint and the applicable surface drainage features toward the West Boiler Slag Pond:

### 3.1 SURFACE CHANNELS TO WEST BOILER SLAG POND

Four riprap-lined surface water channels are constructed east of the Type I active landfill. See reference Drawing No. 16-30870-05 in Appendix C, provided to clarify the four surface water channels observed east of the Type I landfill. The channels nearest the paved haul road and the southern ridge (Devil's Backbone) control flow from the surrounding watershed. The two channels in the middle are intended to manage stormwater flow once final cover is placed in Phase I. Flow from the four channels moves eastward to the West Boiler Slag Pond and its associated National Pollutant Discharge Elimination System (NPDES)-permitted outfall.

This section includes the observations for only the two stormwater channels, one near the haul road and the other along the southern ridge. The two final cover channels are discussed in Section 3.2.

- Cracking, spalling, and deterioration was observed affecting the interior lining of the southernmost of the two culverts passing under the access road on the east end of the closed Type III landfill (Point 2, Appendix A; Photo 1, Appendix B). The deterioration has caused the corrugated metal to be exposed to flow. Both culverts were slightly obscured by vegetation (Point 1, Appendix A).

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Observations

January 11, 2018

- A log was noted in the combined channel east of the construction trailer and upstream of the Conspan outlet flowing into the West Boiler Slag Pond (Photo 2, Appendix B).
- CCR materials were not noted in the channel aside from backfill near the Conspan headwall flowing into the West Boiler Slag Pond. The Conspan is a precast concrete culvert and foundation represented on reference Drawing No. 16-30870-05 in Appendix C and is 72 feet long and 20 feet wide by 5 feet tall culvert at a 1.25% slope.
- Within the riprap channel, approximately halfway between the culverts and the Conspan near the West Boiler Slag Pond, a low spot with standing water was observed (Point 3, Appendix A; Photo 3, Appendix B). Heavy vegetation extended from the low spot toward the upstream side of the Conspan (Point 3 to Point 5, Appendix A). The vegetation present did not appear to impact functionality of the channel, but hindered visual inspection.
- The riprap mattress in the north stormwater channel near the haul road was observed to be slightly displaced with bulging and was wavy in appearance (Point 4, Appendix A; Photo 4, Appendix B). This did not appear to impact functionality.
- The gabion and riprap mattresses appear to be functioning as designed and in acceptable condition.
- Some grass and vegetation was present in the channel on the upstream side of the West Boiler Slag Pond Conspan outlet. The vegetation present did not impede proper function of the channel. (Photo 5, Appendix B)
- The West Boiler Slag Pond Conspan flow appears unrestricted with slight vegetation growing. (Photos 5 and 6, Appendix B)

### 3.2 FINAL GRADE SURFACE/STORM WATER CHANNELS – EAST OF PHASE I TYPE I LANDFILL

As discussed in Section 3.1, the final grade surface/storm water channels are the two interior channels flowing eastward from the landfill into the West Boiler Slag Pond and discharging through its monitored NPDES-permitted outfall.

- The final grade surface/storm water channels include two headwalls and pipes passing under the access road past the temporary construction office trailers. A slight bow in the crown of the southern of the two pipes has been observed since 2015; however, no depression was noticed in the road, and flow is not impeded. The bow did not appear to have changed between 2015 and 2017.
- The cracks noted on the surface of the inlet headwall for the northwest final grade channel appear unchanged since 2015. Flow is not impeded; this is a maintenance observation for continued monitoring (Photo 7, Appendix B).

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Observations

January 11, 2018

- An erosion rill (approximately two feet wide by 15 inches deep) was seen near the northwest corner of the Type III landfill final cover, adjacent to the northern surface storm/surface water ditch (Point 6, Appendix A).
- A cluster of vermin burrows was observed in the Type III landfill cover, adjacent to the south side of the final cover north storm/surface water channel. The burrows were approximately two- to three-inches in diameter. (Points 8 and 11, Appendix A; Photo 8, Appendix B).
- Vegetation was sparse in a bare area (approximately 4 feet wide by 30 feet long) along the north side of the final cover surface/storm water channel adjacent to the riprap (Point 9, Appendix A). This is appeared to be in the same condition as observed in 2016.
- A potential slough was observed on the south side of the haul road at the toe of slope toward the northeast corner of the Type III landfill (Point 10, Appendix A; Photo 9, Appendix B). The scarp appeared to be semi-circular, approximately 15-20 feet in diameter. It did not appear to impact the integrity of the haul road.
- The drainage pipe from the truck wash area into the northern storm/surface water channel on the Type III landfill appeared to be partially obscured by sediment (Point 7, Appendix A; Photo 10, Appendix B).
- Inspections near the leachate pipe outlet headwalls (Points 12 and 13, Appendix A; Photo 11, Appendix B) at the northeast corner of the Type III landfill resulted in the following observations:
  - There was a seep approximately 15 feet north of the northern leachate pipe outlet. The seep was at approximately the same elevation as the invert of the pipe, and consisted of standing water with a sheen and exposed geotextile fabric (Point 14, Appendix A; Photo 14, Appendix B).
  - A sheen was seen above and beside the southern leachate pipe headwall (Point 15, Appendix A; Photos 15 and 16, Appendix B).
- Several areas with thin vegetation were observed from the southeast corner extending to the southwest corner of the Type III landfill area. Sizes of the bare areas are indicated in Appendix A in the descriptions for Points 16 through 20.

### 3.3 PHASE I TYPE I LANDFILL

The Phase I Type I landfill began accepting CCRs in 2008. No subphases within the waste footprint have been permanently capped and closed. Areas nearing final grades have temporary cover and are vegetated. The slopes are relatively uniform and mowed. Crews were actively grading temporary cover along the southern slope of the landfill during the November site visit. The southern perimeter ditch has been reshaped and lined with stone since the 2016 inspection.

- Subphases 1A1 and 1B1 were observed to be nearly built to permitted final CCR grades. The subphases have been temporarily covered with six inches of soil, and vegetation has been established.

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Observations

January 11, 2018

- The temporary cover vegetation on the top of Subphases 1A1/1B1 (Photo 17, Appendix B) was generally in one of two conditions: 1 to 1.5 feet tall grasses that were typically laying down, or 3 to 3.5 feet tall brushy vegetation.
- An approximately 3-foot depression/hole at the beginning of an erosion rill was observed outside of the waste limits, south of the access road on the southeast corner of Cell 1A1 (Point 21, Appendix A).
- An approximately 2.5-foot depression/hole was observed outside of the waste limits, south of the access road on the south side of the southeast corner of Cell 1A1 (Point 22, Appendix A).
- Sediment buildup and an area bare of vegetation (Points 23 and 24, Appendix A; Photo 18, Appendix B) was seen near the edge of the working area of temporary cover on the south side of the landfill (Point 25, Appendix A; Photo 19, Appendix B).
- The end of the currently placed temporary cover on the south side of Cell 1B2 was observed and marked in Appendix A as Point 26. The temporary cover limits are approximately 15 feet north of the stone-lined surface water channel (the end of which is marked as Point 27 in Appendix A; Photo 20 in Appendix B). An area of temporary cover extending about 40 feet further north feet was being regraded during the inspection (Point 26, Appendix A; Photo 19, Appendix B).
- Active waste placement was ongoing in Cells 1C based on the observation of gypsum stockpiles in the cell that were ready for spreading. Piles of bottom ash, used as chimney drains in the landfill, were visible and appeared to be properly spaced (Photo 21, Appendix B).
- Several bare or rocky areas were observed on the northern slope of the temporary cover in Cells 1A2/1B2. These were located as Points 30, 31, 32, 33, 34, 36, and 42 in Appendix A. The edges of a large area of rocky, minimally vegetated temporary cover near the top of the slope was located with Points 37 and 38 in Appendix A. These areas appear to follow dozer tracks and may be a function of the temporary cover fill consisting of excessive amounts of gravel/cobbles. Photo 22 in Appendix B represents a typical area of thin vegetation and rocky cover. Several erosion rills were observed in the grassed areas downslope from the rocky/bare areas.
- The storm water channel at the toe of the northern slope of the landfill was grassed, and the rock check dams were in place and functioning properly. The check dam near the boundary of Cells 1A1 and 1A2 had collected a substantial amount of sediment (Photo 23, Appendix B).
- An erosion rill with thin vegetation and a bare area was observed on the lower 1/3 of the northern slope of the landfill. The area was approximately 30 feet by 15 feet, and gypsum was exposed at the surface (Point 35, Appendix A; Photo 24, Appendix B).
- A second area, approximately 10 feet by 2 feet, was observed on the lower 1/3 of the northern slope of the landfill. This area included exposed bottom ash at the surface (Point 42, Appendix A; Photo 25, Appendix B).

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### Recommendations

January 11, 2018

- Minor erosion rills (approximately 6 inches wide and 6 inches deep) were observed above the check dam (Point 41, Appendix A; Photo 26, Appendix B).
- An erosion rill runs from top to bottom of the northeastern slope of Subphases 1A1/1B1 near the north corner. It was approximately 12 inches deep and obscured by vegetation. This rill has been monitored since the 2016 inspection (Point 40, Appendix A; Photos 27 and 28, Appendix B).
- Several large concrete chunks were observed within the temporary cover at the top of the slope near the northeast corner of the landfill (Point 39, Appendix A; Photo 29, Appendix B).
- The temporary cover outslopes of Subphase 1A1/1B1 were consistent with previous inspection, and were generally flatter than and complying with the permitted final cover grades.
- Storm water within Subphase 1C is collected and directed towards the Landfill Runoff Collection Pond. The pipe inlets and outlets were located during the November site visit and were observed to be blocked with sediment. (Photos 30 and 31; Point 29, Appendix A)
- The leachate pipe appeared unrestricted and actively flowing. Vegetation was maintained around the headwall to allow visual observation. (Point 28, Appendix A; Photo 32, Appendix B)

## 4.0 RECOMMENDATIONS

The following recommendations are offered for the Clifty Creek Station's Type I Restricted Waste Landfill. The recommendations are not listed in order of priority.

### Stability Issues:

None noted.

### Operational Issues:

- Conduct field surveys to measure current topography and compare to design geometry. Regrade surface as needed to conform to design. Areas near to permitted CCR grades are recommended to be capped, closed, and vegetated (Subphases 1A1, 1B1, 1A2, and 1B2).
- An Operations and Maintenance Manual should be developed that includes provisions for the placement of materials within the landfill, the maintenance of the landfill, and the procedure to follow if issues arise during the operation of the landfill.
- Monitor seeps from the northeast corner of the Type III landfill. Consider ways to segregate and reduce the various source of flows into the eastward stormwater and leachate collection channel.

## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

### References

January 11, 2018

### Maintenance Issues:

- Continue to conduct weekly and monthly field inspections to schedule and maintain the necessary best management practices for the stormwater channels, sediment traps, and rock check dams serving the landfill.
- Maintain the vegetation along the exterior slopes and within the surface drainage channels to facilitate inspections by removing taller weeds and woody vegetation or reestablishing vegetation as needed. Particular attention should be given to the taller brushy vegetation on the top of the landfill and the rocky, bare areas on the northern slope. Temporary cover should be monitored and maintained as gradation specifications deviate from the final cover requirements.
- Remove excess vegetation from drainage channels, pipe inlets, and outlets. Flow was visible at the pipes observed by Stantec during the November site visit.
- Continue to repair erosion features, reestablish vegetation, and monitor in future inspections.
- Continue to monitor the surface water channel headwalls and culverts east of the landfill. Repair as needed.
- Monitor the integrity of the exposed corrugated metal in the southernmost of the culverts near the temporary construction trailers. If needed, remediation of the culvert should be considered to re-establish an internal liner for the pipe.
- Monitor the vermin burrows in the cover of the Type III landfill, and repair as needed.
- Monitor the potential slough near the haul road on the north side of the Type III landfill. If the slough progresses toward the haul road and/or truck wash facility, a remediation could be considered.
- Clean out sediment from the truck wash surface water drainage pipe outlet/headwall area and the surface water collection pipes at the west end of Subphase 1C.

## 5.0 REFERENCES

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## 2017 CCR RULE INSPECTION CLIFTY CREEK LANDFILL

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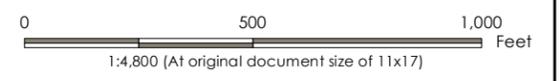
**APPENDIX A**  
**FIGURE 1 – PLAN VIEW**

**Clifty Creek Ash Landfill  
2017 Annual Inspection - DRAFT**

Point ID	Comment	Latitude	Longitude
1	Vegetation at headwalls	38.736720	-85.431945
2	Deterioration of culvert pipe lining	38.736714	-85.431933
3	Low spot in riprap and start of heavy vegetation	38.736973	-85.431122
4	Displaced/bulging riprap mattress in north storm/surface water channel	38.736954	-85.431469
5	End of heavy vegetation	38.737001	-85.430296
6	Erosion rill with hole, approximately 2 ft wide x 15 in deep	38.735452	-85.435910
7	Drainage pipe invert from truck wash station. Sediment at outlet.	38.735672	-85.435203
8	Animal/vermin burrows near north channel	38.735694	-85.434729
9	Bare area above riprap, approximately 4 ft x 30 ft	38.736310	-85.433299
10	Potential slough above channel, point near middle of scarp	38.736352	-85.433221
11	Additional animal/vermin burrows near north channel	38.736275	-85.433138
12	Southern leachate pipe headwall	38.736407	-85.432436
13	Northern leachate pipe headwall	38.736444	-85.432441
14	Potential seep with sheen, approx. 15 ft north of northern leachate outlet	38.736489	-85.432449
15	Sheen on water beside southern leachate pipe headwall	38.736400	-85.432416
16	Bare area	38.735685	-85.432494
17	Bare area, approx. 6 ft x 15 ft	38.735470	-85.432900
18	Additional bare area, approx. 6 ft x 15 ft	38.735370	-85.433238
19	Bare area, approx. 3 ft x 20 ft	38.735286	-85.433537
20	Bare area, approx. 3 ft x 15 ft	38.735161	-85.433824
21	Approx. 3 feet deep hole at start of erosion rill	38.734040	-85.434428
22	Approx. 2.5 feet deep hole/erosion gully	38.733660	-85.435168
23	Sediment buildup in stone-lined surface water channel	38.732695	-85.436467
24	Bare area next to stone-lined surface water channel	38.732695	-85.436468
25	Edge of ongoing (as of 11/13/2017) temporary cover work	38.732674	-85.436586
26	Approx. end of temp cover on Cell 1B2 (Point offset ~15 ft south of cover)	38.731947	-85.437338
27	End of stone-lined surface water channel	38.731946	-85.437338
28	Leachate pipe outlet	38.729899	-85.441179
29	Blocked stormwater pipe inlet, southwest corner of Cell 1C	38.730486	-85.440627
30	Bare area of temp. cover, thin vegetation	38.733039	-85.439215
31	Bare area of temp. cover, rocky fill and thin vegetation	38.733072	-85.438991
32	Bare area of temp. cover, rocky fill and thin vegetation, runs north down slope	38.733015	-85.438613
33	Bare area of temp. cover, rocky fill and thin vegetation, runs north down slope	38.733080	-85.438391
34	Bare area of temp. cover, rocky fill and thin vegetation, runs north down slope	38.733279	-85.438179
35	Bare area (approx. 30 ft x 15 ft), Gypsum exposed through temp. cover	38.733607	-85.438415
36	Bare area of temp. cover, rocky fill and thin vegetation, runs north down slope	38.733552	-85.437541
37	End of rocky temp. cover with thin vegetation, approx. 1/2 way down slope	38.733657	-85.437343
38	End of rocky temp. cover with thin vegetation, approx. top of slope	38.733847	-85.437058
39	Concrete chunks in temporary cover	38.734266	-85.436441
40	Erosion rill in temp. cover, runs east down slope from top to bottom	38.734227	-85.435397
41	Erosion rill in temp. cover, runs north down slope	38.733854	-85.438485
42	Bare area of temp. cover, rocky fill and thin vegetation, Exposed bottom ash	38.733817	-85.438226



Legend  
 ● Inspection Location



- Notes**
1. Coordinate System: Latitude/Longitude NAD83
  2. Base features - BING
  3. Ortho-imagery does not represent current conditions.
  4. Topo shows Permitted Top of Cover for constructed subphases.



Project Location: Clifty Creek Plant, Jefferson County, IN  
 Prepared by ANP on 2017-12-20  
 Technical Review by KB on 2017-12-20  
 Independent Review by JH on 2017-12-20

Client/Project: Indiana - Kentucky Electric Corporation, Clifty Creek Plant

Figure No. **1**  
 Title **2017 Annual CCR Landfill Inspection**

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 449474  
 564303  
 567584

**APPENDIX B**  
**PHOTOGRAPHIC LOG**

**Photo 1**

Cracking, spalling, and deterioration of pipe lining in culvert. Photo looking west, from downstream to upstream in pipe.

**Photo 2**

The combined surface/storm water channel flowing east to the West Boiler Slag Pond. The log is in the foreground. The vegetation and low area are in the background near the tree line. Photo looking northeast, from upstream to downstream.

**Photo 3**

A low area in the combined surface/storm water channel upstream of the Conspan flowing into the West Boiler Slag Pond. Photo looking east, toward West Boiler Slag Pond.

**Photo 4**

Slight displacement of riprap mattress in combined storm/surface water channel. Bulging of mattress and wavy in appearance. Photo looking west, from downstream to upstream.

**Photo 5**

Grass and vegetation in the channel upstream of the Conspan near the West Boiler Slag Pond. Photo looking southeast from upstream side of Conspan.

**Photo 6**

Flow from Conspan toward West Boiler Slag Pond. Vegetation did not appear to affect flow. Photo looking down at Conspan outlet.



**Photo 7**

The cracks in the inlet headwall for the northwest final grade channel appears unchanged since the 2015 visit. Photo looking east at upstream headwall.



**Photo 8**

Cluster of vermin burrows in Type III landfill cover, adjacent to the south side of the final cover north storm/surface water channel. See Points 8 and 11 in Appendix A. Photo looking north.



**Photo 9**

Potential slough observed on south side of haul road at toe of slope. Approximately 15-20 feet diameter, and did not appear to impact the haul road. See Point 10 in Appendix A. Photo looking north.

**Photo 10**

The surface drainage pipe from the truck wash station into the northern storm/surface water drainage channel on the Type III landfill cover was partially obstructed by sediment. See Point 7 in Appendix A. Photo looking north.

**Photo 11**

Leachate pipe headwalls at northeast corner of Type III Landfill. See Points 12 and 13 in Appendix A. Photo looking southwest.

**Photo 12**

Southern leachate pipe headwall at northeast corner of Type III landfill. See Point 12 in Appendix A. Photo looking west.



**Photo 13**

Northern leachate pipe headwall at northeast corner of Type III landfill. See Point 13 in Appendix A. Photo looking west.



**Photo 14**

Seep, approximately 15 feet north of northern leachate pipe outlet. See Point 14 in Appendix A.



**Photo 15**

Seep adjacent to outlet of southern leachate pipe. Sheen beside headwall. See Point 15 in Appendix A.

**Photo 16**

Seep at outlet of southern leachate pipe. Standing water and sheen above headwall. See Point 15 in Appendix A.

**Photo 17**

Vegetated temporary cover on Subphases 1A1/1B1. Cover was either 1 to 1.5 feet tall grasses or 3 to 2.5 feet tall hardy/brushy vegetation. Photo looking north from outside of southern waste boundary.

**Photo 18**

Sediment buildup and an area bare of vegetation near the edge of the working area of temporary cover on the south side of landfill. See Points 23 and 24 in Appendix A. Photo looking north.

**Photo 19**

Working area of temporary cover on south side of landfill. See Points 25 and 26 in Appendix A. Photo looking northeast.

**Photo 20**

End of stone lining in surface channel on south side of landfill. See Point 27 in Appendix A. Photo looking northwest.

**Photo 21**

Active waste placement in Cell 1C. Gypsum placement with visible chimney drains, constructed via vertical piles of bottom ash. Photo looking northwest.

**Photo 22**

Typical image of several areas of temporary cover on Cells 1A2/1B2 where vegetation was thin and cover soil contained gravel/cobbles. See Points 30, 31, 32-34, 36-38, and 42 in Appendix A. Photo looking east along the north slope of the landfill.

**Photo 23**

Sediment collected in the rock check dam near the boundary of Cells 1A1 and 1A2. Photo looking northeast.

**Photo 24**

Bare/rocky area of temporary cover, approximately 30 feet by 15 feet, with exposed gypsum. See Point 35 in Appendix A. Photo looking east along northern slope of landfill.

**Photo 25**

Typical image of several areas of temporary cover on Cells 1A2/1B2 where vegetation was thin and cover soil contained gravel/cobbles. See Points 30, 31, 32-34, 36-38, and 42 in Appendix A. Photo looking east along the north slope of the landfill.

**Photo 26**

Minor erosion rills above the check dam on the northern slope of the landfill. See Point 41 in Appendix A.

**Photo 27**

Erosion rill from top to bottom of northeastern slope of Subphases 1A1/1B1 near the north corner. Has been monitored since 2016 inspection. This rill runs downhill from Point 40 as shown in Appendix A.

**Photo 28**

Erosion rill from top to bottom of northeastern slope of Subphases 1A1/1B1 near the north corner. Has been monitored since 2016 inspection. This rill runs downhill from Point 40 as shown in Appendix A.

**Photo 29**

Concrete chunks within the temporary cover at the top of the slope near the northeast corner of the landfill. See Point 39 in Appendix A.

**Photo 30**

Stormwater collection inlet on south side of Subphase 1C, blocked by sediment. See Point 29 in Appendix A. Photo looking east.



**Photo 31**

Stormwater collection outlet on south side of Subphase 1C. Sediment collected at outlet. Photo looking west.



**Photo 32**

Leachate pipe outlet, west of Subphase 1C. See Point 28 in Appendix A.

**APPENDIX C**  
**REFERENCE DRAWINGS**

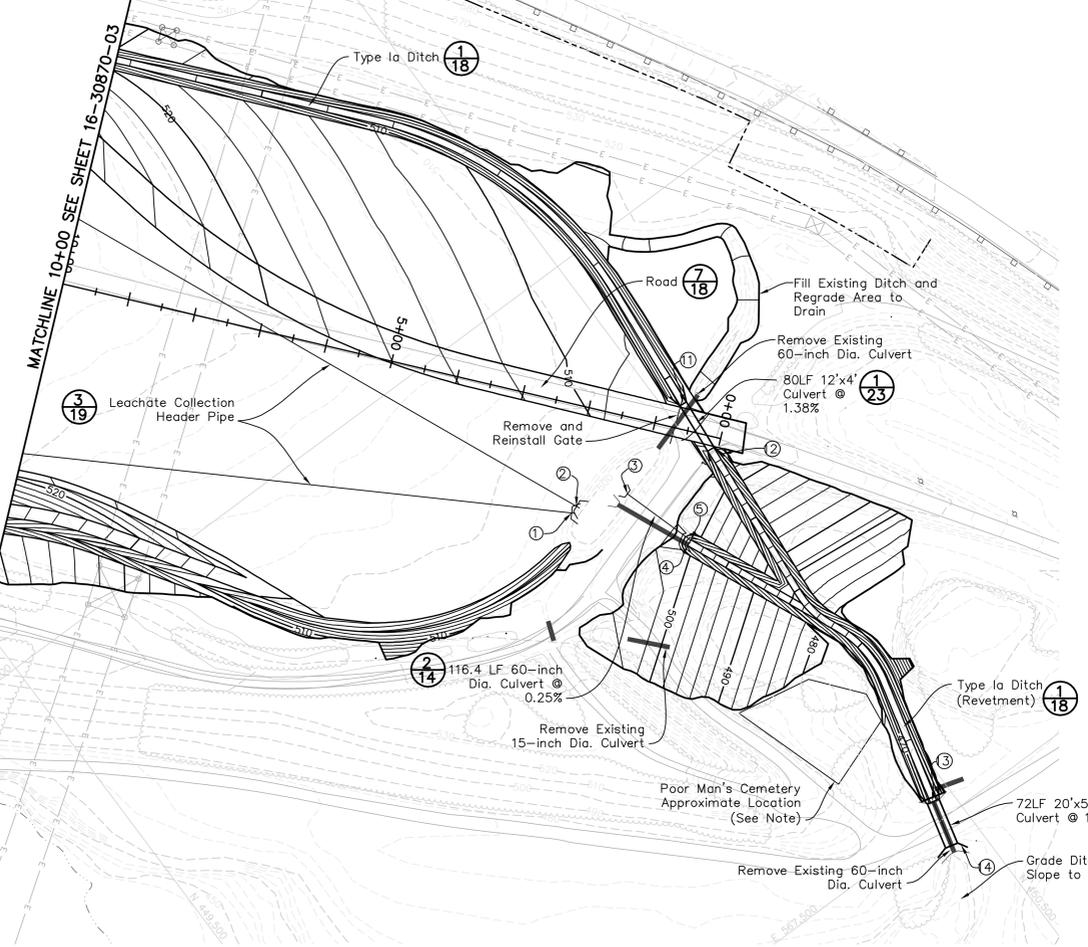
**Notes:**

1. Topographic mapping for the hill sides and areas east of the existing landfill are supplied by Photogrammetric Services, Inc., Reynoldsburg, Ohio (April 28, 1992). Topographic mapping for the surface of the existing ash pond and landfill was supplied by Henderson Aerial Surveys, Inc., Grove City, Ohio (April 16, 2005) and Bowen, Inc. (June, 2007). Hydrographic survey of existing fly ash pond performed on May 4, 2005.
2. Information presented in Indiana State Plane coordinate system (NAD27/NAVD88 Indiana East, feet).
3. IKEC will locate and stake the limits of the Poor Man's Cemetery. The Contractor shall not operate within the limits of the Cemetery.
4. The flow line of all surface ditches shall be adjusted to match headwalls and wingwalls.
5. See Drawing 16-30870-21 for Headwall Details. See Drawing 16-30870-23 for Culvert Details.

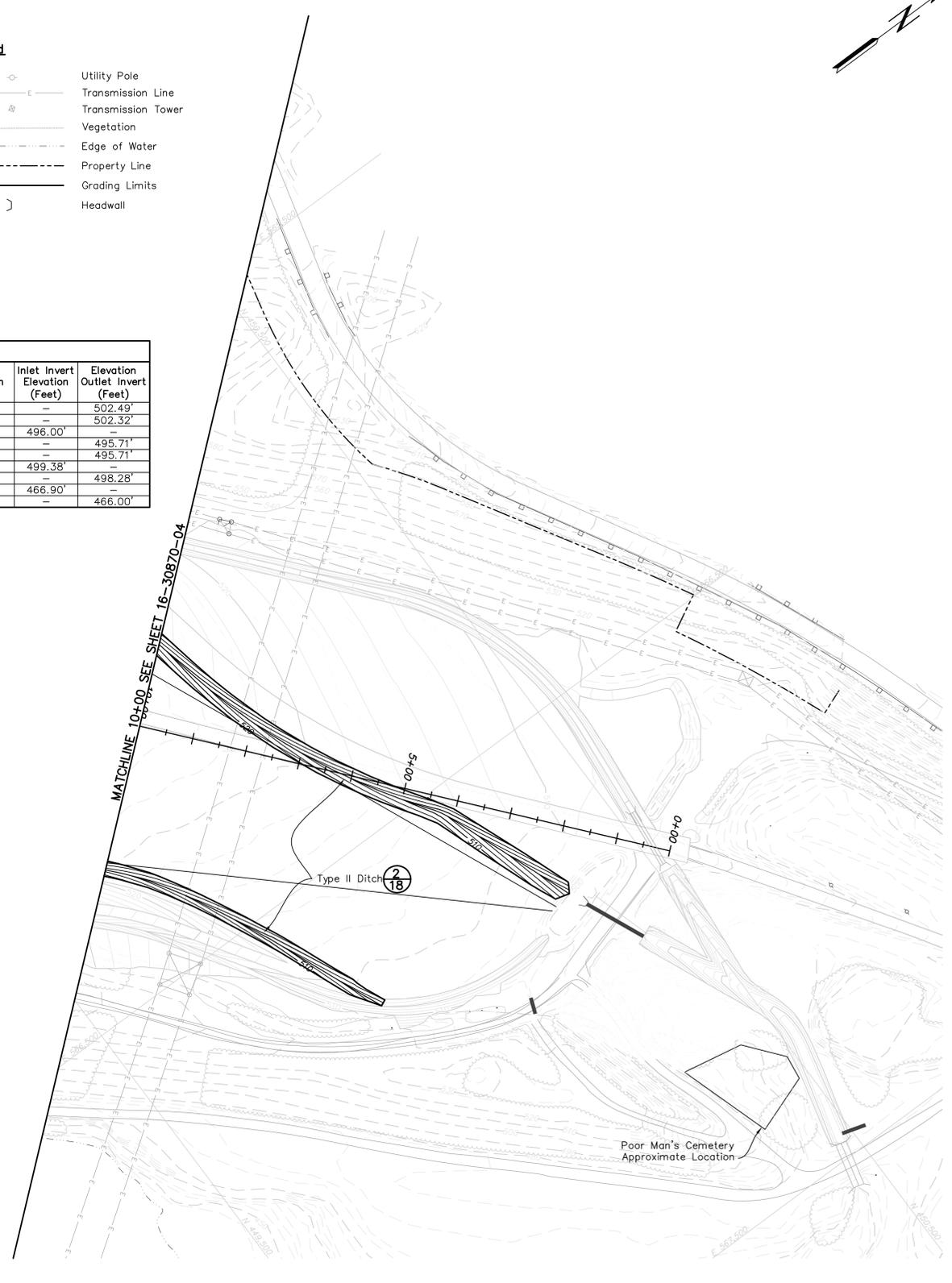
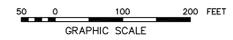
**Legend**

- Utility Pole
- Transmission Line
- ⊗ Transmission Tower
- Vegetation
- - - Edge of Water
- - - Property Line
- - - Grading Limits
- ) Headwall

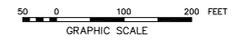
Structures							
Structure ID	Type	Size	Northing (Feet)	Eastng (Feet)	Rim Elevation (Feet)	Inlet Invert Elevation (Feet)	Outlet Invert Elevation (Feet)
1	Headwall	16-inch	450,297.83	566,806.52	-	-	502.49'
2	Headwall	16-inch	450,309.73	566,803.32	-	-	502.32'
3	Headwall	60-inch	450,380.92	566,832.97	-	496.00'	-
4	Headwall	60-inch	450,407.47	566,947.48	-	-	495.71'
5	Headwall	60-inch	450,414.75	566,944.34	-	-	495.71'
11	Culvert	12 x4' Inlet	450,527.17	566,774.52	-	499.38'	-
12	Culvert	12 x4' Outlet	450,519.57	566,854.16	-	-	498.28'
13	Culvert	20 x5' Inlet	450,470.28	567,470.12	-	466.90'	-
14	Culvert	20 x5' Outlet	450,452.61	567,539.92	-	-	466.00'



INITIAL CONSTRUCTION



FINAL GRADE



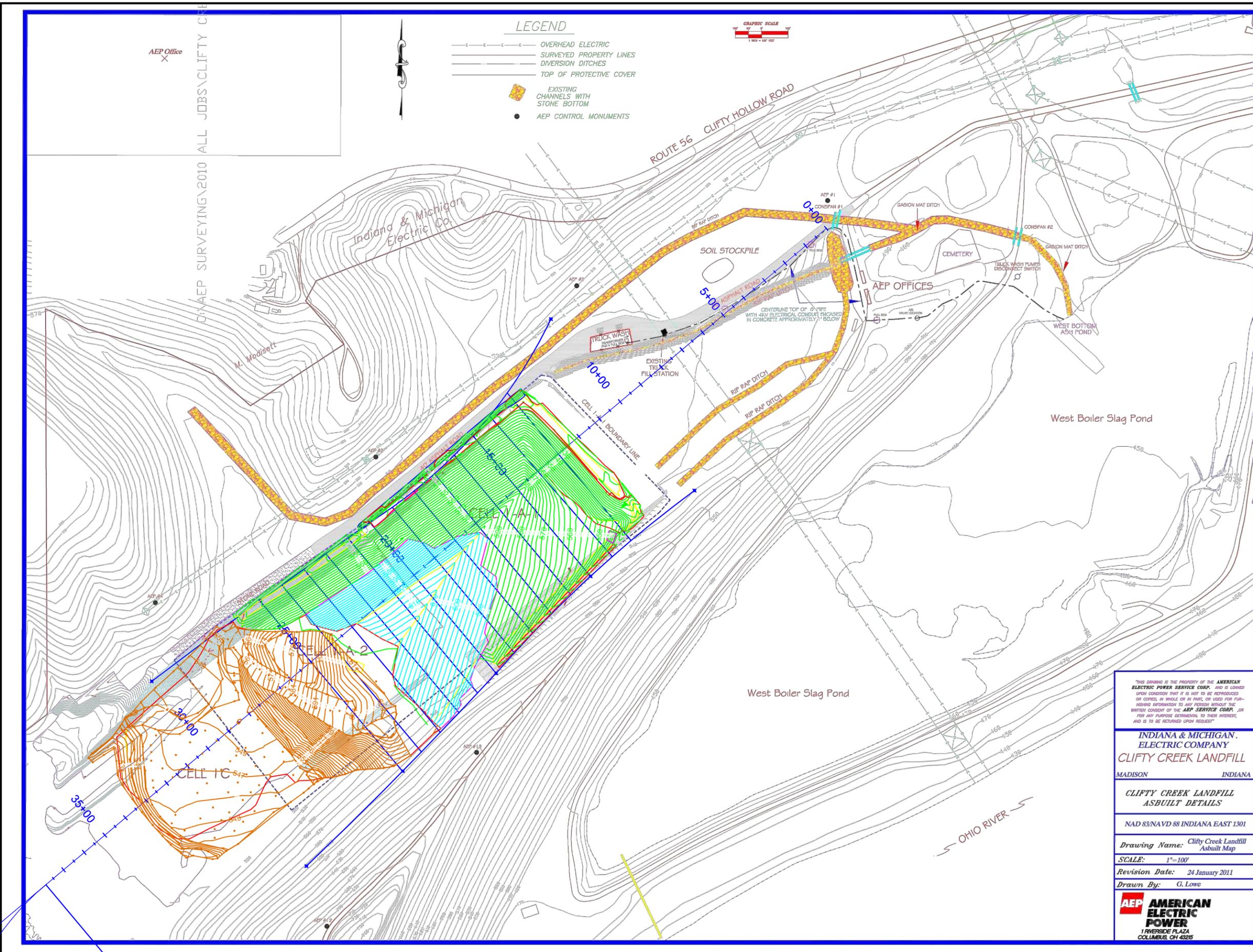
DATE	NO.	DESCRIPTION	APPD.
REVISIONS			
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INDIANA - KENTUCKY ELECTRIC CO. CLIFTY CREEK PLANT MADISON INDIANA COAL ASH LANDFILL SUBPHASE 1A INITIAL CONSTRUCTION AND FINAL GRADE			
DWG. NO. 16-30870-05			
SCALE: CIVIL ENGINEERING DIVISION			
DR:	APPROVED BY		
CH:	DATE:		
ENGR:	DATE:		
DATE:	DATE:		
AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215			

Section or Detail No.  
Sheet Where Shown  
REFERENCE KEY

SCALE: AS SHOWN  
DR: CW  
CH: DMD  
ENGR: DPG  
DATE: JAN., 2010

Stantec Consulting Services Inc.  
1001 Avenue H  
Des Moines, Ore.  
50314  
573-682-0200  
www.stantec.com





- Notes:
1. Cell 1-B-1 is constructed above cell 1-A-1. Contours in green note area that has been covered with cover soil and grass is well established. Contours in blue note area that was recently covered with soil and seeded (June/July 2017). Brown Contours note active fill area.
  2. Cell 1-B-2 is being constructed above cell 1-A-2.
  3. Cell 1D is to be constructed above Cell 1C.
  4. Cell 1E is to be constructed above 1D and part of 1-B-2.

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**INDIANA & MICHIGAN ELECTRIC COMPANY**  
**CLIFTY CREEK LANDFILL**  
 MADISON INDIANA  
**CLIFTY CREEK LANDFILL**  
**ASBUILT DETAILS**

NAD 83/NAVD 88 INDIANA EAST 1301

Drawing Name: Clifty Creek Landfill Asbuilt Map  
 SCALE: 1"=100'  
 Revision Date: 24 January 2011  
 Drawn By: G. Lowe

**AEP AMERICAN ELECTRIC POWER**  
 1 RIVERSIDE PLAZA  
 COLUMBUS, OH 43215

Clifty Creek Station

3rd Quarter, 2017.  
 Quarterly Plot