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**2019 Annual Groundwater Monitoring and Corrective Action Report**

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**January 31, 2020**

# **2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT**

## **DUCK CREEK LANDFILL, DUCK CREEK POWER STATION**



Bright ideas. Sustainable change.

**2019 ANNUAL GROUNDWATER MONITORING AND  
CORRECTIVE ACTION REPORT  
DUCK CREEK LANDFILL, DUCK CREEK POWER STATION**

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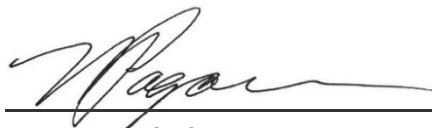
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## CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>3</b>
<b>1. Introduction</b>	<b>4</b>
<b>2. Monitoring and Corrective Action Program Status</b>	<b>5</b>
<b>3. Key Actions Completed in 2019</b>	<b>6</b>
<b>4. Problems Encountered and Actions to Resolve the Problems</b>	<b>8</b>
<b>5. Key Activities Planned for 2020</b>	<b>9</b>
<b>6. References</b>	<b>10</b>

## TABLES

Table A	2018–2019 Detection Monitoring Program Summary (in text)
Table 1	2019 Analytical Results – Groundwater Elevation and Appendix III Parameters
Table 2	Statistical Background Values

## FIGURES

Figure 1	Monitoring Well Location Map
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## APPENDICES

Appendix A	Alternate Source Demonstrations
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Duck Creek

## ACRONYMS AND ABBREVIATIONS

ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
LF	Landfill
SAP	Sampling and Analysis Plan
SSI	Statistically Significant Increase

Duck Creek

## EXECUTIVE SUMMARY

This report has been prepared to provide the information required by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.90(e) for the Duck Creek Landfill (LF) located at Duck Creek Power Station near Canton, Illinois.

Groundwater is being monitored at Duck Creek LF in accordance with the Detection Monitoring Program requirements specified in 40 C.F.R. § 257.94.

No changes were made to the monitoring system in 2019 (no wells were installed or decommissioned).

The following Statistically Significant Increases (SSIs) of 40 C.F.R. Part 257 Appendix III parameter concentrations greater than background concentrations were determined during one or more sampling events in 2019:

- Calcium at well G06S

Alternate Source Demonstrations (ASDs) were completed for the SSIs referenced above and Duck Creek LF remains in the Detection Monitoring Program.

Duck Creek

## 1. INTRODUCTION

This report has been prepared by Ramboll on behalf of Illinois Power Resources Generating, LLC, to provide the information required by 40 C.F.R. § 257.90(e) for Duck Creek LF located at Duck Creek Power Station near Canton, Illinois.

In accordance with 40 C.F.R. § 257.90(e), the owner or operator of a Coal Combustion Residuals (CCR) unit must prepare an Annual Groundwater Monitoring and Corrective Action Report for the preceding calendar year that documents the status of the Groundwater Monitoring and Corrective Action Program for the CCR unit, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and projects key activities for the upcoming year. At a minimum, the Annual Report must contain the following information, to the extent available:

1. A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit.
2. Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.
3. In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the Detection Monitoring or Assessment Monitoring Programs.
4. A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from Detection Monitoring to Assessment Monitoring in addition to identifying the constituent(s) detected at a Statistically Significant Increase relative to background levels).
5. Other information required to be included in the Annual Report as specified in §§ 257.90 through 257.98.

This report provides the required information for Duck Creek LF for calendar year 2019.

## **2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS**

No changes have occurred to the monitoring program status in calendar year 2019, and Duck Creek LF remains in the Detection Monitoring Program in accordance with 40 C.F.R. § 257.94.

Duck Creek

### 3. KEY ACTIONS COMPLETED IN 2019

The Detection Monitoring Program is summarized in Table A. The groundwater monitoring system, including the CCR unit and all background and downgradient monitoring wells, is presented in Figure 1. No changes were made to the monitoring system in 2019 (no wells were installed or decommissioned). In general, one groundwater sample was collected from each background and downgradient well during each monitoring event.<sup>1</sup> All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (SAP) (NRT/OBG, 2017a). All monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 (as applicable) in 2019 are presented in Table 1. Analytical data were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017b) to determine any SSIs of Appendix III parameters relative to background concentrations.

Statistical background values are provided in Table 2.

Analytical results for the June, July, and October 2018 sampling events were provided in the 2018 Annual Groundwater Monitoring and Corrective Action Report.

Potential alternate sources were evaluated as outlined in the 40 C.F.R. § 257.94(e)(2). ASDs were completed and certified by a qualified professional engineer. The dates the ASDs were completed are provided in Table A. The ASDs completed in 2019 are included in Appendix A.

<sup>1</sup> Sampling was limited to G09S during the April 2019 sampling event to confirm Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.



**Table A – 2018–2019 Detection Monitoring Program Summary**

Sampling Date	Analytical Data Receipt Date	Parameters Collected	SSI(s)	SSI(s) Determination Date	ASD Completion Date
June 6-7, 2018	July 9, 2018	Appendix III	Calcium (G06S)	October 7, 2018	January 7, 2019
July 6, 2018	July 9, 2018	Appendix III Greater than Background <sup>1</sup>	NA	NA	NA
October 4-5, 2018	January 16, 2019	Appendix III	none	April 15, 2019	NA
February 6-8, 2019	April 15, 2019	Appendix III	none	July 15, 2019	NA
April 5-8, 2019	April 15, 2019	Appendix III Greater than Background <sup>1</sup>	NA	NA	NA
July 8-16, 2019	October 28, 2019	Appendix III	TBD	TBD	TBD

**Notes:**

NA: Not Applicable

TBD: To Be Determined

1. To confirm SSIs, as allowed by the Statistical Analysis Plan, groundwater samples were collected and analyzed for Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event.

## **4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS**

No problems were encountered with the Groundwater Monitoring Program during 2019. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

Duck Creek

## 5. KEY ACTIVITIES PLANNED FOR 2020

The following key activities are planned for 2020:

- Continuation of the Detection Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2020.
- Complete evaluation of analytical data from the downgradient wells, using background data to determine whether an SSI of Appendix III parameters detected at concentrations greater than background concentrations has occurred.
- If an SSI is identified, potential alternate sources (i.e., a source other than the CCR unit caused the SSI or that that SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality) will be evaluated.
  - If an alternate source is demonstrated to be the cause of the SSI, a written demonstration will be completed within 90 days of SSI determination and included in the 2020 Annual Groundwater Monitoring and Corrective Action Report.
  - If an alternate source(s) is not identified to be the cause of the SSI, the applicable requirements of 40 C.F.R. §§ 257.94 through 257.98 as may apply in 2020 (e.g., Assessment Monitoring) will be met, including associated recordkeeping/notifications required by 40 C.F.R. §§ 257.105 through 257.108.

## 6. REFERENCES

Natural Resource Technology, an OBG Company (NRT/OBG), 2017a. Sampling and Analysis Plan, Duck Creek Landfill, Duck Creek Power Station, Canton, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b. Statistical Analysis Plan, Duck Creek Power Station, Edwards Power Station, Illinois Power Resources Generating, LLC, October 17, 2017.

Duck Creek

## TABLES

Duck Creek

**TABLE 1.**  
**2019 ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS**  
**2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT**  
DUCK CREEK POWER STATION  
UNIT ID 204 - DUCK CREEK LANDFILL  
CANTON, ILLINOIS  
DETECTION MONITORING PROGRAM

Well Identification Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date & Time Sampled	Depth to Groundwater (ft) <sup>1</sup>	Groundwater Elevation (ft NAVD88)	40 C.F.R. Part 257 Appendix III						
						Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (S.U.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
						6020A <sup>2</sup>	6020A <sup>2</sup>	9251 <sup>2</sup>	9214 <sup>2</sup>	SM 4500 H+B <sup>2</sup>	9036 <sup>2</sup>	SM 2540C <sup>2</sup>
<b>Background / Upgradient Monitoring Wells</b>												
G02S	40.512880	-89.991105	2/6/2019 12:37	8.74	613.19	0.048	99	2.5	0.379	7.0	<1.0	400
			4/8/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
			7/8/2019 13:04	10.87	611.06	0.050	96	<5.0	0.394	7.0	<1.0	420
			11/12/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
G04S	40.519166	-89.991056	2/6/2019 13:40	11.98	616.89	0.017	150	17	0.268	7.0	250	720
			4/5/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
			7/8/2019 14:10	16.43	612.44	0.021	150	16	0.316	7.0	260	760
			11/12/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Downgradient Monitoring Wells</b>												
G06S	40.521790	-89.988798	2/8/2019 9:52	21.15	606.54	0.023	110	7.5	0.358	6.9	41	370
			4/5/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
			7/9/2019 11:16	19.37	608.32	0.062	190	12	0.389	6.8	48	760
			11/12/2019 14:40	22.10	605.59	NA	140	NA	NA	6.8	NA	NA
G09S	40.522511	-89.986754	2/8/2019 10:40	19.98	604.95	0.018	98	21	0.295	7.2	54	420
			4/5/2019 9:06	16.75	608.18	NA	NA	19	NA	7.0	NA	NA
			7/9/2019 13:28	18.28	606.65	0.03	120	20	0.415	7.1	57	670
			11/12/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
G12S	40.520934	-89.986415	2/8/2019 11:38	21.64	608.33	0.016	84	17	0.316	7.0	91	410
			4/5/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
			7/9/2019 14:27	15.51	614.46	0.020	100	16	0.371	7.1	78	480
			11/12/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
G15S	40.518546	-89.986626	2/8/2019 12:57	24.99	609.23	0.012	90	15	0.310	7.1	38	400
			4/5/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
			7/16/2019 13:54	23.75	610.47	0.025	90	17	0.328	7.1	45	480
			11/12/2019 NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[O: RAB 12/20/19, C: KLT 12/23/19, U: RAB 1/14/2020, C: KLT 1/14/20]

**Notes:**

40 C.F.R. = Title 40 of the Code of Federal Regulations

ft = foot/feet

mg/L = milligrams per liter

NA = Not Analyzed

NAVD88 = North American Vertical Datum of 1988

NS = Not Sampled

S.U. = Standard Units

< = concentration is less than the concentration shown, which corresponds to the reporting limit for the method; estimated concentrations below the reporting limit and associated qualifiers are not provided since not utilized in statistics to determine Statistically Significant Increases (SSIs) over background.

<sup>1</sup>All depths to groundwater were measured on the first day of the sampling event.

<sup>2</sup>4-digit numbers represent SW-846 analytical methods.

**TABLE 2.**  
**STATISTICAL BACKGROUND VALUES**  
**2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT**  
DUCK CREEK POWER STATION  
UNIT ID 204 - DUCK CREEK LANDFILL  
CANTON, ILLINOIS  
DETECTION MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
<b>40 C.F.R. Part 257 Appendix III</b>	
Boron (mg/L)	0.13
Calcium (mg/L)	165
Chloride (mg/L)	20
Fluoride (mg/L)	0.527
pH (S.U.)	6.5 / 7.3
Sulfate (mg/L)	330
Total Dissolved Solids (mg/L)	835

[O: RAB 12/20/19, C: KLT 12/23/19]

**Notes:**

40 C.F.R. = Title 40 of the Code of Federal Regulations

mg/L = milligrams per liter

S.U. = Standard Units

UPL = Upper Prediction Limit




Duck Creek

## FIGURES

Duck Creek





-  UPGRADIENT MONITORING WELL LOCATION
-  DOWNGRADIENT MONITORING WELL LOCATION
-  CCR MONITORED UNIT

**MONITORING WELL LOCATION MAP  
DUCK CREEK LANDFILL  
UNIT ID:204**

**2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT**  
VISTRA CCR RULE GROUNDWATER MONITORING  
DUCK CREEK POWER STATION  
CANTON, ILLINOIS

**FIGURE 1**

O'BRIEN & GERE ENGINEERS, INC.  
A RAMBOLL COMPANY



**APPENDIX A**  
**ALTERNATE SOURCE DEMONSTRATIONS**

Duck Creek

**40 C.F.R. § 257.94(e)(2): ALTERNATE SOURCE DEMONSTRATION  
DUCK CREEK LANDFILL  
JANUARY 7, 2019**

Duck Creek

January 7, 2019

Title 40 of the Code of Federal Regulations (C.F.R.) § 257.94(e)(2) allows the owner or operator of a coal combustion residuals (CCR) unit 90 days from the date of determination of statistically significant increases (SSIs) over background concentrations of groundwater constituents listed in Appendix III of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSI(s), or that the SSI(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (“alternate source demonstration”).

This alternate source demonstration has been prepared on behalf of Illinois Power Resources Generating, LLC, by O’Brien & Gere Engineers, Inc., part of Ramboll, to provide pertinent information pursuant to 40 C.F.R. § 257.94(e)(2) for the Duck Creek Landfill located near Canton, Illinois.

The second semi-annual detection monitoring samples (Detection Monitoring Round 2) were collected on June 6-7, 2018. In accordance with 40 C.F.R. Section 257.93(h)(2), statistical analysis of the data to identify SSIs of 40 C.F.R. Part 257 Appendix III parameters over background concentrations was completed within 90 days of receipt of the analytical data (July 9, 2018). The statistical determination identified the following SSIs at downgradient monitoring wells:

- Calcium at well G06S

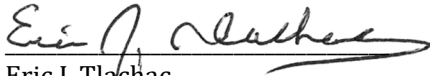
The third semi-annual detection monitoring samples (Detection Monitoring Round 3) were collected on October 4, 2018. Analytical data from these samples indicated that calcium concentrations at G06S were below background concentrations. The Statistical Analysis Plan<sup>1</sup> allows for resampling to confirm SSIs within 90 days of receipt of laboratory data. Because the Detection Monitoring Round 3 (D3) sampling event was completed within the 90-day time-frame for resampling allowed by the Statistical Analysis Plan, the calcium SSI observed at G06S during the Detection Monitoring Round 2 (D2) sampling event was not confirmed by resampling. This demonstrates that incomplete statistical evaluation was the cause of the calcium SSI observed at the Duck Creek Landfill during the D2 sampling event. Therefore, an assessment monitoring program is not required, and the Duck Creek Landfill will remain in detection monitoring.

This alternate source demonstration (ASD) was completed within 90 days of determination of the SSIs (October 8, 2018), as required by 40 C.F.R. § 257.94(e)(2).

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<sup>1</sup> Natural Resource Technology, an OBG Company, 2017, Statistical Analysis Plan, Duck Creek Power Station, Edwards Power Station, Illinois Power Resources Generating, LLC, October 17, 2017.

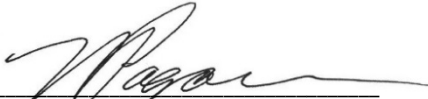
I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.



Eric J. Tlachac  
Qualified Professional Engineer  
062-063091  
Illinois  
O'Brien & Gere Engineers, Inc., part of Ramboll  
Date: January 7, 2019



I, Nicole M. Pagano, a professional geologist in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.



Nicole M. Pagano  
Professional Geologist  
196-000750  
O'Brien & Gere Engineers, Inc., part of Ramboll  
Date: January 7, 2019

