2021 USEPA CCR RULE PERIODIC OPERATING RECORD RUN-ON AND RUN-OFF CONTROL PLAN REVIEW REPORT-REV 1

§257.81

CCR LANDFILL

Zimmer Power Company, LLC

Moscow, Ohio

Submitted to

Zimmer Power Plant

1781 US Route 52
Moscow, Ohio 45153

Submitted by

Geosyntec consultants

engineers | scientists | innovators

1 McBride and Son Center Drive, Suite 202
Chesterfield, Missouri 63005

December 17, 2021

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EXECUTIVE SUMMARY

This Periodic Operating Record Run-on and Run-off Control Plan Review Report (Report) for the CCR Landfill (LF) at the Zimmer Power Plant (ZIM) (also known as Zimmer Power Station) has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257 herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial run-on and run-off control system plans for existing CCR landfills, completed in 2016 [2]) be updated on a five-year basis. All reviews are to be posted on the Zimmer Power Company, LLC (ZPC) CCR Website. The Report was initially finalized on October 11, 2021; since then, additional details supporting the Initial Run-on and Run-off Control System Plan were made available for review. Therefore, this version of the Report replaces and supersedes the prior Report dated October 11, 2021.

The review concluded that no significant updates to the existing run-on and run-off control plan are required. The initial run-on and run-off control system plan developed in 2016 [2] was independently reviewed by Geosyntec. Field observations, interviews with plant staff, and evaluations were performed to evaluate conditions in 2021 relative to the 2016 initial run-on and run-off control plan [2]. The current conditions do not indicate changes are necessary because there are no significant observed changes at the LF since development of the initial plan that would potentially affect the runoff control system plan. **Table 1** provides a summary of the initial 2016 run-on and run-off control plan [2] and conditions observed in 2021.

Table 1 – Periodic Run-on and Run-off Control System Plan Review

CCR Rule Reference	Requirement Summary	2016 Initial Certification		2021 Periodic Certification	
		Requirement Met?	Comments	Requirement Met?	Comments
§257.81 (a)(1)	Prevent flow onto the active portion of the CCR unit during peak discharge from a 24-hr, 25-yr storm.	Yes	Run-on is diverted away from the active areas of the LF via diversion berms and clean water ditches designed based on hydraulic calculations for at least the 25-yr, 24-hr storm event [2].	Yes	No changes were identified that may affect this requirement.
§257.81 (a)(1)	Collect and control run-off from the active portion of the CCR unit during the 24-hr, 25-yr storm.	Yes	Run-off from active portions of the LF is captured in lined ditches and diverted to Landfill Sediment Pond No. 1; these structures are designed based on hydraulic calculations to convey flow for at least the 25-yr, 24-hr storm event [2].	Yes	No changes were identified that may affect this requirement.
§257.81(b)	Handle run-off from the active portion of the CCR Unit in accordance with surface water requirements under the Clean Water Act (40 CFR §257.3-3)	Yes	Water within the Landfill Sediment Pond No. 1 is pumped to the Coal Pile Run-off Pond at ZIM. Water is then routed to NPDES-permitted outfall, which includes specific permit requirements related to §257.3-3 [2].	Yes	No changes were identified that may affect this requirement.

SECTION 1

INTRODUCTION AND BACKGROUND

This Periodic Operating Record Run-on and Run-off Control Plan Review Report (Report) was prepared by Geosyntec Consultants (Geosyntec) for Zimmer Power Company, LLC (ZPC) (plant operating entity). The review is required by the United States Environmental Protection Agency (USEPA) Coal Combustion Residual (CCR) Rule [1] to document compliance with the CCR Rule for the CCR Landfill (LF) [2] at the Zimmer Power Plant (ZIM) (also known as Zimmer Power Station).

The LF is located at 1781 US Route 52 in Moscow, Ohio 45153. The location of LF is illustrated in **Figure 1**, and a site plan showing the location of the LF is provided in **Figure 2**. LF is approximately 3.5 miles east of the ZIM in Washington Township.

Figure 1 – Site Location Map (aerial from Google Earth [3]**)**

Figure 2 – Site Plan (aerial from Google Earth [3]**)**

1.1 Landfill Description

In 2015, the constructed area of the CCR Landfill was approximately 208 acres with approximately 75 additional acres of undeveloped design capacity [4]. Approximately 90 acres of the CCR Landfill are closed with final, and approximately 85 acres are with transitional (intermediate) cover. The remaining 20 acres are active [5]. The initial run-on and run-off control system plan (§257.81) was completed by Hanson Professional Services, Inc. (Hanson) in 2016 and subsequently posted to ZPC's CCR Website [2].

1.2 Report Objectives

The objectives of this report are to:

- Compare site conditions from 2015/2016, when the initial run-on and run-off control system plan [2] was prepared, to current site conditions in 2020/2021, and evaluate if updates are required to the initial plan based on changes at the site.

- Independently review the initial run-on and run-off control plan [2] to determine if updates may be required based on technical considerations.

If updates are required, they will be performed and documented within this Report, unless noted otherwise.

SECTION 2

COMPARISON OF INITIAL AND PERIODIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the LF between the start of the initial CCR certification program in 2015 and 2016 (initial conditions) and subsequent collection of periodic certification site data in 2020 and 2021 (periodic conditions).

2.2 Review of Annual Inspection Reports

Annual onsite inspections of the LF were performed between 2015 and 2020 ([6], [7], [8], [9], [10]) and were certified by a licensed professional engineer in accordance with §257.84(b). Each inspection report stated that the following information, relative to the previous inspection:

- No changes in geometry were present at the perimeter of the LF,
- The LF on average received 200,000 CY of CCR every year,
- No appearances of actual or potential structural weakness of the CCR were observed,
- No existing conditions were occurring that were or had the potential to disrupt the operation or safety of the LF, and
- No other changes were observed which may have affected the ability or operation of the LF.

In summary, the reports did not indicate any significant changes to the LF between 2015 and 2020 except for filling.

2.3 Comparison of Initial and Periodic Surveys

The initial survey of the LF, conducted at the site by Duke Energy (Duke) in 2016 [4], was compared to the periodic survey of the LF, conducted by IngenAE, LLC (IngenAE) in 2020 [11], using AutoCAD Civil3D 2021 software. This comparison was intended to quantify changes in the volume of CCR placed within the LF, evaluate potential changes in surface stormwater drainage around the LF, and evaluate if CCR may have been placed outside of the grades of the LF used for the existing run-on, run-off control plan [2]. This comparison is presented in side-by-side views of each survey in **Drawing 1**, and a plan view isopach map denoting changes in ground surface elevation in **Drawing 2.** A summary of the changes in CCR volumes is provided in **Table 2**.

Table 2 – Comparison of Initial to Periodic Survey

Total Change in CCR Volume (CY)	950,461
Were there significant changes in exterior stormwater drainage?	Yes
Was CCR placed outside of the design grades of the LF?	No

The comparison indicated that approximately 950,461 CY of CCR was placed in the LF between 2015 to 2021. The comparison did not indicate that CCR had been placed outside the design grades of the LF.

2.4 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the CPRP were prepared from Google Earth [3] imagery dated October 2015 and were compared to periodic aerial photographs prepared from Google Earth [3] imagery dated October 2020 to visually evaluate if potential site changes (i.e., construction of new ditches, changes in site operations, or changes to other appurtenances) may have occurred between 2015 and 2020. A comparison of these aerial photographs is provided in **Drawing 3**, and the following changes were identified:

- Additional final cover was placed around the western side and eastern side of the active area of the LF. The limits of the active area appear to have been reduced.

2.5 Periodic Site Visit

A periodic site visit was conducted by Panos Andonyadis of Geosyntec on June 2, 2021. The site visit was intended to evaluate potential changes at the site since development of the initial run-on and run-off control plan [2] (i.e., modifications to stormwater drainage system(s), modifications to adjacent structures that may route run-on towards the landfill), in addition to performing visual observations of the LF and surrounding area to evaluate if potential maintenance to existing run-on and run-off control systems were required. The site visit is documented in a field observation form and photographic log provided in **Appendix A**. A summary of significant findings from the site visit is provided below:

- The vegetative cover for the final and partial closed areas appears to be in good condition with no signs of erosion.

- New ditches and run-off control structures internal to the LF appear to have been installed and are not shown on the initial run-on run-off plan [2].

2.6 Interview with Power Plant Staff

An interview with Sean Behm of the ZPC and Desiree Loveless of Vistra was conducted by Panos Andonyadis of Geosyntec on June 02, 2021 Mr. Behm was employed at ZIM between 2020 and

2021 and Ms. Loveless was employed with Vistra between 2015 and 2021 and were asked the following questions and provided the following answers regarding changes that that may have occurred at the LF since development of the initial run-on and run-off control plan [2] in 2015. A summary of the interview is provided below.

- Were any construction projects completed for the LF since 2015, and, if so, are design drawings and/or details available?
    - Additional final cover was placed and additional fill was placed within the landfill.
    - New run-off diversion ditches were installed.
- Have there been any changes to operational and/or maintenance programs for the LF since 2015?
    - No.
- Have any other changes and the LF occurred since 2015 that may substantially affect the existing run-on and run-off control plan [2]?
    - New run-off ditches installed internal to the landfill to direct flow to Landfill Sediment Pond No. 1 (Pond 1) and Landfill Sediment Pond No. 1A (Pond 1A).
- Have there been any instances of uncontrolled stormwater run-on to the LF since 2015?
    - No.
- Have there been any instances of uncontrolled stormwater run-off from the LF since 2015?
    - No.

SECTION 3

RUN-ON AND RUN-OFF CONTROL PLAN - §257.81

3.1 Overview of Initial RRCSP

The Initial Run-on and Run-off Control System Plan (Initial RRCSP) was prepared by Hanson in 2016 ([2], [12]), following the requirements of §257.81. The Initial RRCSP included the following information

- A description of the run-on control features designed for a 25-year, 24-hour storm event;
- A description of the run-off control features designed for a 25-year, 24-hour storm event;
- Detailed discussions of the calculations supporting the design of the control features; and
- Operation and maintenance procedures to be followed.

Per the Initial RRCSP report, stormwater control features were designed to manage run-on and run-off. Run-on control is provided with perimeter diversion berms that direct flow around the LF towards either South Creek or Indian Creek East Tributary ([2], [12]).

Run-off control is captured with lined ditches and diverted to Pond 1 or Pond 1A. Water from Pond 1A then flows to Pond 1. Water from Pond 1 is then pumped to the Coal Yard Runoff Pond ([2], [12]).

3.2 Review of Initial RRCSP

Geosyntec performed a review of the Initial RRCSP ([2], [12]), in terms of technical approach, input parameters, and assessment of the results. The review included the following tasks:

- Reviewing the rainfall depth and distribution for appropriateness;
- Performing a high-level review of the inputs to the hydrological modeling;
- Performing a high-level review of the design approach to the hydrological modeling;
- Reviewing the adequacy of stormwater control features versus the applicable requirements of the CCR Rule; and
- Perform a high-level review of the network of stormwater control features.

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

3.3 Summary of Site Changes Affecting Initial RRCSP

No changes between 2015 and 2021 were identified that would require updates to the Initial RRCSP. Updates to the Initial RRCSP are not recommended at this time.

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SECTION 4

CONCLUSIONS

The ZIM LF run-on and run-off controls system plan (§257.81) was evaluated relative to the USEPA CCR Rule periodic assessment requirements. Based on these evaluations, the referenced requirements are satisfied for run-on and run-off control system planning, and updates to the initial run-on and run-off control plan [2] are not required at this time.

SECTION 5

CERTIFICATION STATEMENT

CCR Unit: Zimmer Power Company LLC, Zimmer Power Plant, CCR Landfill

I, Panos Andonyadis, being a Registered Professional Engineer in good standing in the State of Ohio, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this 2021 USEPA CCR Rule Periodic Certification Report, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the periodic assessment of the run-on and run-off control system plan, dated December 2021, was conducted in accordance with the requirements of 40 CFR §257.81.

Printed Name

December 17, 2021

Date

Exp. 12/31/2023

SECTION 6

REFERENCES

[1] United States Environmental Protection Agency, 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, 2015.

[2] Hanson Professional Services, Inc., "CCR Rule Report: Run-on and Run-off Control System Plan, Zimmer Power Station CCR Landfill, Clermont County, Ohio," October 2016.

[3] Google, LLC, "Google Earth Pro," 2020.

[4] Duke Energy, "Landfill Annual Operational Report - Topographic Map for WM. H. Zimmer Generating Station," Moscow, OH, February 2016.

[5] Dynegy Zimmer, LLC, "Landfill Annual Operational Report - Topographic Map," March 2021.

[6] D. B. Hoots, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.84(b), CCR Landfill, Zimmer Power Station,* January 14, 2016.

[7] D. B. Hoots, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.84(b), CCR Landfill, Zimmer Power Station,* December 14, 2017.

[8] D. B. Hoots, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.84(b), CCR Landfill, Zimmer Power Station,* December 14, 2018.

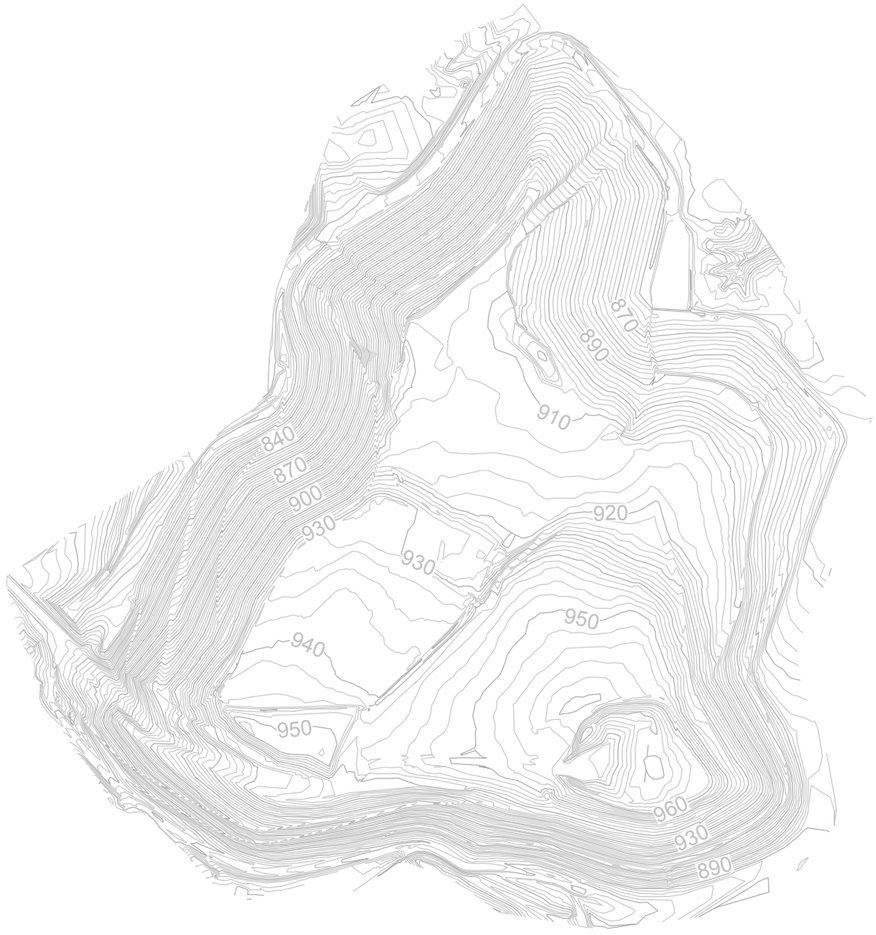
[9] D. B. Hoots, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.84(b), CCR Landfill, Zimmer Power Station,* January 12, 2017.

[10] D. B. Hoots, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.84(b), CCR Landfill, Zimmer Power Station,* November 24, 2020.

[11] Ellison Surveying, Inc. , "Topographic survey, Zimmer Power Plant Landfill, Washington Township, Clermont County, Ohio," Lebanon, OH, January 2021.

[12] Hanson, "Permit to Install Application, Design Calculations, Volume III Design Calculations, Wm. H. Zimmer Residual Waste Landfill, Clemont County, Washington Township, Ohio," August 1998.

DRAWINGS



INITIAL SURVEY
02-26-2016 TOPOGRAPHY

PERIODIC SURVEY
01-01-2021 TOPOGRAPHY

0 700
SCALE IN FEET

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM A DRAWING TITLED “LANDFILL ANNUAL OPERATIONAL REPORT - TOPOGRAPHIC MAP FOR WM. H. ZIMMER GENERATING STATION”, PREPARED BY DUKE ENERGY, DATED FEBRUARY 26, 2016.
2. THE PERIODIC SURVEY WAS TAKEN FROM A DRAWING TITLED “TOPOGRAPHIC SURVEY, ZIMMER POWER PLANT LANDFILL, WASHINGTON TOWNSHIP, CLERMONT COUNTY, OHIO”, PREPARED BY ELLISON SURVEYING, INC., DATED JANUARY 1, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN HORIZONTAL AND VERTICAL DATUMS SPECIFIC TO THE ZIMMER POWER PLANT CONTROL MONUMENTS.

INITIAL TO PERIODIC SURVEY COMPARISON
LANDFILL
ZIMMER POWER PLANT
MOSCOW, OHIO

Geosyntec consultants

GLP8027.10 | JULY 2021

DRAWING
1

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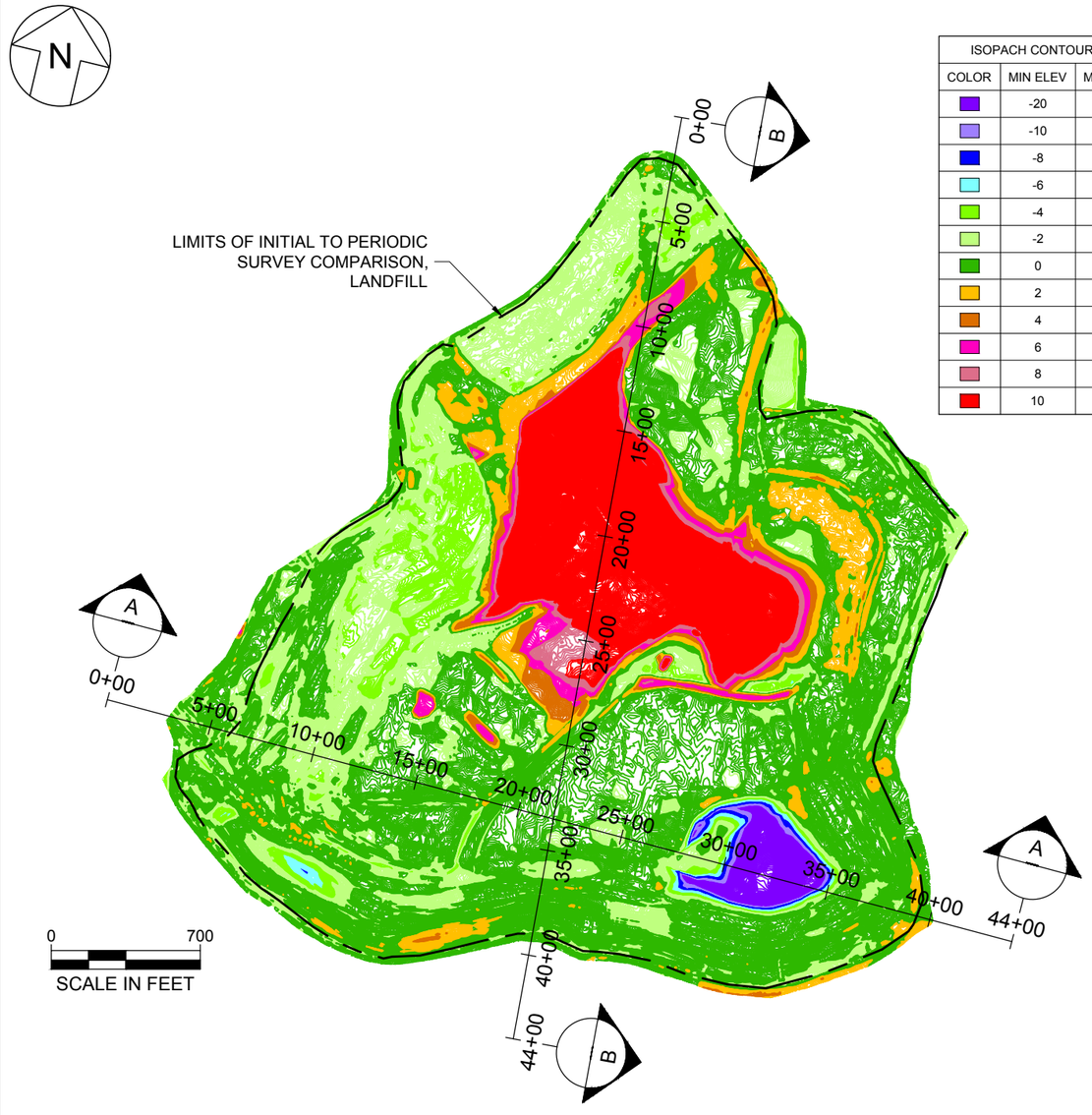
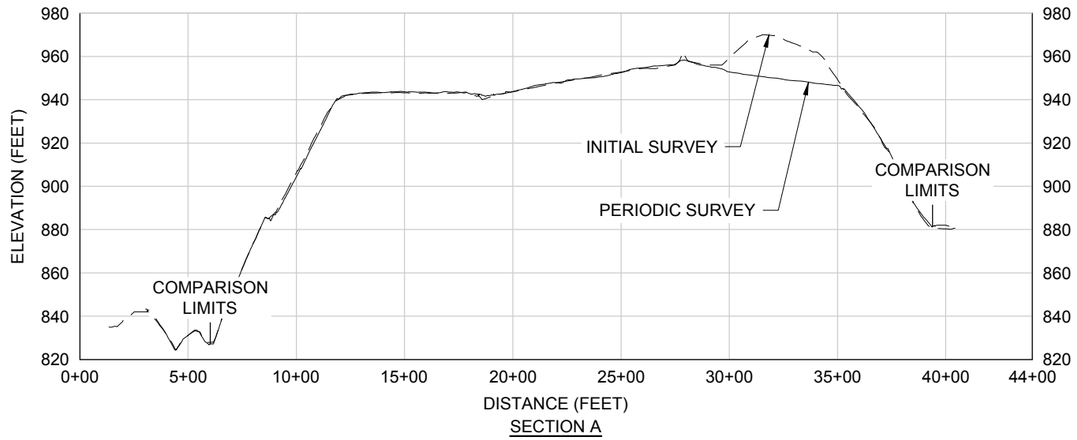
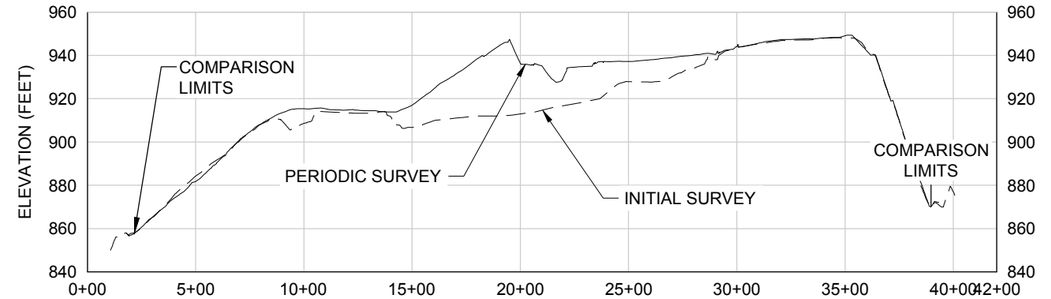


ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
	-20	-10
	-10	-8
	-8	-6
	-6	-4
	-4	-2
	-2	0
	0	2
	2	4
	4	6
	6	8
	8	10
	10	42



SECTION A



SECTION B

INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
	CUT	FILL	NET (CU. YD.)
LANDFILL	220,515	1,170,977	950,461 (FILL)

0 70
VERT: SCALE IN FEET

0 700
HORZ: SCALE IN FEET

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM A DRAWING TITLED “LANDFILL ANNUAL OPERATIONAL REPORT - TOPOGRAPHIC MAP FOR WM. H. ZIMMER GENERATING STATION”, PREPARED BY DUKE ENERGY, DATED FEBRUARY 26, 2016.
2. THE PERIODIC SURVEY WAS TAKEN FROM A DRAWING TITLED “TOPOGRAPHIC SURVEY, ZIMMER POWER PLANT LANDFILL, WASHINGTON TOWNSHIP, CLERMONT COUNTY, OHIO”, PREPARED BY ELLISON SURVEYING, INC., DATED JANUARY 1, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN HORIZONTAL AND VERTICAL DATUMS SPECIFIC TO THE ZIMMER POWER PLANT CONTROL MONUMENTS.

SURVEY COMPARISON ISOPACH
LANDFILL
ZIMMER POWER PLANT
MOSCOW, OHIO

Geosyntec consultants

GLP8027.10 | JULY 2021

DRAWING 2

P:\CADD\PROJECTS\VIVISTRA PONDS\ZIMMER\FIGURES\ISOPACH-3 - Last Saved by: KHanavec on 5/17/21

INITIAL AERIAL
10-2015 IMAGERY

PERIODIC AERIAL
10-2020 IMAGERY

N

0 700

SCALE IN FEET

NOTES:

1. THE INITIAL IMAGERY WAS TAKEN FROM GOOGLE EARTH, IMAGE DATED OCTOBER 2015, DOWNLOADED 12 JULY 2021.
2. THE PERIODIC IMAGERY WAS TAKEN FROM GOOGLE EARTH, IMAGE DATED OCTOBER 2020, DOWNLOADED 12 JULY 2021.

INITIAL TO PERIODIC AERIAL IMAGERY
COMPARISON
LANDFILL
ZIMMER POWER PLANT
MOSCOW, OHIO

Geosyntec consultants

DRAWING 3

GLP8027.10 | JULY 2021

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ATTACHMENTS

Attachment A

LF Site Visit Photolog

EXECUTIVE SUMMARY

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The review concluded that significant updates to the existing run-on and run-off control plan are required. The initial run-on and run-off control system plan developed in 2016 [2] was independently reviewed by Geosyntec. Field observations, interviews with plant staff, and evaluations were performed to evaluate conditions in 2021 relative to the 2016 initial run-on and run-off control plan [2]. The current conditions compared to the design calculations and assumptions supporting the run-on and run-ff control plan do not agree and indicate changes are necessary to the runoff control system plan and supporting documentation. **Table 1** provides a summary of the initial 2016 run-on and run-off control plan [2] and conditions observed in 2021.

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Zimmer Power Company, LLC **Project Number:** GLP8027

CCR Unit: CCR Landfill **Site:** Zimmer Power Plant

Photo: 01 **Date**: 06/02/2021 **Direction Facing:** W **Comments:** Photo of the southern slope final cover. Good vegetative cover and perimeter ditch is unobstructed.	
Photo: 02 **Date:** 06/02/2021 **Direction Facing:** E **Comments:** Eastern slope of the landfill with final cover. Good vegetative cover. Perimeter ditches consistent with the runon and runoff plan (drainage north to south).	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Zimmer Power Company, LLC **Project Number:** GLP8027

CCR Unit: CCR Landfill **Site:** Zimmer Power Plant

Photo: 03

Date: 06/02/2021

Direction Facing: E

Comments: Photo of a new articulated concrete lined channel being constructed along the north east side of the landfill and Pond 1A.

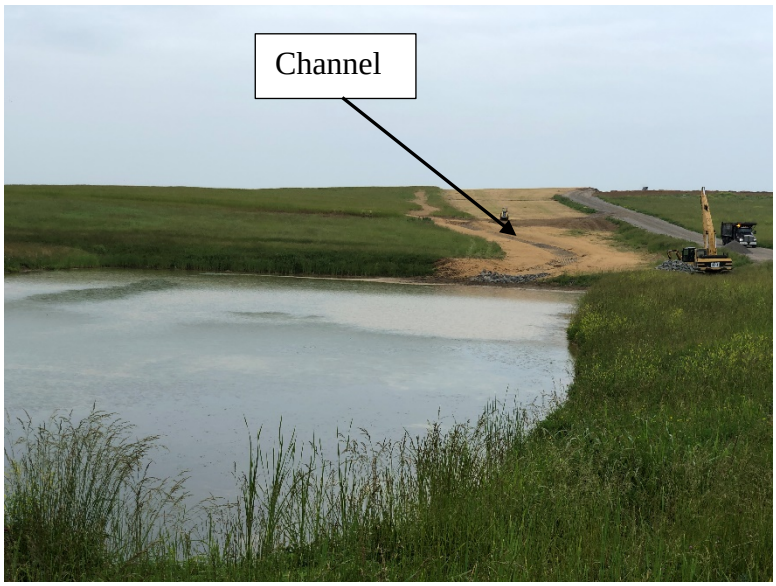

Photo: 04

Date: 06/02/2021

Direction Facing: SW

Comments: Photo of the northern tip. Cover is being reseeded to establish vegetation.

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Zimmer Power Company, LLC **Project Number:** GLP8027

CCR Unit: CCR Landfill **Site:** Zimmer Power Plant

Photo: 05 **Date:** 06/02/2021 **Direction Facing:** W **Comments:** Photo taken from the southern access road on the landfill. Riprap lined ditch along the southern side of the landfill. Ditch captures water from the active portion of the landfill and is a temporary feature.	

Photo: 06 **Date:** 06/02/2021 **Direction Facing:** NW **Comments:** Active landfill area. No signs of erosion or runoff. Water drains to a chimney drain near the center of the open cell.