Coal Combustion Residuals Landfill

Run-on and Run-off Control System Plan

Sibley Quarry Landfill

Prepared for
DTE Electric Company

October 2021

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Certifications

I hereby certify that I have examined the facility and, being familiar with the provisions of 40 CFR 257 Subpart D, attest that this Coal Combustion Residuals landfill run-on and run-off control system plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR § 257.81. I certify that the plan is adequate for this facility and that procedures for recordkeeping and reporting have been established.

Thomas J. Radue

Digitally signed by Thomas J. Radue
Date: 2021.10.15 10:31:48 -05'00'

Thomas J. Radue
Barr Engineering Co.

Dated this 15th day of October, 2021

Revision	Date	Summary of Revisions
0	October 17, 2016	Initial Plan (Prepared by AECOM)
1	October 15, 2021	Periodic Update

1 Introduction

DTE Electric Company (DTE Electric) owns and operates an existing coal combustion residuals (CCR) landfill located at the Sibley Quarry in Trenton, Michigan. The landfill is licensed under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Operating License Number 9602. The landfill receives a combination of CCR from nearby DTE Electric power plants and inert fill. CCR management is subject to Federal Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments per 40 CFR 257 Subpart D. This CCR run-on and run-off control system plan has been developed to satisfy the requirements described in 40 CFR § 257.81, run-on and run-off controls for CCR landfills, as they apply to DTE's Sibley Quarry Landfill.

Sibley Quarry is a former limestone quarry with a base elevation of approximately 300 feet above mean sea level (amsl), and crest elevation along the quarry high wall of approximately 600 feet amsl, though elevation and delineation of the high wall crest is variable as one progresses around the perimeter of the quarry. The site consists of 207 acres located at 801 Fort Street in the City of Trenton, Wayne County, Michigan. The site was operated as a limestone quarry beginning in the mid 1800's and was acquired by DTE Electric in 1951. The site has been operated by DTE Electric as a landfill since acquisition and is currently licensed as a Coal Ash Landfill under the provisions of Michigan Part 115, Solid Waste Management, of the Natural Resource and Environmental Protection Act (NREPA), 1994 Public Act ("PA") 451.

The current operating license designates approximately 92 acres as areas authorized to receive waste. Approximately 90 acres, along the perimeter of landfill to the north, west, and south, are at final grade and have received final cover prior to September 2, 1999, and therefore are closed. Remaining portions of the site do not contain waste.

The quarry receives seepage inflows from the quarry high wall, direct precipitation on the quarry footprint, and some surface run-on from the closed quarry perimeter which generally slopes inward toward the quarry. The quarry is continually dewatered using submersible pumps in an existing sump area located roughly 200 feet northwest of the chimney drain sump shown on Figure 1. In late Fall 2021 new submersible pumps will be placed in the chimney drain sump, which will become operational and replace the existing submersible pump system. The chimney drain dewatering system is designed to maintain quarry dewatering operations throughout future CCR filling operations within the quarry. The normal operating plan for the dewatering system is for water elevation within the chimney drain sump to move between a low elevation of 306 feet amsl and a high elevation of 309 feet amsl. Water discharge from the quarry is at a rate of approximately 1.5 million gallons per day. The water is treated and then discharged to the Detroit River in compliance with requirements of the National Pollutant Discharge Elimination System (NPDES) permit MI0001953.

2 Objectives

Per 40 CFR § 257.81, the owner of an existing CCR landfill is required to design, construct, operate, and maintain a run-on and run-off control system. To fulfill these objectives, the run-on and run-off control system plan must:

- provide documentation that the run-on control system adequately manages flow onto the active portion of the CCR unit during and following the peak discharge from a 25-year, 24-hour storm;
- provide documentation that the run-off control system adequately collects and controls at least the water volume from a 25-year, 24-hour storm;
- define recordkeeping requirements;
- define reporting requirements; and
- include a certification from a qualified professional engineer.

3 Run-on Control System

The purpose of a run-on control system is to prevent surface water from offsite areas flowing onto the active landfill area. The Sibley Quarry landfill is unique in that the active portion of the unit is self-contained below surrounding grade. The fill area is generally within the lower portions of the quarry, which are separated from perimeter land area by the quarry access ramps and quarry high wall. Run-on control from offsite areas is prevented by a ridge which surrounds the site, which has a minimum crest elevation of approximately 605 feet amsl and prevents surface water run-on for events up to and exceeding a 25-year, 24-hour storm. Figure 1 shows the perimeter ridge and the surrounding area, with arrows added to illustrate surface drainage outside of and away from the landfill.

4 Run-off Control System

The purpose of a run-off control system is to prevent water that has come into contact with CCR from draining offsite. Within the perimeter ridge that surrounds the active portions of the landfill, run-off flows towards the quarry chimney drain sump along varying slopes. Slope contours from a 2020 aerial survey are shown on Figure 1. These slopes include steep vertical drop-offs at the historic limits of the quarry mining development, channelized conveyances along access roads, and waste fill slopes that flow to the chimney drain sump.

Site hydrology and hydraulics were modeled using HydroCAD Version 10.00-25 and Soil Conservation Service (SCS) methods to estimate on-site effects of the design storm event. The design storm for the run-off control system is the 25-year, 24-hour storm event, which has a rainfall depth of 3.97 inches (reference: NOAA Atlas 14). Hydrology calculations are included in Appendix A.

The model shows that the sump water level rises to a peak level of approximately 315 feet amsl during the design storm, with the peak flow being contained within the quarry below surrounding grade (approximately 605 feet amsl). Following the design storm event, the quarry sump dewatering system has

capacity to return the system to the normal operating range by discharging via treatment and the permitted discharge.

5 Recordkeeping and Reporting

According to 40 CFR § 257.81(c)(2), DTE Electric will amend the written run-on and run-off control system plan whenever there is a change in conditions that would substantially affect the written plan. Additionally, DTE Electric will prepare periodic updates to the plan every five years (minimum).

DTE Electric will maintain a copy of the most recent version of the run-on and run-off control system plan in the facility's operating record in accordance with 40 CFR § 257.105, Recordkeeping Requirements, and the plan will be made publicly available on the DTE Electric CCR web site in compliance with 40 CFR § 257.107, Publicly Accessible Internet Site Requirements. Notification will be sent to State Director in compliance with 40 CFR § 257.106, Notification Requirements.

6 Conclusion

This run-on and run-off control system plan meets the requirements of 40 CFR § 257.81 by:

- providing documentation that the run-on control system adequately manages flow onto the active portion of the CCR unit during and following the peak discharge from a 25-year, 24-hour storm;
- providing documentation that the run-off control system adequately collects and controls at least the water volume from a 25-year, 24-hour storm;
- defining recordkeeping and reporting requirements; and
- being certified by a qualified professional engineer.

This plan will continue to be maintained and implemented by DTE Electric per the requirements outlined and cited herein.

7 References

NOAA Atlas 14 Point Precipitation Frequency Estimates: Michigan. National Weather Service. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=mi

Figures

Barr Footer: ArcGIS 10.8.1, 2021-10-04 14:12 File: I:\Projects\22\82\1120\Maps\Reports\Drainage\Figure1_SibleyQuarry_SiteDrainage.mxd User: MAC2

RAY AVE
KOESTER AVE
HAMANN AVE
HINTON AVE
QUARRY RD
SIBLEY RD
NEW YORK AVE
WASHINGTON AVE
CLEVELAND AVE
PARK PL
CHICAGO AVE
FORT ST
M 85
W JEFFERSON AVE
KING RD

Trenton, MI
Wayne County

600 ft.
550 ft.
500 ft.
450 ft.
400 ft.
350 ft.
300 ft.

Chimney Drain Sump
Approximate Dewatering Pipeline
Conveyor Area
Site Infrastructure
Upper Treatment Ponds
Settling Ponds
Conveyance Channel
NPDES Discharge Pump House

BARR

Approximate Parcel Boundary
Approximate Permitted Active Landfill Area
Approximate Landfill Area That Received Clay Cover
Elevation Contours
Index (50')
Intermediate (10')
Approximate Drainage Divide
Approximate Boundary of Permitted Active Landfilling Area
Conveyance Channel
Approximate Dewatering Pipeline
Approximate Flow Arrow

N
0 400 800
Feet

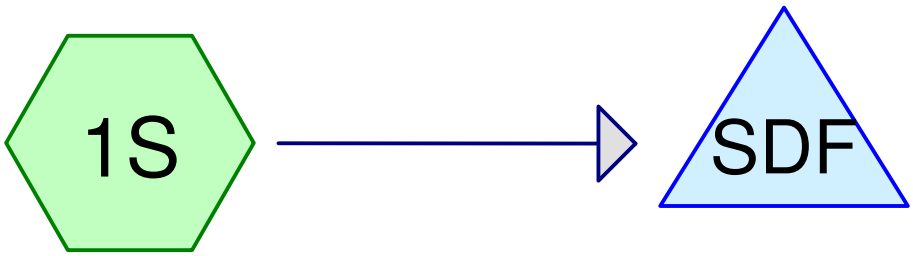
Notes:
- Parcel data shown on this figure from 2015 and is provided by Wayne County for reference only.
- Topographic data shown on this figure from March 16, 2020 drone flight by PEA INC.
- Aerial Image: FSA NAIP 2020

SITE DRAINAGE
Sibley Quarry
DTE Energy
Trenton, Michigan

FIGURE 1

Appendix A

HydroCAD Report



Quarry Contributing Area

Quarry

Subcat Reach Pond Link

Routing Diagram for DTE Sibley RORO HH Model 6-3-21
Prepared by Barr Engineering Co., Printed 6/6/2021

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
97.700	82	CCR covered area (1S)
54.380	71	Meadow, non-grazed, HSG C (1S)
152.080	**78**	**TOTAL AREA**

Summary for Subcatchment 1S: Quarry Contributing Area

Updated from 2016 model based on updated topography and 2020 construction new impervious surface.

Runoff by SCS TR-20 using MSE 24 hour rainfall.

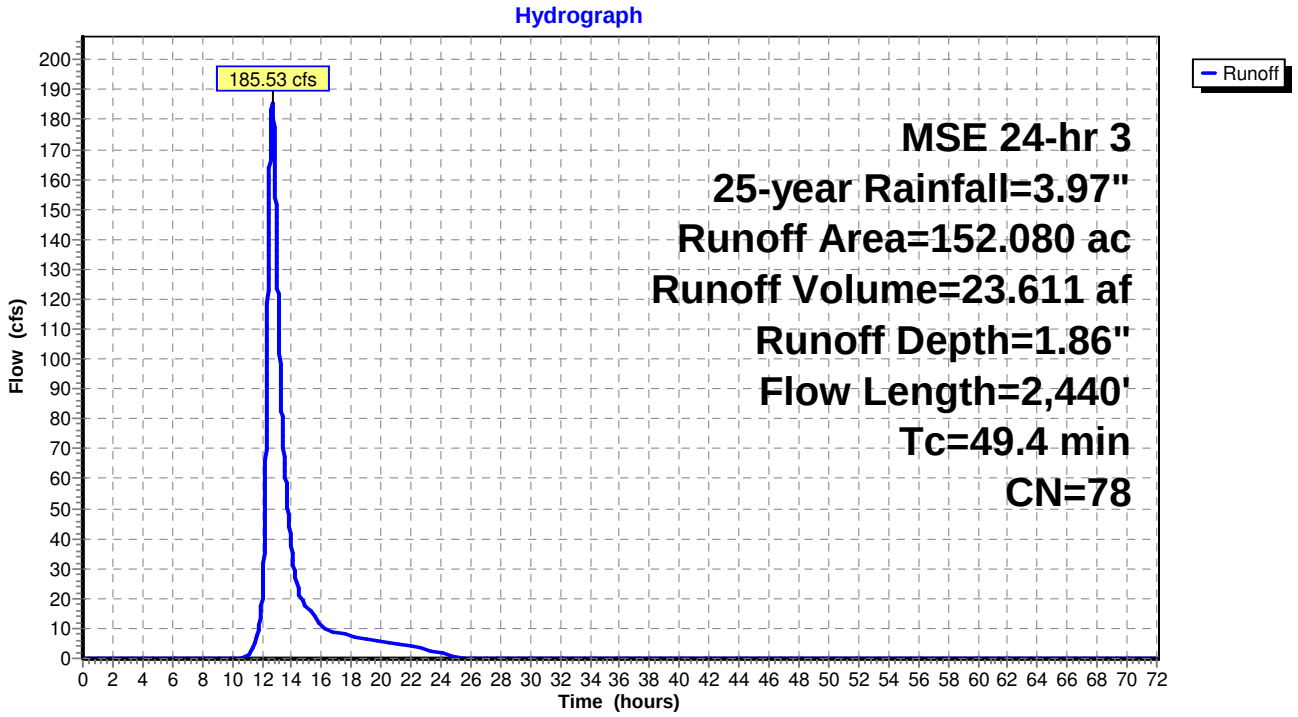
Runoff = 185.53 cfs @ 12.68 hrs, Volume= 23.611 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 25-year Rainfall=3.97"

	Area (ac)	CN	Description
*	97.700	82	CCR covered area
	54.380	71	Meadow, non-grazed, HSG C
	152.080	78	Weighted Average
	152.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	100	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.34"
24.5	920	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	80	0.0760	1.93		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.5	340	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	1,000	0.2800	8.52		**Shallow Concentrated Flow, rock ledges into sump area** Unpaved Kv= 16.1 fps
49.4	2,440	Total			

Subcatchment 1S: Quarry Contributing Area



Summary for Pond SDF: Quarry

Reflects 2020 chimney drain pumping system.

Percent voids were adjusted to 40% for elevations below 315 based on 2020 sump area drainage layer construction.

Inflow Area = 152.080 ac, 0.00% Impervious, Inflow Depth > 2.95" for 25-year event
Inflow = 187.85 cfs @ 12.68 hrs, Volume= 37.418 af, Incl. 2.32 cfs Base Flow
Outflow = 5.25 cfs @ 23.00 hrs, Volume= 30.986 af, Atten= 97%, Lag= 618.8 min
Primary = 5.25 cfs @ 23.00 hrs, Volume= 30.986 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 306.00' Surf.Area= 0 sf Storage= 176,396 cf
Peak Elev= 315.07' @ 23.00 hrs Surf.Area= 0 sf Storage= 955,834 cf (779,438 cf above start)

Plug-Flow detention time= 1,642.9 min calculated for 26.936 af (72% of inflow)
Center-of-Mass det. time= 830.8 min (2,164.9 - 1,334.1)

Volume	Invert	Avail.Storage	Storage Description
#1	295.80'	12,932,055 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
295.80	0
296.00	76
297.00	983
298.00	3,607
299.00	8,316
300.00	15,196
301.00	25,250
302.00	40,327
303.00	62,143
304.00	91,897
305.00	130,928
306.00	176,396
307.00	226,519
308.00	280,800
309.00	340,178
310.00	406,912
311.00	483,073
312.00	566,244
313.00	655,517
314.00	751,324
315.00	854,053
316.00	2,410,614
317.00	2,704,914
318.00	3,015,981
319.00	3,343,356
320.00	3,686,229
321.00	4,042,629
322.00	4,412,151
323.00	4,794,741
324.00	5,188,833
325.00	5,592,888
326.00	6,006,420
327.00	6,429,213
328.00	6,865,371
329.00	7,316,487
330.00	7,781,859
331.00	8,258,571
332.00	8,745,381
333.00	9,241,587
334.00	9,745,488
335.00	10,256,841
336.00	10,776,159
337.00	11,304,603
338.00	11,840,796
339.00	12,383,388
340.00	12,932,055

Device	Routing	Invert	Outlet Devices
#1	Primary	306.00'	**Chimney Drain Pump Curve Data** Discharges@614.00' Turns Off<302.18'

Flow (gpm)= 180.0 312.0 333.0 404.0 430.0 487.0 527.0 609.0 683.0 720.0 750.0 786.0 807.0 863.0 875.0 909.0 949.0 958.0 998.0 1,030.0 1,038.0 1,077.0 1,106.0 1,112.0 1,144.0 1,146.0 1,175.0 1,203.0 1,231.0 1,255.0 1,274.0 1,280.0
Head (feet)= 460.00 450.00 448.00 443.00 440.00 434.00 430.00 420.00 410.00 404.00 400.00 394.00 390.00 380.00 377.00 370.00 361.00 360.00 350.00 342.00 340.00 330.00 321.00 320.00 310.00 309.00 300.00 290.00 280.00 270.00 263.00 260.00

#2 Primary 306.00' **Chimney Drain Pump Curve Data**
Discharges@614.00' Turns Off<302.18'
Flow (gpm)= 180.0 312.0 333.0 404.0 430.0 487.0 527.0 609.0 683.0 720.0 750.0 786.0 807.0 863.0 875.0 909.0 949.0 958.0 998.0 1,030.0 1,038.0 1,077.0 1,106.0 1,112.0 1,144.0 1,146.0 1,175.0 1,203.0 1,231.0 1,255.0 1,274.0 1,280.0
Head (feet)= 460.00 450.00 448.00 443.00 440.00 434.00 430.00 420.00 410.00 404.00 400.00 394.00 390.00 380.00 377.00 370.00 361.00 360.00 350.00 342.00 340.00 330.00 321.00 320.00 310.00 309.00 300.00 290.00 280.00 270.00 263.00 260.00

Primary OutFlow Max=5.25 cfs @ 23.00 hrs HW=315.07' (Free Discharge)
└─**1=Chimney Drain Pump Curve Data** (Pump Controls 2.62 cfs)
└─**2=Chimney Drain Pump Curve Data** (Pump Controls 2.62 cfs)

Pond SDF: Quarry