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Mr. Mike Smith, P.E.
Iowa Department of Natural Resources
Land Quality Bureau
Wallace State Office Building
502 East 9th Street
Des Moines, Iowa 50319-0034

Subject: 2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Dear Mike: ,

SCS Engineers, on behalf of the City of Hawarden, has completed the Annual Water Quality Report for the closed City of Hawarden C&D Landfill for the year 2023. Our services were performed in general accordance with Iowa Administrative Code (IAC) 567-103, the closure permit, and applicable amendments. Please find enclosed the 2023 Annual Water Quality Report and the 2023 Landfill Gas Annual Report for the City of Hawarden C&D Landfill.

If you have any questions regarding these reports, please contact Nathan Ohrt at (319) 331-9613.

Sincerely,



Nathan Ohrt
Senior Project Professional
SCS Engineers



Timothy C. Buelow, P.E.
Project Director
SCS Engineers

NPO/TCB

Copies: Mr. Travis Waterman, Public Works Director – City of Hawarden



2023 ANNUAL WATER QUALITY REPORT

FOR

CITY OF HAWARDEN C&D LANDFILL
(CLOSED)

HAWARDEN, IA

SOLID WASTE PERMIT NUMBER: 84-SDP-02-75C

SUBMITTAL DATE: NOVEMBER 2023

PREPARED FOR:

CITY OF HAWARDEN

PREPARED BY:

SCS ENGINEERS

CertificationPrepared by: Nathan OhrtDate: 10/28/2023

Typed: Nathan Ohrt

Reviewed by: Timothy C. BuelowDate: 11/28/2023

Typed: Timothy C. Buelow, P.E.

Certification page (114.26(8)"d")

An annual report summarizing the effect of the facility on groundwater and surface water quality shall be submitted to the department each year. The summary is to be prepared by an engineer registered in the state of Iowa.

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. <u>Timothy C. Buelow</u> Date: <u>11/28/23</u> Timothy C. Buelow, P.E. License No. 14445 My license renewal date is December 31, 2023. Pages or sheets covered by this seal: <u>All except Appendix B-1.</u>
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Executive Summary

ES.1 Period of Report Coverage

SCS Engineers (SCS) on behalf of the City of Hawarden, has completed the required groundwater sampling of the closed City of Hawarden Construction and Demolition (C&D) Landfill (Landfill). The purpose of this Annual Water Quality Report (AWQR) is to document and statistically evaluate the groundwater sampling results since the 2022 AWQR. This report was prepared in general accordance with the requirements of Iowa Administrative Code (IAC) 567-103.2(4), the closure permit requirements, and applicable permit amendments. This report summarizes the 2023 groundwater monitoring program at the Landfill and provides analysis of the data collected.

ES.2 Report Priority

The following summarizes report priorities associated with groundwater compliance at the closed Landfill:

- Department review urgency: None.
- Department review impact on rules schedule: None.
- Actions or activities on hold pending Department review or comment: None.
- Actions and/or permit amendments needed: None.

ES.3 Site Status and Applicable Rules

- Landfill Status: Closed.
- Types of waste accepted: Previously C&D waste.
- Applicable IAC rules: 567-103.2(2), 103.2(3), 103.2(4), 103.2(14), 110.9(2)

ES.4 Comments

Due at least in part to the unusually dry weather conditions during this reporting period, monitoring wells MW-1R, MW-3R, and MW-4R did not provide sufficient water to obtain a sample during the April 2023 sampling event and monitoring wells MW-1R, MW-2R, and MW-3R did not provide sufficient water to obtain a sample during the October 2023 sampling event.

Elevated inorganic concentrations measured in monitoring wells MW-2R, MW-4R, and MW-5R are likely at least in part due to elevated total suspended solids (TSS) concentrations. As approved in email correspondence dated February 16, 2023 (Doc #105856), these monitoring wells were developed by SCS in March 2023. The TSS concentrations measured in October 2023 were at the low end of the historical range for monitoring wells MW-2R and MW-5R, but the concentration was highly elevated in monitoring well MW-4R, over ten times higher than the previous maximum concentration in the six available TSS concentrations.

Due to the significantly elevated concentration of TSS in monitoring well MW-4R during the October 2023 sampling event (3,470 mg/L), several metals were measured at historical maximums and statistically significant increases (SSIs) above background. However, only cobalt and lead were measured above their respective GWPSs; therefore, the data was retained and reported herein. If elevated TSS concentrations are observed again during the 2024 semi-annual sampling events, redevelopment of the monitoring wells may be appropriate.

Monitoring well MW-8 will be sampled for cobalt and TSS during the 2024 semi-annual sampling events to delineate the cobalt impact measured at monitoring well MW-3/MW-3R.

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Section 1.0

Acronyms/Abbreviations

AL = Action Level

CCV = Continuing Calibration Verification

CL = Control Limit - Mean plus Two Standard Deviations

DNR = Iowa Department of Natural Resources

DO = Dissolved Oxygen

GWPS = Groundwater Protection Standard

GWQAP = Groundwater Quality Assessment Plan

HMSP = Hydrological Monitoring System Plan

LEL = Lower Explosive Limit

LCL = Lower Confidence Limit

LCS = Laboratory Control Sample

LN = Lognormal

M+/-2SD = Mean Plus/Minus Two Standard Deviations

MCL = EPA Maximum Contaminant Level

MDL = Method Detection Limit

N = Normal

NC = No Change

NM = Not Measured

ORP = Oxidation-Reduction Potential

PL = Prediction Limit

QA = Quality Assurance

QC = Quality Control

RL = Reporting Limit

SWS = DNR Statewide Standard for a Protected Groundwater Source

SSI = Statistically Significant Increase Above Background

SSL = Statistically Significant Level Above Groundwater Protection Standard

SSS = Site-Specific Standard (Site-Specific GWPS)

TSS = Total Suspended Solids

UCL = Upper Confidence Limit

VOC = Volatile Organic Compound

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Section 2.0

Site Background

2.1 Site Location

The Landfill property is depicted on Figure 1 (Approved Monitoring Network). The Landfill is located in the Northeast Quarter of the Northeast Quarter of Section 23, Township 95 North, Range 48 West, in Sioux County, Iowa.

2.2 Facility

The Landfill was agricultural farmland prior to use as a landfill site in 1975. The northern portion of the Landfill property is currently used for cropland. The Landfill was developed as a sanitary landfill in 1975 and served the City of Hawarden as a sanitary landfill until it consolidated sanitary landfill activities with the Northwest Iowa Area Solid Waste Agency in 1979. All city household and commercial solid waste collections were then transferred to the Northwest Iowa Area Sanitary Landfill near Sheldon, Iowa by direct collection vehicle transfer. The City of Hawarden Landfill served as a C&D disposal site serving only the City of Hawarden from 1979 until 1988. The Landfill actively received waste until no later than March 1993 when a closure permit was approved by the DNR.

2.3 Geology and Hydrogeology of the Site

The 2010 Water Quality Testing Report for the City of Hawarden Closed Construction and Demolition Landfill prepared by Five States Engineering, provided the following geological description:

The Closed Hawarden Construction and Demolition site is located in the northern area of the loess hills region of Iowa. The site varies in elevation between 1285 near monitoring well 7 and 1345 at the high point of fill at approximately 2+00 N, 8+50E. No solid waste is landfilled below an elevation of 1310. There is no runoff to the fill area of the site from adjacent properties or adjacent areas of the site property. The site is located at the high point of the surrounding terrain. The site is well graded to promote surface runoff from the final cover of the fill areas.

The geology of the site is typical for the loess hills region. Aeolian sand and loess soils overlay underlying glacial clay till. The sand and loess soils are relatively high permeability soils as compared to the very low permeability glacial clay till. The site soils investigations conducted in 1978 and 1991 identified the locations of various soils and the resultant surface of the glacial clay till soil. The principal discharge of groundwater was identified as the area of well site 3. Soil borings and topography indicate that this is a concave area with discharge in a southwest direction. It was estimated that up to 30 - 50% of the groundwater discharge may pass this well site based on a review of the glacial till elevations and cell base grades in areas not incised into the glacial clay. The base of the landfill is graded to the west towards well site 7. The landfill was not constructed with a compacted cell base. It was reported that all sand encountered in the cell base or cut slopes was removed and replaced with compacted soils as a normal operational procedure. Laboratory analysis of soils at well site 3 indicated that the permeability of underlying glacial clay till soils was 6×10^{-8} cm/sec (less than 1-inch/year). A 2-foot-thick layer of sand located immediately above the glacial till demonstrated a permeability of 7.8×10^{-3} cm/sec (22 ft/day). The loess surface soils of the area typically demonstrate a permeability of 1×10^{-5} to 2×10^{-5} cm/sec (0.3 to 0.6 ft/day). Dry surface soils were encountered during the site borings. No saturated soils were encountered at any boring location. No static free water was observable in piezometers established in soil borings. Monitoring wells were incised 3 to 5 feet into the glacial clay to allow

collection of water samples from the thin layer of groundwater that existed immediately above the glacial clay till layer.

The 1993 Permit Renewal Documentation prepared by Five States Engineering provided the following hydrogeological description:

The loess and sand materials are highly permeable. The underlying glacial clay till has a very low permeability. The groundwater table is located in a thin layer of materials located directly above the glacial clay till. The thickness of the saturated zone may vary from several inches in areas where sand is the lower permeable material to two feet where loess soil is the lower permeable material. The relatively thin layer of saturated material requires the use of monitoring wells which are partially inset in the glacial clay till. An inset of 2 to 3 feet is generally used to allow accumulation of sufficient volumes of water to allow a groundwater sample collection. Well stabilization and recovery periods are generally very long and increase as well locations are made near the upper regions of a groundwater flow zone.

Several of the original monitoring wells at the Landfill were not able to consistently provide groundwater samples. As reported in correspondence dated June 24, 2022 (Doc #103483), monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were replaced with deeper monitoring wells MW-1R, MW-2R, MW-3R, MW-4R, and MW-5R in April 2022. The installed depths of the original and replacement wells are shown in the tables below.

Original		Replacement	
Monitoring Well	Installed Well Depth	Monitoring Well	Installed Well Depth
MW-1	30.0	MW-1R	89.9
MW-2	24.6	MW-2R	88.4
MW-3	25.0	MW-3R	65.3
MW-4	17.0	MW-4R	83.8
MW-5	24.2	MW-5R	55.3

As reported in the June 24, 2022 correspondence, the replacement monitoring wells were installed with 15-foot pre-packed monitoring well screens. The borings of monitoring wells MW-1R, MW-2R, MW-3R, and MW-4R encountered a sand layer described on the boring logs as “fine brown sand, moist,” “brown sand, moist,” “gray sand,” “gray sand with traces of clay, moist,” “light brown sand, moist,” and “light brown coarse sand, moist.” The replacement wells were entirely screened in these sandy layers, many of which were described as moist. Monitoring well MW-5R was installed to a shallower depth and the boring did not encounter the sand layer but was screened in what appears to be the intersection between weathered and unweathered glacial till based on the descriptions on the boring log.

Section 3.0

Figures Discussion

The following figures are attached.

3.1 Figure 1 – Approved Monitoring Network

The Landfill property and hydrologic monitoring system plan (HMSP) monitoring network is depicted in Figure 1. Figure 1 indicates the location of each monitoring well and its respective monitoring program.

3.2 Figure 2 – Groundwater Contours

A groundwater contour map based on water levels measured during the April 2023 sampling event is included as Figure 2. Figure 2 indicates the groundwater beneath the Landfill flows in a generally south/southeasterly direction.

3.3 Figure 3 – Reporting Period Detection Summary

Figure 3 shows the range of measured concentrations by monitoring point for the HMSP monitoring wells during this reporting period. Further discussion of the detected constituents is included in Section 6.0 – Data Evaluation and Summary of this report.

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Section 4.0

Standards History Graphs

Standards history graphs are included in Appendix F. Standards history graphs for the following parameters are included:

- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Copper
- Lead
- Nickel
- Selenium
- Vanadium
- Zinc

The prediction limit was below the GWPS for each of the graphed parameters. Antimony, silver, and thallium were not included as these constituents had no quantified detections in the period of record.

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Section 5.0

QA/QC Summary

The quality assurance/quality control (QA/QC) program for the Landfill follows similar protocols as included in the HMSP. Data validation procedures were performed on analytical results for laboratory quality control samples and a quality assurance assessment of the data was conducted as the data were generated. The QA review procedure provides documentation of the accuracy and precision of the analytical data and confirms that the analyses are sufficiently sensitive to detect constituents at levels below regulatory standards, where such standards exist. SCS then conducts QA/QC data validation of the produced data, which includes review of sample handling, analytical sensitivity, and blanks, accuracy, and precision. A summary of the laboratory QA/QC and data validation can be found in Appendices B-1, Laboratory Data, and B-2, Data Validation, respectively. The QA/QC review indicated that the data was acceptable, with the exception of the October 4, 2023 sample from monitoring well MW-4R for the inorganic parameters. The data are not considered representative due to significantly elevated TSS. The MW-4R data was statistically evaluated for this reporting period. However, following collection of groundwater sampling in 2024 and review of the analytical results, it is likely that the October 4, 2023 inorganic analytical results for monitoring well MW-4R will be removed from statistical consideration based on physical cause.

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Section 6.0

Data Evaluation

The historical analytical results of the groundwater monitoring points for the Landfill are presented in Appendix C (Summary of Groundwater Chemistry). Statistical Output Tables and Graphs are included in Appendix D.

6.1 Data Evaluation

Groundwater monitoring for the Landfill consists of samples from one monitoring well along the east side (MW-1R, upgradient), one monitoring well along the west side (MW-5R), and three monitoring wells along the south side (MW-2R, MW-3R, MW-4R). The range of concentrations measured in each monitoring well during this reporting period are summarized in Figure 3, which included two samples plus a duplicate in monitoring well MW-5 and one sample each in monitoring wells MW-2R and MW-4R.

The full set of Appendix I parameters have been sampled since 2018. It should be noted that a sufficient dataset of eight samples for statistical analyses for all monitoring wells is not yet established for all Appendix I parameters in each monitoring well. Statistical evaluation was performed on the data obtained. A summary of the Appendix I concentrations for the parameters detected for the monitoring wells in 2023 are shown in the following table. Blank cells in the table indicate constituents that were not detected. Monitoring wells MW-1R and MW-3R did not have sufficient water for sampling during either 2023 semi-annual sampling event while monitoring wells MW-4R and MW-2R did not have sufficient water during the April 2023 and October 2023 sampling events, respectively.

Constituent	GWPS	MW-2R	MW-4R	MW-5R
Arsenic	0.01 mg/L	0.0106	0.00732	0.00298- 0.00265
Barium	2 mg/L	0.0459	0.0275	0.0746- 0.0392
Cadmium	0.005 mg/L	0.0002*	0.000582	
Chromium	0.1 mg/L	0.001*	0.00717	
Cobalt	0.0021 mg/L	0.000752	0.00715	0.00405- 0.00225
Copper	1.3 mg/L	0.00941	0.0491	
Lead	0.015 mg/L	0.00101	0.0173	0.000574
Nickel	0.1 mg/L	0.00542	0.021	0.00879- 0.005*
Selenium	0.05 mg/L	0.0049*	0.0201	
Vanadium	0.035 mg/L	0.005*	0.0215	0.001*- 0.003*
Zinc	2 mg/L	0.012*	0.0556	0.0229

Constituent	GWPS	MW-2R	MW-4R	MW-5R
Total Suspended Solids	None	34.8	3470	3.25-33.1

* - Indicates J flag. The concentration is above the method detection limit but below the reporting limit; the concentration is estimated.

The measured Appendix I concentrations were compared to current Iowa Statewide Groundwater Protection Standard (GWPS) values. Concentrations shown in bold in the table above were measured above their respective GWPS values.

GWPS exceedances were measured for arsenic at monitoring well MW-2R during the April 2023 sampling event, cobalt and lead in monitoring well MW-4R during the October 2023 sampling event, and cobalt in monitoring well MW-5R during both 2023 sampling events. The majority of site-wide maximum concentrations during this reporting period were measured in monitoring well MW-4R, while one site-wide maximum concentration was measured in both monitoring wells MW-2R and MW-5R. No volatile organic compounds were detected during this reporting period.

It should be noted that the total suspended solids (TSS) concentration in monitoring well MW-4R was highly elevated during this reporting period, although the monitoring well was installed with a pre-packed monitoring well screen. Multiple metals had historical maximum concentrations and SSIs measured in monitoring well MW-4R due to the elevated TSS concentration.

6.2 Trending Analysis and Discussion

There were no statistically significant trends identified by Mann-Kendall analysis during this reporting period. However, it should be noted that the Appendix I datasets for monitoring wells MW-4R and MW-5R are still in the process of obtaining an initial eight background samples. The Mann-Kendall trend analysis is included in Appendix D, Statistical Output Tables and Graphs.

Confidence Intervals and TSS Discussion

Confidence intervals were calculated during this reporting period for the HMSP monitoring network. Lower confidence levels remained below the GWPSs with the exception of cobalt in monitoring well MW-3/MW-3R. As previously stated, elevated TSS concentrations were measured in the original monitoring well MW-3, and the elevated cobalt concentrations appear to be at least partially correlated to the elevated TSS, as noted in the 2021 AWQR (Doc #101572). It should be noted that a sample was unable to be obtained from monitoring wells MW-1R and MW-3R during this reporting period due to insufficient water; drought conditions in the area are the likely cause.

A confidence interval summary table and graphs are included in Appendix D, Statistical Output Tables and Graphs.

Section 7.0

Recommendations

7.1 Site Impact on Groundwater

Redevelopment of monitoring wells MW-2R, MW-4R, and MW-5R in March 2023 reduced TSS concentrations in monitoring well MW-2R and MW-5R, but the TSS concentrations in monitoring well MW-4R were significantly elevated during the October 2023 sampling event (3,470 mg/L), resulting in several metals being measured at historical maximums and statistically SSLs above background. If elevated TSS concentrations are observed during the 2024 semi-annual sampling events, further redevelopment of the monitoring wells may be appropriate.

There were no SSLs above a GWPS with the exception of cobalt in MW-3/MW-3R. A majority of measured concentrations were generally stable during this reporting period.

7.2 Proposed Monitoring

Monitoring well MW-8 will be sampled for cobalt and TSS during the 2024 semi-annual sampling events to delineate the cobalt impact measured at monitoring well MW-3/MW-3R.

7.3 Proposed Monitoring Well Changes

There are no changes to the monitoring wells proposed at this time.

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Tables

Table 1
Monitoring Program Summary
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Monitoring Well	Formation ⁽¹⁾	Current Monitoring Program	Change for Next Sampling Event	Prediction Limit Exceedances during the 2023 Reporting Period	Total Number of Samples in Each Monitoring Program Since January 1, 2018		
					Routine	Supplemental	Remedial Action
MW-1/MW-1R ⁽³⁾	Glacial Till/Sand Layers	Upgradient	None	No Sample ⁽²⁾	8	-	-
MW-2R	Glacial Till/Sand	Downgradient	None	Arsenic, Copper	8	-	-
MW-3/MW-3R ⁽³⁾	Glacial Till/Sand	Downgradient	None	No Sample ⁽²⁾	7	-	-
MW-4R	Glacial Till/Sand and Sandy Loess	Downgradient	None	Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Nickel, Selenium, Vanadium, Zinc	5	-	-
MW-5R	Glacial Till/ Sand and Loess	Downgradient	None	Arsenic, Cobalt, Nickel	7	-	-
Other Monitoring Points ⁽⁴⁾							
MW-7	Glacial Till	Supplemental	None	Not applicable.	-	11	-
MW-8	Sand	Bracketing	Will be sampled for cobalt for impact delineation near monitoring well MW-3R.				

Notes:

- ⁽¹⁾ Obtained from screened interval on boring logs.
- ⁽²⁾ Monitoring wells had insufficient water to sample during the 2023 semi-annual sampling events.
- ⁽³⁾ Monitoring wells were replaced prior to the 1st 2022 semi-annual sampling event. As samples were not able to be obtained since installation due to insufficient water, data is only from the original monitoring wells.
- ⁽⁴⁾ The 2021 AWQR Response letter dated March 15, 2022 (Doc #102569) approved the removal of monitoring well MW-7 from the HMSP monitoring network upon the installation of monitoring wells MW-4R and MW-5R. Monitoring well MW-7 will be maintained as a supplemental bracketing well, should it become necessary. In addition, monitoring well MW-8 was installed as a supplemental bracketing well south of monitoring well MW-3/MW-3R.

Table 2
Monitoring Program Implementation Schedule
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Monitoring Well	Recent Sampling Dates and Constituents		Upcoming Sampling Dates and Constituents	
	April 2023	October 2023	1 st 2024 Semi-Annual Event	2 nd 2024 Semi-Annual Event
MW-1R	None (Insufficient Water)	None (Insufficient Water)	Appendix I, TSS	Appendix I, TSS
MW-2R	Appendix I, TSS	None (Insufficient Water)	Appendix I, TSS	Appendix I, TSS
MW-3R	None (Insufficient Water)	None (Insufficient Water)	Appendix I, TSS	Appendix I, TSS
MW-4R	None (Insufficient Water)	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS
MW-5R	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS
MW-7	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS
MW-8			Cobalt, TSS	Cobalt, TSS

Notes:

- 1) Monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were replaced prior to the 1st 2022 semi-annual sampling event due to many wells consistently having insufficient water to sample. Both monitoring wells MW-1R and MW-3R still did not produce sufficient water during either 2023 sampling event. However, the drought likely contributed to the low water levels.

Table 3
Monitoring Well Maintenance and Performance Re-Evaluation Schedule
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Compliance with:	2021	2022	2023	2024	2025
567 IAC 110.9(2)"a" high and low water levels	Completed	Completed	Included	Scheduled	Scheduled
567 IAC 110.9(2)"b" changes in the hydrologic setting and flow paths	Completed	Completed	Included	Scheduled	Scheduled
567 IAC 110.9(2)"c" well depths	Completed	Completed	Included	Scheduled	Scheduled
567 IAC 113.10 well recharge rate evaluation		Completed		Scheduled	

Table 4
Monitoring Well Performance and Maintenance Summary
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Well	Top of Casing	Top of Screen	Total Depth		Date of Measurements		Maximum Depth
					4/11/2023	10/4/2023	Discrepancy (ft)
MW-1R	1346.1	1271.2	89.9	Groundwater Level (ft)	88.50	Dry	NM
				Groundwater Elevation (Ft MSL)	1257.60	NA	
				Measured Well Depth (ft)	NM	NM	
				Submerged screen	N	N	
MW-2R	1336.1	1261.7	88.4	Groundwater Level (ft)	83.40	Dry	NM
				Groundwater Elevation (Ft MSL)	1252.70	NA	
				Measured Well Depth (ft)	NM	NM	
				Submerged screen	N	N	
MW-3R	1325.7	1275.4	65.3	Groundwater Level (ft)	65.11	Dry	NM
				Groundwater Elevation (Ft MSL)	1260.59	NA	
				Measured Well Depth (ft)	NM	NM	
				Submerged screen	N	Y	
MW-4R	1317.8	1248.5	83.8	Groundwater Level (ft)	65.12	65.53	NM
				Groundwater Elevation (Ft MSL)	1252.68	1252.27	
				Measured Well Depth (ft)	NM	NM	
				Submerged screen	Y	Y	
MW-5R	1312.8	1272.5	55.3	Groundwater Level (ft)	31.69	32.86	NM
				Groundwater Elevation (Ft MSL)	1281.11	1279.94	
				Measured Well Depth (ft)	NM	NM	
				Submerged screen	Y	Y	

Comments:

- 1) It should be recognized that, due to the small amount of water thickness in multiple monitoring wells, it is likely that some of the groundwater elevations measured during the April 2023 sampling event are reflective of water trapped in the well point and not the elevation of the groundwater near the monitoring wells.
- 2) Well depths with dedicated sampling pumps are required to be measured every five years. As the monitoring wells were installed in 2021, well depths will be measured in 2026.

Table 5
Background and GWPS Summary
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Interwell Background/GWPS (MW-1/MW-1R)

Constituent	Units	Samples	Detections	Background Level	Statistical Test	GWPS	Source
Antimony (Sb)	mg/L	7	0	<0.002	DQR	0.006	MCL
Arsenic (As)	mg/L	12	3	0.00152	PL (NP)	0.01	MCL
Barium (Ba)	mg/L	9	9	0.7287	PL (P)	2.0	MCL
Beryllium (Be)	mg/L	7	2	0.00051	PL (NP)	0.004	MCL
Cadmium (Cd)	mg/L	7	4	0.0003307	PL (P)	0.005	MCL
Chromium (Cr)	mg/L	7	7	0.004675	PL (P)	0.1	MCL
Cobalt (Co)	mg/L	7	5	0.001795	PL (P)	0.0021	SWS
Copper (Cu)	mg/L	7	7	0.008589	PL (P)	1.3	MCL
Lead (Pb)	mg/L	7	7	0.008134	PL (P)	0.015	MCL
Nickel (Ni)	mg/L	7	4	0.006646	PL (P)	0.1	SWS
Selenium (Se)	mg/L	7	7	0.007427	PL (P)	0.05	MCL
Silver (Ag)	mg/L	7	0	< 0.001	DQR	0.1	SWS
Thallium (Tl)	mg/L	7	0	< 0.001	DQR	0.002	MCL
Vanadium (V)	mg/L	7	5	0.006418	PL (P)	0.035	SWS
Zinc (Zn)	mg/L	7	4	0.01986	PL (P)	2.0	SWS

Notes:

- 1) Background levels based on calculated prediction limits or reporting limit, as applicable.

Acronyms/Abbreviations:

RL = Reporting Limit

SWS = Statewide Standard

GWPS = Groundwater Protection Standard

MCL = EPA Maximum Contaminant Level

SSS = Site-Specific GWPS

DQR = Double Quantification Rule

Comments:

- 1) **Water quality results and effectiveness of the statistical data evaluation criteria:** Statistical evaluations consist of prediction limits, double quantification rule, confidence intervals/confidence bands, as appropriate, and do not use data from the background wells for development of the confidence intervals or confidence bands.
- 2) **Changes to the previous statistical method during reporting period:** There were no changes to the statistical method since the 2022 reporting period.

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding Prediction Limit Exceedances
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Well	Constituent	Units	Most Recent Result	Background Standard
MW-4R	Cadmium	mg/L	0.000582	0.0003307
	Chromium	mg/L	0.00717	0.004675
	Lead	mg/L	0.0173	0.008134
	Vanadium	mg/L	0.0215	0.006418
MW-5R	Arsenic	mg/L	0.00265	0.00152

Notes:

- 1) Criteria for inclusion in this table is a well/constituent pair with a detected concentration above the current prediction limit (PL) during the current reporting period and no detection above the PL in the immediately preceding reporting period.

Comments:

- 1) **Problems with the current HMSP network:** Monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were replaced prior to the 1st 2022 semi-annual sampling event due to the original wells having little to no water and therefore, unable to be sampled consistently. Following the installation of the deeper wells, monitoring wells MW-1R and MW-3R have not produced samples.
- 2) **Schedule to implement remedies:** Not applicable.
- 3) **Alternative constituent or sample frequency changes:** None.
- 4) **Significant changes to prediction limits:** None.

Table 7
Summary Table of Ongoing and Newly Identified Prediction Limit Exceedances
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Well	Constituent	Units	Most Recent Result	Background Standard	GWPS
MW-2R	Arsenic	mg/L	0.0106	0.00152	0.01
	Copper	mg/L	0.00941	0.008589	1.3
MW-4R	Arsenic	mg/L	0.00732	0.00152	0.01
	Cadmium	mg/L	0.000582	0.0003307	0.005
	Chromium	mg/L	0.00717	0.004675	0.1
	Cobalt	mg/L	0.00715	0.001795	0.0021
	Copper	mg/L	0.0491	0.008589	1.3
	Lead	mg/L	0.0173	0.008134	0.015
	Nickel	mg/L	0.021	0.006646	0.1
	Selenium	mg/L	0.0201	0.007427	0.05
	Vanadium	mg/L	0.0215	0.006418	0.035
	Zinc	mg/L	0.0556	0.01986	2
MW-5R	Arsenic	mg/L	0.00265	0.00152	0.01
	Cobalt	mg/L	0.00225	0.001795	0.0021
	Nickel	mg/L	0.00489*	0.006646	0.1

Notes:

- 1) Ongoing prediction limit (PL) exceedance is defined as one or more PL exceedance for a monitoring well/constituent pair in both the previous and current reporting periods.

 Shaded indicates a newly identified PL exceedance, as defined under Table 6.

- *- Indicates J flag. The concentration is above the method detection limit but below the reporting limit; the concentration is estimated.

Comments:

- 1) **Problems with the current HMSP network:** Monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were replaced prior to the 1st 2022 semi-annual sampling event due to the original wells having little to no water and therefore, unable to be sampled consistently. Following the installation of the deeper wells, monitoring wells MW-1R and MW-3R have not produced samples.
- 2) **Proposed remedies:** None.
- 3) **Alternative constituent or sample frequency changes:** None.
- 4) **Plume delineation strategies:** Not applicable.
- 5) **Property owner notifications:** Not applicable.

Table 8
Summary of Groundwater Chemistry
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

The Summary of Groundwater Chemistry is located in Appendix C.

Table 9
Historical Prediction Limit and Action Level Exceedances
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Key

	Prediction Limit Exceedance ⁽¹⁾
	GWPS Exceedance
	Confidence Interval Exceedance

Well	Constituent	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023
MW-2R	Arsenic			NS	NS				NS
	Cobalt			NS	NS				NS
	Copper			NS	NS				NS
	Zinc			NS	N				NS
MW-3/3R	Cobalt				NS	NS	NS	NS	NS
MW-4R	Arsenic		NS	NS	NS			NS	
	Cadmium		NS	NS	NS			NS	
	Chromium		NS	NS	NS			NS	
	Cobalt		NS	NS	NS			NS	
	Copper		NS	NS	NS			NS	
	Lead		NS	NS	NS			NS	
	Nickel		NS	NS	NS			NS	
	Selenium		NS	NS	NS			NS	
	Vanadium		NS	NS	NS			NS	
	Zinc		NS	NS	NS			NS	
MW-5R	Arsenic		NS	NS	NS				
	Cobalt		NS	NS	NS				
	Nickel		NS	NS	NS				
	Zinc		NS	NS	NS				
	Acetone		NS	NS	NS				

(1) Inorganic prediction limit analysis began during the 2021 statistical evaluation upon receipt of at least five Appendix I background sampling in the background monitoring well.

NS - Not Sampled. The monitoring well did not produce a sample during this semi-annual period.

Comments:

- 1) In accordance with the 2018 AWQR response letter dated January 28, 2019 (Doc #94249), a more powerful statistical method was approved.
- 2) Monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were replaced prior to the 1st 2022 semi-annual sampling event due to the original wells having little to no water and therefore, unable to be sampled consistently. Following the installation of the deeper wells, monitoring wells MW-1R and MW-3R have not produced samples.

Table 10
Groundwater Quality Assessment Plan Trend Analysis
2023 Annual Water Quality Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Well	Current SSL	Trend
None		

Notes: A Groundwater Quality Assessment Plan is currently not required.

Figures

Path: C:\Users\hmadson\OneDrive - SCS Engineers\Desktop\GIS Maps\Site Maps\HWB\HWB01\2023 HWB01\Hawarden-2023 HWB01.aprx
User: hmadson
Date Saved: 11/02/2023 2:44 PM



Monitoring Well	Monitoring Program
MW-1R	Upgradient
MW-2R	Downgradient
MW-3R	Downgradient
MW-4R	Downgradient
MW-5R	Downgradient



Approved Monitoring Network

Legend

Monitoring Well

HMSP Monitoring Well

Approximate Waste Boundary

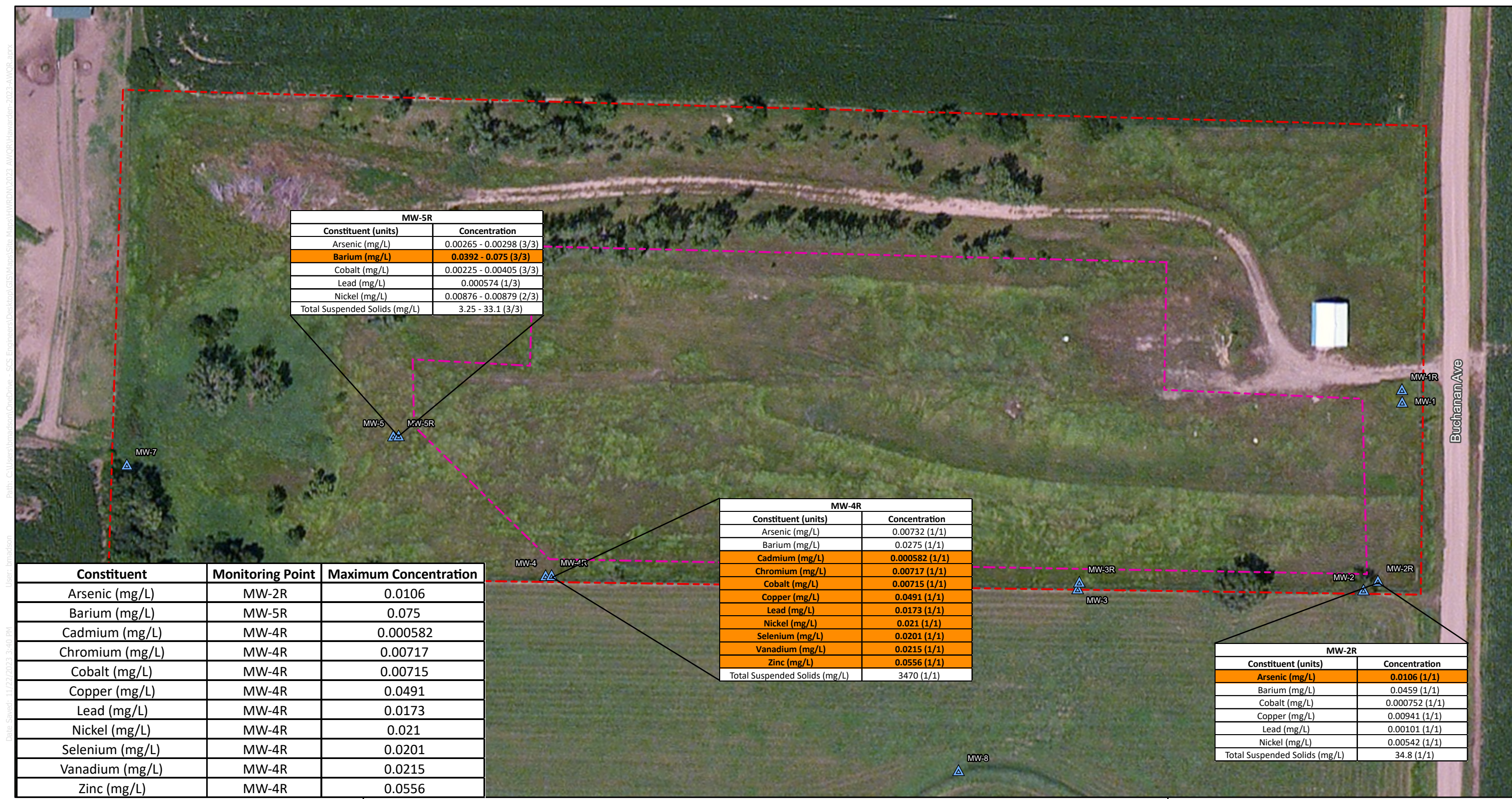
Approximate Property Boundary

City of Hawarden C&D
Landfill (Closed)
Hawarden, IA
Project No: 27223170.00
Drawing Date: November
2023

Figure 1

GEODATA, Esri, HERE, Garmin, FourSquare, FRC, MITI, NASA, USGS, Esri, CGLAR, USGS, Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Path: C:\Users\hmadson\OneDrive - SCS Engineers\Desktop\GIS Maps\Site Maps\MW\MDU2023 AMQR\Hawarden-2023 AMQR.aprx
User: hmadson
Date Saved: 11/02/2023 3:40 PM

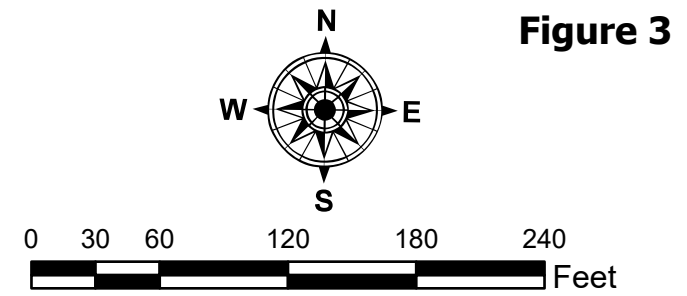


Reporting Period Detection Summary

Legend

- Monitoring Well
- Approximate Waste Boundary
- Approximate Property Boundary

City of Hawarden C&D Landfill (Closed)
Hawarden, IA
Project No: 27223170.00
Drawing Date: November 2023



Appendix A
Field Sampling Forms

FORM FOR GROUNDWATER SAMPLING

Project:	Hawarden C&D Landfill		
Monitoring Well/Piezometer ID:	MW-1R	Date:	4/11/2023
Gradient:	Up	Sampler:	Scott Stoller

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes
Litter/Standing Water?	No

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	88.50
Initial Groundwater Elevation (ft-amsl):	1257.60
Equipment Used:	

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
	Purging start time.						
	Parameters stabilized, sample collected.						

Quantity of Water Removed from Well (liters):	0.0
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	
Average Purge Rate (mL/min):	0.00

D. WELL MAINTENANCE

Does the well require any future maintenance?	No
If yes, explain:	
Additional Comments:	Well did not have sufficient water to sample.

FORM FOR GROUNDWATER SAMPLING

Project: Hawarden C&D Landfill	
Monitoring Well/Piezometer ID: MW-2R	Date: 4/11/2023
Gradient: Down	Sampler: Scott Stoller

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped? Yes	
Litter/Standing Water? No	

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	83.40
Initial Groundwater Elevation (ft-amsl):	1252.70
Equipment Used:	Dedicated Submersible

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
3:32 PM	Purging start time.						
3:35 PM	14.1	NM	1437.6	6.94	179.8	NM	
3:38 PM	14.5	NM	1461.2	6.98	184.4	NM	
3:41 PM	14.7	NM	1472.9	6.97	188.9	NM	
3:44 PM	15.5	NM	1480.4	6.98	190.3	NM	
Parameters stabilized, sample collected.							

Quantity of Water Removed from Well (liters):	4.0
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	12:00
Average Purge Rate (mL/min):	333.33

D. WELL MAINTENANCE

Does the well require any future maintenance? No	
If yes, explain:	
Additional Comments:	Water level was below top of pump @ 84.60. There was an equipment malfunction with the YSI probes while stabilizing, dissolved oxygen and turbidity data could not be collected.

FORM FOR GROUNDWATER SAMPLING

Project: Hawarden C&D Landfill	
Monitoring Well/Piezometer ID: MW-3R	Date: 4/11/2023
Gradient: Down	Sampler: Scott Stoller

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes	
Litter/Standing Water?	No	

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	65.11
Initial Groundwater Elevation (ft-amsl):	1260.59
Equipment Used:	Dedicated Submersible

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
	Purging start time.						
	Parameters stabilized, sample collected.						

Quantity of Water Removed from Well (liters):	0.0
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	
Average Purge Rate (mL/min):	0.00

D. WELL MAINTENANCE

Does the well require any future maintenance?		No
If yes, explain:		
Additional Comments:	Well did not have sufficient water to sample.	

FORM FOR GROUNDWATER SAMPLING

[illegible]

FORM FOR GROUNDWATER SAMPLING

[illegible]

FORM FOR GROUNDWATER SAMPLING

[illegible]

FORM FOR GROUNDWATER SAMPLING

[illegible]

FORM FOR GROUNDWATER SAMPLING

Project:	Hawarden C&D Landfill		
Monitoring Well/Piezometer ID:	MW-2R	Date:	10/3/2023
Gradient:	Down	Sampler:	Konner Roth

A. MW/PIEZOMETER CONDITIONS	
Well/Piezometer Capped?	Yes
Litter/Standing Water?	No

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)	
Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	Dry
Initial Groundwater Elevation (ft-amsl):	NA
Equipment Used:	

C. WELL PURGING							
FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES							
Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
	Purging start time.						
	Parameters stabilized, sample collected.						

Quantity of Water Removed from Well (liters):	0.0
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	
Average Purge Rate (mL/min):	0.00

D. WELL MAINTENANCE	
Does the well require any future maintenance?	No
If yes, explain:	
Additional Comments:	The well was dry.

FORM FOR GROUNDWATER SAMPLING

[illegible]

FORM FOR GROUNDWATER SAMPLING

Project:	Hawarden C&D Landfill		
Monitoring Well/Piezometer ID:	MW-4R	Date:	10/3/2023
Gradient:	Down	Sampler:	Konner Roth

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes
Litter/Standing Water?	No

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	65.53
Initial Groundwater Elevation (ft-amsl):	1252.27
Equipment Used:	Dedicated Submersible

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
6:24 PM	Purging start time.						
6:27 PM	13.3	0.8	2317.8	6.62	19.6	2991.6	
6:30 PM	13.6	0.6	2319.0	6.68	19.3	3158.2	
6:33 PM	13.9	0.6	2318.6	6.72	20.3	3004.2	
6:36 PM	14.0	0.8	2315.4	6.74	24.1	2415.1	
6:39 PM	14.2	1.0	2316.4	6.73	29.0	2273.2	
Parameters stabilized, sample collected.							

Quantity of Water Removed from Well (liters):	2.5
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	15:00
Average Purge Rate (mL/min):	166.67

D. WELL MAINTENANCE

Does the well require any future maintenance?	No
If yes, explain:	
Additional Comments:	The water was brown and odorless.

FORM FOR GROUNDWATER SAMPLING

Project:	Hawarden C&D Landfill		
Monitoring Well/Piezometer ID:	MW-5R	Date:	10/3/2023
Gradient:	Down	Sampler:	Konner Roth

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes
Litter/Standing Water?	No

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	NM
Initial Static Water Level (feet):	32.86
Initial Groundwater Elevation (ft-amsl):	1279.94
Equipment Used:	Dedicated Submersible

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
9:26 AM	Purging start time.						
9:29 AM	12.4	1.2	2184.4	6.67	-190.0	29.0	
9:32 AM	12.6	2.6	1984.6	6.74	-207.2	25.6	
9:35 AM	13.1	3.2	1895.4	6.77	-212.6	20.7	
9:38 AM	13.3	4.1	1815.4	6.80	-216.1	19.0	
Parameters stabilized, sample collected.							

Quantity of Water Removed from Well (liters):	2.0
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	12:00
Average Purge Rate (mL/min):	166.67

D. WELL MAINTENANCE

Does the well require any future maintenance?	No
If yes, explain:	
Additional Comments:	

FORM FOR GROUNDWATER SAMPLING

Project:	Hawarden C&D Landfill		
Monitoring Well/Piezometer ID:	MW-7	Date:	10/4/2023
Gradient:	Down	Sampler:	Konner Roth

A. MW/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes
Litter/Standing Water?	No

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Measured Well Total Depth (feet):	50.0
Initial Static Water Level (feet):	17.60
Initial Groundwater Elevation (ft-amsl):	1269.57
Equipment Used:	Dedicated Tubing – Peristaltic Pump

C. WELL PURGING

FIELD PARAMETERS [stabilization criteria] RECORD EVERY 3 MINUTES

Time	Temperature (°C) 10%	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm) +/- 10%	pH (S.U.) +/- 0.1	ORP (mV)	Turbidity (FNU)	
10:04 AM	Purging start time.						
10:07 AM	11.2	6.2	1048.9	7.51	-100.6	2.3	
10:10 AM	11.1	5.9	1043.9	7.49	-89.5	2.3	
10:13 AM	11.3	5.8	1041.7	7.49	-82.1	2.2	
10:16 AM	11.2	5.7	1042.4	7.48	-74.8	2.2	
Parameters stabilized, sample collected.							

Quantity of Water Removed from Well (liters):	1.9
Was well pumped/bailed dry?	No
Total Amount of Time Purged (minutes:seconds):	12:00
Average Purge Rate (mL/min):	158.33

D. WELL MAINTENANCE

Does the well require any future maintenance?	No
If yes, explain:	
Additional Comments:	

Appendix B-1
Laboratory Analytical Data Sheets

ANALYTICAL REPORT

PREPARED FOR

Attn: Ben Madson
SCS Engineers
1690 All State Court, Suite 100
West Des Moines, Iowa 50265

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JOB DESCRIPTION

Hawarden C&D Landifll - 1st 2023 Semi Annual Samp
SDG NUMBER 27223170

JOB NUMBER

310-253550-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

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Case Narrative

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual Samp

Job ID: 310-253550-1
SDG: 27223170

Job ID: 310-253550-1

Laboratory: Eurofins Cedar Falls

Narrative

Job Narrative 310-253550-1

Receipt

The samples were received on 4/13/2023 4:05 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.8°C

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-253550-1	MW-2R	Water	04/11/23 15:44	04/13/23 16:05
310-253550-2	MW-5R	Water	04/11/23 14:12	04/13/23 16:05
310-253550-3	MW-7	Water	04/11/23 17:23	04/13/23 16:05
310-253550-4	MW-D	Water	04/11/23 14:12	04/13/23 16:05
310-253550-5	Trip Blank	Water	04/11/23 00:00	04/13/23 16:05

Detection Summary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-2R

Lab Sample ID: 310-253550-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Arsenic	0.0106		0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0459		0.00200	0.000640	mg/L	1			6020B	Total/NA
Cadmium	0.000157	J	0.000200	0.000100	mg/L	1			6020B	Total/NA
Chromium	0.00118	J	0.00500	0.00110	mg/L	1			6020B	Total/NA
Cobalt	0.000752		0.000500	0.000170	mg/L	1			6020B	Total/NA
Copper	0.00941		0.00500	0.00180	mg/L	1			6020B	Total/NA
Lead	0.00101		0.000500	0.000240	mg/L	1			6020B	Total/NA
Nickel	0.00542		0.00500	0.00190	mg/L	1			6020B	Total/NA
Selenium	0.00491	J	0.00500	0.00140	mg/L	1			6020B	Total/NA
Vanadium	0.00456	J	0.00500	0.00110	mg/L	1			6020B	Total/NA
Zinc	0.0119	J	0.0200	0.00640	mg/L	1			6020B	Total/NA
Total Suspended Solids	34.8		1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: MW-5R

Lab Sample ID: 310-253550-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Arsenic	0.00288		0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0750		0.00200	0.000640	mg/L	1			6020B	Total/NA
Cobalt	0.00401		0.000500	0.000170	mg/L	1			6020B	Total/NA
Nickel	0.00876		0.00500	0.00190	mg/L	1			6020B	Total/NA
Vanadium	0.00119	J	0.00500	0.00110	mg/L	1			6020B	Total/NA
Total Suspended Solids	3.25		1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: MW-7

Lab Sample ID: 310-253550-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Barium	0.0118		0.00200	0.000640	mg/L	1			6020B	Total/NA

Client Sample ID: MW-D

Lab Sample ID: 310-253550-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Carbon disulfide	0.545	J	1.00	0.450	ug/L	1			8260D	Total/NA
Arsenic	0.00298		0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0746		0.00200	0.000640	mg/L	1			6020B	Total/NA
Cobalt	0.00405		0.000500	0.000170	mg/L	1			6020B	Total/NA
Nickel	0.00879		0.00500	0.00190	mg/L	1			6020B	Total/NA
Vanadium	0.00122	J	0.00500	0.00110	mg/L	1			6020B	Total/NA
Total Suspended Solids	6.00		1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: Trip Blank

Lab Sample ID: 310-253550-5

No Detections.

This Detection Summary does not include radiochemical test results.

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Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
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Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-2R

Lab Sample ID: 310-253550-1

Date Collected: 04/11/23 15:44

Matrix: Water

Date Received: 04/13/23 16:05

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 14:07	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 14:07	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 14:07	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 14:07	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 14:07	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 14:07	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 14:07	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 14:07	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 14:07	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 14:07	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 14:07	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 14:07	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 14:07	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 14:07	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 14:07	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 14:07	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 14:07	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 14:07	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 14:07	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 14:07	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 14:07	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 14:07	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 14:07	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			04/14/23 14:07	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 14:07	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 14:07	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 14:07	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 14:07	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 14:07	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 14:07	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 14:07	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 14:07	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 14:07	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 14:07	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 14:07	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 14:07	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 14:07	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 14:07	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 14:07	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 14:07	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 14:07	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 14:07	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 14:07	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 14:07	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 14:07	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 14:07	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 14:07	1

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Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-2R

Lab Sample ID: 310-253550-1

Date Collected: 04/11/23 15:44

Matrix: Water

Date Received: 04/13/23 16:05

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	117		80 - 128		04/14/23 14:07	1
Toluene-d8 (Surr)	96		80 - 120		04/14/23 14:07	1
4-Bromofluorobenzene (Surr)	101		80 - 120		04/14/23 14:07	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200	0.00100	mg/L		04/17/23 09:40	04/20/23 17:42	1
Arsenic	0.0106		0.00200	0.000530	mg/L		04/17/23 09:40	04/20/23 17:42	1
Barium	0.0459		0.00200	0.000640	mg/L		04/17/23 09:40	04/20/23 17:42	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		04/17/23 09:40	04/20/23 17:42	1
Cadmium	0.000157	J	0.000200	0.000100	mg/L		04/17/23 09:40	04/20/23 17:42	1
Chromium	0.00118	J	0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:42	1
Cobalt	0.000752		0.000500	0.000170	mg/L		04/17/23 09:40	04/20/23 17:42	1
Copper	0.00941		0.00500	0.00180	mg/L		04/17/23 09:40	04/20/23 17:42	1
Lead	0.00101		0.000500	0.000240	mg/L		04/17/23 09:40	04/20/23 17:42	1
Nickel	0.00542		0.00500	0.00190	mg/L		04/17/23 09:40	04/20/23 17:42	1
Selenium	0.00491	J	0.00500	0.00140	mg/L		04/17/23 09:40	04/20/23 17:42	1
Silver	<0.00100		0.00100	0.000500	mg/L		04/17/23 09:40	04/20/23 17:42	1
Thallium	<0.00100		0.00100	0.000260	mg/L		04/17/23 09:40	04/20/23 17:42	1
Vanadium	0.00456	J	0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:42	1
Zinc	0.0119	J	0.0200	0.00640	mg/L		04/17/23 09:40	04/20/23 17:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	34.8		1.88	0.638	mg/L			04/14/23 15:11	1

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-5R

Lab Sample ID: 310-253550-2

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 14:29	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 14:29	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 14:29	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 14:29	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 14:29	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 14:29	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 14:29	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 14:29	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 14:29	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 14:29	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 14:29	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 14:29	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 14:29	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 14:29	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 14:29	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 14:29	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 14:29	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 14:29	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 14:29	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 14:29	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 14:29	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 14:29	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 14:29	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			04/14/23 14:29	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 14:29	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 14:29	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 14:29	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 14:29	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 14:29	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 14:29	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 14:29	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 14:29	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 14:29	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 14:29	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 14:29	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 14:29	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 14:29	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 14:29	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 14:29	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 14:29	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 14:29	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 14:29	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 14:29	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 14:29	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 14:29	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 14:29	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 14:29	1

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Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
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Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-5R

Lab Sample ID: 310-253550-2

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	118		80 - 128		04/14/23 14:29	1
Toluene-d8 (Surr)	97		80 - 120		04/14/23 14:29	1
4-Bromofluorobenzene (Surr)	99		80 - 120		04/14/23 14:29	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200	0.00100	mg/L		04/17/23 09:40	04/20/23 17:45	1
Arsenic	0.00288		0.00200	0.000530	mg/L		04/17/23 09:40	04/20/23 17:45	1
Barium	0.0750		0.00200	0.000640	mg/L		04/17/23 09:40	04/20/23 17:45	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		04/17/23 09:40	04/20/23 17:45	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		04/17/23 09:40	04/20/23 17:45	1
Chromium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:45	1
Cobalt	0.00401		0.000500	0.000170	mg/L		04/17/23 09:40	04/20/23 17:45	1
Copper	<0.00500		0.00500	0.00180	mg/L		04/17/23 09:40	04/20/23 17:45	1
Lead	<0.000500		0.000500	0.000240	mg/L		04/17/23 09:40	04/20/23 17:45	1
Nickel	0.00876		0.00500	0.00190	mg/L		04/17/23 09:40	04/20/23 17:45	1
Selenium	<0.00500		0.00500	0.00140	mg/L		04/17/23 09:40	04/20/23 17:45	1
Silver	<0.00100		0.00100	0.000500	mg/L		04/17/23 09:40	04/20/23 17:45	1
Thallium	<0.00100		0.00100	0.000260	mg/L		04/17/23 09:40	04/20/23 17:45	1
Vanadium	0.00119 J		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:45	1
Zinc	<0.0200		0.0200	0.00640	mg/L		04/17/23 09:40	04/20/23 17:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	3.25		1.88	0.638	mg/L			04/14/23 15:11	1

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-7

Lab Sample ID: 310-253550-3

Date Collected: 04/11/23 17:23

Matrix: Water

Date Received: 04/13/23 16:05

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 14:52	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 14:52	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 14:52	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 14:52	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 14:52	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 14:52	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 14:52	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 14:52	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 14:52	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 14:52	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 14:52	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 14:52	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 14:52	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 14:52	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 14:52	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 14:52	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 14:52	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 14:52	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 14:52	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 14:52	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 14:52	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 14:52	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 14:52	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			04/14/23 14:52	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 14:52	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 14:52	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 14:52	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 14:52	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 14:52	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 14:52	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 14:52	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 14:52	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 14:52	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 14:52	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 14:52	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 14:52	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 14:52	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 14:52	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 14:52	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 14:52	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 14:52	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 14:52	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 14:52	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 14:52	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 14:52	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 14:52	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 14:52	1

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Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-7

Lab Sample ID: 310-253550-3

Date Collected: 04/11/23 17:23

Matrix: Water

Date Received: 04/13/23 16:05

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	117		80 - 128		04/14/23 14:52	1
Toluene-d8 (Surr)	95		80 - 120		04/14/23 14:52	1
4-Bromofluorobenzene (Surr)	101		80 - 120		04/14/23 14:52	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200	0.00100	mg/L		04/17/23 09:40	04/20/23 17:47	1
Arsenic	<0.00200		0.00200	0.000530	mg/L		04/17/23 09:40	04/20/23 17:47	1
Barium	0.0118		0.00200	0.000640	mg/L		04/17/23 09:40	04/20/23 17:47	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		04/17/23 09:40	04/20/23 17:47	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		04/17/23 09:40	04/20/23 17:47	1
Chromium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:47	1
Cobalt	<0.000500		0.000500	0.000170	mg/L		04/17/23 09:40	04/20/23 17:47	1
Copper	<0.00500		0.00500	0.00180	mg/L		04/17/23 09:40	04/20/23 17:47	1
Lead	<0.000500		0.000500	0.000240	mg/L		04/17/23 09:40	04/20/23 17:47	1
Nickel	<0.00500		0.00500	0.00190	mg/L		04/17/23 09:40	04/20/23 17:47	1
Selenium	<0.00500		0.00500	0.00140	mg/L		04/17/23 09:40	04/20/23 17:47	1
Silver	<0.00100		0.00100	0.000500	mg/L		04/17/23 09:40	04/20/23 17:47	1
Thallium	<0.00100		0.00100	0.000260	mg/L		04/17/23 09:40	04/20/23 17:47	1
Vanadium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:47	1
Zinc	<0.0200		0.0200	0.00640	mg/L		04/17/23 09:40	04/20/23 17:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<1.88		1.88	0.638	mg/L			04/14/23 15:11	1

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-D

Lab Sample ID: 310-253550-4

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 15:14	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 15:14	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 15:14	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 15:14	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 15:14	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 15:14	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 15:14	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 15:14	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 15:14	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 15:14	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 15:14	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 15:14	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 15:14	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 15:14	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 15:14	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 15:14	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 15:14	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 15:14	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 15:14	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 15:14	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 15:14	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 15:14	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 15:14	1
Carbon disulfide	0.545 J		1.00	0.450	ug/L			04/14/23 15:14	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 15:14	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 15:14	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 15:14	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 15:14	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 15:14	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 15:14	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 15:14	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 15:14	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 15:14	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 15:14	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 15:14	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 15:14	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 15:14	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 15:14	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 15:14	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 15:14	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 15:14	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 15:14	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 15:14	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 15:14	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 15:14	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 15:14	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 15:14	1

Eurofins Cedar Falls

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: MW-D

Lab Sample ID: 310-253550-4

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	121		80 - 128		04/14/23 15:14	1
Toluene-d8 (Surr)	96		80 - 120		04/14/23 15:14	1
4-Bromofluorobenzene (Surr)	100		80 - 120		04/14/23 15:14	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200	0.00100	mg/L		04/17/23 09:40	04/20/23 17:53	1
Arsenic	0.00298		0.00200	0.000530	mg/L		04/17/23 09:40	04/20/23 17:53	1
Barium	0.0746		0.00200	0.000640	mg/L		04/17/23 09:40	04/20/23 17:53	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		04/17/23 09:40	04/20/23 17:53	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		04/17/23 09:40	04/20/23 17:53	1
Chromium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:53	1
Cobalt	0.00405		0.000500	0.000170	mg/L		04/17/23 09:40	04/20/23 17:53	1
Copper	<0.00500		0.00500	0.00180	mg/L		04/17/23 09:40	04/20/23 17:53	1
Lead	<0.000500		0.000500	0.000240	mg/L		04/17/23 09:40	04/20/23 17:53	1
Nickel	0.00879		0.00500	0.00190	mg/L		04/17/23 09:40	04/20/23 17:53	1
Selenium	<0.00500		0.00500	0.00140	mg/L		04/17/23 09:40	04/20/23 17:53	1
Silver	<0.00100		0.00100	0.000500	mg/L		04/17/23 09:40	04/20/23 17:53	1
Thallium	<0.00100		0.00100	0.000260	mg/L		04/17/23 09:40	04/20/23 17:53	1
Vanadium	0.00122 J		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 17:53	1
Zinc	<0.0200		0.0200	0.00640	mg/L		04/17/23 09:40	04/20/23 17:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	6.00		1.88	0.638	mg/L			04/14/23 15:11	1

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: Trip Blank

Lab Sample ID: 310-253550-5

Date Collected: 04/11/23 00:00

Matrix: Water

Date Received: 04/13/23 16:05

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 13:21	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 13:21	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 13:21	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 13:21	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 13:21	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 13:21	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 13:21	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 13:21	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 13:21	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 13:21	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 13:21	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 13:21	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 13:21	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 13:21	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 13:21	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 13:21	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 13:21	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 13:21	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 13:21	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 13:21	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 13:21	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 13:21	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 13:21	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			04/14/23 13:21	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 13:21	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 13:21	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 13:21	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 13:21	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 13:21	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 13:21	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 13:21	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 13:21	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 13:21	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 13:21	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 13:21	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 13:21	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 13:21	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 13:21	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 13:21	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 13:21	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 13:21	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 13:21	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 13:21	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 13:21	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 13:21	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 13:21	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 13:21	1

Eurofins Cedar Falls

Client Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Client Sample ID: Trip Blank

Lab Sample ID: 310-253550-5

Date Collected: 04/11/23 00:00

Matrix: Water

Date Received: 04/13/23 16:05

<i>Surrogate</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Dibromofluoromethane (Surr)</i>	117		80 - 128		04/14/23 13:21	1
<i>Toluene-d8 (Surr)</i>	96		80 - 120		04/14/23 13:21	1
<i>4-Bromofluorobenzene (Surr)</i>	102		80 - 120		04/14/23 13:21	1

Definitions/Glossary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
SQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DBFM (80-128)	TOL (80-120)	BFB (80-120)
310-253550-1	MW-2R	117	96	101
310-253550-2	MW-5R	118	97	99
310-253550-3	MW-7	117	95	101
310-253550-4	MW-D	121	96	100
310-253550-5	Trip Blank	117	96	102
LCS 310-384348/6	Lab Control Sample	100	96	97
LCS 310-384348/7	Lab Control Sample	117	95	101
MB 310-384348/5	Method Blank	115	96	101

Surrogate Legend

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

BFB = 4-Bromofluorobenzene (Surr)

QC Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-384348/5

Matrix: Water

Analysis Batch: 384348

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			04/14/23 12:13	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			04/14/23 12:13	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			04/14/23 12:13	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			04/14/23 12:13	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			04/14/23 12:13	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			04/14/23 12:13	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			04/14/23 12:13	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			04/14/23 12:13	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			04/14/23 12:13	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			04/14/23 12:13	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			04/14/23 12:13	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			04/14/23 12:13	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			04/14/23 12:13	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			04/14/23 12:13	1
2-Hexanone	<10.0		10.0	2.00	ug/L			04/14/23 12:13	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			04/14/23 12:13	1
Acetone	<10.0		10.0	3.10	ug/L			04/14/23 12:13	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			04/14/23 12:13	1
Benzene	<0.500		0.500	0.220	ug/L			04/14/23 12:13	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			04/14/23 12:13	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			04/14/23 12:13	1
Bromoform	<5.00		5.00	0.780	ug/L			04/14/23 12:13	1
Bromomethane	<4.00		4.00	1.10	ug/L			04/14/23 12:13	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			04/14/23 12:13	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			04/14/23 12:13	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			04/14/23 12:13	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			04/14/23 12:13	1
Chloroethane	<4.00		4.00	0.790	ug/L			04/14/23 12:13	1
Chloroform	<3.00		3.00	1.30	ug/L			04/14/23 12:13	1
Chloromethane	<3.00		3.00	0.610	ug/L			04/14/23 12:13	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			04/14/23 12:13	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			04/14/23 12:13	1
Dibromomethane	<1.00		1.00	0.330	ug/L			04/14/23 12:13	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			04/14/23 12:13	1
Iodomethane	<10.0		10.0	7.00	ug/L			04/14/23 12:13	1
Methylene chloride	<5.00		5.00	1.70	ug/L			04/14/23 12:13	1
Styrene	<1.00		1.00	0.370	ug/L			04/14/23 12:13	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			04/14/23 12:13	1
Toluene	<1.00		1.00	0.430	ug/L			04/14/23 12:13	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			04/14/23 12:13	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			04/14/23 12:13	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			04/14/23 12:13	1
Trichloroethene	<1.00		1.00	0.430	ug/L			04/14/23 12:13	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			04/14/23 12:13	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			04/14/23 12:13	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			04/14/23 12:13	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			04/14/23 12:13	1

Eurofins Cedar Falls

QC Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 310-384348/5

Matrix: Water

Analysis Batch: 384348

Client Sample ID: Method Blank

Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	115		80 - 128		04/14/23 12:13	1
Toluene-d8 (Surr)	96		80 - 120		04/14/23 12:13	1
4-Bromofluorobenzene (Surr)	101		80 - 120		04/14/23 12:13	1

Lab Sample ID: LCS 310-384348/6

Matrix: Water

Analysis Batch: 384348

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	20.0	18.13		ug/L		91	68 - 123
1,1,1-Trichloroethane	20.0	21.23		ug/L		106	71 - 128
1,1,2,2-Tetrachloroethane	20.0	18.37		ug/L		92	64 - 124
1,1,2-Trichloroethane	20.0	19.75		ug/L		99	70 - 124
1,1-Dichloroethane	20.0	21.41		ug/L		107	71 - 123
1,1-Dichloroethene	20.0	21.75		ug/L		109	61 - 129
1,2,3-Trichloropropane	20.0	17.64		ug/L		88	64 - 125
1,2-Dibromo-3-chloropropane	20.0	15.69		ug/L		78	50 - 150
1,2-Dibromoethane (EDB)	20.0	20.09		ug/L		100	73 - 125
1,2-Dichlorobenzene	20.0	18.06		ug/L		90	68 - 120
1,2-Dichloroethane	20.0	20.95		ug/L		105	70 - 124
1,2-Dichloropropane	20.0	21.95		ug/L		110	73 - 121
1,4-Dichlorobenzene	20.0	18.39		ug/L		92	67 - 120
2-Butanone (MEK)	40.0	39.08		ug/L		98	50 - 150
2-Hexanone	40.0	36.58		ug/L		91	60 - 132
4-Methyl-2-pentanone (MIBK)	40.0	37.27		ug/L		93	62 - 130
Acetone	40.0	33.10		ug/L		83	50 - 150
Acrylonitrile	200	226.9		ug/L		113	50 - 150
Benzene	20.0	21.82		ug/L		109	73 - 122
Bromochloromethane	20.0	21.69		ug/L		108	68 - 132
Bromodichloromethane	20.0	19.86		ug/L		99	72 - 121
Bromoform	20.0	17.16		ug/L		86	55 - 129
Carbon disulfide	20.0	20.91		ug/L		105	58 - 131
Carbon tetrachloride	20.0	21.83		ug/L		109	67 - 132
Chlorobenzene	20.0	19.84		ug/L		99	69 - 121
Chlorodibromomethane	20.0	18.84		ug/L		94	69 - 122
Chloroform	20.0	20.76		ug/L		104	72 - 120
cis-1,2-Dichloroethene	20.0	21.88		ug/L		109	74 - 120
cis-1,3-Dichloropropene	20.0	19.77		ug/L		99	71 - 126
Dibromomethane	20.0	21.41		ug/L		107	72 - 123
Ethylbenzene	20.0	20.67		ug/L		103	69 - 122
Iodomethane	20.0	11.85		ug/L		59	10 - 150
Methylene chloride	20.0	21.34		ug/L		107	50 - 150
Styrene	20.0	20.08		ug/L		100	67 - 125
Tetrachloroethene	20.0	20.85		ug/L		104	69 - 131
Toluene	20.0	20.35		ug/L		102	72 - 121
trans-1,2-Dichloroethene	20.0	22.16		ug/L		111	68 - 125
trans-1,3-Dichloropropene	20.0	20.11		ug/L		101	68 - 124

Eurofins Cedar Falls

QC Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-384348/6

Matrix: Water

Analysis Batch: 384348

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec
	Added	Result	Qualifier				Limits
trans-1,4-Dichloro-2-butene	20.0	15.99		ug/L		80	48 - 150
Trichloroethene	20.0	21.66		ug/L		108	73 - 126
Vinyl acetate	40.0	41.48		ug/L		104	50 - 150
Xylenes, Total	40.0	40.41		ug/L		101	68 - 124

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
Dibromofluoromethane (Surr)	100		80 - 128
Toluene-d8 (Surr)	96		80 - 120
4-Bromofluorobenzene (Surr)	97		80 - 120

Lab Sample ID: LCS 310-384348/7

Matrix: Water

Analysis Batch: 384348

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec
	Added	Result	Qualifier				Limits
Bromomethane	20.0	15.58		ug/L		78	24 - 150
Chloroethane	20.0	19.79		ug/L		99	51 - 137
Chloromethane	20.0	13.66		ug/L		68	37 - 150
Trichlorofluoromethane	20.0	23.42		ug/L		117	56 - 144
Vinyl chloride	20.0	20.07		ug/L		100	57 - 136

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
Dibromofluoromethane (Surr)	117		80 - 128
Toluene-d8 (Surr)	95		80 - 120
4-Bromofluorobenzene (Surr)	101		80 - 120

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-384383/1-A

Matrix: Water

Analysis Batch: 385075

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 384383

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Antimony	<0.00200		0.00200	0.00100	mg/L		04/17/23 09:40	04/20/23 16:49	1
Arsenic	<0.00200		0.00200	0.000530	mg/L		04/17/23 09:40	04/20/23 16:49	1
Barium	<0.00200		0.00200	0.000640	mg/L		04/17/23 09:40	04/20/23 16:49	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		04/17/23 09:40	04/20/23 16:49	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		04/17/23 09:40	04/20/23 16:49	1
Chromium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 16:49	1
Cobalt	<0.000500		0.000500	0.000170	mg/L		04/17/23 09:40	04/20/23 16:49	1
Copper	<0.00500		0.00500	0.00180	mg/L		04/17/23 09:40	04/20/23 16:49	1
Lead	<0.000500		0.000500	0.000240	mg/L		04/17/23 09:40	04/20/23 16:49	1
Nickel	<0.00500		0.00500	0.00190	mg/L		04/17/23 09:40	04/20/23 16:49	1
Selenium	<0.00500		0.00500	0.00140	mg/L		04/17/23 09:40	04/20/23 16:49	1
Silver	<0.00100		0.00100	0.000500	mg/L		04/17/23 09:40	04/20/23 16:49	1
Thallium	<0.00100		0.00100	0.000260	mg/L		04/17/23 09:40	04/20/23 16:49	1
Vanadium	<0.00500		0.00500	0.00110	mg/L		04/17/23 09:40	04/20/23 16:49	1

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QC Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 310-384383/1-A

Matrix: Water

Analysis Batch: 385075

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 384383

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	<0.0200		0.0200	0.00640	mg/L		04/17/23 09:40	04/20/23 16:49	1

Lab Sample ID: LCS 310-384383/2-A

Matrix: Water

Analysis Batch: 385075

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 384383

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.200	0.2349		mg/L		117	80 - 120
Arsenic	0.200	0.2094		mg/L		105	80 - 120
Barium	0.100	0.1056		mg/L		106	80 - 120
Beryllium	0.100	0.1052		mg/L		105	80 - 120
Cadmium	0.100	0.1020		mg/L		102	80 - 120
Chromium	0.100	0.09792		mg/L		98	80 - 120
Cobalt	0.100	0.1102		mg/L		110	80 - 120
Copper	0.200	0.2247		mg/L		112	80 - 120
Lead	0.200	0.2077		mg/L		104	80 - 120
Nickel	0.200	0.2132		mg/L		107	80 - 120
Selenium	0.400	0.4006		mg/L		100	80 - 120
Silver	0.100	0.1131		mg/L		113	80 - 120
Thallium	0.200	0.1607		mg/L		80	80 - 120
Vanadium	0.100	0.09600		mg/L		96	80 - 120
Zinc	0.200	0.2026		mg/L		101	80 - 120

Lab Sample ID: 310-253550-3 DU

Matrix: Water

Analysis Batch: 385075

Client Sample ID: MW-7

Prep Type: Total/NA

Prep Batch: 384383

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Antimony	<0.00200		<0.00200		mg/L		NC	20
Arsenic	<0.00200		<0.00200		mg/L		NC	20
Barium	0.0118		0.01212		mg/L		3	20
Beryllium	<0.00100		<0.00100		mg/L		NC	20
Cadmium	<0.000200		<0.000200		mg/L		NC	20
Chromium	<0.00500		<0.00500		mg/L		NC	20
Cobalt	<0.000500		<0.000500		mg/L		NC	20
Copper	<0.00500		<0.00500		mg/L		NC	20
Lead	<0.000500		<0.000500		mg/L		NC	20
Nickel	<0.00500		<0.00500		mg/L		NC	20
Selenium	<0.00500		<0.00500		mg/L		NC	20
Silver	<0.00100		<0.00100		mg/L		NC	20
Thallium	<0.00100		<0.00100		mg/L		NC	20
Vanadium	<0.00500		<0.00500		mg/L		NC	20
Zinc	<0.0200		<0.0200		mg/L		NC	20

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QC Sample Results

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-384382/1
Matrix: Water
Analysis Batch: 384382

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00	1.70	mg/L			04/14/23 15:11	1

Lab Sample ID: LCS 310-384382/2
Matrix: Water
Analysis Batch: 384382

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	96.00		mg/L		96	75 - 116

QC Association Summary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

GC/MS VOA

Analysis Batch: 384348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-253550-1	MW-2R	Total/NA	Water	8260D	
310-253550-2	MW-5R	Total/NA	Water	8260D	
310-253550-3	MW-7	Total/NA	Water	8260D	
310-253550-4	MW-D	Total/NA	Water	8260D	
310-253550-5	Trip Blank	Total/NA	Water	8260D	
MB 310-384348/5	Method Blank	Total/NA	Water	8260D	
LCS 310-384348/6	Lab Control Sample	Total/NA	Water	8260D	
LCS 310-384348/7	Lab Control Sample	Total/NA	Water	8260D	

Metals

Prep Batch: 384383

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-253550-1	MW-2R	Total/NA	Water	3005A	
310-253550-2	MW-5R	Total/NA	Water	3005A	
310-253550-3	MW-7	Total/NA	Water	3005A	
310-253550-4	MW-D	Total/NA	Water	3005A	
MB 310-384383/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-384383/2-A	Lab Control Sample	Total/NA	Water	3005A	
310-253550-3 DU	MW-7	Total/NA	Water	3005A	

Analysis Batch: 385075

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-253550-1	MW-2R	Total/NA	Water	6020B	384383
310-253550-2	MW-5R	Total/NA	Water	6020B	384383
310-253550-3	MW-7	Total/NA	Water	6020B	384383
310-253550-4	MW-D	Total/NA	Water	6020B	384383
MB 310-384383/1-A	Method Blank	Total/NA	Water	6020B	384383
LCS 310-384383/2-A	Lab Control Sample	Total/NA	Water	6020B	384383
310-253550-3 DU	MW-7	Total/NA	Water	6020B	384383

General Chemistry

Analysis Batch: 384382

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-253550-1	MW-2R	Total/NA	Water	I-3765-85	
310-253550-2	MW-5R	Total/NA	Water	I-3765-85	
310-253550-3	MW-7	Total/NA	Water	I-3765-85	
310-253550-4	MW-D	Total/NA	Water	I-3765-85	
MB 310-384382/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-384382/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Lab Chronicle

Client: SCS Engineers
 Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
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Job ID: 310-253550-1
 SDG: 27223170

Client Sample ID: MW-2R

Lab Sample ID: 310-253550-1

Date Collected: 04/11/23 15:44

Matrix: Water

Date Received: 04/13/23 16:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	384348	FE5V	EET CF	04/14/23 14:07
Total/NA	Prep	3005A			384383	DHM5	EET CF	04/17/23 09:40
Total/NA	Analysis	6020B		1	385075	ZRI4	EET CF	04/20/23 17:42
Total/NA	Analysis	I-3765-85		1	384382	A4XP	EET CF	04/14/23 15:11

Client Sample ID: MW-5R

Lab Sample ID: 310-253550-2

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	384348	FE5V	EET CF	04/14/23 14:29
Total/NA	Prep	3005A			384383	DHM5	EET CF	04/17/23 09:40
Total/NA	Analysis	6020B		1	385075	ZRI4	EET CF	04/20/23 17:45
Total/NA	Analysis	I-3765-85		1	384382	A4XP	EET CF	04/14/23 15:11

Client Sample ID: MW-7

Lab Sample ID: 310-253550-3

Date Collected: 04/11/23 17:23

Matrix: Water

Date Received: 04/13/23 16:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	384348	FE5V	EET CF	04/14/23 14:52
Total/NA	Prep	3005A			384383	DHM5	EET CF	04/17/23 09:40
Total/NA	Analysis	6020B		1	385075	ZRI4	EET CF	04/20/23 17:47
Total/NA	Analysis	I-3765-85		1	384382	A4XP	EET CF	04/14/23 15:11

Client Sample ID: MW-D

Lab Sample ID: 310-253550-4

Date Collected: 04/11/23 14:12

Matrix: Water

Date Received: 04/13/23 16:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	384348	FE5V	EET CF	04/14/23 15:14
Total/NA	Prep	3005A			384383	DHM5	EET CF	04/17/23 09:40
Total/NA	Analysis	6020B		1	385075	ZRI4	EET CF	04/20/23 17:53
Total/NA	Analysis	I-3765-85		1	384382	A4XP	EET CF	04/14/23 15:11

Client Sample ID: Trip Blank

Lab Sample ID: 310-253550-5

Date Collected: 04/11/23 00:00

Matrix: Water

Date Received: 04/13/23 16:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	384348	FE5V	EET CF	04/14/23 13:21

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Eurofins Cedar Falls

Accreditation/Certification Summary

Client: SCS Engineers
Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual
Samp

Job ID: 310-253550-1
SDG: 27223170

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-23

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Method Summary

Client: SCS Engineers

Project/Site: Hawarden C&D Landfill - 1st 2023 Semi Annual

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Job ID: 310-253550-1

SDG: 27223170

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

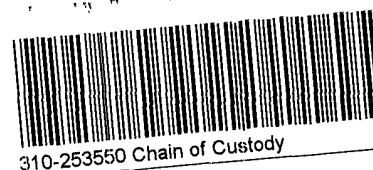
USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

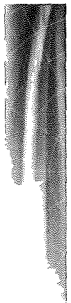


Environment Testing
America



Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>SCS</u>			
City/State:	CITY	STATE	Project:
		<u>IA</u>	
Receipt Information			
Date/Time Received:	DATE	TIME	Received By:
	<u>4/13/23</u>	<u>1605</u>	<u>ST</u>
Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee			
☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler? ☒ Yes ☐ No If yes: Cooler ID: _____			
Multiple Coolers? ☐ Yes ☒ No If yes: Cooler # _____ of _____			
Cooler Custody Seals Present? ☐ Yes ☒ No If yes: Cooler custody seals intact? ☐ Yes ☐ No			
Sample Custody Seals Present? ☐ Yes ☒ No If yes: Sample custody seals intact? ☐ Yes ☐ No			
Trip Blank Present? ☒ Yes ☐ No If yes: Which VOA samples are in cooler? ↓			
<u>ALL</u>			
Temperature Record			
Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other: _____ ☐ NONE			
Thermometer ID: <u>R</u>		Correction Factor (°C): <u>+0.2</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>3.6</u>		Corrected Temp (°C): <u>3.8</u>	
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>		<u>CONTAINER 2</u>
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No			
a) If yes: Is there evidence that the chilling process began? ☐ Yes ☐ No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			



TestAmerica

3019 Venture Way
Cedar Falls, Iowa 50613

319 277 2401 (phone)

SCS ENGINEERS

REPORT TO: Bert Madison
 NAME: SCS Engineers
 COMPANY NAME: Hawarden C&D Landfill 1st 2023 Semi-Annual Sampling
 PROJECT NAME: 2723170
 PROJECT NUMBER: 1690 All State Ct. Ste 100
 ADDRESS: West Des Moines, IA 50265

SAMPLER: SCS ENGINEERS
 SITE NAME: City of Hawarden Landfill
 ADDRESS: 1690 All State Ct. Ste 100
 CITY/STATE/ZIP: West Des Moines, IA 50265
 TELEPHONE NUMBER: 319 277 2401
 FAX:
 SAMPLED BY (PRINT NAME): Scott Holter
 SIGNATURE: [Signature]

CITY/STATE/ZIP West Des Moines, IA 50265										Analyze for															
PRESERVATION										MATRIX															
Sample ID	# of Containers Ordered	Date Sampled	Time Sampled	# of Containers Shipped	Grab	Composite	Field Filtered	Ice	H ₂ O, (Red & White Label)	HCl (Blue & White Label)	MCH (Orange & White Label)	H ₂ O, Plastic (Yellow & White Label)	H ₂ O, Glass (Yellow & White Label)	None (Black & White Label)	Trip Blank	Groundwater	Waterwater	Drinking Water	Sludge	Soil	Trip Blank	Appendix I	Total Suspended Solids	Trip Blank	As Results
MW-1R		7/11	14:12	X																		X			
MW-2R		7/11	17:27	X																		X			
MW-3R		7/11	17:27	X																		X			
MW-4R		7/11	17:27	X																		X			
MW-5R		7/11	17:27	X																		X			
MW-7		7/11	17:27	X																		X			
MW-D		7/11	17:27	X																		X			
Trip Blank															X										
Shipped Via	Shipped Via																								
Comments	Comments																								

Red by ST
4/13/23 1005



Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-253550-1

SDG Number: 27223170

Login Number: 253550

List Number: 1

Creator: Homolar, Dana J

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

PREPARED FOR

Attn: Tom Kane
City of Hawarden
1150 Central Ave
Hawarden, Iowa 51023
Generated 10/13/2023 2:24:49 PM

JOB DESCRIPTION

City of Hawarden

JOB NUMBER

310-266708-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Generated
10/13/2023 2:24:49 PM

Authorized for release by
Meredith Liechti, Service Center Manager
meredith.liechti@et.eurofinsus.com
(319)277-2401

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Case Narrative

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Job ID: 310-266708-1

Laboratory: Eurofins Cedar Falls

Narrative

Job Narrative 310-266708-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method. Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 10/6/2023 4:15 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 0.6°C

GC/MS VOA

Method 8260D: The following sample was collected in a properly preserved vial; however, the pH was outside the required criteria when verified by the laboratory. The sample was analyzed within the 7-day holding time specified for unpreserved samples: MW-4R (310-266708-1).

Method 8260D: The continuing calibration verification (CCV) associated with batch 310-401891 recovered outside of the control limits for Trichlorofluoromethane (-20.9%D). The LCS associated with this CCV passed CCV criteria for the affected analyte; therefore, the data have been reported. The associated sample is impacted: (CCV 310-401891/4).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

Method 6020B: The laboratory control sample (LCS) for preparation batch 310-401969 and analytical batch 310-402306 recovered outside control limits for the following analytes: Antimony. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Sample Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-266708-1	MW-4R	Water	10/04/23 18:50	10/06/23 16:15
310-266708-2	MW-5R	Water	10/04/23 09:50	10/06/23 16:15
310-266708-3	MW-7	Water	10/04/23 10:36	10/06/23 16:15
310-266708-4	MW-D	Water	10/04/23 10:36	10/06/23 16:15
310-266708-5	Trip Blank	Water	10/04/23 00:00	10/06/23 16:15

Detection Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-4R

Lab Sample ID: 310-266708-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
1,1,1-Trichloroethane	0.242	J	1.00	0.190	ug/L	1			8260D	Total/NA
Arsenic	0.00732		0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0275		0.00200	0.000640	mg/L	1			6020B	Total/NA
Beryllium	0.000979	J	0.00100	0.000330	mg/L	1			6020B	Total/NA
Cadmium	0.000582		0.000200	0.000100	mg/L	1			6020B	Total/NA
Chromium	0.00717		0.00500	0.00110	mg/L	1			6020B	Total/NA
Cobalt	0.00715		0.000500	0.000170	mg/L	1			6020B	Total/NA
Copper	0.0491		0.00500	0.00180	mg/L	1			6020B	Total/NA
Lead	0.0173		0.000500	0.000240	mg/L	1			6020B	Total/NA
Nickel	0.0210		0.00500	0.00190	mg/L	1			6020B	Total/NA
Selenium	0.0201		0.00500	0.00140	mg/L	1			6020B	Total/NA
Thallium	0.000266	J	0.00100	0.000260	mg/L	1			6020B	Total/NA
Vanadium	0.0215		0.00500	0.00110	mg/L	1			6020B	Total/NA
Zinc	0.0556		0.0200	0.00640	mg/L	1			6020B	Total/NA
Total Suspended Solids	3470		60.0	20.4	mg/L	1			I-3765-85	Total/NA

Client Sample ID: MW-5R

Lab Sample ID: 310-266708-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Arsenic	0.00265		0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0392		0.00200	0.000640	mg/L	1			6020B	Total/NA
Cobalt	0.00225		0.000500	0.000170	mg/L	1			6020B	Total/NA
Lead	0.000574		0.000500	0.000240	mg/L	1			6020B	Total/NA
Nickel	0.00489	J	0.00500	0.00190	mg/L	1			6020B	Total/NA
Vanadium	0.00269	J	0.00500	0.00110	mg/L	1			6020B	Total/NA
Total Suspended Solids	33.1		1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: MW-7

Lab Sample ID: 310-266708-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Arsenic	0.000599	J	0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0117		0.00200	0.000640	mg/L	1			6020B	Total/NA
Total Suspended Solids	3.00		1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: MW-D

Lab Sample ID: 310-266708-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Arsenic	0.000626	J	0.00200	0.000530	mg/L	1			6020B	Total/NA
Barium	0.0118		0.00200	0.000640	mg/L	1			6020B	Total/NA
Total Suspended Solids	0.875	J	1.88	0.638	mg/L	1			I-3765-85	Total/NA

Client Sample ID: Trip Blank

Lab Sample ID: 310-266708-5

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-4R

Lab Sample ID: 310-266708-1

Date Collected: 10/04/23 18:50

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 18:09	1
1,1,1-Trichloroethane	0.242	J	1.00	0.190	ug/L			10/09/23 18:09	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 18:09	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 18:09	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 18:09	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 18:09	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 18:09	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 18:09	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 18:09	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 18:09	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 18:09	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 18:09	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 18:09	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 18:09	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 18:09	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 18:09	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 18:09	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 18:09	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 18:09	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 18:09	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 18:09	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 18:09	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 18:09	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 18:09	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 18:09	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 18:09	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 18:09	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 18:09	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 18:09	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 18:09	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 18:09	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 18:09	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 18:09	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 18:09	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 18:09	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 18:09	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 18:09	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 18:09	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 18:09	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 18:09	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 18:09	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 18:09	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 18:09	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 18:09	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 18:09	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 18:09	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 18:09	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	99		80 - 128		10/09/23 18:09	1

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-4R

Lab Sample ID: 310-266708-1

Date Collected: 10/04/23 18:50

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	102		80 - 120		10/09/23 18:09	1
4-Bromofluorobenzene (Surr)	104		80 - 120		10/09/23 18:09	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200	*+	0.00200	0.00100	mg/L		10/10/23 11:00	10/11/23 17:06	1
Arsenic	0.00732		0.00200	0.000530	mg/L		10/10/23 11:00	10/11/23 17:06	1
Barium	0.0275		0.00200	0.000640	mg/L		10/10/23 11:00	10/11/23 17:06	1
Beryllium	0.000979	J	0.00100	0.000330	mg/L		10/10/23 11:00	10/11/23 17:06	1
Cadmium	0.000582		0.000200	0.000100	mg/L		10/10/23 11:00	10/11/23 17:06	1
Chromium	0.00717		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:06	1
Cobalt	0.00715		0.000500	0.000170	mg/L		10/10/23 11:00	10/11/23 17:06	1
Copper	0.0491		0.00500	0.00180	mg/L		10/10/23 11:00	10/11/23 17:06	1
Lead	0.0173		0.000500	0.000240	mg/L		10/10/23 11:00	10/11/23 17:06	1
Nickel	0.0210		0.00500	0.00190	mg/L		10/10/23 11:00	10/11/23 17:06	1
Selenium	0.0201		0.00500	0.00140	mg/L		10/10/23 11:00	10/11/23 17:06	1
Silver	<0.00100		0.00100	0.000500	mg/L		10/10/23 11:00	10/11/23 17:06	1
Thallium	0.000266	J	0.00100	0.000260	mg/L		10/10/23 11:00	10/11/23 17:06	1
Vanadium	0.0215		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:06	1
Zinc	0.0556		0.0200	0.00640	mg/L		10/10/23 11:00	10/11/23 17:06	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	3470		60.0	20.4	mg/L			10/10/23 09:56	1

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-5R

Lab Sample ID: 310-266708-2

Date Collected: 10/04/23 09:50

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 17:47	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			10/09/23 17:47	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 17:47	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 17:47	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 17:47	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 17:47	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 17:47	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 17:47	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 17:47	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 17:47	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 17:47	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 17:47	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 17:47	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 17:47	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 17:47	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 17:47	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 17:47	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 17:47	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 17:47	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 17:47	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 17:47	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 17:47	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 17:47	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 17:47	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 17:47	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 17:47	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 17:47	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 17:47	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 17:47	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 17:47	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 17:47	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 17:47	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 17:47	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 17:47	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 17:47	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 17:47	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 17:47	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 17:47	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 17:47	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 17:47	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 17:47	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 17:47	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 17:47	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 17:47	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 17:47	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 17:47	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 17:47	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	99		80 - 128		10/09/23 17:47	1

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-5R

Lab Sample ID: 310-266708-2

Date Collected: 10/04/23 09:50

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	97		80 - 120		10/09/23 17:47	1
4-Bromofluorobenzene (Surr)	103		80 - 120		10/09/23 17:47	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200	*+	0.00200	0.00100	mg/L		10/10/23 11:00	10/11/23 17:08	1
Arsenic	0.00265		0.00200	0.000530	mg/L		10/10/23 11:00	10/11/23 17:08	1
Barium	0.0392		0.00200	0.000640	mg/L		10/10/23 11:00	10/11/23 17:08	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		10/10/23 11:00	10/11/23 17:08	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		10/10/23 11:00	10/11/23 17:08	1
Chromium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:08	1
Cobalt	0.00225		0.000500	0.000170	mg/L		10/10/23 11:00	10/11/23 17:08	1
Copper	<0.00500		0.00500	0.00180	mg/L		10/10/23 11:00	10/11/23 17:08	1
Lead	0.000574		0.000500	0.000240	mg/L		10/10/23 11:00	10/11/23 17:08	1
Nickel	0.00489	J	0.00500	0.00190	mg/L		10/10/23 11:00	10/11/23 17:08	1
Selenium	<0.00500		0.00500	0.00140	mg/L		10/10/23 11:00	10/11/23 17:08	1
Silver	<0.00100		0.00100	0.000500	mg/L		10/10/23 11:00	10/11/23 17:08	1
Thallium	<0.00100		0.00100	0.000260	mg/L		10/10/23 11:00	10/11/23 17:08	1
Vanadium	0.00269	J	0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:08	1
Zinc	<0.0200		0.0200	0.00640	mg/L		10/10/23 11:00	10/11/23 17:08	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	33.1		1.88	0.638	mg/L			10/10/23 09:56	1

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-7

Lab Sample ID: 310-266708-3

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 17:04	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			10/09/23 17:04	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 17:04	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 17:04	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 17:04	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 17:04	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 17:04	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 17:04	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 17:04	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 17:04	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 17:04	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 17:04	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 17:04	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 17:04	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 17:04	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 17:04	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 17:04	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 17:04	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 17:04	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 17:04	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 17:04	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 17:04	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 17:04	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 17:04	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 17:04	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 17:04	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 17:04	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 17:04	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 17:04	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 17:04	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 17:04	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 17:04	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 17:04	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 17:04	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 17:04	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 17:04	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 17:04	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 17:04	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 17:04	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 17:04	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 17:04	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 17:04	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 17:04	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 17:04	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 17:04	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 17:04	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 17:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	97		80 - 128		10/09/23 17:04	1

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-7

Lab Sample ID: 310-266708-3

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	95		80 - 120		10/09/23 17:04	1
4-Bromofluorobenzene (Surr)	103		80 - 120		10/09/23 17:04	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200	*+	0.00200	0.00100	mg/L		10/10/23 11:00	10/11/23 17:10	1
Arsenic	0.000599	J	0.00200	0.000530	mg/L		10/10/23 11:00	10/11/23 17:10	1
Barium	0.0117		0.00200	0.000640	mg/L		10/10/23 11:00	10/11/23 17:10	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		10/10/23 11:00	10/11/23 17:10	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		10/10/23 11:00	10/11/23 17:10	1
Chromium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:10	1
Cobalt	<0.000500		0.000500	0.000170	mg/L		10/10/23 11:00	10/11/23 17:10	1
Copper	<0.00500		0.00500	0.00180	mg/L		10/10/23 11:00	10/11/23 17:10	1
Lead	<0.000500		0.000500	0.000240	mg/L		10/10/23 11:00	10/11/23 17:10	1
Nickel	<0.00500		0.00500	0.00190	mg/L		10/10/23 11:00	10/11/23 17:10	1
Selenium	<0.00500		0.00500	0.00140	mg/L		10/10/23 11:00	10/11/23 17:10	1
Silver	<0.00100		0.00100	0.000500	mg/L		10/10/23 11:00	10/11/23 17:10	1
Thallium	<0.00100		0.00100	0.000260	mg/L		10/10/23 11:00	10/11/23 17:10	1
Vanadium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:10	1
Zinc	<0.0200		0.0200	0.00640	mg/L		10/10/23 11:00	10/11/23 17:10	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	3.00		1.88	0.638	mg/L			10/10/23 09:56	1

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-D

Lab Sample ID: 310-266708-4

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 17:26	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			10/09/23 17:26	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 17:26	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 17:26	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 17:26	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 17:26	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 17:26	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 17:26	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 17:26	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 17:26	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 17:26	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 17:26	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 17:26	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 17:26	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 17:26	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 17:26	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 17:26	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 17:26	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 17:26	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 17:26	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 17:26	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 17:26	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 17:26	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 17:26	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 17:26	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 17:26	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 17:26	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 17:26	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 17:26	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 17:26	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 17:26	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 17:26	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 17:26	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 17:26	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 17:26	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 17:26	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 17:26	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 17:26	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 17:26	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 17:26	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 17:26	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 17:26	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 17:26	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 17:26	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 17:26	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 17:26	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 17:26	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	95		80 - 128		10/09/23 17:26	1

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-D

Lab Sample ID: 310-266708-4

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	95		80 - 120		10/09/23 17:26	1
4-Bromofluorobenzene (Surr)	104		80 - 120		10/09/23 17:26	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200	*+	0.00200	0.00100	mg/L		10/10/23 11:00	10/11/23 17:13	1
Arsenic	0.000626	J	0.00200	0.000530	mg/L		10/10/23 11:00	10/11/23 17:13	1
Barium	0.0118		0.00200	0.000640	mg/L		10/10/23 11:00	10/11/23 17:13	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		10/10/23 11:00	10/11/23 17:13	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		10/10/23 11:00	10/11/23 17:13	1
Chromium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:13	1
Cobalt	<0.000500		0.000500	0.000170	mg/L		10/10/23 11:00	10/11/23 17:13	1
Copper	<0.00500		0.00500	0.00180	mg/L		10/10/23 11:00	10/11/23 17:13	1
Lead	<0.000500		0.000500	0.000240	mg/L		10/10/23 11:00	10/11/23 17:13	1
Nickel	<0.00500		0.00500	0.00190	mg/L		10/10/23 11:00	10/11/23 17:13	1
Selenium	<0.00500		0.00500	0.00140	mg/L		10/10/23 11:00	10/11/23 17:13	1
Silver	<0.00100		0.00100	0.000500	mg/L		10/10/23 11:00	10/11/23 17:13	1
Thallium	<0.00100		0.00100	0.000260	mg/L		10/10/23 11:00	10/11/23 17:13	1
Vanadium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 17:13	1
Zinc	<0.0200		0.0200	0.00640	mg/L		10/10/23 11:00	10/11/23 17:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	0.875	J	1.88	0.638	mg/L			10/10/23 09:56	1

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-266708-5

Date Collected: 10/04/23 00:00

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 11:16	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			10/09/23 11:16	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 11:16	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 11:16	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 11:16	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 11:16	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 11:16	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 11:16	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 11:16	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 11:16	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 11:16	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 11:16	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 11:16	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 11:16	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 11:16	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 11:16	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 11:16	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 11:16	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 11:16	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 11:16	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 11:16	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 11:16	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 11:16	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 11:16	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 11:16	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 11:16	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 11:16	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 11:16	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 11:16	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 11:16	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 11:16	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 11:16	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 11:16	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 11:16	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 11:16	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 11:16	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 11:16	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 11:16	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 11:16	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 11:16	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 11:16	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 11:16	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 11:16	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 11:16	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 11:16	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 11:16	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 11:16	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	97		80 - 128		10/09/23 11:16	1

Eurofins Cedar Falls

Client Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-266708-5

Date Collected: 10/04/23 00:00

Matrix: Water

Date Received: 10/06/23 16:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

<i>Surrogate</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Toluene-d8 (Surr)</i>	95		80 - 120		10/09/23 11:16	1
<i>4-Bromofluorobenzene (Surr)</i>	104		80 - 120		10/09/23 11:16	1

Definitions/Glossary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		DBFM (80-128)	TOL (80-120)	BFB (80-120)
310-266708-1	MW-4R	99	102	104
310-266708-2	MW-5R	99	97	103
310-266708-3	MW-7	97	95	103
310-266708-3 MS	MW-7	95	99	101
310-266708-3 MSD	MW-7	91	100	99
310-266708-4	MW-D	95	95	104
310-266708-5	Trip Blank	97	95	104
LCS 310-401891/6	Lab Control Sample	94	100	102
LCS 310-401891/7	Lab Control Sample	99	95	104
MB 310-401891/5	Method Blank	102	96	103

Surrogate Legend

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

BFB = 4-Bromofluorobenzene (Surr)

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-401891/5

Matrix: Water

Analysis Batch: 401891

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	<1.00		1.00	0.380	ug/L			10/09/23 10:10	1
1,1,1-Trichloroethane	<1.00		1.00	0.190	ug/L			10/09/23 10:10	1
1,1,2,2-Tetrachloroethane	<1.00		1.00	0.470	ug/L			10/09/23 10:10	1
1,1,2-Trichloroethane	<1.00		1.00	0.450	ug/L			10/09/23 10:10	1
1,1-Dichloroethane	<1.00		1.00	0.220	ug/L			10/09/23 10:10	1
1,1-Dichloroethene	<2.00		2.00	0.560	ug/L			10/09/23 10:10	1
1,2,3-Trichloropropane	<1.00		1.00	0.590	ug/L			10/09/23 10:10	1
1,2-Dibromo-3-chloropropane	<5.00		5.00	1.20	ug/L			10/09/23 10:10	1
1,2-Dibromoethane (EDB)	<1.00		1.00	0.340	ug/L			10/09/23 10:10	1
1,2-Dichlorobenzene	<1.00		1.00	0.370	ug/L			10/09/23 10:10	1
1,2-Dichloroethane	<1.00		1.00	0.390	ug/L			10/09/23 10:10	1
1,2-Dichloropropane	<1.00		1.00	0.270	ug/L			10/09/23 10:10	1
1,4-Dichlorobenzene	<1.00		1.00	0.230	ug/L			10/09/23 10:10	1
2-Butanone (MEK)	<10.0		10.0	2.10	ug/L			10/09/23 10:10	1
2-Hexanone	<10.0		10.0	2.00	ug/L			10/09/23 10:10	1
4-Methyl-2-pentanone (MIBK)	<10.0		10.0	2.10	ug/L			10/09/23 10:10	1
Acetone	<10.0		10.0	3.10	ug/L			10/09/23 10:10	1
Acrylonitrile	<5.00		5.00	2.20	ug/L			10/09/23 10:10	1
Benzene	<0.500		0.500	0.220	ug/L			10/09/23 10:10	1
Bromochloromethane	<5.00		5.00	0.540	ug/L			10/09/23 10:10	1
Bromodichloromethane	<1.00		1.00	0.390	ug/L			10/09/23 10:10	1
Bromoform	<5.00		5.00	0.780	ug/L			10/09/23 10:10	1
Bromomethane	<4.00		4.00	1.10	ug/L			10/09/23 10:10	1
Carbon disulfide	<1.00		1.00	0.450	ug/L			10/09/23 10:10	1
Carbon tetrachloride	<2.00		2.00	0.650	ug/L			10/09/23 10:10	1
Chlorobenzene	<1.00		1.00	0.400	ug/L			10/09/23 10:10	1
Chlorodibromomethane	<5.00		5.00	0.750	ug/L			10/09/23 10:10	1
Chloroethane	<4.00		4.00	0.790	ug/L			10/09/23 10:10	1
Chloroform	<3.00		3.00	1.30	ug/L			10/09/23 10:10	1
Chloromethane	<3.00		3.00	0.610	ug/L			10/09/23 10:10	1
cis-1,2-Dichloroethene	<1.00		1.00	0.210	ug/L			10/09/23 10:10	1
cis-1,3-Dichloropropene	<5.00		5.00	0.250	ug/L			10/09/23 10:10	1
Dibromomethane	<1.00		1.00	0.330	ug/L			10/09/23 10:10	1
Ethylbenzene	<1.00		1.00	0.310	ug/L			10/09/23 10:10	1
Iodomethane	<10.0		10.0	7.00	ug/L			10/09/23 10:10	1
Methylene chloride	<5.00		5.00	1.70	ug/L			10/09/23 10:10	1
Styrene	<1.00		1.00	0.370	ug/L			10/09/23 10:10	1
Tetrachloroethene	<1.00		1.00	0.480	ug/L			10/09/23 10:10	1
Toluene	<1.00		1.00	0.430	ug/L			10/09/23 10:10	1
trans-1,2-Dichloroethene	<1.00		1.00	0.270	ug/L			10/09/23 10:10	1
trans-1,3-Dichloropropene	<5.00		5.00	0.560	ug/L			10/09/23 10:10	1
trans-1,4-Dichloro-2-butene	<10.0		10.0	1.10	ug/L			10/09/23 10:10	1
Trichloroethene	<1.00		1.00	0.430	ug/L			10/09/23 10:10	1
Trichlorofluoromethane	<4.00		4.00	0.380	ug/L			10/09/23 10:10	1
Vinyl acetate	<10.0		10.0	2.50	ug/L			10/09/23 10:10	1
Vinyl chloride	<1.00		1.00	0.180	ug/L			10/09/23 10:10	1
Xylenes, Total	<3.00		3.00	0.400	ug/L			10/09/23 10:10	1

Eurofins Cedar Falls

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 310-401891/5

Matrix: Water

Analysis Batch: 401891

Client Sample ID: Method Blank

Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	102		80 - 128		10/09/23 10:10	1
Toluene-d8 (Surr)	96		80 - 120		10/09/23 10:10	1
4-Bromofluorobenzene (Surr)	103		80 - 120		10/09/23 10:10	1

Lab Sample ID: LCS 310-401891/6

Matrix: Water

Analysis Batch: 401891

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	20.0	16.92		ug/L		85	68 - 123
1,1,1-Trichloroethane	20.0	18.54		ug/L		93	71 - 128
1,1,2,2-Tetrachloroethane	20.0	18.49		ug/L		92	64 - 124
1,1,2-Trichloroethane	20.0	18.64		ug/L		93	70 - 124
1,1-Dichloroethane	20.0	22.25		ug/L		111	71 - 123
1,1-Dichloroethene	20.0	20.32		ug/L		102	61 - 129
1,2,3-Trichloropropane	20.0	18.01		ug/L		90	64 - 125
1,2-Dibromo-3-chloropropane	20.0	21.72		ug/L		109	50 - 150
1,2-Dibromoethane (EDB)	20.0	18.01		ug/L		90	73 - 125
1,2-Dichlorobenzene	20.0	18.53		ug/L		93	68 - 120
1,2-Dichloroethane	20.0	18.20		ug/L		91	70 - 124
1,2-Dichloropropane	20.0	21.03		ug/L		105	73 - 121
1,4-Dichlorobenzene	20.0	18.19		ug/L		91	67 - 120
2-Butanone (MEK)	40.0	41.86		ug/L		105	50 - 150
2-Hexanone	40.0	43.57		ug/L		109	60 - 132
4-Methyl-2-pentanone (MIBK)	40.0	41.98		ug/L		105	62 - 130
Acetone	40.0	43.60		ug/L		109	50 - 150
Acrylonitrile	200	217.3		ug/L		109	50 - 150
Benzene	20.0	19.32		ug/L		97	73 - 122
Bromochloromethane	20.0	18.49		ug/L		92	68 - 132
Bromodichloromethane	20.0	18.46		ug/L		92	72 - 121
Bromoform	20.0	16.57		ug/L		83	55 - 129
Carbon disulfide	20.0	22.48		ug/L		112	58 - 131
Carbon tetrachloride	20.0	18.36		ug/L		92	67 - 132
Chlorobenzene	20.0	17.77		ug/L		89	69 - 121
Chlorodibromomethane	20.0	17.26		ug/L		86	69 - 122
Chloroform	20.0	19.08		ug/L		95	72 - 120
cis-1,2-Dichloroethene	20.0	19.17		ug/L		96	74 - 120
cis-1,3-Dichloropropene	20.0	19.51		ug/L		98	71 - 126
Dibromomethane	20.0	18.10		ug/L		90	72 - 123
Ethylbenzene	20.0	18.98		ug/L		95	69 - 122
Iodomethane	20.0	12.41		ug/L		62	10 - 150
Methylene chloride	20.0	20.82		ug/L		104	50 - 150
Styrene	20.0	18.86		ug/L		94	67 - 125
Tetrachloroethene	20.0	17.67		ug/L		88	69 - 131
Toluene	20.0	18.94		ug/L		95	72 - 121
trans-1,2-Dichloroethene	20.0	18.95		ug/L		95	68 - 125
trans-1,3-Dichloropropene	20.0	18.62		ug/L		93	68 - 124
trans-1,4-Dichloro-2-butene	20.0	20.08		ug/L		100	48 - 150

Eurofins Cedar Falls

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-401891/6

Matrix: Water

Analysis Batch: 401891

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Trichloroethene	20.0	18.88		ug/L		94	73 - 126
Vinyl acetate	40.0	39.38		ug/L		98	50 - 150
Xylenes, Total	40.0	36.74		ug/L		92	68 - 124

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Dibromofluoromethane (Surr)	94		80 - 128
Toluene-d8 (Surr)	100		80 - 120
4-Bromofluorobenzene (Surr)	102		80 - 120

Lab Sample ID: LCS 310-401891/7

Matrix: Water

Analysis Batch: 401891

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Bromomethane	20.0	14.62		ug/L		73	24 - 150
Chloroethane	20.0	18.76		ug/L		94	51 - 137
Chloromethane	20.0	23.41		ug/L		117	37 - 150
Trichlorofluoromethane	20.0	16.21		ug/L		81	56 - 144
Vinyl chloride	20.0	21.28		ug/L		106	57 - 136

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Dibromofluoromethane (Surr)	99		80 - 128
Toluene-d8 (Surr)	95		80 - 120
4-Bromofluorobenzene (Surr)	104		80 - 120

Lab Sample ID: 310-266708-3 MS

Matrix: Water

Analysis Batch: 401891

Client Sample ID: MW-7

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1,2-Tetrachloroethane	<1.00		25.0	14.96		ug/L		60	52 - 130
1,1,1,1-Trichloroethane	<1.00		25.0	15.34		ug/L		61	49 - 130
1,1,1,2,2-Tetrachloroethane	<1.00		25.0	17.49		ug/L		70	51 - 130
1,1,1,2-Trichloroethane	<1.00		25.0	17.32		ug/L		69	56 - 130
1,1-Dichloroethane	<1.00		25.0	19.71		ug/L		79	53 - 130
1,1-Dichloroethene	<2.00		25.0	16.87		ug/L		67	39 - 130
1,2,3-Trichloropropane	<1.00		25.0	16.05		ug/L		64	50 - 130
1,2-Dibromo-3-chloropropane	<5.00		25.0	17.47		ug/L		70	45 - 150
1,2-Dibromoethane (EDB)	<1.00		25.0	16.44		ug/L		66	59 - 130
1,2-Dichlorobenzene	<1.00		25.0	16.58		ug/L		66	53 - 130
1,2-Dichloroethane	<1.00		25.0	16.02		ug/L		64	57 - 130
1,2-Dichloropropane	<1.00		25.0	19.20		ug/L		77	60 - 130
1,4-Dichlorobenzene	<1.00		25.0	16.30		ug/L		65	53 - 130
2-Butanone (MEK)	<10.0		50.0	36.75		ug/L		73	47 - 150
2-Hexanone	<10.0		50.0	40.89		ug/L		82	45 - 132
4-Methyl-2-pentanone (MIBK)	<10.0		50.0	40.31		ug/L		81	46 - 132
Acetone	<10.0		50.0	38.62		ug/L		77	35 - 150
Acrylonitrile	<5.00		250	209.6		ug/L		84	50 - 150

Eurofins Cedar Falls

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-266708-3 MS

Matrix: Water

Analysis Batch: 401891

Client Sample ID: MW-7

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Benzene	<0.500		25.0	17.67		ug/L		71	47 - 130
Bromochloromethane	<5.00		25.0	17.24		ug/L		69	54 - 132
Bromodichloromethane	<1.00		25.0	16.10		ug/L		64	58 - 130
Bromoform	<5.00		25.0	13.67		ug/L		55	42 - 130
Carbon disulfide	<1.00		25.0	18.56		ug/L		74	39 - 131
Carbon tetrachloride	<2.00		25.0	14.47		ug/L		58	45 - 132
Chlorobenzene	<1.00		25.0	16.30		ug/L		65	54 - 130
Chlorodibromomethane	<5.00		25.0	14.70		ug/L		59	53 - 130
Chloroform	<3.00		25.0	16.68		ug/L		67	55 - 130
cis-1,2-Dichloroethene	<1.00		25.0	17.28		ug/L		69	52 - 130
cis-1,3-Dichloropropene	<5.00		25.0	16.73		ug/L		67	55 - 130
Dibromomethane	<1.00		25.0	16.65		ug/L		67	61 - 130
Ethylbenzene	<1.00		25.0	17.08		ug/L		68	48 - 130
Iodomethane	<10.0		25.0	14.74		ug/L		59	10 - 150
Methylene chloride	<5.00		25.0	18.85		ug/L		75	50 - 150
Styrene	<1.00		25.0	16.96		ug/L		68	46 - 130
Tetrachloroethene	<1.00		25.0	15.18		ug/L		61	42 - 131
Toluene	<1.00		25.0	17.35		ug/L		69	48 - 130
trans-1,2-Dichloroethene	<1.00		25.0	16.29		ug/L		65	54 - 130
trans-1,3-Dichloropropene	<5.00		25.0	15.96		ug/L		64	51 - 130
trans-1,4-Dichloro-2-butene	<10.0		25.0	12.83		ug/L		51	33 - 150
Trichloroethene	<1.00		25.0	16.29		ug/L		65	55 - 130
Vinyl acetate	<10.0		50.0	33.82		ug/L		68	34 - 150
Xylenes, Total	<3.00		50.0	33.80		ug/L		68	44 - 130

Surrogate	MS %Recovery	MS Qualifier	Limits
Dibromofluoromethane (Surr)	95		80 - 128
Toluene-d8 (Surr)	99		80 - 120
4-Bromofluorobenzene (Surr)	101		80 - 120

Lab Sample ID: 310-266708-3 MSD

Matrix: Water

Analysis Batch: 401891

Client Sample ID: MW-7

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	<1.00		25.0	14.71		ug/L		59	52 - 130	2	20
1,1,1-Trichloroethane	<1.00		25.0	14.36		ug/L		57	49 - 130	7	20
1,1,2,2-Tetrachloroethane	<1.00		25.0	17.03		ug/L		68	51 - 130	3	20
1,1,2-Trichloroethane	<1.00		25.0	16.59		ug/L		66	56 - 130	4	20
1,1-Dichloroethane	<1.00		25.0	18.86		ug/L		75	53 - 130	4	20
1,1-Dichloroethene	<2.00		25.0	15.42		ug/L		62	39 - 130	9	28
1,2,3-Trichloropropane	<1.00		25.0	16.10		ug/L		64	50 - 130	0	20
1,2-Dibromo-3-chloropropane	<5.00		25.0	18.02		ug/L		72	45 - 150	3	20
1,2-Dibromoethane (EDB)	<1.00		25.0	16.14		ug/L		65	59 - 130	2	20
1,2-Dichlorobenzene	<1.00		25.0	16.40		ug/L		66	53 - 130	1	20
1,2-Dichloroethane	<1.00		25.0	15.20		ug/L		61	57 - 130	5	21
1,2-Dichloropropane	<1.00		25.0	18.74		ug/L		75	60 - 130	2	31
1,4-Dichlorobenzene	<1.00		25.0	15.95		ug/L		64	53 - 130	2	20

Eurofins Cedar Falls

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-266708-3 MSD

Matrix: Water

Analysis Batch: 401891

Client Sample ID: MW-7

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
2-Butanone (MEK)	<10.0		50.0	38.05		ug/L		76	47 - 150	3	20
2-Hexanone	<10.0		50.0	40.30		ug/L		81	45 - 132	1	20
4-Methyl-2-pentanone (MIBK)	<10.0		50.0	39.93		ug/L		80	46 - 132	1	20
Acetone	<10.0		50.0	37.27		ug/L		75	35 - 150	4	26
Acrylonitrile	<5.00		250	201.8		ug/L		81	50 - 150	4	21
Benzene	<0.500		25.0	16.80		ug/L		67	47 - 130	5	20
Bromochloromethane	<5.00		25.0	16.21		ug/L		65	54 - 132	6	20
Bromodichloromethane	<1.00		25.0	15.11		ug/L		60	58 - 130	6	20
Bromoform	<5.00		25.0	13.28		ug/L		53	42 - 130	3	20
Carbon disulfide	<1.00		25.0	16.99		ug/L		68	39 - 131	9	32
Carbon tetrachloride	<2.00		25.0	13.85		ug/L		55	45 - 132	4	20
Chlorobenzene	<1.00		25.0	15.67		ug/L		63	54 - 130	4	20
Chlorodibromomethane	<5.00		25.0	14.33		ug/L		57	53 - 130	3	20
Chloroform	<3.00		25.0	15.87		ug/L		63	55 - 130	5	20
cis-1,2-Dichloroethene	<1.00		25.0	16.46		ug/L		66	52 - 130	5	20
cis-1,3-Dichloropropene	<5.00		25.0	16.40		ug/L		66	55 - 130	2	20
Dibromomethane	<1.00		25.0	15.49		ug/L		62	61 - 130	7	20
Ethylbenzene	<1.00		25.0	16.63		ug/L		67	48 - 130	3	20
Iodomethane	<10.0		25.0	16.03		ug/L		64	10 - 150	8	35
Methylene chloride	<5.00		25.0	17.95		ug/L		72	50 - 150	5	24
Styrene	<1.00		25.0	16.55		ug/L		66	46 - 130	2	20
Tetrachloroethene	<1.00		25.0	14.64		ug/L		59	42 - 131	4	20
Toluene	<1.00		25.0	16.64		ug/L		67	48 - 130	4	20
trans-1,2-Dichloroethene	<1.00		25.0	15.11		ug/L		60	54 - 130	7	24
trans-1,3-Dichloropropene	<5.00		25.0	15.39		ug/L		62	51 - 130	4	20
trans-1,4-Dichloro-2-butene	<10.0		25.0	12.66		ug/L		51	33 - 150	1	20
Trichloroethene	<1.00		25.0	15.50		ug/L		62	55 - 130	5	20
Vinyl acetate	<10.0		50.0	33.80		ug/L		68	34 - 150	0	27
Xylenes, Total	<3.00		50.0	32.86		ug/L		66	44 - 130	3	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Dibromofluoromethane (Surr)	91		80 - 128
Toluene-d8 (Surr)	100		80 - 120
4-Bromofluorobenzene (Surr)	99		80 - 120

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-401969/1-A

Matrix: Water

Analysis Batch: 402239

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 401969

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200	0.00100	mg/L		10/10/23 11:00	10/11/23 13:42	1
Arsenic	<0.00200		0.00200	0.000530	mg/L		10/10/23 11:00	10/11/23 13:42	1
Barium	<0.00200		0.00200	0.000640	mg/L		10/10/23 11:00	10/11/23 13:42	1
Beryllium	<0.00100		0.00100	0.000330	mg/L		10/10/23 11:00	10/11/23 13:42	1
Cadmium	<0.000200		0.000200	0.000100	mg/L		10/10/23 11:00	10/11/23 13:42	1
Chromium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 13:42	1
Cobalt	<0.000500		0.000500	0.000170	mg/L		10/10/23 11:00	10/11/23 13:42	1

Eurofins Cedar Falls

QC Sample Results

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 310-401969/1-A

Matrix: Water

Analysis Batch: 402239

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 401969

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	<0.00500		0.00500	0.00180	mg/L		10/10/23 11:00	10/11/23 13:42	1
Lead	<0.000500		0.000500	0.000240	mg/L		10/10/23 11:00	10/11/23 13:42	1
Nickel	<0.00500		0.00500	0.00190	mg/L		10/10/23 11:00	10/11/23 13:42	1
Selenium	<0.00500		0.00500	0.00140	mg/L		10/10/23 11:00	10/11/23 13:42	1
Silver	<0.00100		0.00100	0.000500	mg/L		10/10/23 11:00	10/11/23 13:42	1
Thallium	<0.00100		0.00100	0.000260	mg/L		10/10/23 11:00	10/11/23 13:42	1
Vanadium	<0.00500		0.00500	0.00110	mg/L		10/10/23 11:00	10/11/23 13:42	1
Zinc	<0.0200		0.0200	0.00640	mg/L		10/10/23 11:00	10/11/23 13:42	1

Lab Sample ID: LCS 310-401969/2-A

Matrix: Water

Analysis Batch: 402239

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 401969

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	0.200	0.2007		mg/L		100	80 - 120
Barium	0.100	0.1028		mg/L		103	80 - 120
Beryllium	0.100	0.1036		mg/L		104	80 - 120
Cadmium	0.100	0.1008		mg/L		101	80 - 120
Chromium	0.100	0.1033		mg/L		103	80 - 120
Cobalt	0.100	0.09847		mg/L		98	80 - 120
Copper	0.200	0.1946		mg/L		97	80 - 120
Lead	0.200	0.2073		mg/L		104	80 - 120
Nickel	0.200	0.1989		mg/L		99	80 - 120
Selenium	0.400	0.3883		mg/L		97	80 - 120
Silver	0.100	0.1001		mg/L		100	80 - 120
Thallium	0.200	0.1645		mg/L		82	80 - 120
Vanadium	0.100	0.1002		mg/L		100	80 - 120
Zinc	0.200	0.1895		mg/L		95	80 - 120

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-402039/1

Matrix: Water

Analysis Batch: 402039

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00	1.70	mg/L			10/10/23 09:56	1

Lab Sample ID: LCS 310-402039/2

Matrix: Water

Analysis Batch: 402039

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	97.00		mg/L		97	75 - 116

Eurofins Cedar Falls

QC Association Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

GC/MS VOA

Analysis Batch: 401891

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-266708-1	MW-4R	Total/NA	Water	8260D	
310-266708-2	MW-5R	Total/NA	Water	8260D	
310-266708-3	MW-7	Total/NA	Water	8260D	
310-266708-4	MW-D	Total/NA	Water	8260D	
310-266708-5	Trip Blank	Total/NA	Water	8260D	
MB 310-401891/5	Method Blank	Total/NA	Water	8260D	
LCS 310-401891/6	Lab Control Sample	Total/NA	Water	8260D	
LCS 310-401891/7	Lab Control Sample	Total/NA	Water	8260D	
310-266708-3 MS	MW-7	Total/NA	Water	8260D	
310-266708-3 MSD	MW-7	Total/NA	Water	8260D	

Metals

Prep Batch: 401969

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-266708-1	MW-4R	Total/NA	Water	3005A	
310-266708-2	MW-5R	Total/NA	Water	3005A	
310-266708-3	MW-7	Total/NA	Water	3005A	
310-266708-4	MW-D	Total/NA	Water	3005A	
MB 310-401969/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-401969/2-A	Lab Control Sample	Total/NA	Water	3005A	

Analysis Batch: 402239

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-401969/1-A	Method Blank	Total/NA	Water	6020B	401969
LCS 310-401969/2-A	Lab Control Sample	Total/NA	Water	6020B	401969

Analysis Batch: 402306

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-266708-1	MW-4R	Total/NA	Water	6020B	401969
310-266708-2	MW-5R	Total/NA	Water	6020B	401969
310-266708-3	MW-7	Total/NA	Water	6020B	401969
310-266708-4	MW-D	Total/NA	Water	6020B	401969

General Chemistry

Analysis Batch: 402039

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-266708-1	MW-4R	Total/NA	Water	I-3765-85	
310-266708-2	MW-5R	Total/NA	Water	I-3765-85	
310-266708-3	MW-7	Total/NA	Water	I-3765-85	
310-266708-4	MW-D	Total/NA	Water	I-3765-85	
MB 310-402039/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-402039/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Lab Chronicle

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Client Sample ID: MW-4R

Lab Sample ID: 310-266708-1

Date Collected: 10/04/23 18:50

Matrix: Water

Date Received: 10/06/23 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	401891	WSE8	EET CF	10/09/23 18:09
Total/NA	Prep	3005A			401969	KCK5	EET CF	10/10/23 11:00
Total/NA	Analysis	6020B		1	402306	A6US	EET CF	10/11/23 17:06
Total/NA	Analysis	I-3765-85		1	402039	DGU1	EET CF	10/10/23 09:56

Client Sample ID: MW-5R

Lab Sample ID: 310-266708-2

Date Collected: 10/04/23 09:50

Matrix: Water

Date Received: 10/06/23 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	401891	WSE8	EET CF	10/09/23 17:47
Total/NA	Prep	3005A			401969	KCK5	EET CF	10/10/23 11:00
Total/NA	Analysis	6020B		1	402306	A6US	EET CF	10/11/23 17:08
Total/NA	Analysis	I-3765-85		1	402039	DGU1	EET CF	10/10/23 09:56

Client Sample ID: MW-7

Lab Sample ID: 310-266708-3

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	401891	WSE8	EET CF	10/09/23 17:04
Total/NA	Prep	3005A			401969	KCK5	EET CF	10/10/23 11:00
Total/NA	Analysis	6020B		1	402306	A6US	EET CF	10/11/23 17:10
Total/NA	Analysis	I-3765-85		1	402039	DGU1	EET CF	10/10/23 09:56

Client Sample ID: MW-D

Lab Sample ID: 310-266708-4

Date Collected: 10/04/23 10:36

Matrix: Water

Date Received: 10/06/23 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	401891	WSE8	EET CF	10/09/23 17:26
Total/NA	Prep	3005A			401969	KCK5	EET CF	10/10/23 11:00
Total/NA	Analysis	6020B		1	402306	A6US	EET CF	10/11/23 17:13
Total/NA	Analysis	I-3765-85		1	402039	DGU1	EET CF	10/10/23 09:56

Client Sample ID: Trip Blank

Lab Sample ID: 310-266708-5

Date Collected: 10/04/23 00:00

Matrix: Water

Date Received: 10/06/23 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	401891	WSE8	EET CF	10/09/23 11:16

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Eurofins Cedar Falls

Accreditation/Certification Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-23

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Method Summary

Client: City of Hawarden
Project/Site: City of Hawarden

Job ID: 310-266708-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401



310-266708 Chain of Custody

Cooler/Sample Receipt and Temperature Log

Client Information			
Client: <u>SCS</u>			
City/State:	CITY	STATE	Project:
Receipt Information			
Date/Time Received:	DATE <u>10/6/23</u>	TIME <u>1615</u>	Received By: <u>EM</u>
Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee ☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?		☒ Yes ☐ No	If yes: Cooler ID: _____
Multiple Coolers?		☐ Yes ☒ No	If yes: Cooler # _____ of _____
Cooler Custody Seals Present?		☐ Yes ☒ No	If yes: Cooler custody seals intact? ☐ Yes ☐ No
Sample Custody Seals Present?		☐ Yes ☒ No	If yes: Sample custody seals intact? ☐ Yes ☐ No
Trip Blank Present?		☒ Yes ☐ No	If yes: Which VOA samples are in cooler? <u>↓</u>
<u>All</u>			
Temperature Record			
Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other: _____ ☐ NONE			
Thermometer ID: <u>P</u>		Correction Factor (°C): <u>0</u>	
Temp Blank Temperature — If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>0.6</u>		Corrected Temp (°C): <u>0.6</u>	
Sample Container Temperature			
Container(s) used:	CONTAINER 1		CONTAINER 2
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No a) If yes: Is there evidence that the chilling process began? ☐ Yes ☐ No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

TestAmerica

3019 Venture Way
Cedar Falls, Iowa 50613

319 277 2401 (phone)

[illegible]

Login Sample Receipt Checklist

Client: City of Hawarden

Job Number: 310-266708-1

Login Number: 266708

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix B-2
Data Validation Documentation

Completed by: Nathan Ohrt
 Date of Sampling: 4/11/2023
 Lab Report Date: 4/24/2023
 Site Name: City of Hawarden Landfill
 Project Type: 1st 2023 Semi-Annual Sampling
 Lab Report Number: 310-253550

OK NO N/A NOTES

Sample Collection and Sample Handling

Chain of Custody
 Temperature
 Preservation
 Condition
 Case Narrative
 Holding Times

X			
X			
X			
X			
X			
X			

Analytical Sensitivity and Blanks

Method Blank Detections
 Trip Blank Detections

X			No detections.
X			No detections.

Accuracy

ICV/CCV
 LCS/LCSD
 MS/MSD
 Surrogates (organics only)

X			
X			
X			
X			

Precision

QA/QC Sample RPDs
 Field Duplicates

X			
X			Sample MW-5R and duplicate sample MW-D had <50% RPD for analyzed parameters.

Completed by: Nathan Ohrt
Date of Sampling: 10/4/2023
Lab Report Date: 10/13/2023
Site Name: City of Hawarden Landfill
Project Type: 2nd 2023 Semi-Annual Sampling
Lab Report Number: 310-266708

OK NO N/A NOTES

Sample Collection and Sample Handling

Chain of Custody
Temperature

Preservation

Condition
Case Narrative
Holding Times

X			
X			
X			MW-4R was collected in a properly preserved vial; however, the pH was outside the required criteria when verified by the laboratory; the sample was analyzed within the 7-day holding time specified for unpreserved samples.
X			
X			
X			

Analytical Sensitivity and Blanks

Method Blank Detections
Trip Blank Detections

X			No detections.
X			No detections.

Accuracy

ICV/CCV

LCS/LCSD

MS/MSD
Surrogates (organics only)

	X		The CCV recovered outside of the control limits for trichlorofluoromethane; the associated LCS passed using CCV criteria so the data was reported.
	X		The LCS recovered outside control limits for antimony; the analyte was biased high in the LCS and not detected in the associated samples so the data was reported.
X			
X			

Precision

QA/QC Sample RPDs
Field Duplicates

X			
X			Sample MW-7 and duplicate sample MW-D had <50% RPD for analyzed parameters.

Appendix C
Summary of Groundwater Chemistry

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Total Metals Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Antimony, mg/L (CAS NO - 7440-36-0)	10/11/2018	< 0.003	< 0.003	< 0.003	N/A	N/A
	2/14/2019	< 0.001	< 0.001	< 0.001	N/A	< 0.001
	6/11/2019	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
	6/11/2019	N/A	< 0.003	N/A	N/A	N/A
	2/11/2020	< 0.001	< 0.001	< 0.004	< 0.001	< 0.002
	8/18/2020	< 0.001	< 0.001	0.00069*	N/A	N/A
	8/18/2020	N/A	< 0.001	N/A	N/A	N/A
	5/6/2021	< 0.002	N/A	< 0.002	N/A	N/A
	9/14/2021	< 0.002	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.002	N/A	0.00168*	0.00177*
	6/28/2022	N/A	< 0.002	N/A	N/A	N/A
	9/14/2022	N/A	< 0.002	N/A	< 0.002	0.001*
	9/14/2022	N/A	N/A	N/A	< 0.002	N/A
	4/11/2023	N/A	< 0.002	N/A	N/A	< 0.002
	4/11/2023	N/A	N/A	N/A	N/A	< 0.002
	10/4/2023	N/A	N/A	N/A	< 0.002	< 0.002
Arsenic, mg/L (CAS NO - 7440-38-2)	12/16/2010	N/A	N/A	0.0142	N/A	N/A
	5/9/2012	< 0.001	N/A	0.0258	N/A	N/A
	9/27/2012	< 0.001	N/A	0.0489	N/A	N/A
	4/1/2013	< 0.001	N/A	0.0106	N/A	N/A
	9/18/2013	< 0.001	N/A	0.00117	N/A	N/A
	11/3/2015	N/A	N/A	0.0177	N/A	N/A
	5/8/2018	0.00152*	N/A	< 0.002	N/A	N/A
	10/11/2018	0.000397*	0.000677*	0.00493	N/A	N/A
	2/14/2019	< 0.002	< 0.002	0.0777	N/A	0.0022
	6/11/2019	0.00125	0.000828*	0.124	0.00105	0.0018
	6/11/2019	N/A	0.000872*	N/A	N/A	N/A
	2/11/2020	< 0.002	< 0.002	0.22	0.00117*	0.00109*
	8/18/2020	< 0.002	< 0.002	0.392	N/A	N/A
	8/18/2020	N/A	< 0.002	N/A	N/A	N/A
	5/6/2021	< 0.002	N/A	0.101	N/A	N/A
	9/14/2021	< 0.002	N/A	N/A	N/A	N/A
	6/28/2022	N/A	0.000859*	N/A	0.00234	0.00157*
	6/28/2022	N/A	0.013	N/A	N/A	N/A
	9/14/2022	N/A	0.0128	N/A	0.0026	0.00138*
	9/14/2022	N/A	N/A	N/A	0.00256	N/A
	4/11/2023	N/A	0.0106	N/A	N/A	0.00298
	4/11/2023	N/A	N/A	N/A	N/A	0.00288
	10/4/2023	N/A	N/A	N/A	0.00732	0.00265
Barium, mg/L (CAS NO - 7440-39-3)	12/16/2010	N/A	N/A	1.14	N/A	N/A
	9/18/2013	0.381	N/A	0.438	N/A	N/A
	11/3/2015	N/A	N/A	1.28	N/A	N/A
	5/8/2018	0.632	N/A	0.638	N/A	N/A
	10/11/2018	0.479	0.583	1.25	N/A	N/A
	2/14/2019	0.434	0.219	0.765	N/A	2.13
	6/11/2019	0.471	0.274	2.38	0.146	1.2
	6/11/2019	N/A	0.259	N/A	N/A	N/A
	2/11/2020	0.541	0.681	4	0.379	1.77
	8/18/2020	0.578	0.608	3.87	N/A	N/A
	8/18/2020	N/A	0.607	N/A	N/A	N/A
	5/6/2021	0.491	N/A	2.47	N/A	N/A
	9/14/2021	0.47	N/A	N/A	N/A	N/A
	6/28/2022	N/A	0.0245	N/A	0.0237	0.0349
	6/28/2022	N/A	0.0287	N/A	N/A	N/A
	9/14/2022	N/A	0.0218	N/A	0.0228	0.0319
	9/14/2022	N/A	N/A	N/A	0.0237	N/A
	4/11/2023	N/A	0.0459	N/A	N/A	0.0746
	4/11/2023	N/A	N/A	N/A	N/A	0.075
	10/4/2023	N/A	N/A	N/A	0.0275	0.0392
Beryllium, mg/L (CAS NO - 7440-41-7)	10/11/2018	< 0.001	< 0.001	< 0.001	N/A	N/A
	2/14/2019	< 0.001	< 0.001	< 0.001	N/A	0.000567*
	6/11/2019	< 0.001	< 0.001	< 0.001	< 0.001	0.000575*
	6/11/2019	N/A	< 0.001	N/A	N/A	N/A
	2/11/2020	0.00051*	0.00032*	0.000297*	0.000644*	< 0.001

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Total Metals Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Beryllium, mg/L (CAS NO - 7440-41-7)	8/18/2020	< 0.001	< 0.001	< 0.001	N/A	N/A
	8/18/2020	N/A	< 0.001	N/A	N/A	N/A
	5/6/2021	< 0.001	N/A	< 0.001	N/A	N/A
	9/14/2021	0.000296*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.001	N/A	0.000323*	< 0.001
	6/28/2022	N/A	0.000655*	N/A	N/A	N/A
	9/14/2022	N/A	< 0.001	N/A	0.00035*	< 0.001
	9/14/2022	N/A	N/A	N/A	< 0.001	N/A
	4/11/2023	N/A	< 0.001	N/A	N/A	< 0.001
	4/11/2023	N/A	N/A	N/A	N/A	< 0.001
Cadmium, mg/L (CAS NO - 7440-43-9)	10/4/2023	N/A	N/A	N/A	0.000979*	< 0.001
	12/16/2010	N/A	N/A	< 0.0005	N/A	N/A
	10/11/2018	< 0.0005	< 0.0005	0.000168*	N/A	N/A
	2/14/2019	< 0.0005	0.000105*	0.000169*	N/A	0.000088*
	6/11/2019	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
	6/11/2019	N/A	< 0.0005	N/A	N/A	N/A
	2/11/2020	0.000108	< 0.0001	0.000058*	0.00046	0.000074*
	8/18/2020	0.000052*	0.000105	0.000179	N/A	N/A
	8/18/2020	N/A	0.000077*	N/A	N/A	N/A
	5/6/2021	0.000055*	N/A	0.000054*	N/A	N/A
	9/14/2021	0.000216	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.0001	N/A	0.000173	0.000203
	6/28/2022	N/A	0.000291	N/A	N/A	N/A
	9/14/2022	N/A	0.000098*	N/A	0.000143	< 0.0001
	9/14/2022	N/A	N/A	N/A	0.000134	N/A
	4/11/2023	N/A	0.000157*	N/A	N/A	< 0.0002
	4/11/2023	N/A	N/A	N/A	N/A	< 0.0002
Chromium, mg/L (CAS NO - 7440-47-3)	10/4/2023	N/A	N/A	N/A	0.000582	< 0.0002
	12/16/2010	N/A	N/A	< 0.002	N/A	N/A
	10/11/2018	0.00281*	0.00352*	0.00152*	N/A	N/A
	2/14/2019	0.0027*	< 0.005	< 0.005	N/A	0.00701
	6/11/2019	0.00336*	0.00182*	0.00123*	< 0.005	0.00312*
	6/11/2019	N/A	0.00125*	N/A	N/A	N/A
	2/11/2020	0.00194*	0.00139*	0.00213*	< 0.005	< 0.005
	8/18/2020	0.00209*	0.00136*	0.00235*	N/A	N/A
	8/18/2020	N/A	0.00141*	N/A	N/A	N/A
	5/6/2021	0.00141*	N/A	0.00333*	N/A	N/A
	9/14/2021	0.00153*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.005	N/A	0.00272*	0.00122*
	6/28/2022	N/A	0.00311*	N/A	N/A	N/A
	9/14/2022	N/A	0.00193*	N/A	0.00113*	< 0.005
	9/14/2022	N/A	N/A	N/A	0.00156*	N/A
	4/11/2023	N/A	0.00118*	N/A	N/A	< 0.005
	4/11/2023	N/A	N/A	N/A	N/A	< 0.005
Cobalt, mg/L (CAS NO - 7440-48-4)	10/4/2023	N/A	N/A	N/A	0.00717	< 0.005
	10/11/2018	< 0.001	< 0.001	0.0118	N/A	N/A
	2/14/2019	0.000084*	< 0.0005	0.0312	N/A	0.00153
	6/11/2019	< 0.001	< 0.001	0.0306	< 0.001	0.000491*
	6/11/2019	N/A	< 0.001	N/A	N/A	N/A
	2/11/2020	0.00123	0.000758	0.063	0.00165	0.000833
	8/18/2020	0.000576	0.000428*	0.0592	N/A	N/A
	8/18/2020	N/A	0.00038*	N/A	N/A	N/A
	5/6/2021	0.000333*	N/A	0.0225	N/A	N/A
	9/14/2021	0.000793	N/A	N/A	N/A	N/A
	6/28/2022	N/A	0.00191	N/A	0.00464	0.00393
	6/28/2022	N/A	0.00284	N/A	N/A	N/A
	9/14/2022	N/A	0.000813	N/A	0.00247	0.00369
	9/14/2022	N/A	N/A	N/A	0.00251	N/A
	4/11/2023	N/A	0.000752	N/A	N/A	0.00405
	4/11/2023	N/A	N/A	N/A	N/A	0.00401
	10/4/2023	N/A	N/A	N/A	0.00715	0.00225
Copper, mg/L (CAS NO - 7440-50-8)	12/16/2010	N/A	N/A	< 0.02	N/A	N/A
	10/11/2018	0.00235	0.00276	0.00259	N/A	N/A
	2/14/2019	0.00273*	0.00291*	< 0.005	N/A	0.0102

SCS ENGINEERS

Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Total Metals Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Copper, mg/L (CAS NO - 7440-50-8)	6/11/2019	0.00355	0.00187*	0.00417	0.00948	0.00404
	6/11/2019	N/A	0.00197*	N/A	N/A	N/A
	2/11/2020	0.0051	< 0.005	< 0.02	0.0034*	< 0.01
	8/18/2020	0.00231*	0.0057	0.00334*	N/A	N/A
	8/18/2020	N/A	0.00407*	N/A	N/A	N/A
	5/6/2021	0.00245*	N/A	0.00192*	N/A	N/A
	9/14/2021	0.00609	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.005	N/A	0.0112	0.00423*
	6/28/2022	N/A	0.0207	N/A	N/A	N/A
	9/14/2022	N/A	0.00605	N/A	0.0316	< 0.005
	9/14/2022	N/A	N/A	N/A	0.0314	N/A
	4/11/2023	N/A	0.00941	N/A	N/A	< 0.005
	4/11/2023	N/A	N/A	N/A	N/A	< 0.005
	10/4/2023	N/A	N/A	N/A	0.0491	< 0.005
Lead, mg/L (CAS NO - 7439-92-1)	12/16/2010	N/A	N/A	< 0.004	N/A	N/A
	10/11/2018	0.000622	0.00171	0.000987	N/A	N/A
	2/14/2019	0.000541	0.000308*	0.000322*	N/A	0.0131
	6/11/2019	0.00187	0.000517	0.00152	0.00315	0.00284
	6/11/2019	N/A	0.000257*	N/A	N/A	N/A
	2/11/2020	0.00547	0.00399	0.00753	0.0106	0.00383
	8/18/2020	0.00262	0.00235	0.00296	N/A	N/A
	8/18/2020	N/A	0.0021	N/A	N/A	N/A
	5/6/2021	0.00108	N/A	0.00377	N/A	N/A
	9/14/2021	0.00328	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.0005	N/A	0.00188	0.000874
	6/28/2022	N/A	0.00432	N/A	N/A	N/A
	9/14/2022	N/A	0.00108	N/A	0.00281	< 0.0005
	9/14/2022	N/A	N/A	N/A	0.00269	N/A
	4/11/2023	N/A	0.00101	N/A	N/A	< 0.0005
	4/11/2023	N/A	N/A	N/A	N/A	< 0.0005
	10/4/2023	N/A	N/A	N/A	0.0173	0.000574
Nickel, mg/L (CAS NO - 7440-02-0)	10/11/2018	0.000814*	0.00138*	0.0379	N/A	N/A
	2/14/2019	< 0.005	< 0.005	0.0577	N/A	0.014
	6/11/2019	0.00137*	< 0.002	0.0484	< 0.002	0.0132
	6/11/2019	N/A	< 0.002	N/A	N/A	N/A
	2/11/2020	0.0038*	< 0.005	0.203	< 0.005	0.0173
	8/18/2020	< 0.005	< 0.005	0.224	N/A	N/A
	8/18/2020	N/A	< 0.005	N/A	N/A	N/A
	5/6/2021	< 0.005	N/A	0.0846	N/A	N/A
	9/14/2021	0.00341*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	0.004*	N/A	0.0162	0.0109
	6/28/2022	N/A	0.0131	N/A	N/A	N/A
	9/14/2022	N/A	0.0046*	N/A	0.00778	0.00821
	9/14/2022	N/A	N/A	N/A	0.00779	N/A
	4/11/2023	N/A	0.00542	N/A	N/A	0.00879
	4/11/2023	N/A	N/A	N/A	N/A	0.00876
	10/4/2023	N/A	N/A	N/A	0.021	0.00489*
Selenium, mg/L (CAS NO - 7782-49-2)	10/11/2018	0.0046	0.00427	< 0.0025	N/A	N/A
	2/14/2019	0.00542	0.00647	< 0.005	N/A	< 0.005
	6/11/2019	0.00617	0.00183*	< 0.0025	0.0016*	0.00331
	6/11/2019	N/A	0.00656	N/A	N/A	N/A
	2/11/2020	0.00606	0.00556	0.00162*	0.00418*	< 0.005
	8/18/2020	0.00585	0.00508	< 0.005	N/A	N/A
	8/18/2020	N/A	0.00464*	N/A	N/A	N/A
	5/6/2021	0.00536	N/A	0.00109*	N/A	N/A
	9/14/2021	0.00498*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.005	N/A	0.0134	0.00377*
	6/28/2022	N/A	0.00503	N/A	N/A	N/A
	9/14/2022	N/A	0.00489*	N/A	0.019	0.0016*
	9/14/2022	N/A	N/A	N/A	0.0197	N/A
	4/11/2023	N/A	0.00491*	N/A	N/A	< 0.005
	4/11/2023	N/A	N/A	N/A	N/A	< 0.005
	10/4/2023	N/A	N/A	N/A	0.0201	< 0.005
Silver, mg/L (CAS NO - 7440-22-4)	10/11/2018	< 0.0005	< 0.0005	< 0.0005	N/A	N/A
	2/14/2019	< 0.001	< 0.001	< 0.001	N/A	< 0.001

SCS ENGINEERS

Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Total Metals Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Silver, mg/L (CAS NO - 7440-22-4)	6/11/2019	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
	6/11/2019	N/A	< 0.0005	N/A	N/A	N/A
	2/11/2020	< 0.001	< 0.001	< 0.004	< 0.001	< 0.002
	8/18/2020	< 0.001	< 0.001	< 0.001	N/A	N/A
	8/18/2020	N/A	< 0.001	N/A	N/A	N/A
	5/6/2021	< 0.001	N/A	< 0.001	N/A	N/A
	9/14/2021	< 0.001	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.001	N/A	< 0.001	< 0.001
	6/28/2022	N/A	< 0.001	N/A	N/A	N/A
	9/14/2022	N/A	< 0.001	N/A	< 0.001	< 0.001
	9/14/2022	N/A	N/A	N/A	< 0.001	N/A
	4/11/2023	N/A	< 0.001	N/A	N/A	< 0.001
	4/11/2023	N/A	N/A	N/A	N/A	< 0.001
	10/4/2023	N/A	N/A	N/A	< 0.001	< 0.001
Thallium, mg/L (CAS NO - 7440-28-0)	10/11/2018	< 0.002	< 0.002	< 0.002	N/A	N/A
	2/14/2019	< 0.001	< 0.001	< 0.001	N/A	< 0.001
	6/11/2019	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	6/11/2019	N/A	< 0.002	N/A	N/A	N/A
	2/11/2020	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	8/18/2020	< 0.001	< 0.001	< 0.001	N/A	N/A
	8/18/2020	N/A	< 0.001	N/A	N/A	N/A
	5/6/2021	< 0.001	N/A	< 0.001	N/A	N/A
	9/14/2021	< 0.001	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.001	N/A	0.000399*	< 0.001
	6/28/2022	N/A	< 0.001	N/A	N/A	N/A
	9/14/2022	N/A	< 0.001	N/A	< 0.001	< 0.001
	9/14/2022	N/A	N/A	N/A	< 0.001	N/A
	4/11/2023	N/A	< 0.001	N/A	N/A	< 0.001
	4/11/2023	N/A	N/A	N/A	N/A	< 0.001
	10/4/2023	N/A	N/A	N/A	0.000266*	< 0.001
Vanadium, mg/L (CAS NO - 7440-62-2)	10/11/2018	< 0.005	0.00269*	< 0.005	N/A	N/A
	2/14/2019	0.000631*	< 0.005	0.000786*	N/A	0.00585
	6/11/2019	0.00447*	0.00274*	0.00312*	0.00289*	0.0049*
	6/11/2019	N/A	0.00268*	N/A	N/A	N/A
	2/11/2020	0.0021*	0.00149*	0.00313*	0.00182*	0.00147*
	8/18/2020	0.00153*	0.00142*	0.00339*	N/A	N/A
	8/18/2020	N/A	0.00142*	N/A	N/A	N/A
	5/6/2021	< 0.005	N/A	0.00156*	N/A	N/A
	9/14/2021	0.00196*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	0.00187*	N/A	0.00314*	0.00224*
	6/28/2022	N/A	0.00651	N/A	N/A	N/A
	9/14/2022	N/A	0.00456*	N/A	0.00315*	< 0.005
	9/14/2022	N/A	N/A	N/A	0.00299*	N/A
	4/11/2023	N/A	0.00456*	N/A	N/A	0.00122*
	4/11/2023	N/A	N/A	N/A	N/A	0.00119*
	10/4/2023	N/A	N/A	N/A	0.0215	0.00269*
Zinc, mg/L (CAS NO - 7440-66-6)	12/16/2010	N/A	N/A	0.062	N/A	N/A
	10/11/2018	0.00866*	0.0119*	0.00799*	N/A	N/A
	2/14/2019	< 0.02	0.0103*	< 0.02	N/A	0.143
	6/11/2019	0.0112*	< 0.02	0.0102*	0.0171*	0.019*
	6/11/2019	N/A	< 0.02	N/A	N/A	N/A
	2/11/2020	0.0126*	< 0.02	0.0137*	< 0.02	0.0144*
	8/18/2020	< 0.02	0.0262	0.0227	N/A	N/A
	8/18/2020	N/A	0.0163*	N/A	N/A	N/A
	5/6/2021	< 0.02	N/A	0.0129*	N/A	N/A
	9/14/2021	0.0152*	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.02	N/A	0.0257	0.0229
	6/28/2022	N/A	0.0525	N/A	N/A	N/A
	9/14/2022	N/A	< 0.02	N/A	0.0276	< 0.02
	9/14/2022	N/A	N/A	N/A	0.0267	N/A
	4/11/2023	N/A	0.0119*	N/A	N/A	< 0.02
	4/11/2023	N/A	N/A	N/A	N/A	< 0.02
	10/4/2023	N/A	N/A	N/A	0.0556	< 0.02
Total Suspended Solids, mg/L (CAS NO - TSS)	5/8/2018	639	112	281	N/A	N/A
	10/11/2018	28.6	47	25.1	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Total Metals Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Total Suspended Solids, mg/L (CAS NO - TSS)	2/14/2019	81	2.63	182	N/A	296
	6/11/2019	50	8.25	99.4	110	109
	6/11/2019	N/A	4.25	N/A	N/A	N/A
	2/11/2020	466	184	190	301	425
	8/18/2020	130	128	239	N/A	N/A
	8/18/2020	N/A	47.4	N/A	N/A	N/A
	5/6/2021	105	N/A	188	N/A	N/A
	9/14/2021	353	N/A	N/A	N/A	N/A
	6/28/2022	N/A	102	N/A	219	55.8
	6/28/2022	N/A	186	N/A	N/A	N/A
	9/14/2022	N/A	57.1	N/A	314	3.13
	9/14/2022	N/A	N/A	N/A	216	N/A
	4/11/2023	N/A	34.8	N/A	N/A	6
	4/11/2023	N/A	N/A	N/A	N/A	3.25
	10/4/2023	N/A	N/A	N/A	3470	33.1

Note: * indicates 'J flag'. Detection is below the reporting limit, but greater than the MDL (Method Detection Limit). The concentration is estimated.

Denotes Detection.

Denotes Confirmed Outlier. Statistically Excluded.

Sampling performed over multiple dates is recorded on the first date sampled. Refer to field forms for exact sample date.

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
1,1,1,2-Tetrachloroethane, ug/L (CAS NO - 630-20-6)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,1,1-Trichloroethane, ug/L (CAS NO - 71-55-6)	3/13/2002	< 1	< 1	< 1	N/A	N/A
	11/12/2002	< 1	< 1	< 1	N/A	N/A
	6/6/2005	< 1	< 1	< 1	N/A	N/A
	11/8/2005	< 1	< 1	< 1	N/A	N/A
	5/9/2006	< 1	< 1	< 1	N/A	N/A
	12/20/2006	< 1	< 1	< 1	N/A	N/A
	5/3/2007	< 1	< 1	< 1	N/A	N/A
	11/13/2007	< 1	< 1	< 1	N/A	N/A
	12/8/2008	< 1	< 1	< 1	N/A	N/A
	6/4/2009	< 1	< 1	< 1	N/A	N/A
	12/9/2009	< 1	< 1	< 1	N/A	N/A
	7/13/2010	< 1	< 1	< 1	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	0.251*	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	0.745*	< 1
	9/14/2022	N/A	N/A	N/A	0.618*	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	0.242*	< 1
1,1,2,2-Tetrachloroethane, ug/L (CAS NO - 79-34-5)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
1,1,2,2-Tetrachloroethane, ug/L (CAS NO - 79-34-5)	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,1,2-Trichloroethane, ug/L (CAS NO - 79-00-5)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,1-Dichloroethane, ug/L (CAS NO - 75-34-3)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	1.44	N/A	N/A
	10/11/2018	< 1	< 1	1.09	N/A	N/A
	2/14/2019	< 1	< 1	2.39	N/A	< 1
	6/11/2019	< 1	< 1	0.676*	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	1.37	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	1.3	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,1-Dichloroethene, ug/L (CAS NO - 75-35-4)	3/13/2002	< 2	< 2	< 2	N/A	N/A
	11/12/2002	< 2	< 2	< 2	N/A	N/A
	6/6/2005	< 2	< 2	< 2	N/A	N/A
	11/8/2005	< 2	< 2	< 2	N/A	N/A
	5/9/2006	< 2	< 2	< 2	N/A	N/A
	12/20/2006	< 2	< 2	< 2	N/A	N/A
	5/3/2007	< 2	< 2	< 2	N/A	N/A
	11/13/2007	< 2	< 2	< 2	N/A	N/A
	12/8/2008	< 2	< 2	< 2	N/A	N/A
	6/4/2009	< 2	< 2	< 2	N/A	N/A
	12/9/2009	< 2	< 2	< 2	N/A	N/A
	7/13/2010	< 2	< 2	< 2	N/A	N/A
	4/1/2013	N/A	N/A	< 2	N/A	N/A
	9/18/2013	N/A	N/A	< 2	N/A	N/A
	11/3/2015	N/A	N/A	< 2	N/A	N/A
	10/11/2018	< 2	< 2	< 2	N/A	N/A
	2/14/2019	< 2	< 2	< 2	N/A	< 2
	6/11/2019	< 2	< 2	< 2	< 2	< 2
	6/11/2019	N/A	< 2	N/A	N/A	N/A
	2/11/2020	< 2	< 2	< 20	< 2	< 2
	8/18/2020	< 2	< 2	< 2	N/A	N/A
	8/18/2020	N/A	< 2	N/A	N/A	N/A

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Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
1,1-Dichloroethene, ug/L (CAS NO - 75-35-4)	5/6/2021	< 2	N/A	< 2	N/A	N/A
	9/14/2021	< 2	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 2	N/A	< 2	< 2
	6/28/2022	N/A	< 2	N/A	N/A	N/A
	9/14/2022	N/A	< 2	N/A	< 2	< 2
	9/14/2022	N/A	N/A	N/A	< 2	N/A
	4/11/2023	N/A	< 2	N/A	N/A	< 2
	4/11/2023	N/A	N/A	N/A	N/A	< 2
	10/4/2023	N/A	N/A	N/A	< 2	< 2
1,2,3-Trichloropropane, ug/L (CAS NO - 96-18-4)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,2-Dibromo-3-Chloropropane, ug/L (CAS NO - 96-12-8)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 0.12	< 0.12	< 0.12	N/A	N/A
	2/14/2019	< 1.2	< 1.2	< 1.2	N/A	< 1.2
	6/11/2019	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
	6/11/2019	N/A	< 1.2	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
1,2-Dibromoethane [EDB], ug/L (CAS NO - 106-93-4)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 0.13	< 0.13	< 0.13	N/A	N/A
	2/14/2019	< 0.34	< 0.34	< 0.34	N/A	< 0.34
	6/11/2019	< 0.34	< 0.34	< 0.34	< 0.34	< 0.34
	6/11/2019	N/A	< 0.34	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
1,2-Dibromoethane [EDB], ug/L (CAS NO - 106-93-4)	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,2-Dichlorobenzene, ug/L (CAS NO - 95-50-1)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,2-Dichloroethane, ug/L (CAS NO - 107-06-2)	3/13/2002	< 0.4	< 0.4	< 0.4	N/A	N/A
	11/12/2002	< 0.4	< 0.4	< 0.4	N/A	N/A
	12/18/2002	N/A	N/A	< 0.4	N/A	N/A
	6/6/2005	< 0.4	< 0.4	< 0.4	N/A	N/A
	11/8/2005	< 0.4	< 0.4	< 0.4	N/A	N/A
	5/9/2006	< 0.4	< 0.4	< 0.4	N/A	N/A
	12/20/2006	< 0.4	< 0.4	< 0.4	N/A	N/A
	5/3/2007	< 1	< 1	< 1	N/A	N/A
	11/13/2007	< 1	< 1	< 1	N/A	N/A
	12/8/2008	< 1	< 1	< 1	N/A	N/A
	6/4/2009	< 1	< 1	< 1	N/A	N/A
	12/9/2009	< 1	< 1	< 1	N/A	N/A
	7/13/2010	< 2	< 1	< 1	N/A	N/A
	12/16/2010	N/A	N/A	1.17	N/A	N/A
	5/4/2011	N/A	N/A	< 1	N/A	N/A
	10/6/2011	N/A	N/A	1.02	N/A	N/A
	5/9/2012	N/A	N/A	2.73	N/A	N/A
	9/27/2012	N/A	N/A	< 1	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,2-Dichloropropane, ug/L (CAS NO - 78-87-5)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
1,2-Dichloropropane, ug/L (CAS NO - 78-87-5)	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
1,4-Dichlorobenzene, ug/L (CAS NO - 106-46-7)	3/13/2002	< 1	< 1	< 1	N/A	N/A
	11/12/2002	< 1	< 1	< 1	N/A	N/A
	12/18/2002	N/A	N/A	< 1	N/A	N/A
	6/6/2005	< 1	< 1	< 1	N/A	N/A
	11/8/2005	< 1	< 1	< 1	N/A	N/A
	5/9/2006	< 1	< 1	< 1	N/A	N/A
	12/20/2006	< 1	< 1	< 1	N/A	N/A
	5/3/2007	< 1	< 1	< 1	N/A	N/A
	11/13/2007	< 1	< 1	< 1	N/A	N/A
	12/8/2008	< 1	< 1	1.3	N/A	N/A
	6/4/2009	< 1	< 1	< 1	N/A	N/A
	12/9/2009	< 2	< 2	< 2	N/A	N/A
	7/13/2010	< 1	< 1	< 1	N/A	N/A
	12/16/2010	N/A	N/A	< 1	N/A	N/A
	5/4/2011	N/A	N/A	< 1	N/A	N/A
	10/6/2011	N/A	N/A	< 1	N/A	N/A
	5/9/2012	N/A	N/A	1.18	N/A	N/A
	9/27/2012	N/A	N/A	< 1	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	1.8	N/A	N/A
	2/14/2019	< 1	< 1	3.02	N/A	< 1
	6/11/2019	< 1	< 1	2.26	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	3.75*	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	0.611*	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
2-Butanone, ug/L (CAS NO - 78-93-3)	5/9/2012	N/A	N/A	103	N/A	N/A
	9/27/2012	N/A	N/A	< 10	N/A	N/A
	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	56.9	N/A	< 10
	6/11/2019	< 10	< 10	68.3	< 10	2.53*
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	31.8*	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	2.51*	N/A	< 10	< 10
	6/28/2022	N/A	2.51*	N/A	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
2-Butanone, ug/L (CAS NO - 78-93-3)	9/14/2022	N/A	< 10	N/A	< 10	4.39*
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
2-Hexanone, ug/L (CAS NO - 591-78-6)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	< 100	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 10	N/A	< 10	< 10
	6/28/2022	N/A	< 10	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	< 10
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
4-Methyl-2-Pentanone, ug/L (CAS NO - 108-10-1)	5/9/2012	N/A	N/A	25.4	N/A	N/A
	9/27/2012	N/A	N/A	< 10	N/A	N/A
	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	26.2*	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 10	N/A	< 10	< 10
	6/28/2022	N/A	< 10	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	< 10
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
Acetone, ug/L (CAS NO - 67-64-1)	5/9/2012	N/A	N/A	238	N/A	N/A
	9/27/2012	N/A	N/A	< 10	N/A	N/A
	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	3.12*	39.8	N/A	< 10
	6/11/2019	< 10	< 10	25.6	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	34.6*	< 10	< 10
	8/18/2020	< 10	< 10	6.35*	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	3.81*	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	5.25*	N/A	< 10	< 10
	6/28/2022	N/A	5.14*	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	28.3
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10

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Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Acetone, ug/L (CAS NO - 67-64-1)	10/4/2023	N/A	N/A	N/A	< 10	< 10
Acrylonitrile, ug/L (CAS NO - 107-13-1)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
Benzene, ug/L (CAS NO - 71-43-2)	3/13/2002	< 0.5	< 0.5	< 0.5	N/A	N/A
	11/12/2002	< 0.5	< 0.5	< 0.5	N/A	N/A
	12/18/2002	N/A	N/A	< 0.5	N/A	N/A
	6/6/2005	< 0.5	< 0.5	< 0.5	N/A	N/A
	11/8/2005	< 0.5	< 0.5	< 0.5	N/A	N/A
	5/9/2006	< 0.5	< 0.5	< 0.5	N/A	N/A
	12/20/2006	< 0.5	< 0.5	0.62	N/A	N/A
	5/3/2007	< 0.5	< 0.5	< 0.5	N/A	N/A
	11/13/2007	< 0.5	< 0.5	2.32	N/A	N/A
	12/8/2008	< 0.5	< 0.5	4.25	N/A	N/A
	6/4/2009	< 0.5	< 0.5	< 0.5	N/A	N/A
	12/9/2009	< 0.5	< 0.5	2.08	N/A	N/A
	7/13/2010	< 0.5	< 0.5	0.92	N/A	N/A
	12/16/2010	N/A	N/A	0.95	N/A	N/A
	5/4/2011	N/A	N/A	< 0.5	N/A	N/A
	10/6/2011	N/A	N/A	0.91	N/A	N/A
	5/9/2012	N/A	N/A	3.3	N/A	N/A
	9/27/2012	N/A	N/A	4.65	N/A	N/A
	4/1/2013	N/A	N/A	< 0.5	N/A	N/A
	9/18/2013	N/A	N/A	< 0.5	N/A	N/A
	11/3/2015	N/A	N/A	0.533	N/A	N/A
	10/11/2018	< 0.5	< 0.5	1.17	N/A	N/A
	2/14/2019	< 0.5	< 0.5	2.05	N/A	< 0.5
	6/11/2019	< 0.5	< 0.5	0.965	< 0.5	< 0.5
	6/11/2019	N/A	< 0.5	N/A	N/A	N/A
	2/11/2020	< 0.5	< 0.5	4.43*	< 0.5	0.351*
	8/18/2020	< 0.5	< 0.5	4.38	N/A	N/A
	8/18/2020	N/A	< 0.5	N/A	N/A	N/A
	5/6/2021	< 0.5	N/A	1.84	N/A	N/A
	9/14/2021	< 0.5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 0.5	N/A	< 0.5	< 0.5
	6/28/2022	N/A	< 0.5	N/A	N/A	N/A
	9/14/2022	N/A	< 0.5	N/A	< 0.5	< 0.5
	9/14/2022	N/A	N/A	N/A	< 0.5	N/A
	4/11/2023	N/A	< 0.5	N/A	N/A	< 0.5
	4/11/2023	N/A	N/A	N/A	N/A	< 0.5
	10/4/2023	N/A	N/A	N/A	< 0.5	< 0.5
Bromochloromethane, ug/L (CAS NO - 74-97-5)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5

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Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Bromochloromethane, ug/L (CAS NO - 74-97-5)	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
Bromodichloromethane, ug/L (CAS NO - 75-27-4)	10/4/2023	N/A	N/A	N/A	< 5	< 5
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
Bromoform, ug/L (CAS NO - 75-25-2)	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Bromomethane, ug/L (CAS NO - 74-83-9)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
	4/1/2013	N/A	N/A	< 4	N/A	N/A
	9/18/2013	N/A	N/A	< 4	N/A	N/A
	11/3/2015	N/A	N/A	< 4	N/A	N/A
	10/11/2018	< 4	< 4	< 4	N/A	N/A
	2/14/2019	< 4	< 4	< 4	N/A	< 4
	6/11/2019	< 4	< 4	< 4	< 4	< 4
	6/11/2019	N/A	< 4	N/A	N/A	N/A
	2/11/2020	< 4	< 4	< 40	< 4	< 4
	8/18/2020	< 4	< 4	< 4	N/A	N/A
	8/18/2020	N/A	< 4	N/A	N/A	N/A
	5/6/2021	< 4	N/A	< 4	N/A	N/A
	9/14/2021	< 4	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 4	N/A	< 4	< 4
	6/28/2022	N/A	< 4	N/A	N/A	N/A
	9/14/2022	N/A	< 4	N/A	< 4	< 4
	9/14/2022	N/A	N/A	N/A	< 4	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Bromomethane, ug/L (CAS NO - 74-83-9)	4/11/2023	N/A	< 4	N/A	N/A	< 4
	4/11/2023	N/A	N/A	N/A	N/A	< 4
	10/4/2023	N/A	N/A	N/A	< 4	< 4
	10/4/2023	N/A	N/A	N/A	< 4	< 4
Carbon Disulfide, ug/L (CAS NO - 75-15-0)	12/16/2010	N/A	N/A	< 1	N/A	N/A
	5/4/2011	N/A	N/A	1.98	N/A	N/A
	10/6/2011	N/A	N/A	< 1	N/A	N/A
	5/9/2012	N/A	N/A	< 1	N/A	N/A
	9/27/2012	N/A	N/A	< 1	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	0.717*
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	0.545*
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Carbon Tetrachloride, ug/L (CAS NO - 56-23-5)	3/13/2002	< 0.3	< 0.3	< 0.3	N/A	N/A
	11/12/2002	< 0.3	< 0.3	< 0.3	N/A	N/A
	6/6/2005	< 0.3	< 0.3	< 0.3	N/A	N/A
	11/8/2005	< 0.3	< 0.3	< 0.3	N/A	N/A
	5/9/2006	< 0.3	< 0.3	< 0.3	N/A	N/A
	12/20/2006	< 0.3	< 0.3	< 0.3	N/A	N/A
	5/3/2007	< 2	< 2	< 2	N/A	N/A
	11/13/2007	< 2	< 2	< 2	N/A	N/A
	12/8/2008	< 2	< 2	< 2	N/A	N/A
	6/4/2009	< 2	< 2	< 2	N/A	N/A
	12/9/2009	< 5	< 5	< 5	N/A	N/A
	7/13/2010	< 4	< 4	< 4	N/A	N/A
	4/1/2013	N/A	N/A	< 2	N/A	N/A
	9/18/2013	N/A	N/A	< 2	N/A	N/A
	11/3/2015	N/A	N/A	< 2	N/A	N/A
	10/11/2018	< 2	< 2	< 2	N/A	N/A
	2/14/2019	< 2	< 2	< 2	N/A	< 2
	6/11/2019	< 2	< 2	< 2	< 2	< 2
	6/11/2019	N/A	< 2	N/A	N/A	N/A
	2/11/2020	< 2	< 2	< 20	< 2	< 2
	8/18/2020	< 2	< 2	< 2	N/A	N/A
	8/18/2020	N/A	< 2	N/A	N/A	N/A
	5/6/2021	< 2	N/A	< 2	N/A	N/A
	9/14/2021	< 2	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 2	N/A	< 2	< 2
	6/28/2022	N/A	< 2	N/A	N/A	N/A
	9/14/2022	N/A	< 2	N/A	< 2	< 2
	9/14/2022	N/A	N/A	N/A	< 2	N/A
	4/11/2023	N/A	< 2	N/A	N/A	< 2
	4/11/2023	N/A	N/A	N/A	N/A	< 2
	10/4/2023	N/A	N/A	N/A	< 2	< 2
Chlorobenzene, ug/L (CAS NO - 108-90-7)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A

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Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Chlorobenzene, ug/L (CAS NO - 108-90-7)	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	0.512*	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Chlorodibromomethane, ug/L (CAS NO - 124-48-1)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
Chloroethane, ug/L (CAS NO - 75-00-3)	4/1/2013	N/A	N/A	< 4	N/A	N/A
	9/18/2013	N/A	N/A	< 4	N/A	N/A
	11/3/2015	N/A	N/A	< 4	N/A	N/A
	10/11/2018	< 4	< 4	< 4	N/A	N/A
	2/14/2019	< 4	< 4	< 4	N/A	< 4
	6/11/2019	< 4	< 4	< 4	< 4	< 4
	6/11/2019	N/A	< 4	N/A	N/A	N/A
	2/11/2020	< 4	< 4	< 40	< 4	< 4
	8/18/2020	< 4	< 4	< 4	N/A	N/A
	8/18/2020	N/A	< 4	N/A	N/A	N/A
	5/6/2021	< 4	N/A	< 4	N/A	N/A
	9/14/2021	< 4	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 4	N/A	< 4	< 4
	6/28/2022	N/A	< 4	N/A	N/A	N/A
	9/14/2022	N/A	< 4	N/A	< 4	< 4
	9/14/2022	N/A	N/A	N/A	< 4	N/A
	4/11/2023	N/A	< 4	N/A	N/A	< 4
	4/11/2023	N/A	N/A	N/A	N/A	< 4
	10/4/2023	N/A	N/A	N/A	< 4	< 4
Chloroform, ug/L (CAS NO - 67-66-3)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 3	< 3	< 3	N/A	N/A
	2/14/2019	< 3	< 3	< 3	N/A	< 3
	6/11/2019	< 3	< 3	< 3	< 3	< 3
	6/11/2019	N/A	< 3	N/A	N/A	N/A
	2/11/2020	< 3	< 3	< 30	< 3	< 3
	8/18/2020	< 3	< 3	< 3	N/A	N/A
	8/18/2020	N/A	< 3	N/A	N/A	N/A
	5/6/2021	< 3	N/A	< 3	N/A	N/A
	9/14/2021	< 3	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 3	N/A	< 3	< 3
	6/28/2022	N/A	< 3	N/A	N/A	N/A

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City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Chloroform, ug/L (CAS NO - 67-66-3)	9/14/2022	N/A	< 3	N/A	< 3	< 3
	9/14/2022	N/A	N/A	N/A	< 3	N/A
	4/11/2023	N/A	< 3	N/A	N/A	< 3
	4/11/2023	N/A	N/A	N/A	N/A	< 3
	10/4/2023	N/A	N/A	N/A	< 3	< 3
Chloromethane, ug/L (CAS NO - 74-87-3)	4/1/2013	N/A	N/A	< 3	N/A	N/A
	9/18/2013	N/A	N/A	< 3	N/A	N/A
	11/3/2015	N/A	N/A	< 3	N/A	N/A
	10/11/2018	< 3	< 3	< 3	N/A	N/A
	2/14/2019	< 3	< 3	< 3	N/A	< 3
	6/11/2019	< 3	< 3	< 3	< 3	< 3
	6/11/2019	N/A	< 3	N/A	N/A	N/A
	2/11/2020	< 3	< 3	< 30	< 3	< 3
	8/18/2020	< 3	< 3	< 3	N/A	N/A
	8/18/2020	N/A	< 3	N/A	N/A	N/A
	5/6/2021	< 3	N/A	< 3	N/A	N/A
	9/14/2021	< 3	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 3	N/A	< 3	< 3
	6/28/2022	N/A	< 3	N/A	N/A	N/A
	9/14/2022	N/A	< 3	N/A	< 3	< 3
	9/14/2022	N/A	N/A	N/A	< 3	N/A
	4/11/2023	N/A	< 3	N/A	N/A	< 3
	4/11/2023	N/A	N/A	N/A	N/A	< 3
	10/4/2023	N/A	N/A	N/A	< 3	< 3
cis-1,2-Dichloroethene, ug/L (CAS NO - 156-59-2)	4/1/2013	N/A	N/A	1.3	N/A	N/A
	9/18/2013	N/A	N/A	2.37	N/A	N/A
	11/3/2015	N/A	N/A	3.66	N/A	N/A
	10/11/2018	< 1	< 1	6.97	N/A	N/A
	2/14/2019	< 1	< 1	15	N/A	2.04
	6/11/2019	< 1	< 1	6.2	< 1	1.02
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	13.4	< 1	3.47
	8/18/2020	< 1	< 1	13.1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	3.01	N/A	11.7	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
cis-1,3-Dichloropropene, ug/L (CAS NO - 10061-01-5)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
Ethylbenzene, ug/L (CAS NO - 100-41-4)	5/9/2012	N/A	N/A	9.26	N/A	N/A
	9/27/2012	N/A	N/A	13.6	N/A	N/A
	4/1/2013	N/A	N/A	1.42	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Ethylbenzene, ug/L (CAS NO - 100-41-4)	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	0.533*	N/A	< 1
	6/11/2019	< 1	< 1	0.777*	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	26.6	< 1	< 1
	8/18/2020	< 1	< 1	15.2	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	0.887*	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	0.413*	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Iodomethane, ug/L (CAS NO - 74-88-4)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	< 100	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 10	N/A	< 10	< 10
	6/28/2022	N/A	< 10	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	< 10
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
Methylene Bromide, ug/L (CAS NO - 74-95-3)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Methylene Chloride, ug/L (CAS NO - 75-09-2)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Methylene Chloride, ug/L (CAS NO - 75-09-2)	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
Styrene, ug/L (CAS NO - 100-42-5)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	0.64*	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Tetrachloroethene, ug/L (CAS NO - 127-18-4)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Toluene, ug/L (CAS NO - 108-88-3)	5/9/2012	N/A	N/A	448	N/A	N/A
	9/27/2012	N/A	N/A	569	N/A	N/A
	4/1/2013	N/A	N/A	1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	1.08	N/A	< 1
	6/11/2019	< 1	< 1	1.83	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	220	< 1	< 1
	8/18/2020	< 1	< 1	1.83	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	1.51	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Toluene, ug/L (CAS NO - 108-88-3)	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
trans-1,2-Dichloroethene, ug/L (CAS NO - 156-60-5)	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	< 1	N/A	< 1
	6/11/2019	< 1	< 1	< 1	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	< 1	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	< 1	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
trans-1,3-Dichloropropene, ug/L (CAS NO - 10061-02-6)	4/1/2013	N/A	N/A	< 5	N/A	N/A
	9/18/2013	N/A	N/A	< 5	N/A	N/A
	11/3/2015	N/A	N/A	< 5	N/A	N/A
	10/11/2018	< 5	< 5	< 5	N/A	N/A
	2/14/2019	< 5	< 5	< 5	N/A	< 5
	6/11/2019	< 5	< 5	< 5	< 5	< 5
	6/11/2019	N/A	< 5	N/A	N/A	N/A
	2/11/2020	< 5	< 5	< 50	< 5	< 5
	8/18/2020	< 5	< 5	< 5	N/A	N/A
	8/18/2020	N/A	< 5	N/A	N/A	N/A
	5/6/2021	< 5	N/A	< 5	N/A	N/A
	9/14/2021	< 5	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 5	N/A	< 5	< 5
	6/28/2022	N/A	< 5	N/A	N/A	N/A
	9/14/2022	N/A	< 5	N/A	< 5	< 5
	9/14/2022	N/A	N/A	N/A	< 5	N/A
	4/11/2023	N/A	< 5	N/A	N/A	< 5
	4/11/2023	N/A	N/A	N/A	N/A	< 5
	10/4/2023	N/A	N/A	N/A	< 5	< 5
trans-1,4-Dichloro-2-Butene, ug/L (CAS NO - 110-57-6)	4/1/2013	N/A	N/A	< 10	N/A	N/A
	9/18/2013	N/A	N/A	< 10	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	< 100	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 10	N/A	< 10	< 10
	6/28/2022	N/A	< 10	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	< 10
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
Trichloroethene, ug/L (CAS NO - 79-01-6)	3/13/2002	< 1	< 1	< 1	N/A	N/A
	11/12/2002	< 1	< 1	< 1	N/A	N/A
	12/18/2002	N/A	N/A	< 1	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Trichloroethene, ug/L (CAS NO - 79-01-6)	6/6/2005	< 1	< 1	< 1	N/A	N/A
	11/8/2005	< 1	< 1	< 1	N/A	N/A
	5/9/2006	< 1	< 1	< 1	N/A	N/A
	12/20/2006	< 1	< 1	< 1	N/A	N/A
	5/3/2007	< 1	< 1	< 1	N/A	N/A
	11/13/2007	< 1	< 1	< 1	N/A	N/A
	12/8/2008	< 1	< 1	2.3	N/A	N/A
	6/4/2009	< 1	< 1	< 1	N/A	N/A
	12/9/2009	< 1	< 1	1.79	N/A	N/A
	7/13/2010	< 1	< 1	1.38	N/A	N/A
	12/16/2010	N/A	N/A	1.02	N/A	N/A
	5/4/2011	N/A	N/A	< 1	N/A	N/A
	10/6/2011	N/A	N/A	1.16	N/A	N/A
	5/9/2012	N/A	N/A	2.15	N/A	N/A
	9/27/2012	N/A	N/A	< 1	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	1.26	N/A	< 1
	6/11/2019	< 1	< 1	0.455*	< 1	< 1
	6/11/2019	N/A	< 1	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	1.12	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	2.85	N/A	1.37	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Trichlorofluoromethane, ug/L (CAS NO - 75-69-4)	4/1/2013	N/A	N/A	< 4	N/A	N/A
	9/18/2013	N/A	N/A	< 4	N/A	N/A
	11/3/2015	N/A	N/A	< 4	N/A	N/A
	10/11/2018	< 4	< 4	< 4	N/A	N/A
	2/14/2019	< 4	< 4	< 4	N/A	< 4
	6/11/2019	< 4	< 4	< 4	< 4	< 4
	6/11/2019	N/A	< 4	N/A	N/A	N/A
	2/11/2020	< 4	< 4	< 40	< 4	< 4
	8/18/2020	< 4	< 4	< 4	N/A	N/A
	8/18/2020	N/A	< 4	N/A	N/A	N/A
	5/6/2021	< 4	N/A	< 4	N/A	N/A
	9/14/2021	< 4	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 4	N/A	< 4	< 4
	6/28/2022	N/A	< 4	N/A	N/A	N/A
	9/14/2022	N/A	< 4	N/A	< 4	< 4
	9/14/2022	N/A	N/A	N/A	< 4	N/A
	4/11/2023	N/A	< 4	N/A	N/A	< 4
	4/11/2023	N/A	N/A	N/A	N/A	< 4
	10/4/2023	N/A	N/A	N/A	< 4	< 4
Vinyl Acetate, ug/L (CAS NO - 108-05-4)	4/1/2013	N/A	N/A	< 2	N/A	N/A
	9/18/2013	N/A	N/A	< 2	N/A	N/A
	11/3/2015	N/A	N/A	< 10	N/A	N/A
	10/11/2018	< 10	< 10	< 10	N/A	N/A
	2/14/2019	< 10	< 10	< 10	N/A	< 10
	6/11/2019	< 10	< 10	< 10	< 10	< 10
	6/11/2019	N/A	< 10	N/A	N/A	N/A
	2/11/2020	< 10	< 10	< 100	< 10	< 10
	8/18/2020	< 10	< 10	< 10	N/A	N/A
	8/18/2020	N/A	< 10	N/A	N/A	N/A
	5/6/2021	< 10	N/A	< 10	N/A	N/A
	9/14/2021	< 10	N/A	N/A	N/A	N/A

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Summary of Groundwater Chemistry

City of Hawarden C&D Landfill - 84-SDP-02-75C

Appendix I VOC Constituents	Sample Date	MW-1R UPG	MW-2R DNG	MW-3R DNG	MW-4R DNG	MW-5R DNG
Vinyl Acetate, ug/L (CAS NO - 108-05-4)	6/28/2022	N/A	< 10	N/A	< 10	< 10
	6/28/2022	N/A	< 10	N/A	N/A	N/A
	9/14/2022	N/A	< 10	N/A	< 10	< 10
	9/14/2022	N/A	N/A	N/A	< 10	N/A
	4/11/2023	N/A	< 10	N/A	N/A	< 10
	4/11/2023	N/A	N/A	N/A	N/A	< 10
	10/4/2023	N/A	N/A	N/A	< 10	< 10
Vinyl Chloride, ug/L (CAS NO - 75-01-4)	3/13/2002	< 0.3	< 0.3	< 0.3	N/A	N/A
	11/12/2002	< 0.47	< 0.47	< 0.47	N/A	N/A
	6/6/2005	< 0.47	< 0.47	< 0.47	N/A	N/A
	11/8/2005	< 0.26	< 0.26	< 0.26	N/A	N/A
	5/9/2006	< 0.47	< 0.47	< 0.47	N/A	N/A
	12/20/2006	< 0.47	< 0.47	< 0.47	N/A	N/A
	4/1/2013	N/A	N/A	< 1	N/A	N/A
	9/18/2013	N/A	N/A	< 1	N/A	N/A
	11/3/2015	N/A	N/A	< 1	N/A	N/A
	10/11/2018	< 1	< 1	< 1	N/A	N/A
	2/14/2019	< 1	< 1	1.18	N/A	< 1
	6/11/2019	0.304*	0.246*	0.559*	0.405*	0.332*
	6/11/2019	N/A	0.396*	N/A	N/A	N/A
	2/11/2020	< 1	< 1	< 10	< 1	< 1
	8/18/2020	< 1	< 1	4.12	N/A	N/A
	8/18/2020	N/A	< 1	N/A	N/A	N/A
	5/6/2021	< 1	N/A	1.3	N/A	N/A
	9/14/2021	< 1	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 1	N/A	< 1	< 1
	6/28/2022	N/A	< 1	N/A	N/A	N/A
	9/14/2022	N/A	< 1	N/A	< 1	< 1
	9/14/2022	N/A	N/A	N/A	< 1	N/A
	4/11/2023	N/A	< 1	N/A	N/A	< 1
	4/11/2023	N/A	N/A	N/A	N/A	< 1
	10/4/2023	N/A	N/A	N/A	< 1	< 1
Xylenes, total, ug/L (CAS NO - 1330-20-7)	5/9/2012	N/A	N/A	34.9	N/A	N/A
	9/27/2012	N/A	N/A	49	N/A	N/A
	4/1/2013	N/A	N/A	< 3	N/A	N/A
	9/18/2013	N/A	N/A	< 3	N/A	N/A
	11/3/2015	N/A	N/A	< 3	N/A	N/A
	10/11/2018	< 3	< 3	0.764*	N/A	N/A
	2/14/2019	< 3	< 3	1.56*	N/A	< 3
	6/11/2019	< 3	< 3	3.06	< 3	< 3
	6/11/2019	N/A	< 3	N/A	N/A	N/A
	2/11/2020	< 3	< 3	99.8	< 3	< 3
	8/18/2020	< 3	< 3	34.9	N/A	N/A
	8/18/2020	N/A	< 3	N/A	N/A	N/A
	5/6/2021	< 3	N/A	2.44*	N/A	N/A
	9/14/2021	< 3	N/A	N/A	N/A	N/A
	6/28/2022	N/A	< 3	N/A	0.52*	< 3
	6/28/2022	N/A	2.88*	N/A	N/A	N/A
	9/14/2022	N/A	< 3	N/A	< 3	< 3
	9/14/2022	N/A	N/A	N/A	< 3	N/A
	4/11/2023	N/A	< 3	N/A	N/A	< 3
	4/11/2023	N/A	N/A	N/A	N/A	< 3
	10/4/2023	N/A	N/A	N/A	< 3	< 3

Note: * indicates 'J flag'. Detection is below the reporting limit, but greater than the MDL (Method Detection Limit). The concentration is estimated.

Denotes Detection.

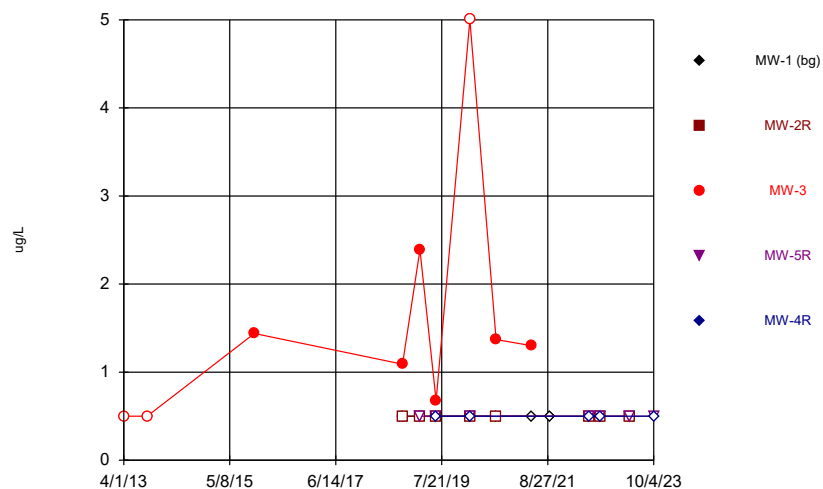
Denotes Confirmed Outlier. Statistically Excluded.

Sampling performed over multiple dates is recorded on the first date sampled. Refer to field forms for exact sample date.

Appendix D
Statistical Summary Tables and Graphs

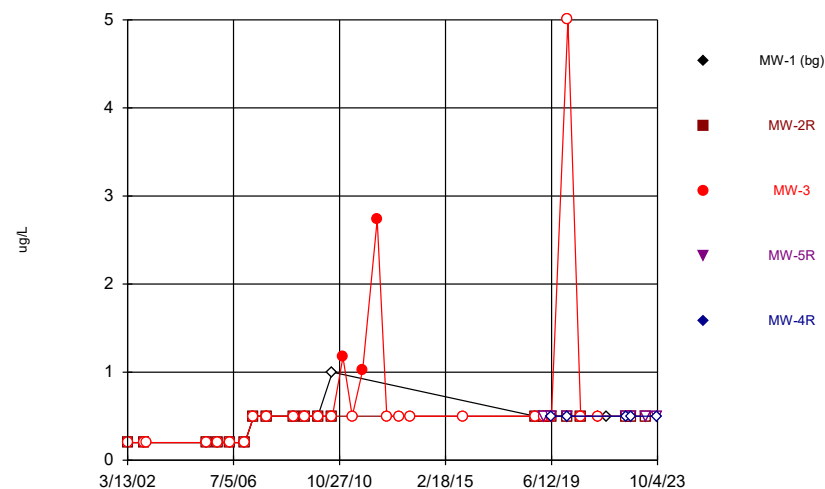
Attachment A
Time Series Plots

Time Series



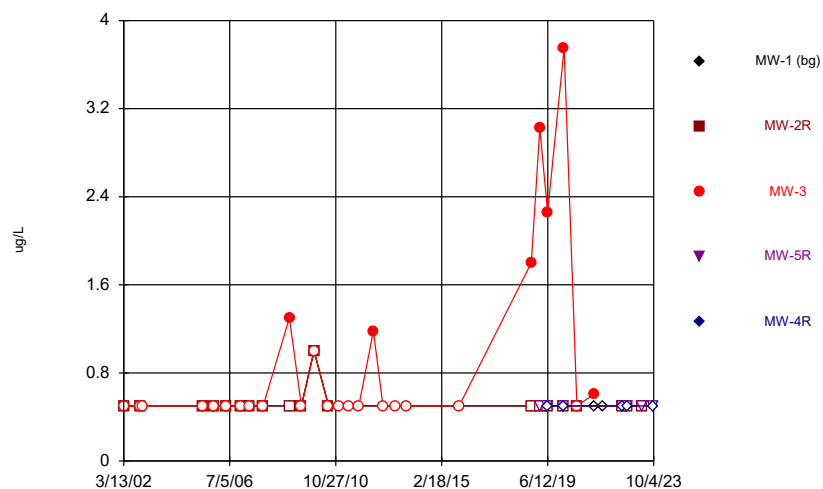
Constituent: 1,1-Dichloroethane Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



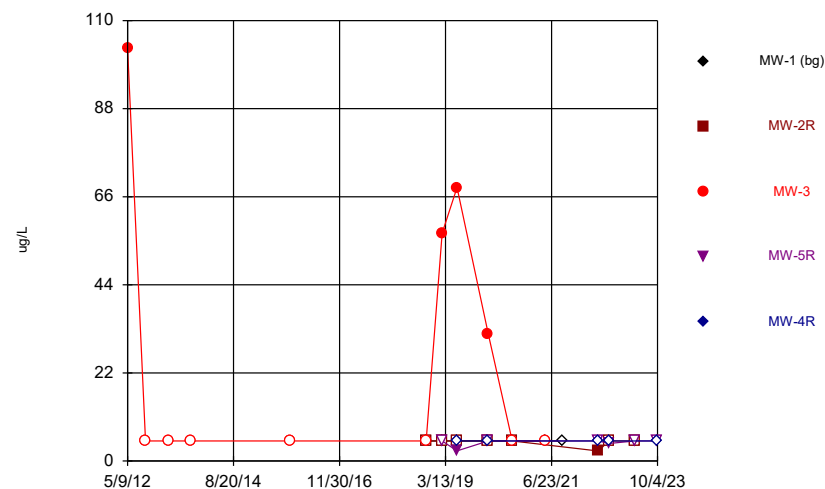
Constituent: 1,2-Dichloroethane Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



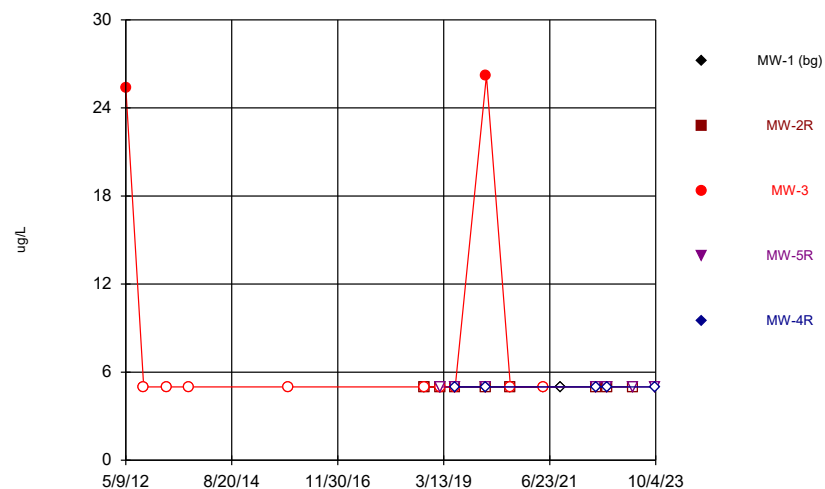
Constituent: 1,4-Dichlorobenzene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



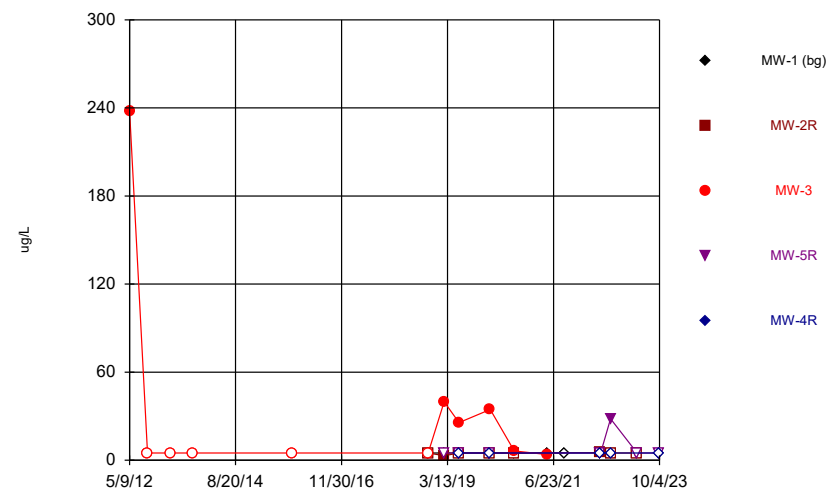
Constituent: 2-Butanone Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



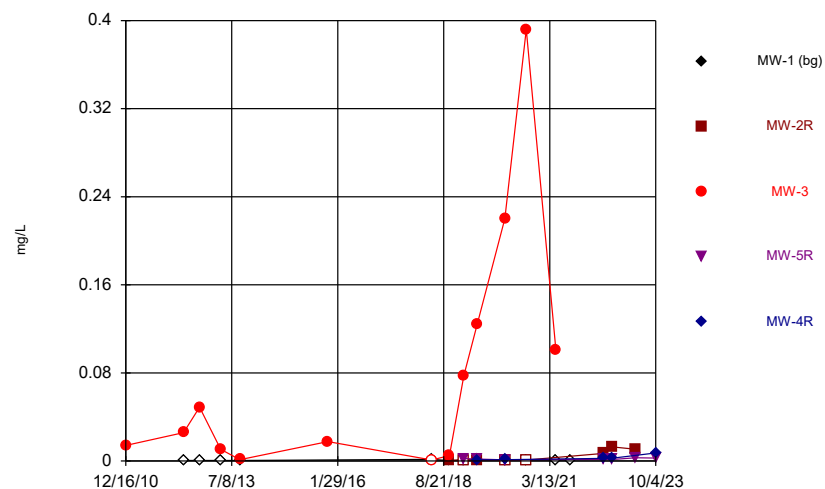
Constituent: 4-Methyl-2-pentanone Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



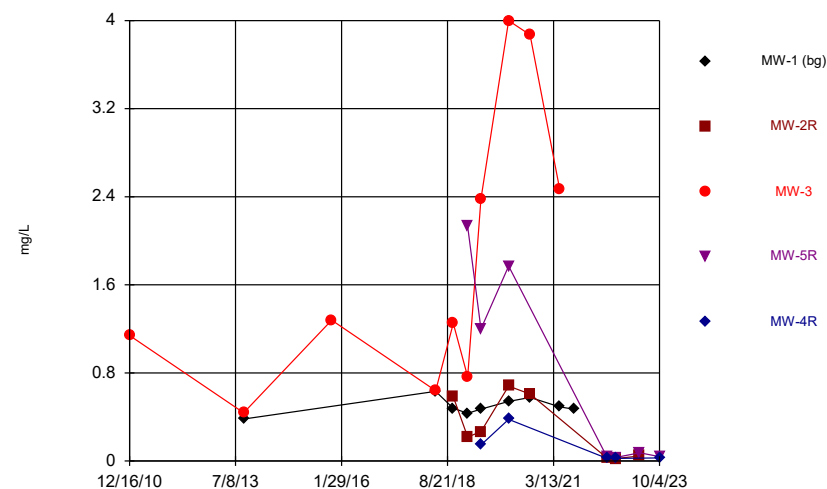
Constituent: Acetone Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



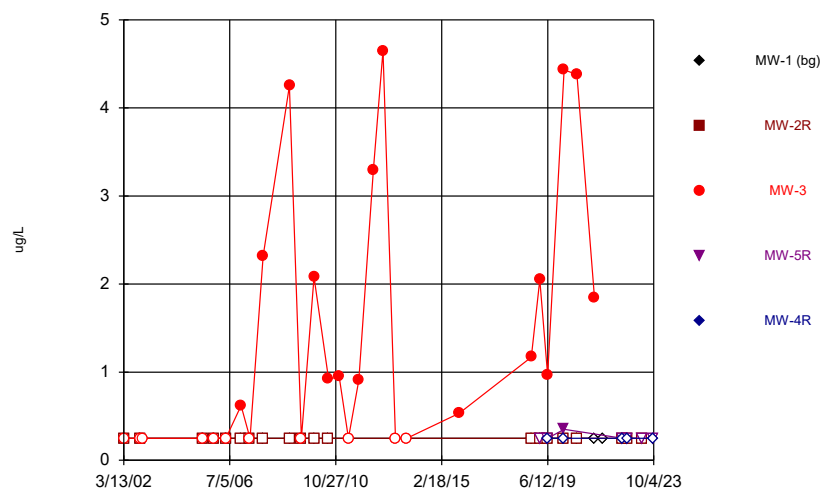
Constituent: Arsenic Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



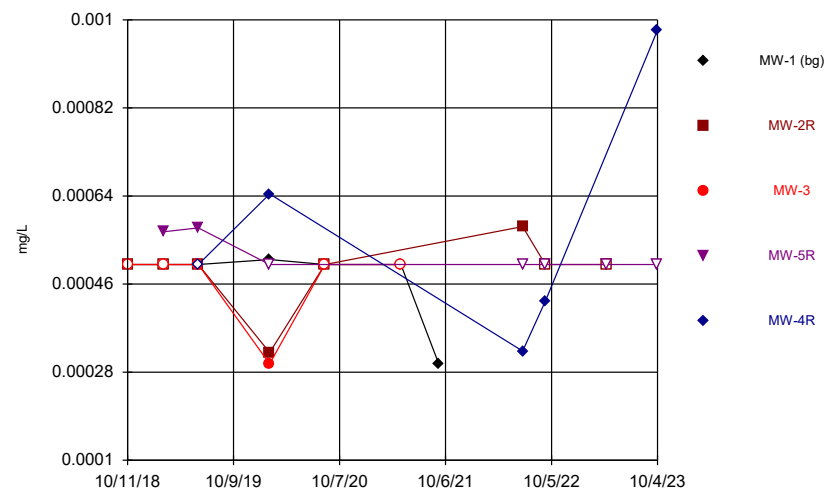
Constituent: Barium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



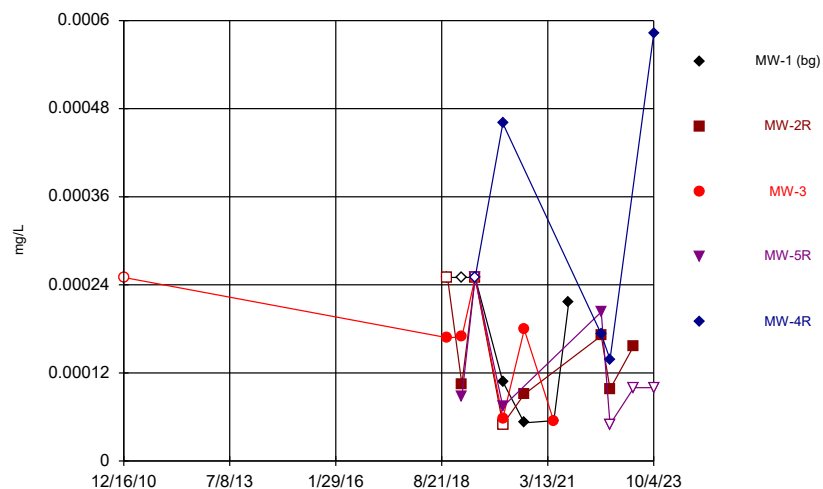
Constituent: Benzene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



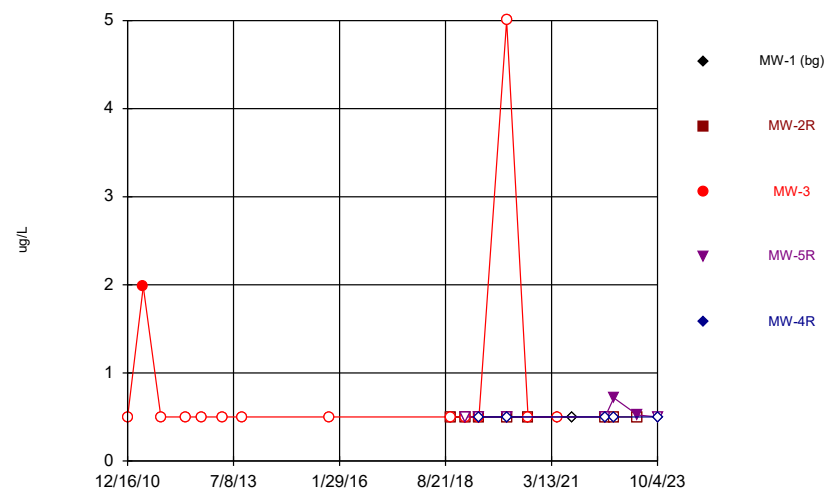
Constituent: Beryllium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



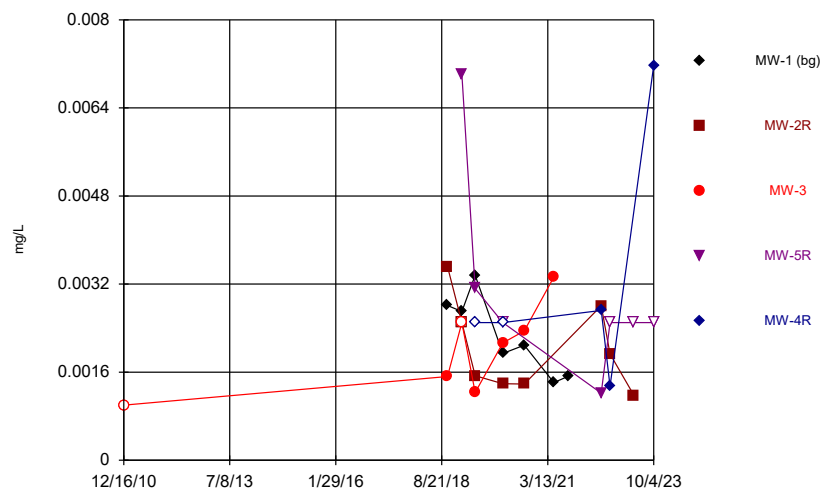
Constituent: Cadmium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



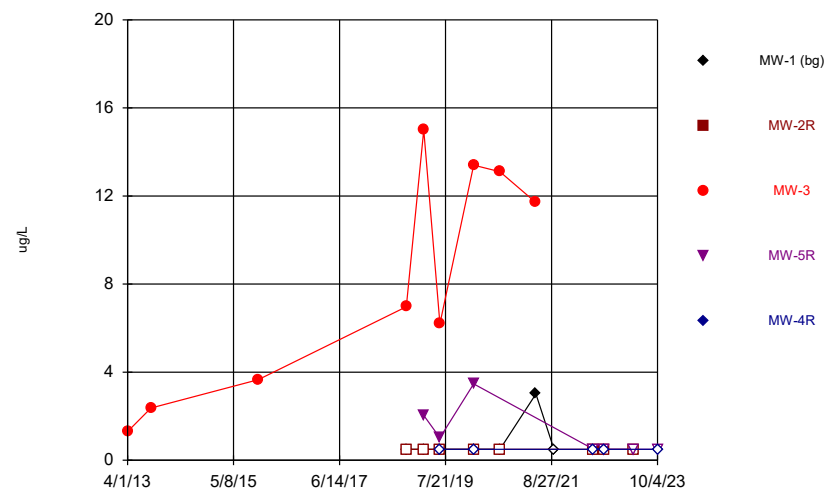
Constituent: Carbon Disulfide Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



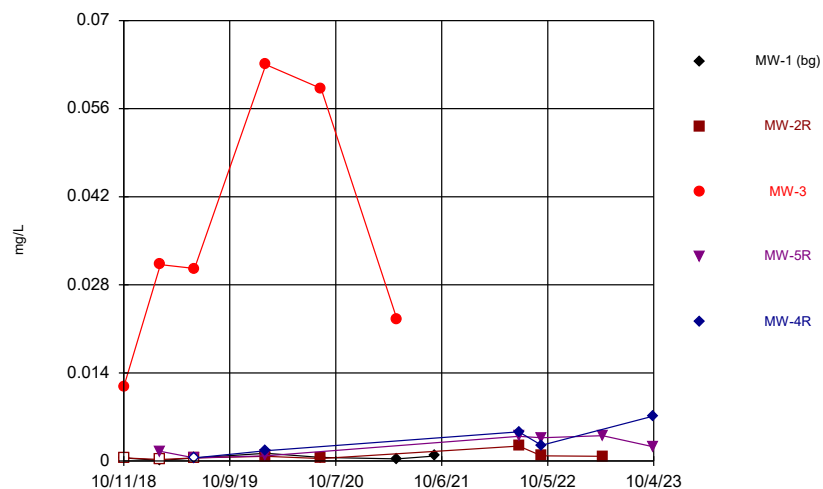
Constituent: Chromium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



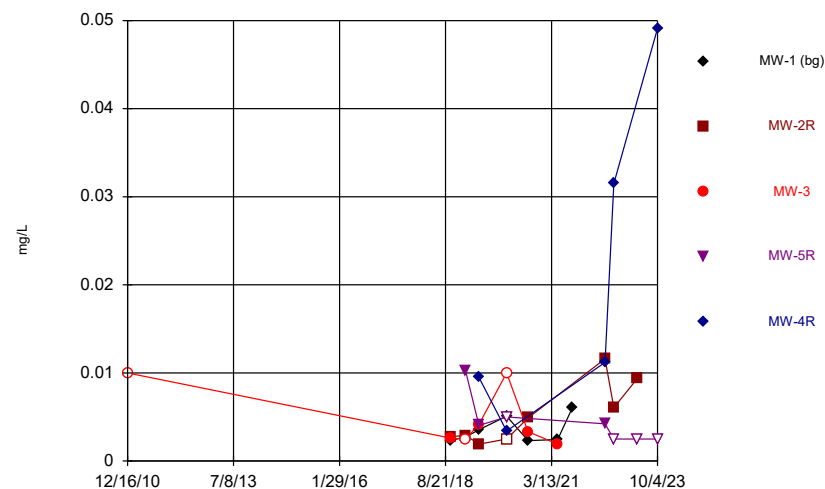
Constituent: Cis-1,2-Dichloroethene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



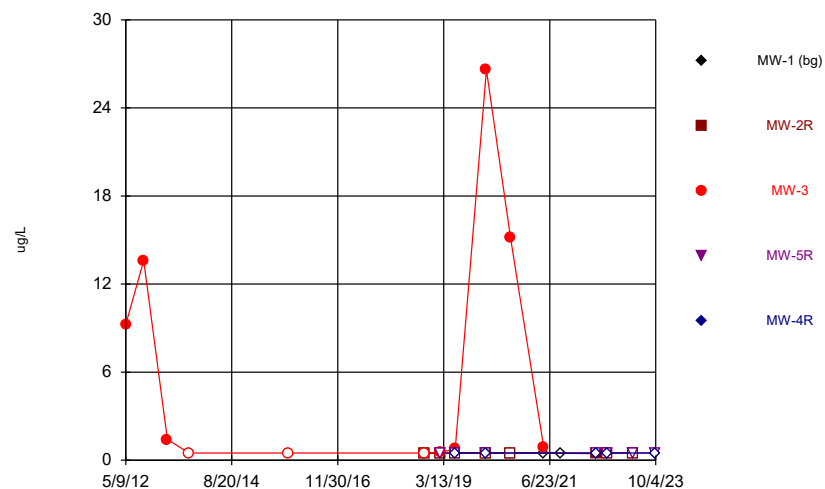
Constituent: Cobalt Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



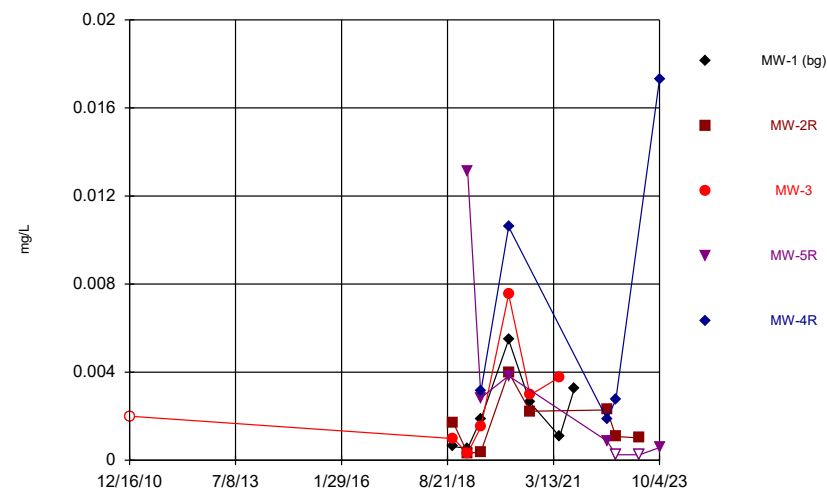
Constituent: Copper Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



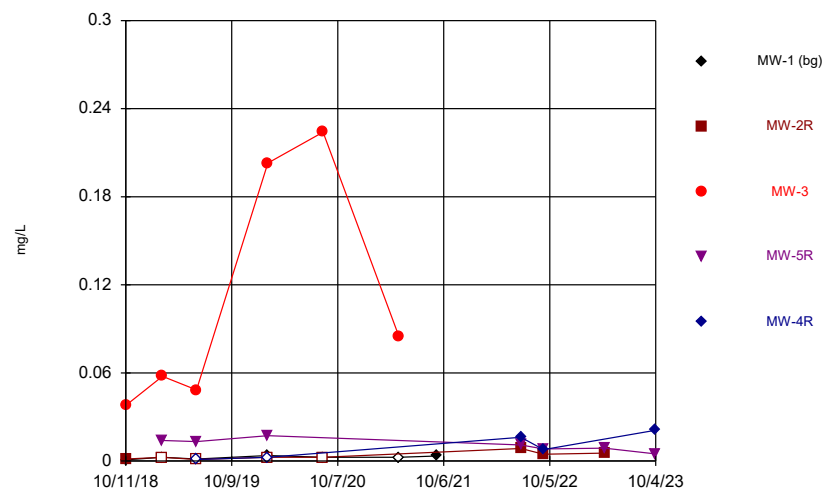
Constituent: Ethylbenzene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



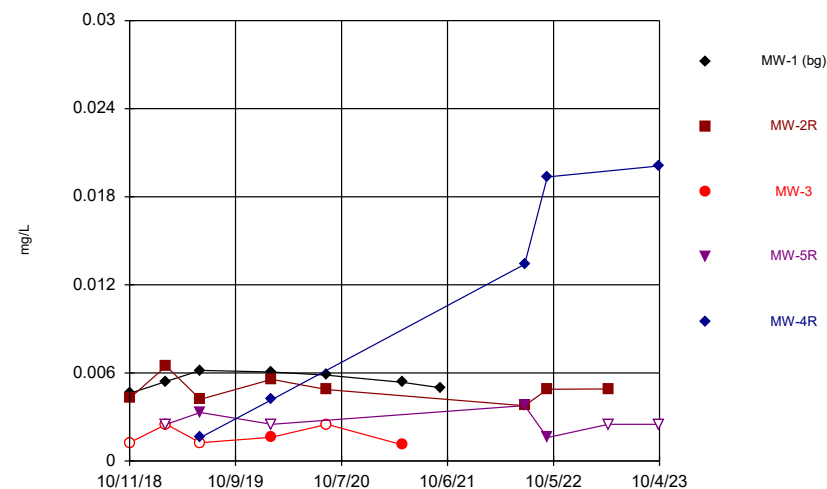
Constituent: Lead Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



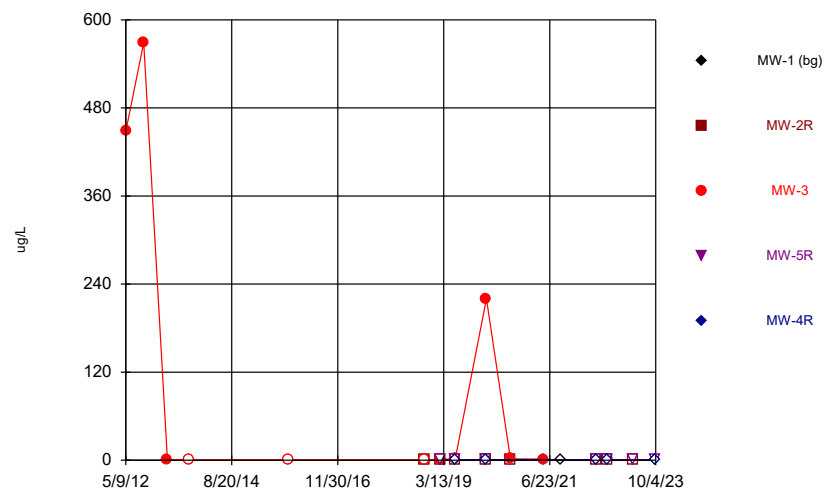
Constituent: Nickel Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



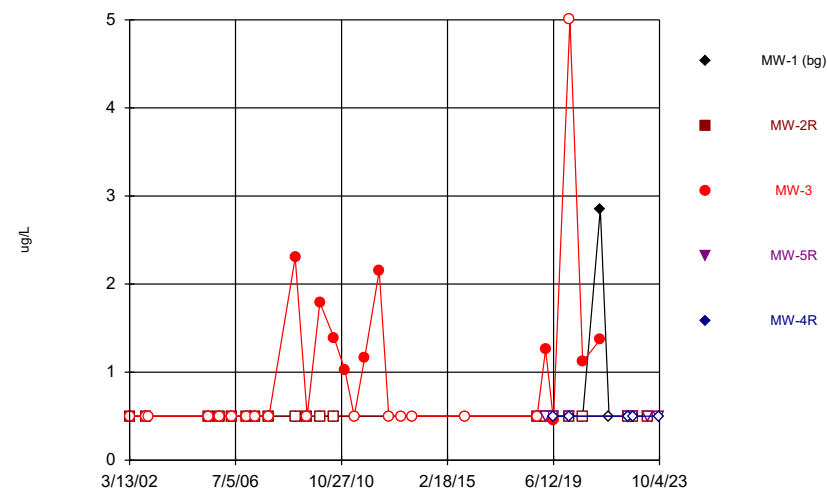
Constituent: Selenium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



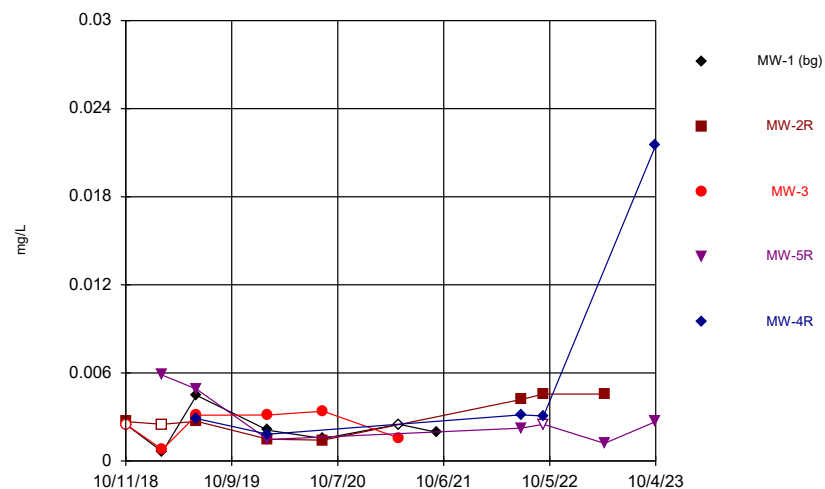
Constituent: Toluene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



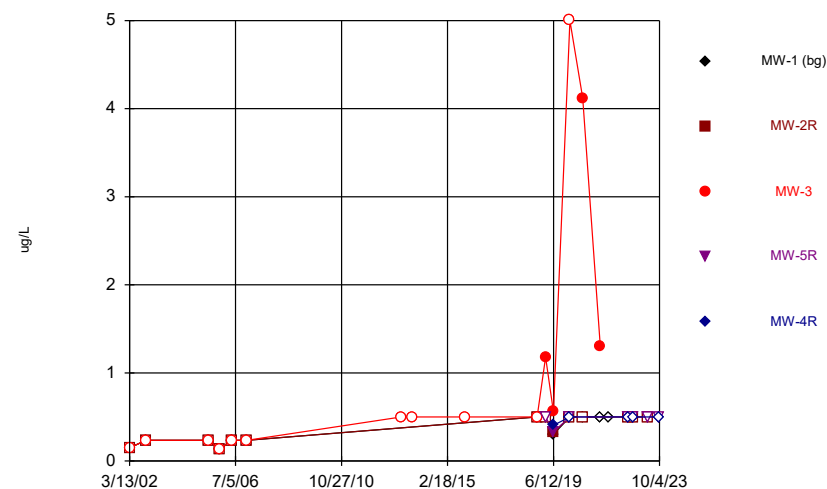
Constituent: Trichloroethene Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



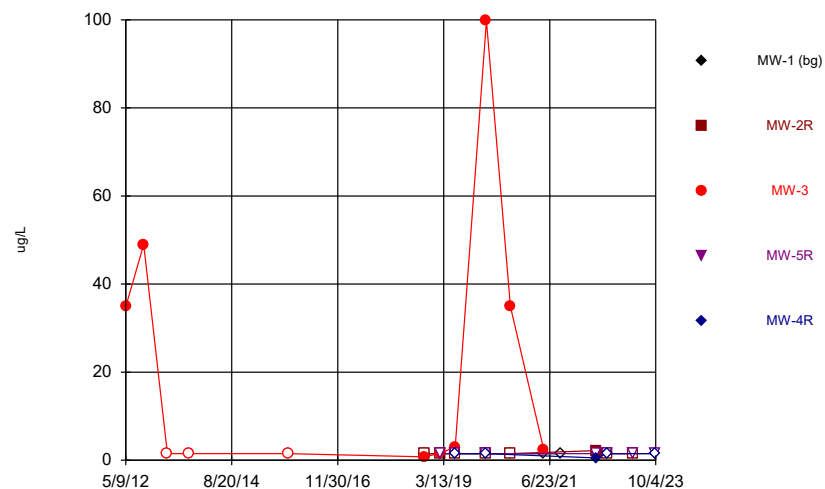
Constituent: Vanadium Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



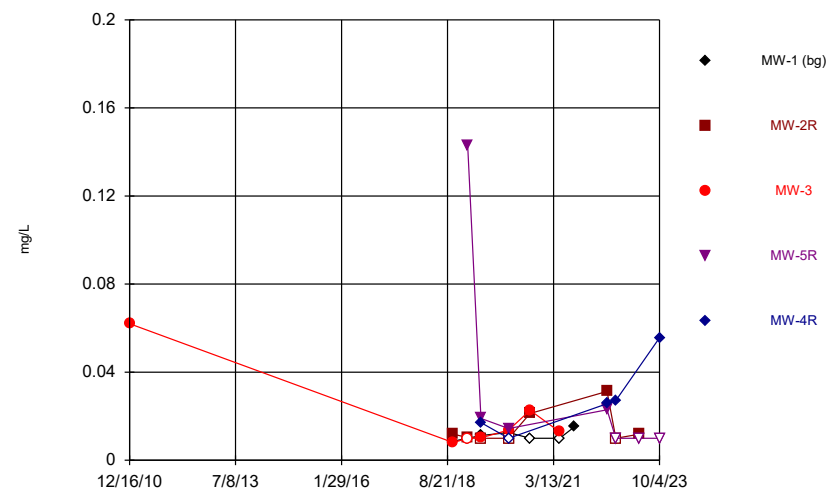
Constituent: Vinyl Chloride Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Time Series



Analysis Run 11/2/2023 1:51 PM View: 2023AWQR - Time Series
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Attachment B
Prediction Limit Tables and Graphs

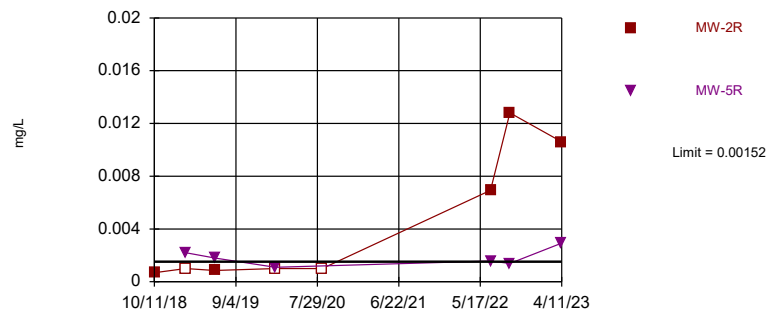
Prediction Limit

City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas Printed 11/2/2023, 3:15 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Trans...</u>	<u>Alpha</u>	<u>Method</u>
Arsenic (mg/L)	MW-2R	0.00152	n/a	4/11/2023	0.0106	Yes	12	75	n/a	0.0694	NP Inter (NDs)
Arsenic (mg/L)	MW-5R	0.00152	n/a	4/11/2023	0.00293	Yes	12	75	n/a	0.0694	NP Inter (NDs)
Barium (mg/L)	MW-2R	0.7287	n/a	4/11/2023	0.0459	No	9	0	No	0.01	Param Inter
Barium (mg/L)	MW-5R	0.7287	n/a	4/11/2023	0.0748	No	9	0	No	0.01	Param Inter
Cobalt (mg/L)	MW-2R	0.001795	n/a	4/11/2023	0.000752	No	7	28.57	No	0.01	Param Inter
Cobalt (mg/L)	MW-5R	0.001795	n/a	4/11/2023	0.00403	Yes	7	28.57	No	0.01	Param Inter
Copper (mg/L)	MW-2R	0.008589	n/a	4/11/2023	0.00941	Yes	7	0	No	0.01	Param Inter
Lead (mg/L)	MW-2R	0.008134	n/a	4/11/2023	0.00101	No	7	0	No	0.01	Param Inter
Nickel (mg/L)	MW-2R	0.006646	n/a	4/11/2023	0.00542	No	7	42.86	No	0.01	Param Inter
Nickel (mg/L)	MW-5R	0.006646	n/a	4/11/2023	0.008775	Yes	7	42.86	No	0.01	Param Inter

Exceeds Limit: MW-2R, MW-5R

Prediction Limit Interwell Non-parametric

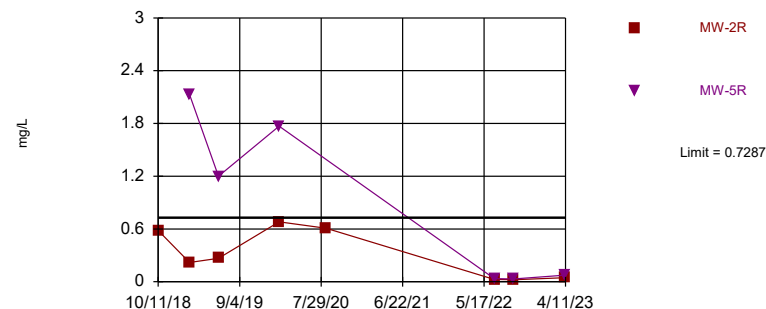


Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 12 background values. 75% NDs. Report alpha = 0.25. Individual comparison alpha = 0.0694. Based on user-set k of 4 (assumes 2 future values). Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Arsenic Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Within Limit

Prediction Limit Interwell Parametric

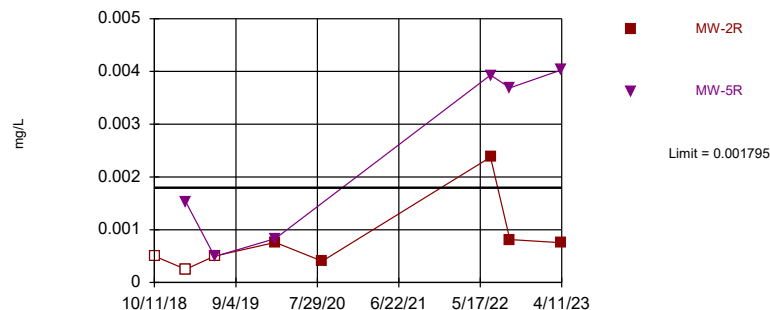


Background Data Summary: Mean=0.4974, Std. Dev.=0.07575, n=9. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9645, critical = 0.764. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Barium Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-5R

Prediction Limit Interwell Parametric

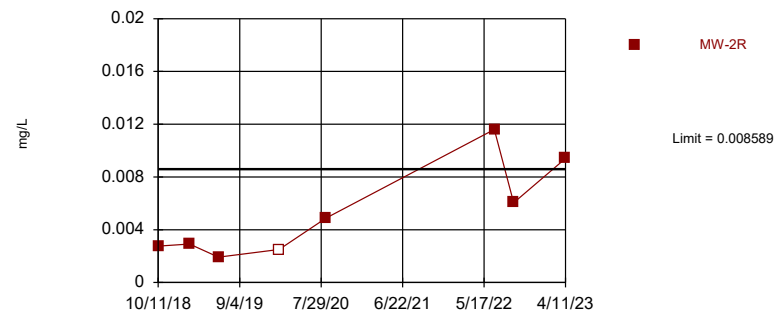


Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.0005584, Std. Dev.=0.000368, n=7, 28.57% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9488, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Cobalt Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-2R

Prediction Limit Interwell Parametric



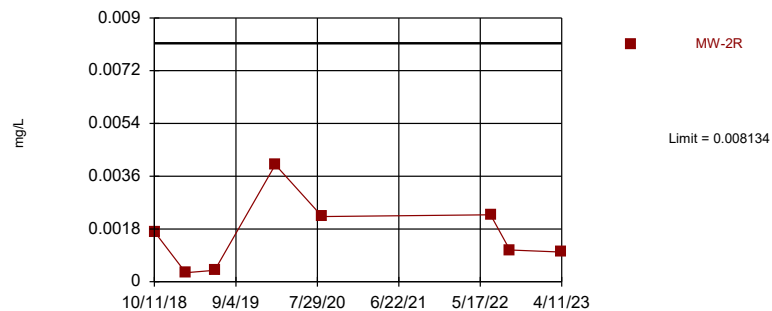
Background Data Summary: Mean=0.003511, Std. Dev.=0.001511, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8159, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Copper Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=0.002212, Std. Dev.=0.001763, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.899, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

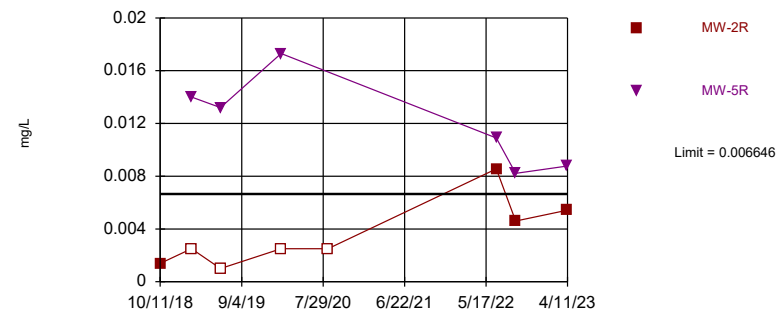
Constituent: Lead Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Hollow symbols indicate censored values.

Exceeds Limit: MW-5R

Prediction Limit

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.002349, Std. Dev.=0.001279, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9336, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Nickel Analysis Run 11/2/2023 3:13 PM View: 2023AWQR - PL Spring
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Prediction Limit

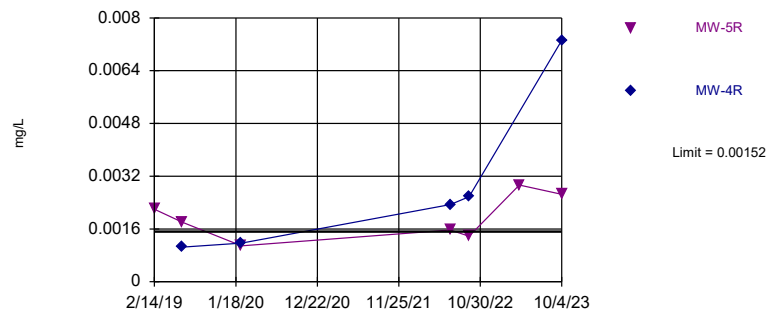
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas Printed 11/2/2023, 3:18 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>%NDs</u>	<u>Trans...</u>	<u>Alpha</u>	<u>Method</u>
Arsenic (mg/L)	MW-5R	0.00152	n/a	10/4/2023	0.00265	Yes	12	75	n/a	0.0694	NP Inter (NDs)
Arsenic (mg/L)	MW-4R	0.00152	n/a	10/4/2023	0.00732	Yes	12	75	n/a	0.0694	NP Inter (NDs)
Barium (mg/L)	MW-5R	0.7287	n/a	10/4/2023	0.0392	No	9	0	No	0.01	Param Inter
Barium (mg/L)	MW-4R	0.7287	n/a	10/4/2023	0.0275	No	9	0	No	0.01	Param Inter
Cadmium (mg/L)	MW-4R	0.0003307	n/a	10/4/2023	0.000582	Yes	7	42.86	No	0.01	Param Inter
Chromium (mg/L)	MW-4R	0.004675	n/a	10/4/2023	0.00717	Yes	7	0	No	0.01	Param Inter
Cobalt (mg/L)	MW-5R	0.001795	n/a	10/4/2023	0.00225	Yes	7	28.57	No	0.01	Param Inter
Cobalt (mg/L)	MW-4R	0.001795	n/a	10/4/2023	0.00715	Yes	7	28.57	No	0.01	Param Inter
Copper (mg/L)	MW-4R	0.008589	n/a	10/4/2023	0.0491	Yes	7	0	No	0.01	Param Inter
Lead (mg/L)	MW-5R	0.008134	n/a	10/4/2023	0.000574	No	7	0	No	0.01	Param Inter
Lead (mg/L)	MW-4R	0.008134	n/a	10/4/2023	0.0173	Yes	7	0	No	0.01	Param Inter
Nickel (mg/L)	MW-4R	0.006646	n/a	10/4/2023	0.021	Yes	7	42.86	No	0.01	Param Inter
Selenium (mg/L)	MW-4R	0.007427	n/a	10/4/2023	0.0201	Yes	7	0	No	0.01	Param Inter
Vanadium (mg/L)	MW-4R	0.006418	n/a	10/4/2023	0.0215	Yes	7	28.57	No	0.01	Param Inter
Zinc (mg/L)	MW-4R	0.01986	n/a	10/4/2023	0.0556	Yes	7	42.86	No	0.01	Param Inter

Exceeds Limit: MW-5R, MW-4R

Prediction Limit

Interwell Non-parametric



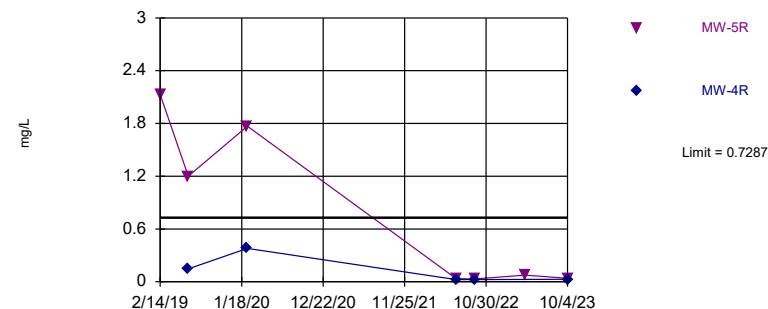
Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 12 background values. 75% NDs. Report alpha = 0.25. Individual comparison alpha = 0.0694. Based on user-set k of 4 (assumes 2 future values). Insufficient data to test for seasonality; data will not be deseasonalized.

Constituent: Arsenic Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Within Limit

Prediction Limit

Interwell Parametric



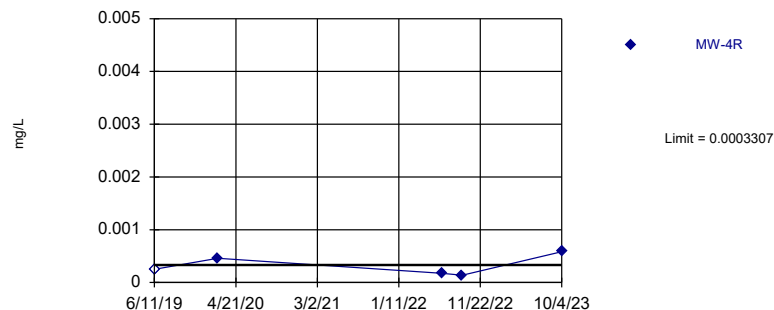
Background Data Summary: Mean=0.4974, Std. Dev.=0.07575, n=9. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9645, critical = 0.764. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Barium Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



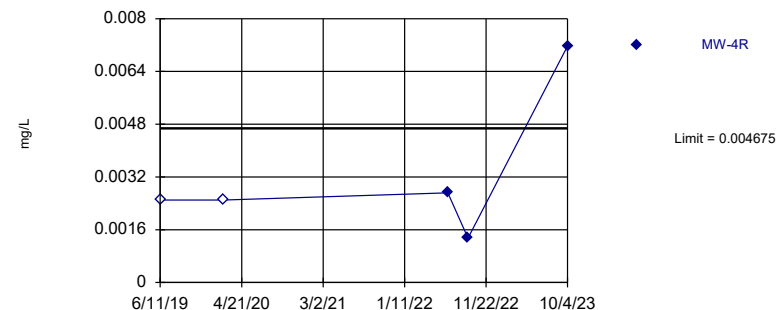
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.0001078, Std. Dev.=0.00006635, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7834, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Cadmium Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



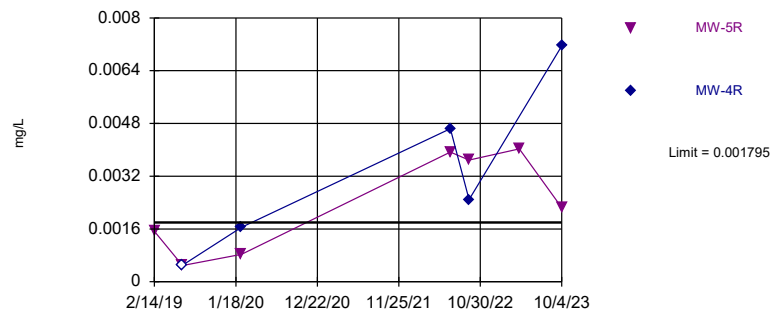
Background Data Summary: Mean=0.002263, Std. Dev.=0.000718, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9453, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Chromium Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-5R, MW-4R

Prediction Limit

Interwell Parametric



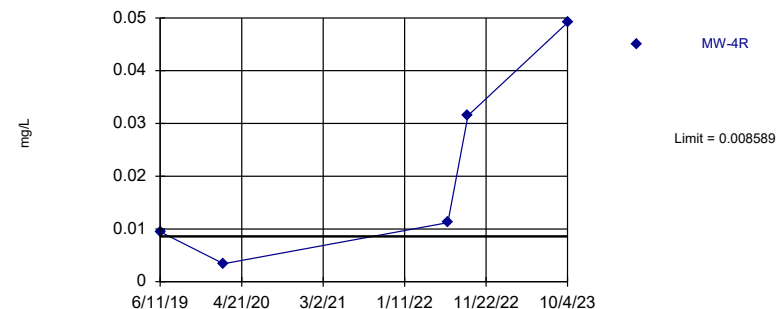
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.0005584, Std. Dev.=0.000368, n=7, 28.57% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9488, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Cobalt Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



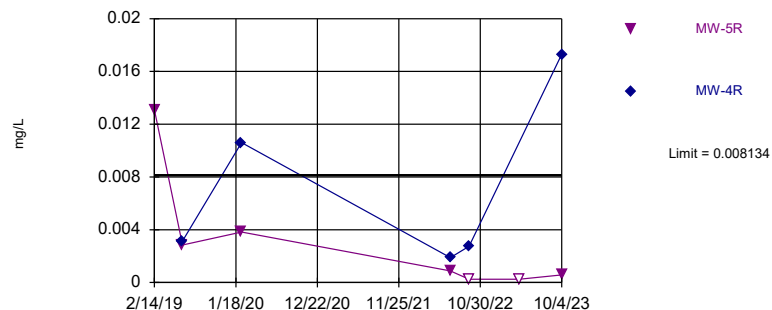
Background Data Summary: Mean=0.003511, Std. Dev.=0.001511, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8159, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Copper Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



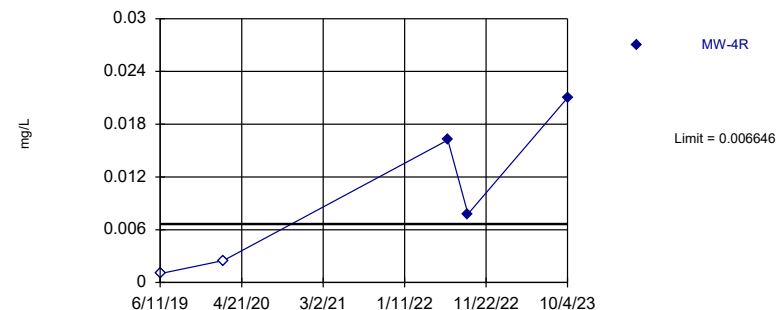
Background Data Summary: Mean=0.002212, Std. Dev.=0.001763, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.899, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 2 future values).

Constituent: Lead Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



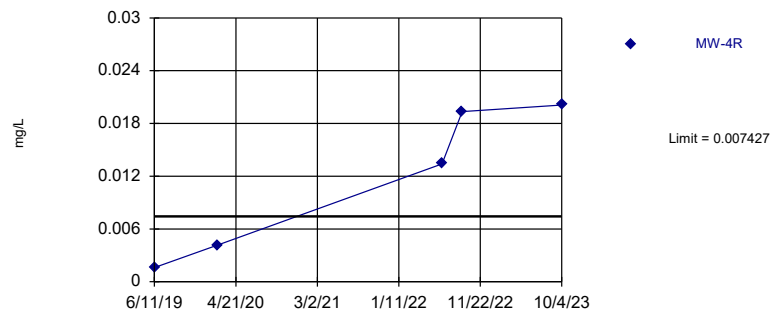
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.002349, Std. Dev.=0.001279, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9336, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Nickel Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



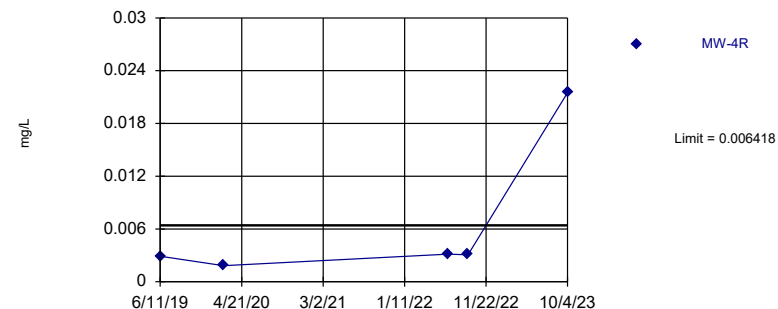
Background Data Summary: Mean=0.005491, Std. Dev.=0.000576, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9491, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Selenium Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



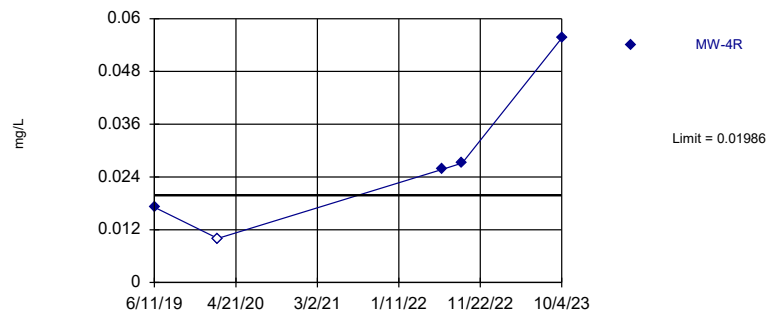
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.002138, Std. Dev.=0.001274, n=7, 28.57% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9196, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Vanadium Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Exceeds Limit: MW-4R

Prediction Limit

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.011192, Std. Dev.=0.002365, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8839, critical = 0.73. Report alpha = 0.0394. Individual comparison alpha = 0.01. Based on user-set k of 4 (assumes 3 future values).

Constituent: Zinc Analysis Run 11/2/2023 3:17 PM View: 2023AWQR - PL Fall
City of Hawarden C&D Landfill Client: SCS Engineers Data: HWRDN HMSP Sanitas

Attachment C

Mann-Kendall Trend Table and Graphs

Trend Test

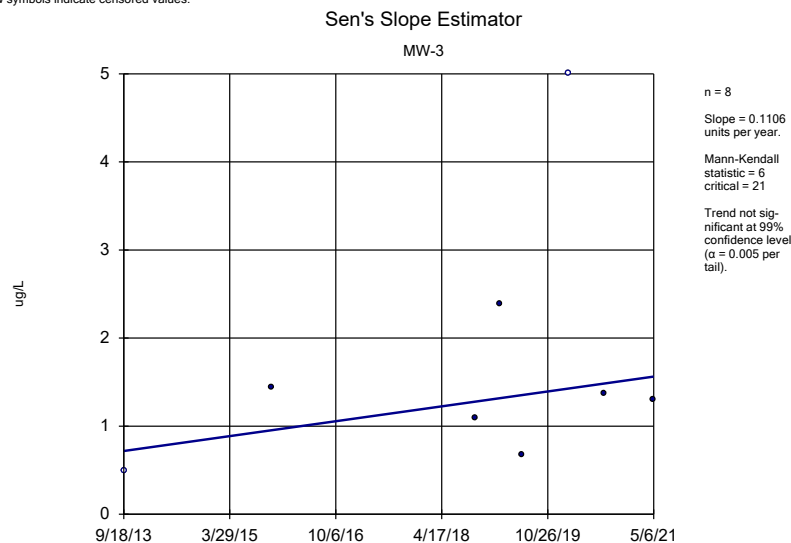
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM Printed 11/3/2023, 11:31 AM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Alpha</u>	<u>Method</u>
1,1-Dichloroethane (ug/L)	MW-3	0.1106	6	21	No	8	25	0.01	NP
1,4-Dichlorobenzene (ug/L)	MW-3	0.08769	7	21	No	8	37.5	0.01	NP
2-Butanone (ug/L)	MW-3	0	2	21	No	8	62.5	0.01	NP
Acetone (ug/L)	MW-3	0	1	21	No	8	37.5	0.01	NP
Acetone (ug/L)	MW-5R	0	2	18	No	7	85.71	0.01	NP
Arsenic (mg/L)	MW-2R	0.002099	21	21	No	8	37.5	0.01	NP
Arsenic (mg/L)	MW-3	0.08867	18	21	No	8	12.5	0.01	NP
Arsenic (mg/L)	MW-4R	0.0008336	10	12	No	5	0	0.01	NP
Arsenic (mg/L)	MW-5R	0.0001119	3	18	No	7	0	0.01	NP
Barium (mg/L)	MW-2R	-0.06625	-10	-21	No	8	0	0.01	NP
Barium (mg/L)	MW-3	0.6236	14	21	No	8	0	0.01	NP
Barium (mg/L)	MW-4R	-0.03253	-4	-12	No	5	0	0.01	NP
Barium (mg/L)	MW-5R	-0.363	-11	-18	No	7	0	0.01	NP
Benzene (ug/L)	MW-3	0.2967	16	21	No	8	12.5	0.01	NP
Cadmium (mg/L)	MW-2R	-0.00001322	-5	-21	No	8	37.5	0.01	NP
Cadmium (mg/L)	MW-3	-0.00001048	-8	-18	No	7	28.57	0.01	NP
Cadmium (mg/L)	MW-4R	0.000004102	0	12	No	5	20	0.01	NP
Cadmium (mg/L)	MW-5R	-0.00000926	-2	-18	No	7	57.14	0.01	NP
Chromium (mg/L)	MW-4R	0.00008233	3	12	No	5	40	0.01	NP
Chromium (mg/L)	MW-5R	-0.0001616	-9	-18	No	7	57.14	0.01	NP
Cis-1,2-Dichloroethene (ug/L)	MW-3	1.341	12	21	No	8	0	0.01	NP
Cis-1,2-Dichloroethene (ug/L)	MW-5R	-0.1594	-11	-18	No	7	57.14	0.01	NP
Cobalt (mg/L)	MW-2R	0.00009897	11	21	No	8	37.5	0.01	NP
Cobalt (mg/L)	MW-3	0.01855	3	14	No	6	0	0.01	NP
Cobalt (mg/L)	MW-4R	0.001433	8	12	No	5	20	0.01	NP
Cobalt (mg/L)	MW-5R	0.0005095	9	18	No	7	0	0.01	NP
Copper (mg/L)	MW-2R	0.001339	16	21	No	8	12.5	0.01	NP
Copper (mg/L)	MW-3	-0.0002607	-6	-18	No	7	42.86	0.01	NP
Copper (mg/L)	MW-4R	0.01001	8	12	No	5	0	0.01	NP
Copper (mg/L)	MW-5R	-0.00079	-14	-18	No	7	57.14	0.01	NP
Ethylbenzene (ug/L)	MW-3	0.1231	19	21	No	8	37.5	0.01	NP
Lead (mg/L)	MW-2R	0.00009351	2	21	No	8	0	0.01	NP
Lead (mg/L)	MW-3	0.001064	9	18	No	7	14.29	0.01	NP
Lead (mg/L)	MW-4R	0.002557	2	12	No	5	0	0.01	NP
Lead (mg/L)	MW-5R	-0.0008929	-14	-18	No	7	28.57	0.01	NP
Nickel (mg/L)	MW-2R	0.0009101	17	21	No	8	50	0.01	NP
Nickel (mg/L)	MW-3	0.04056	9	14	No	6	0	0.01	NP
Nickel (mg/L)	MW-4R	0.004208	8	12	No	5	40	0.01	NP
Nickel (mg/L)	MW-5R	-0.001964	-15	-18	No	7	0	0.01	NP
Selenium (mg/L)	MW-2R	-0.00004909	0	21	No	8	0	0.01	NP
Selenium (mg/L)	MW-4R	0.004325	10	12	No	5	0	0.01	NP
Selenium (mg/L)	MW-5R	0	-3	-18	No	7	57.14	0.01	NP
Toluene (ug/L)	MW-3	0.2127	16	21	No	8	37.5	0.01	NP
Trichloroethene (ug/L)	MW-3	0.1349	11	21	No	8	50	0.01	NP
Vanadium (mg/L)	MW-2R	0.0004791	11	21	No	8	12.5	0.01	NP
Vanadium (mg/L)	MW-4R	0.0005187	6	12	No	5	0	0.01	NP
Vanadium (mg/L)	MW-5R	-0.0007355	-7	-18	No	7	14.29	0.01	NP
Vinyl Chloride (ug/L)	MW-3	0.1761	17	21	No	8	50	0.01	NP
Xylenes, Total (ug/L)	MW-3	0.5424	15	21	No	8	25	0.01	NP
Zinc (mg/L)	MW-2R	0	2	21	No	8	37.5	0.01	NP

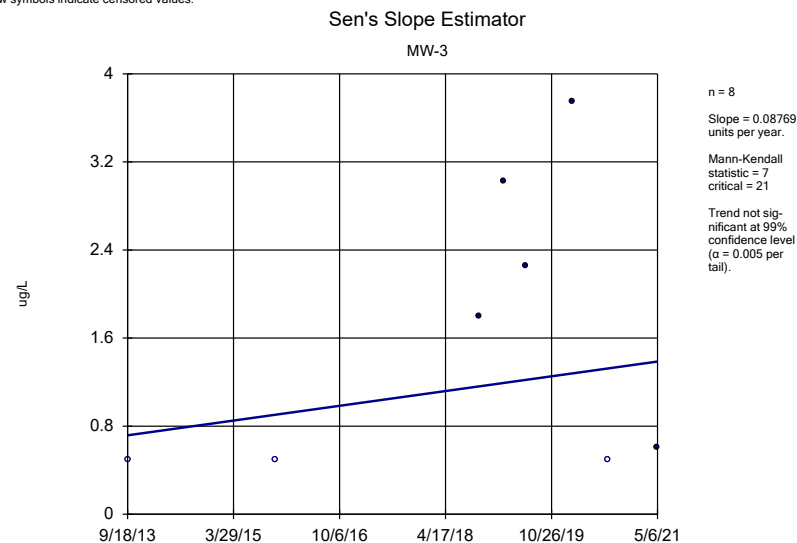
Trend Test

City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM Printed 11/3/2023, 11:31 AM

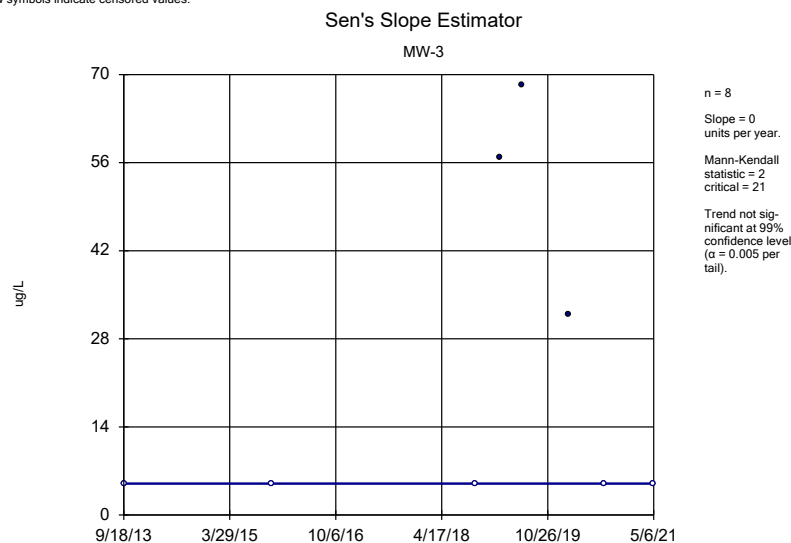
<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Alpha</u>	<u>Method</u>
Zinc (mg/L)	MW-3	0.001418	5	18	No	7	14.29	0.01	NP
Zinc (mg/L)	MW-4R	0.006701	8	12	No	5	20	0.01	NP
Zinc (mg/L)	MW-5R	-0.002758	-14	-18	No	7	42.86	0.01	NP



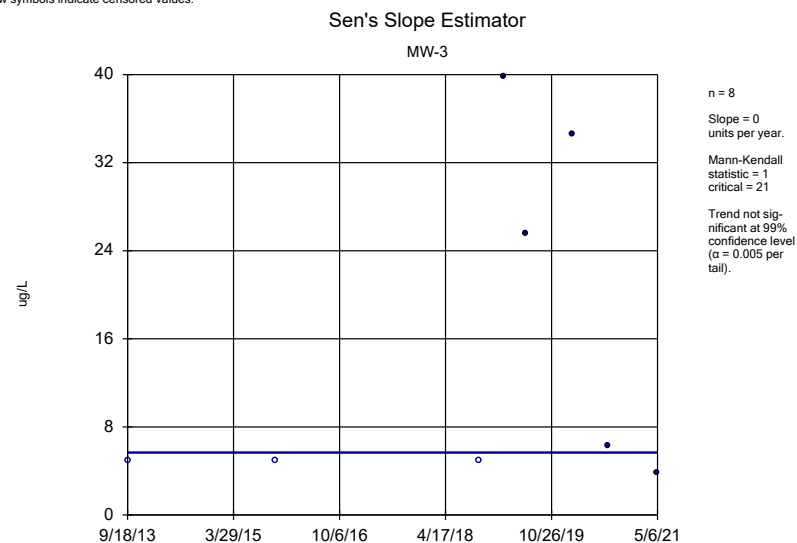
Constituent: 1,1-Dichloroethane Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: 1,4-Dichlorobenzene Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



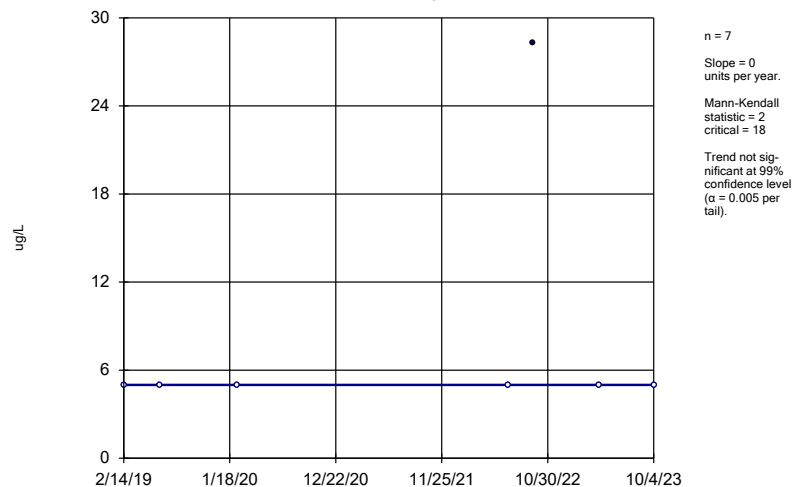
Constituent: 2-Butanone Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Acetone Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

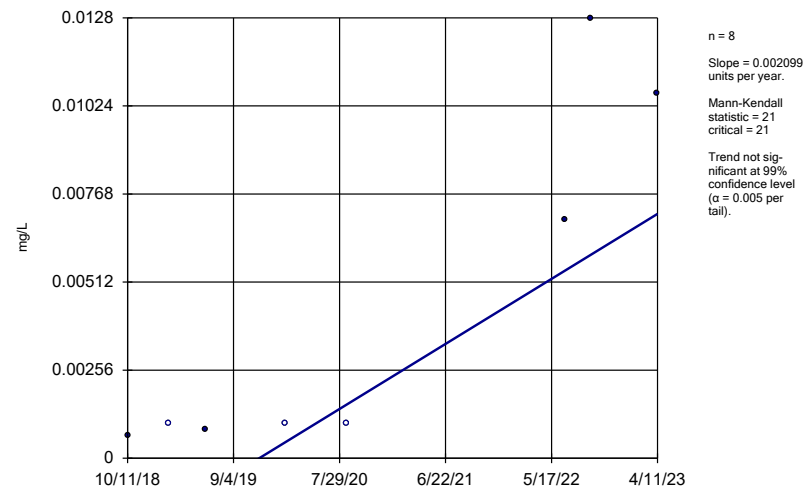
MW-5R



Constituent: Acetone Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

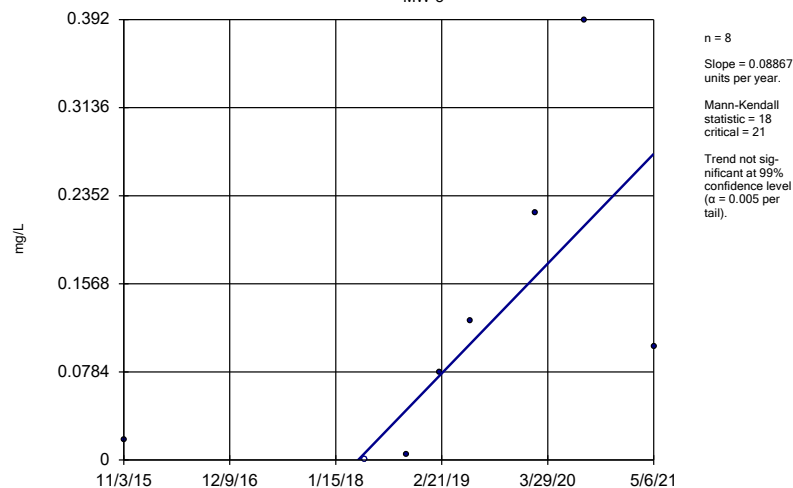
MW-2R



Constituent: Arsenic Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

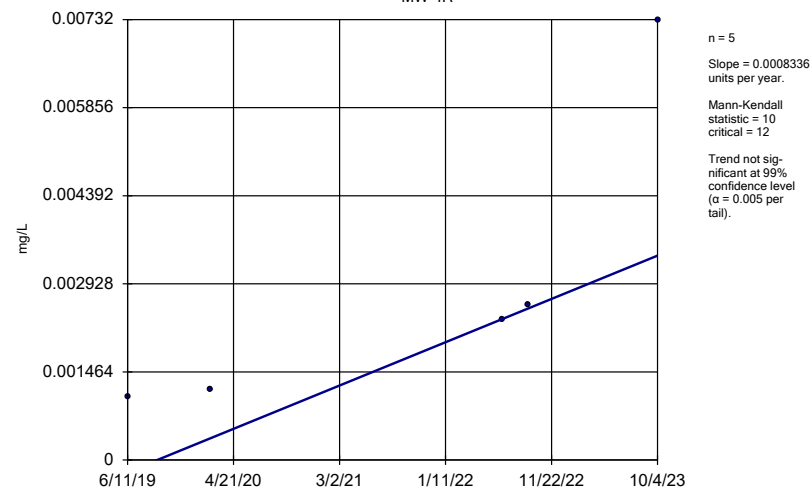
MW-3



Constituent: Arsenic Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

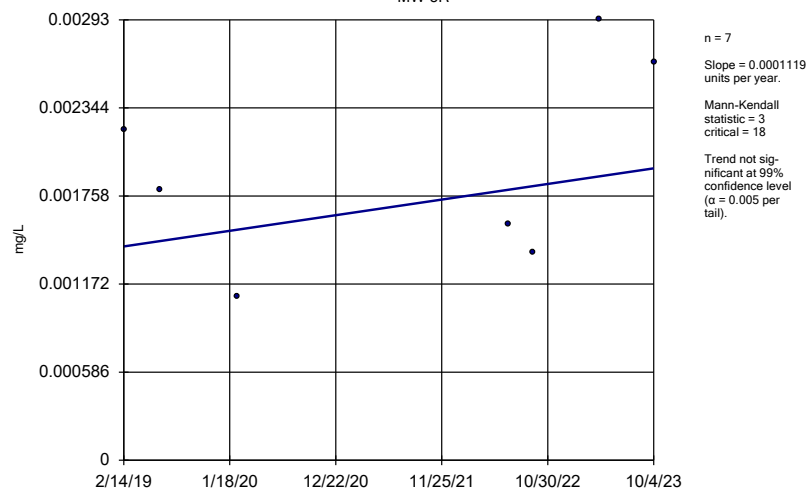
MW-4R



Constituent: Arsenic Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

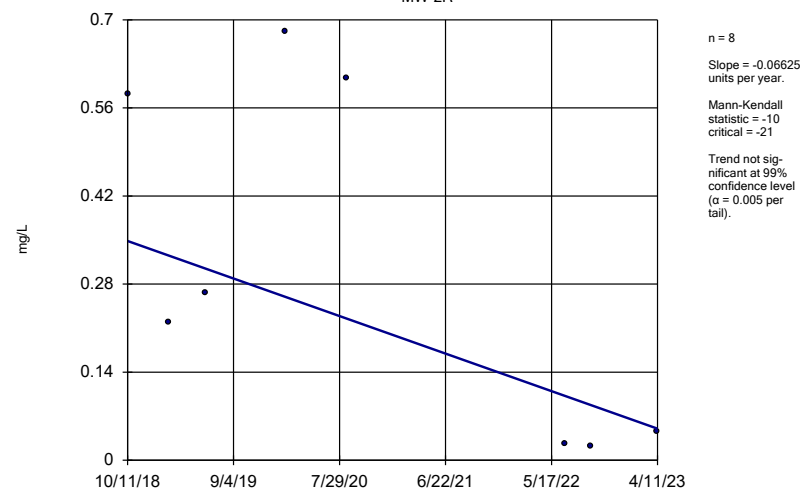
MW-5R



Constituent: Arsenic Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

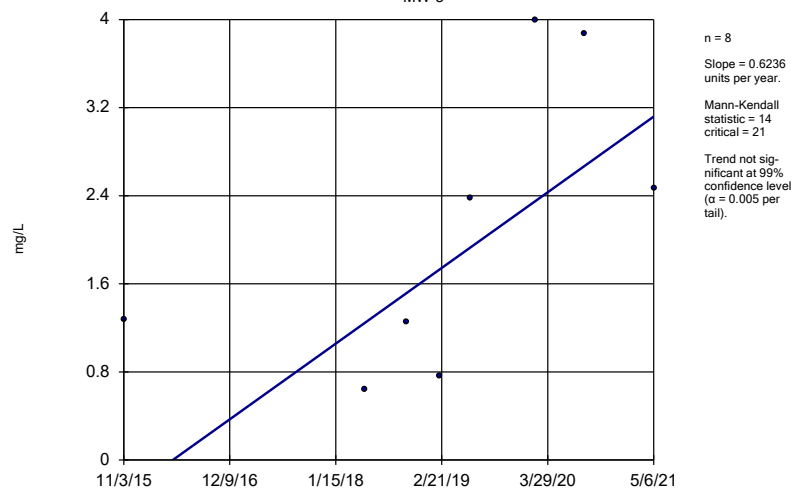
MW-2R



Constituent: Barium Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

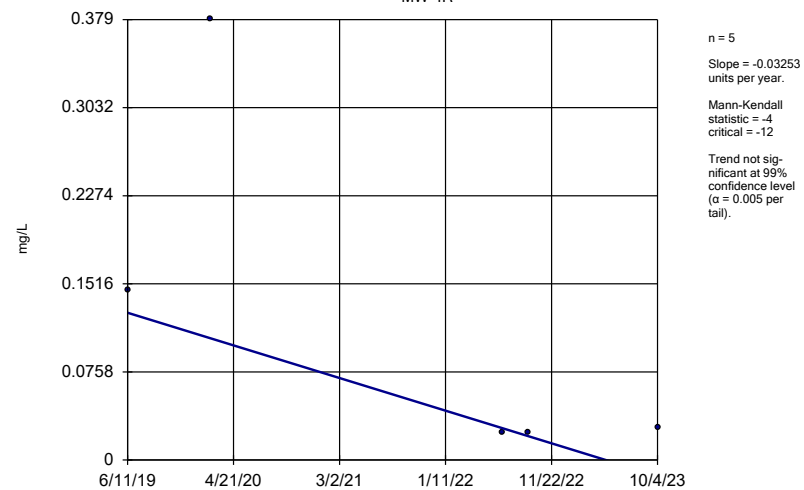
MW-3



Constituent: Barium Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

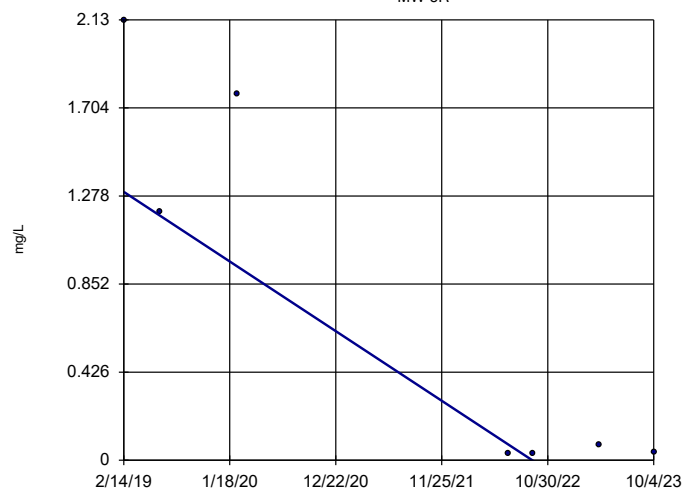
MW-4R



Constituent: Barium Analysis Run 11/3/2023 11:22 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

MW-5R

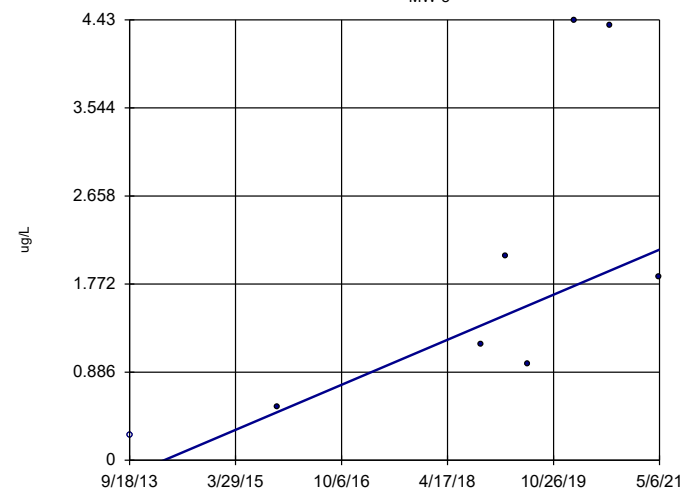


n = 7
 Slope = -0.363
 units per year.
 Mann-Kendall
 statistic = -11
 critical = -18
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Barium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
 City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

MW-3

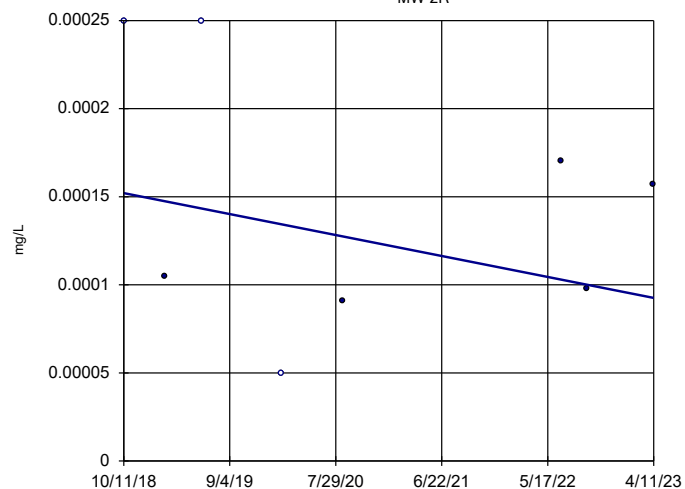


n = 8
 Slope = 0.2967
 units per year.
 Mann-Kendall
 statistic = 16
 critical = 21
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Benzene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
 City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

MW-2R

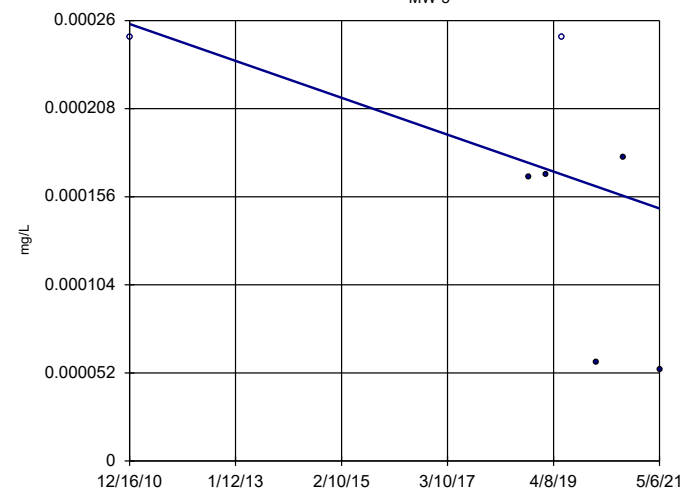


n = 8
 Slope = -0.00001322
 units per year.
 Mann-Kendall
 statistic = -5
 critical = -21
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Cadmium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
 City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

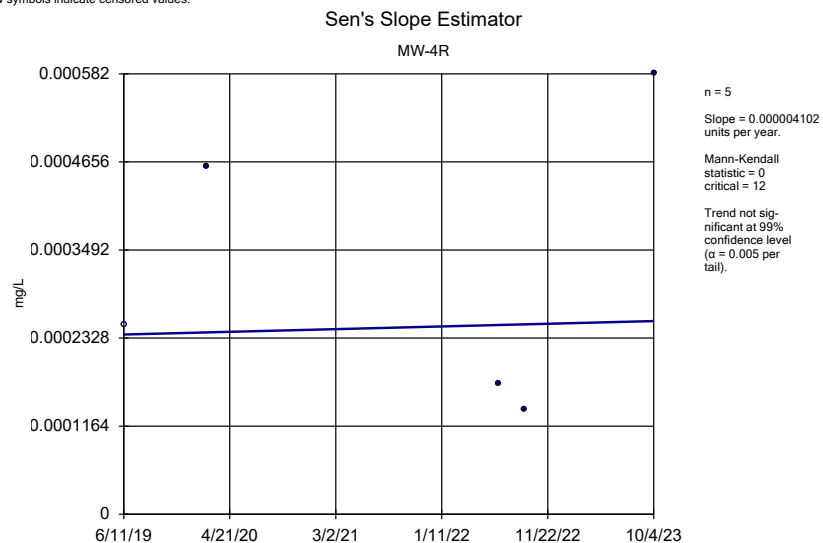
Sen's Slope Estimator

MW-3

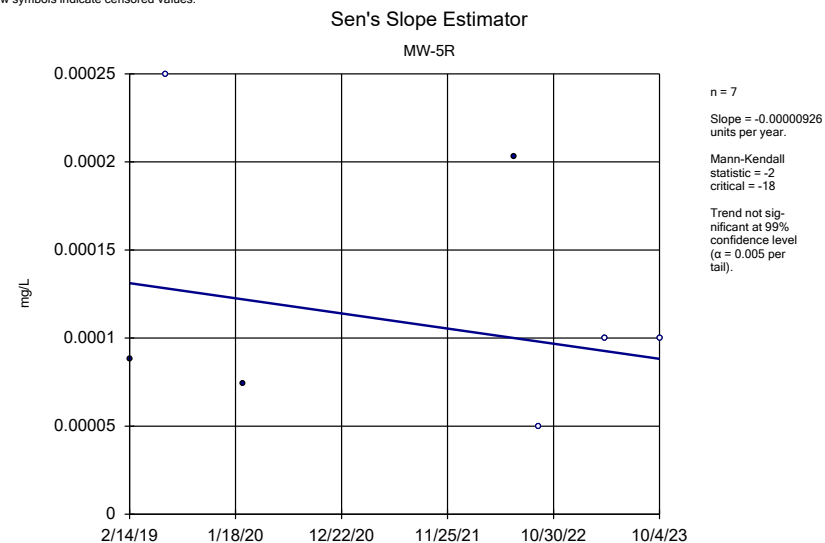


n = 7
 Slope = -0.00001048
 units per year.
 Mann-Kendall
 statistic = -8
 critical = -18
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

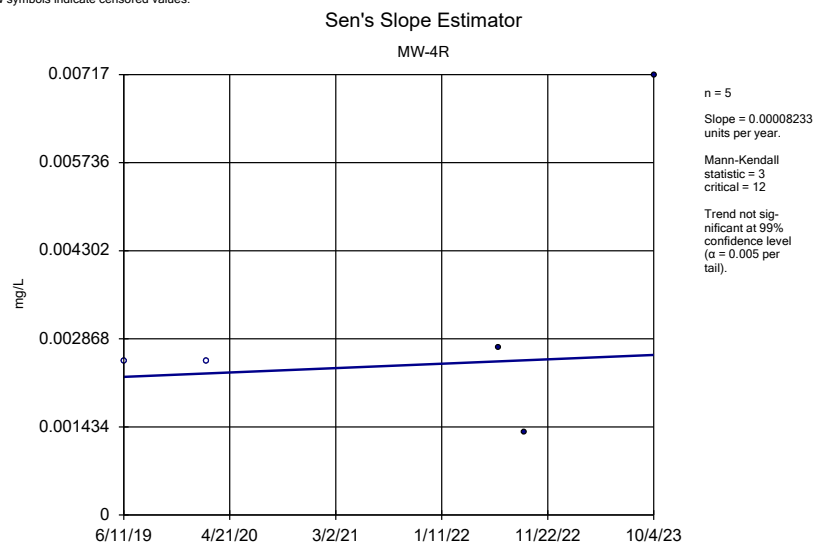
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 City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



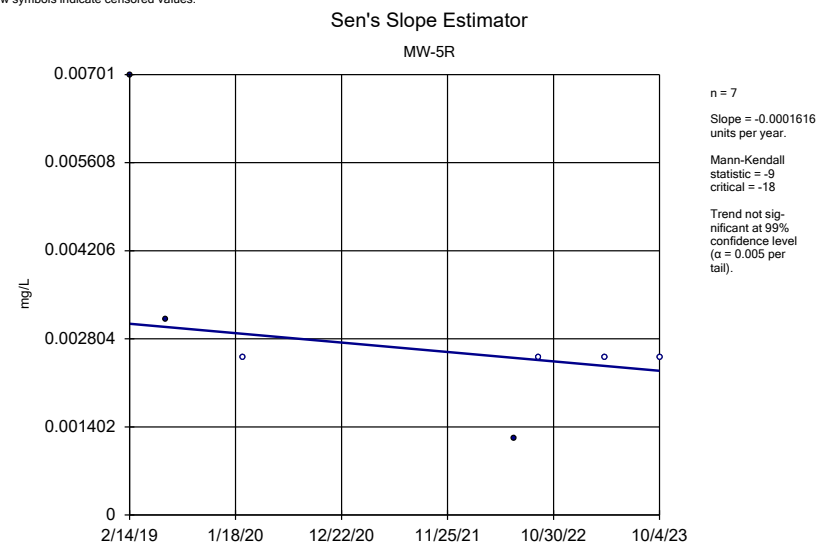
Constituent: Cadmium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Cadmium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



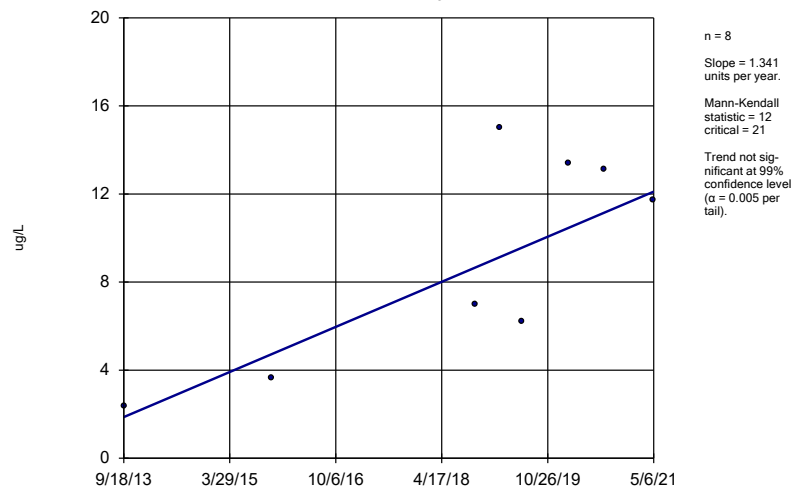
Constituent: Chromium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Chromium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

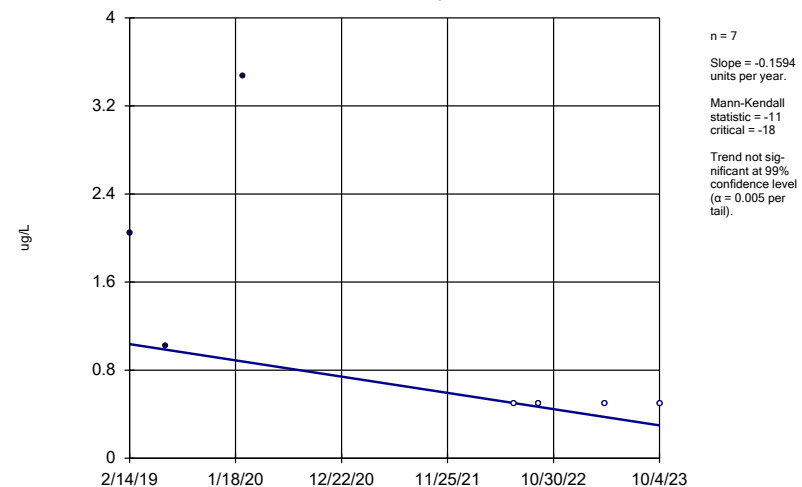
MW-3



Constituent: Cis-1,2-Dichloroethene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

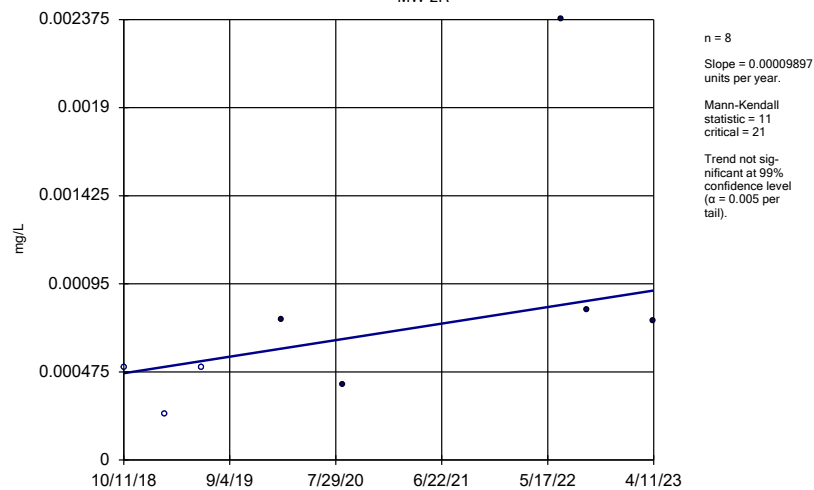
MW-5R



Constituent: Cis-1,2-Dichloroethene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

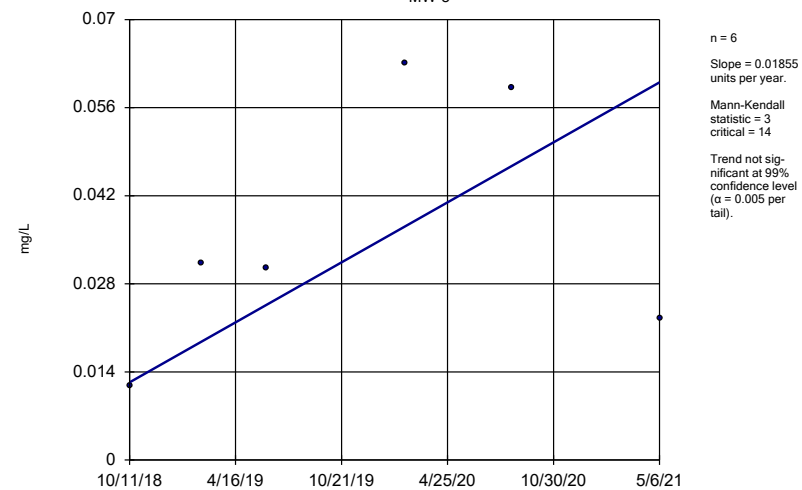
MW-2R



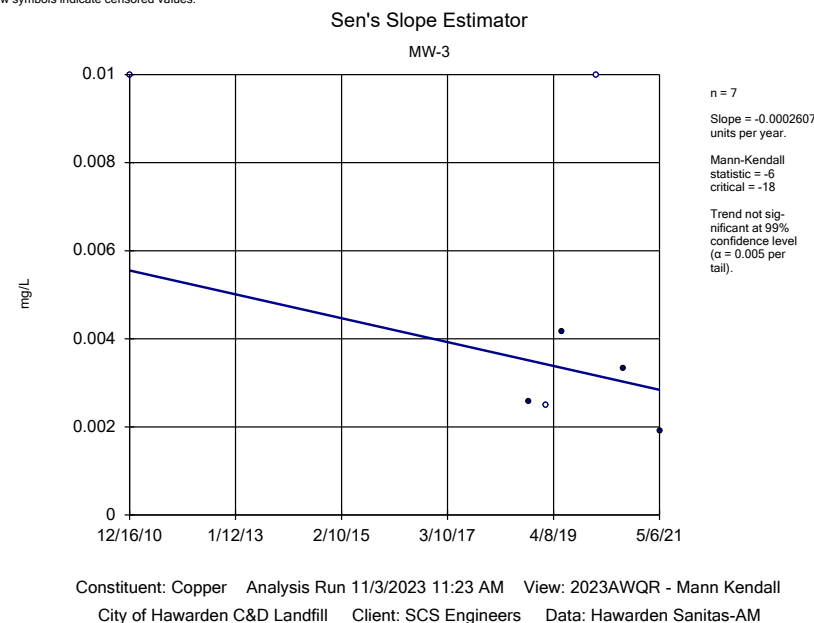
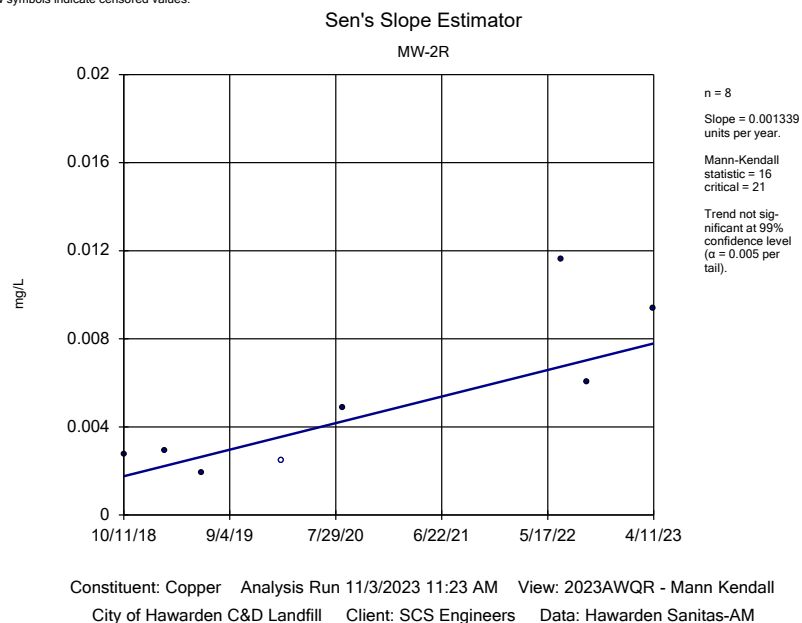
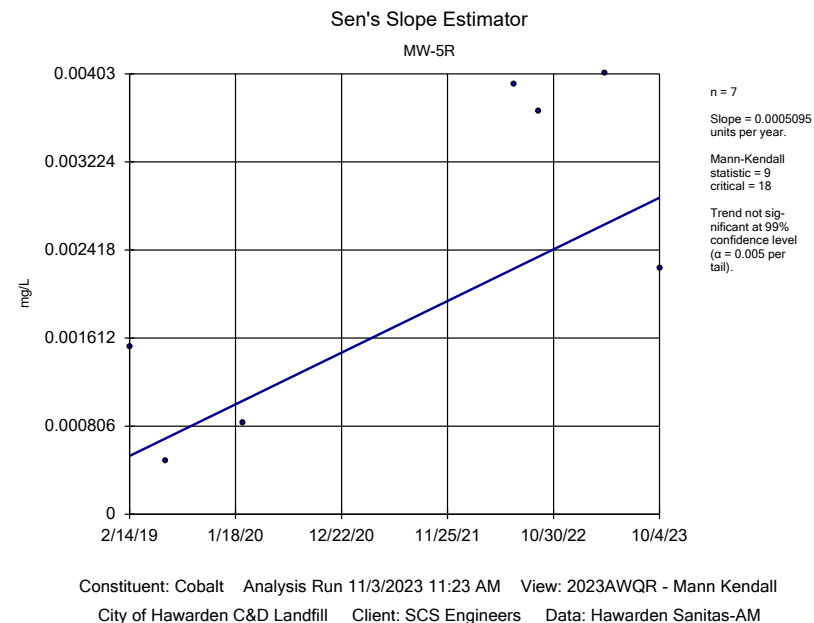
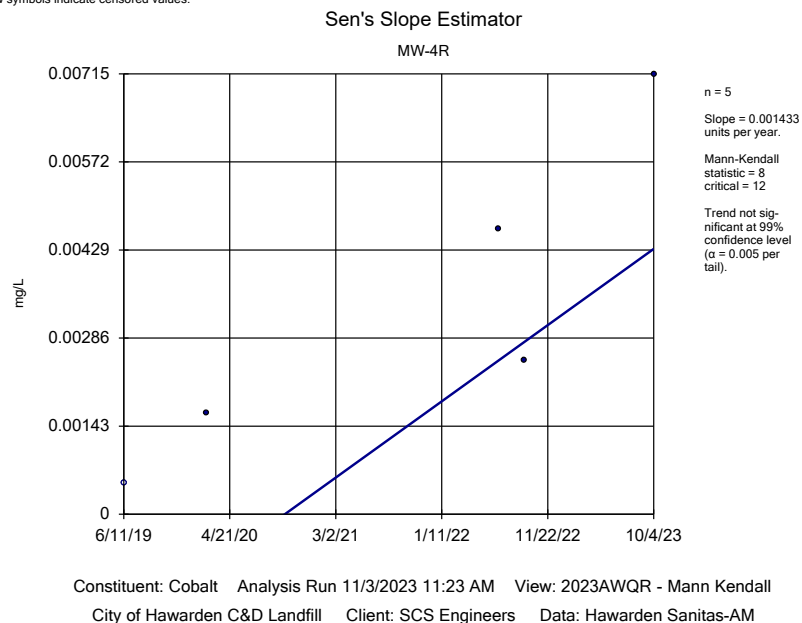
Constituent: Cobalt Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

MW-3

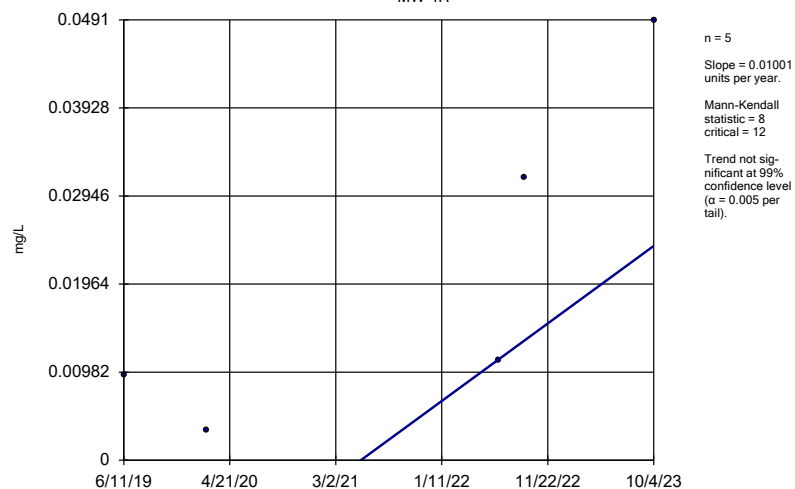


Constituent: Cobalt Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Sen's Slope Estimator

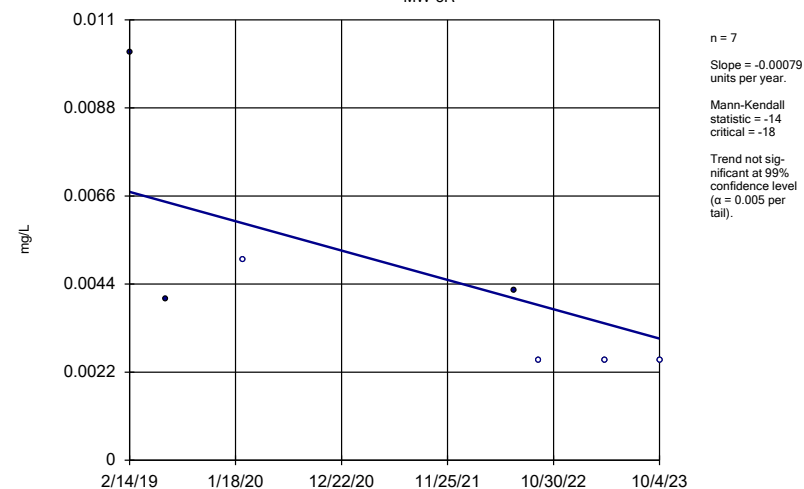
MW-4R



Constituent: Copper Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

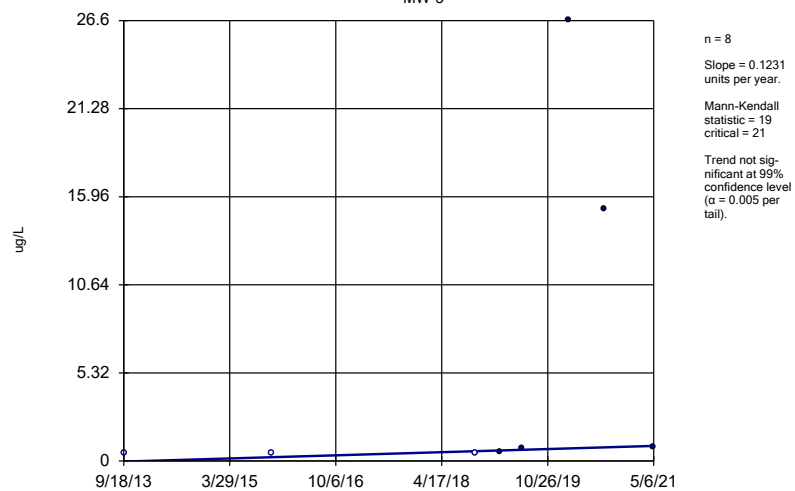
MW-5R



Constituent: Copper Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

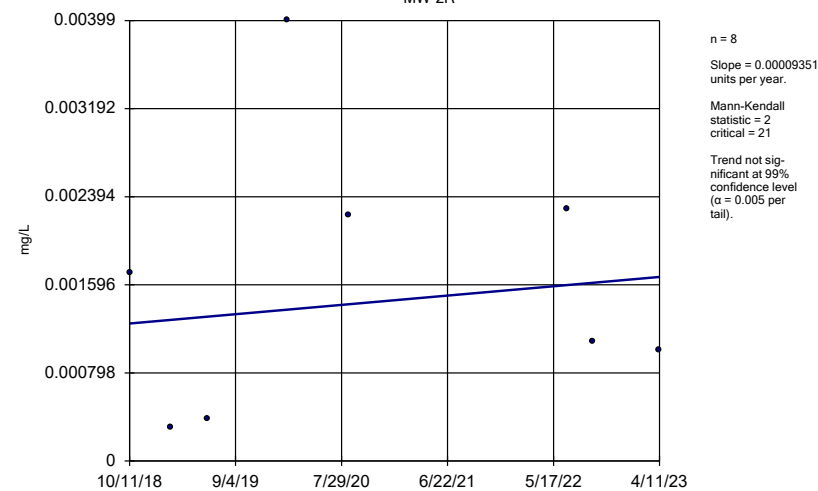
MW-3



Constituent: Ethylbenzene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

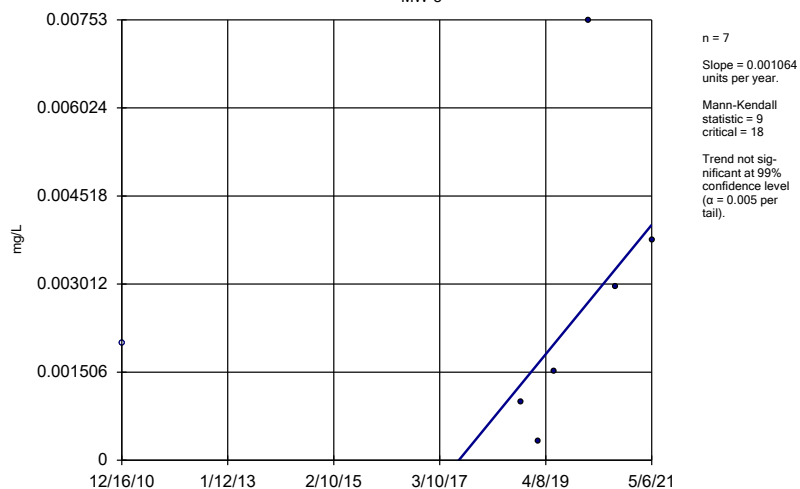
MW-2R



Constituent: Lead Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

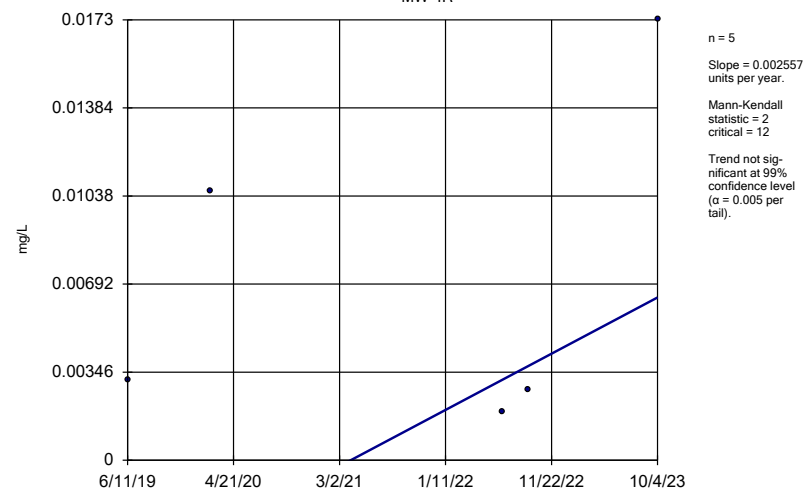
MW-3



Constituent: Lead Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

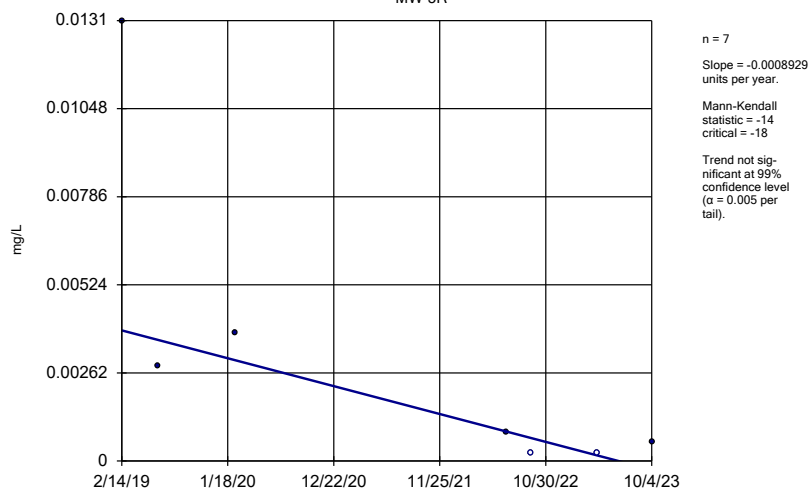
MW-4R



Constituent: Lead Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

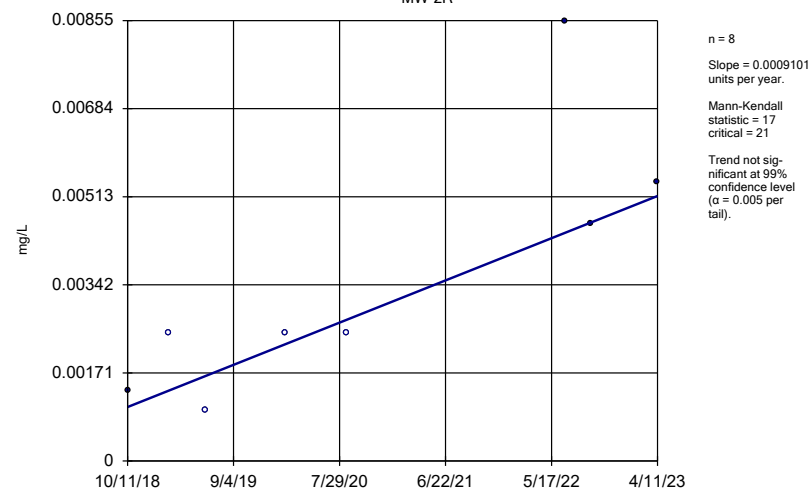
MW-5R



Constituent: Lead Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

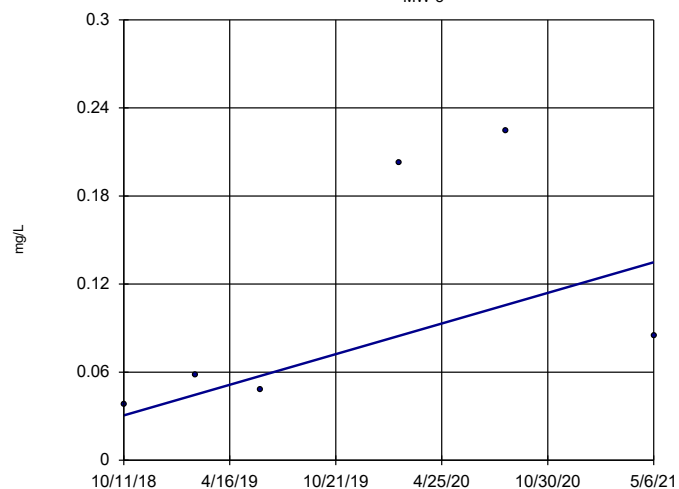
MW-2R



Constituent: Nickel Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

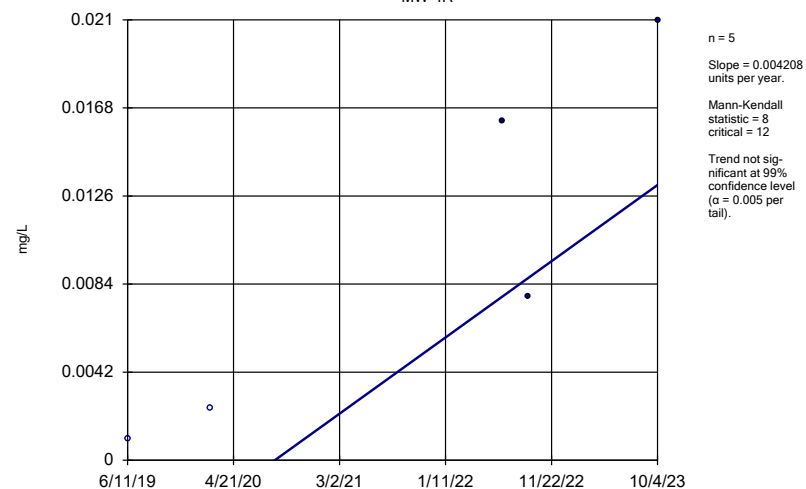
MW-3



Constituent: Nickel Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

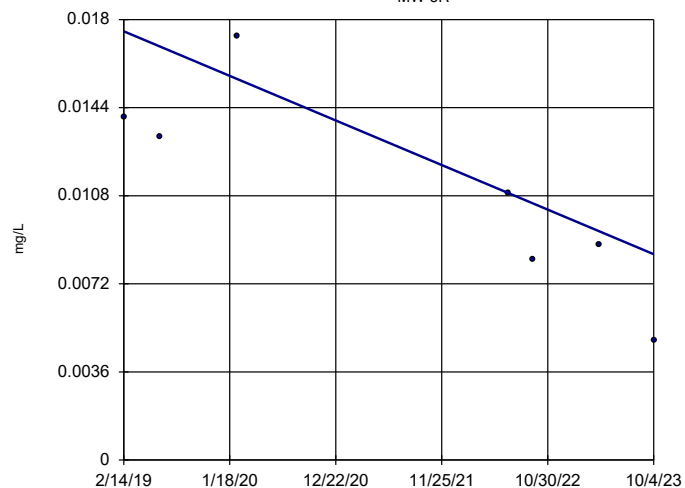
MW-4R



Constituent: Nickel Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

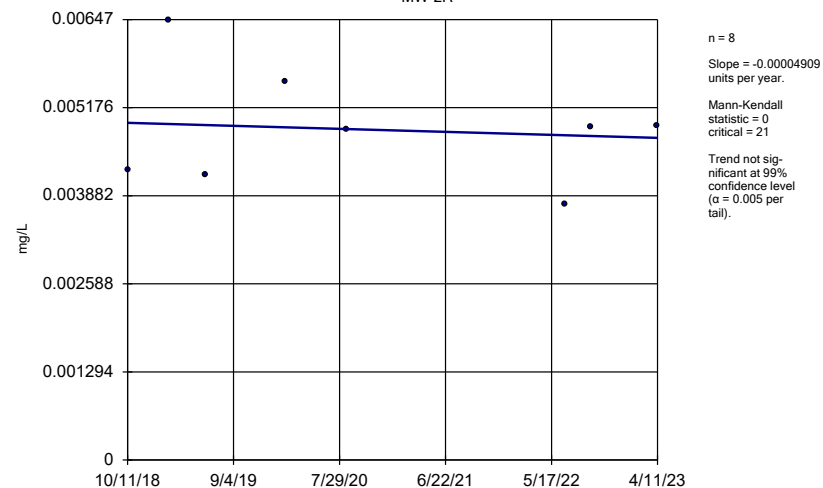
MW-5R



Constituent: Nickel Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

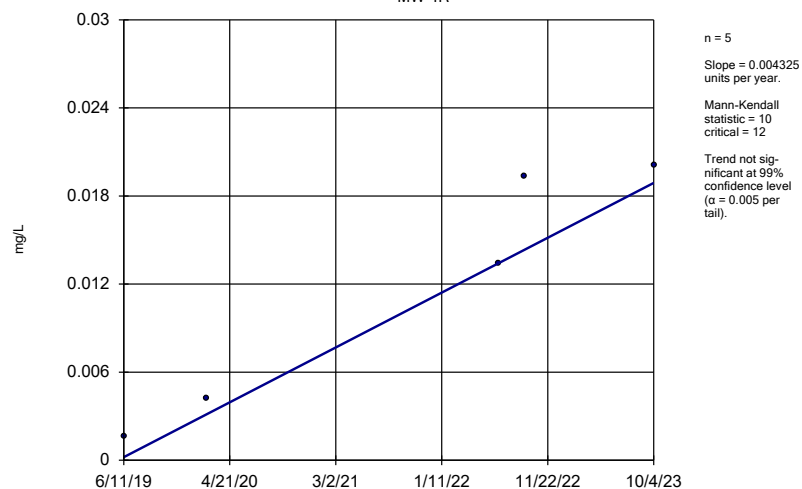
MW-2R



Constituent: Selenium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

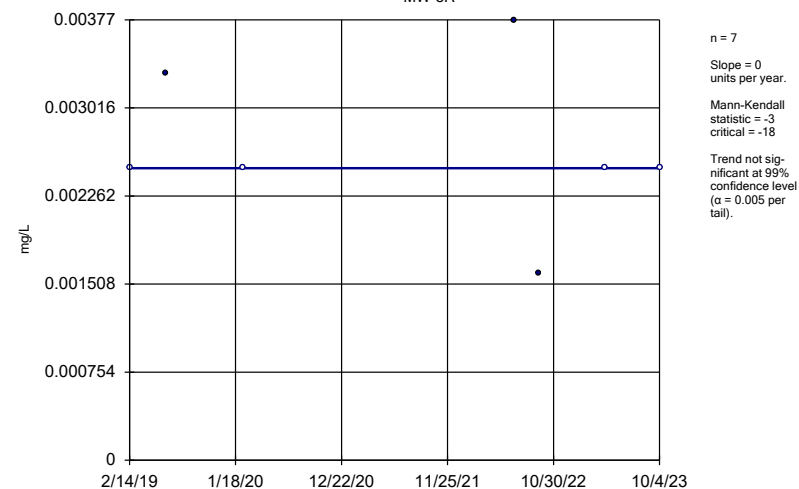
MW-4R



Constituent: Selenium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

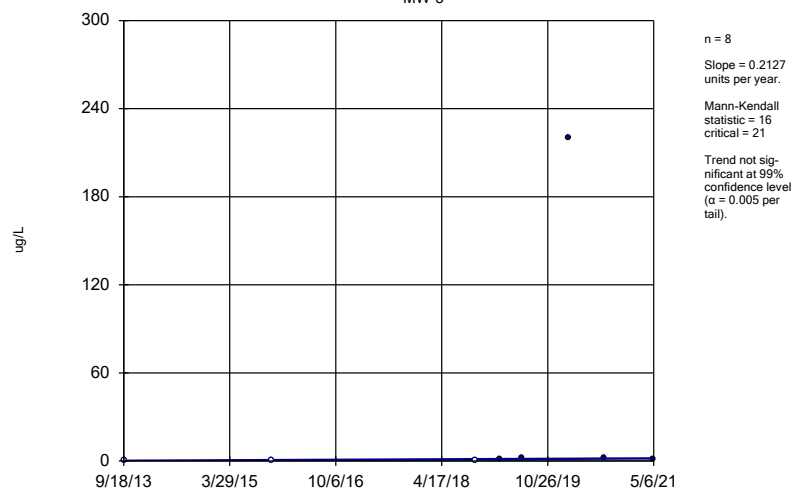
MW-5R



Constituent: Selenium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

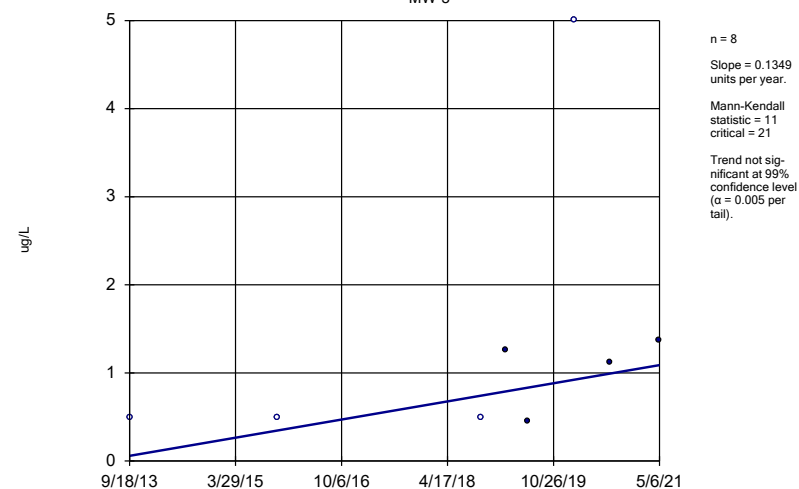
MW-3



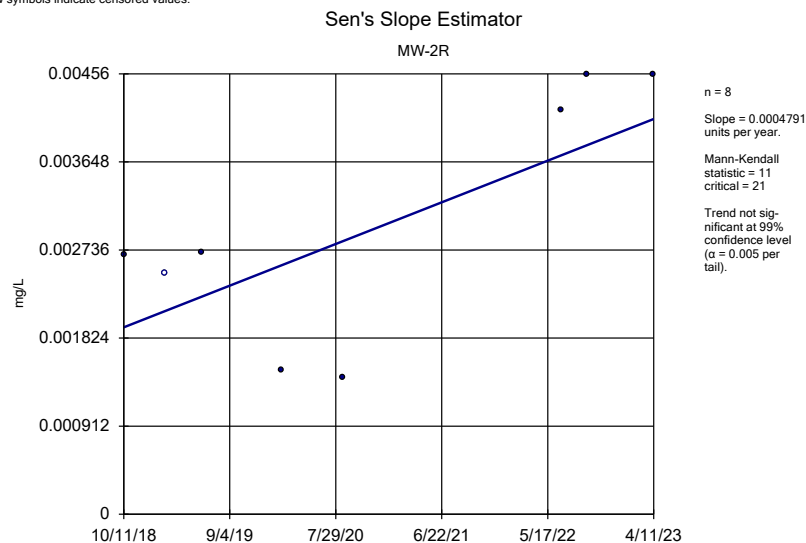
Constituent: Toluene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Sen's Slope Estimator

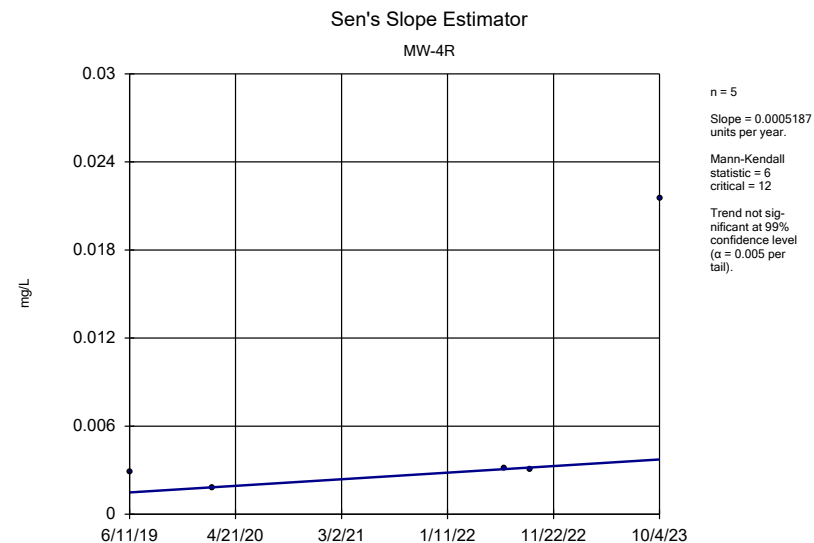
MW-3



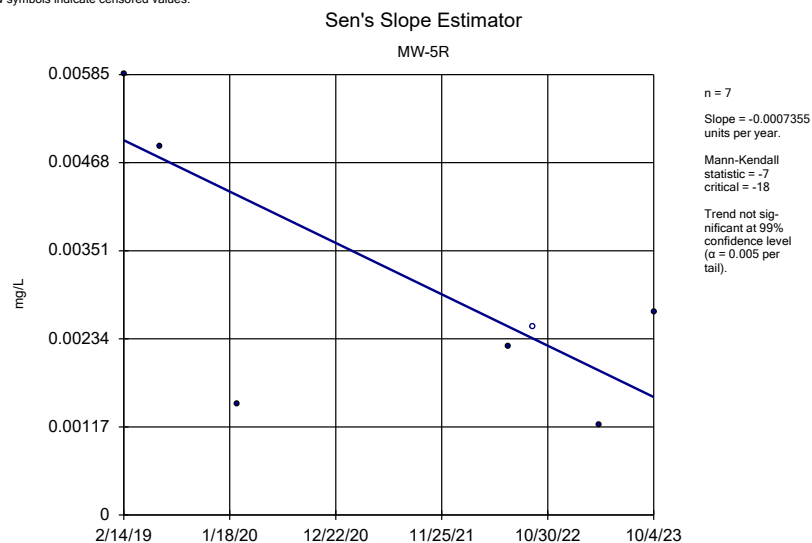
Constituent: Trichloroethene Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



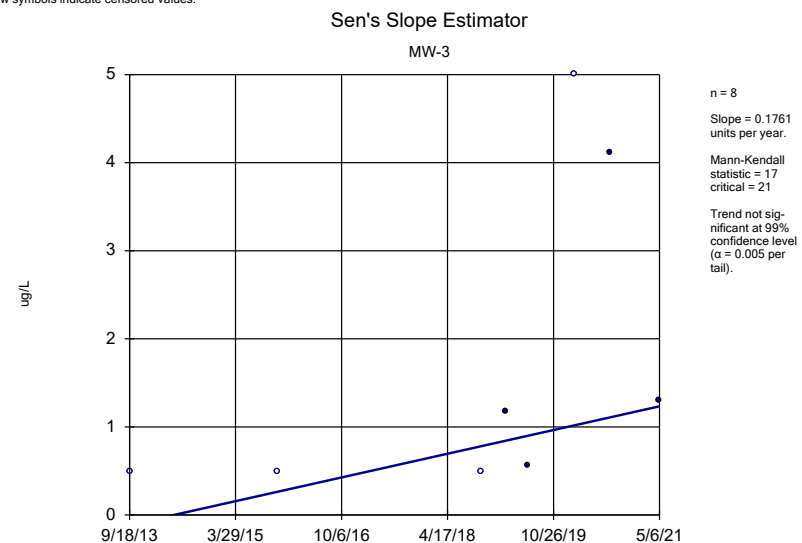
Constituent: Vanadium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



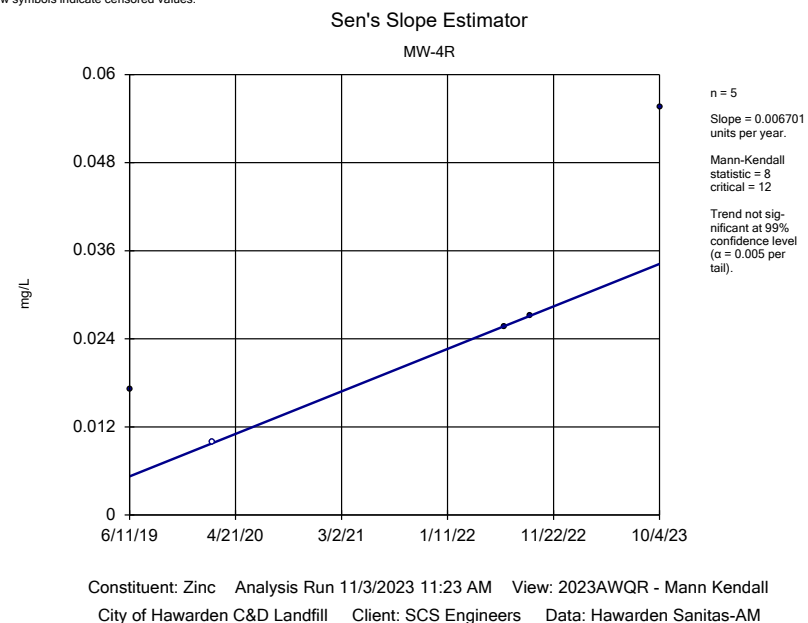
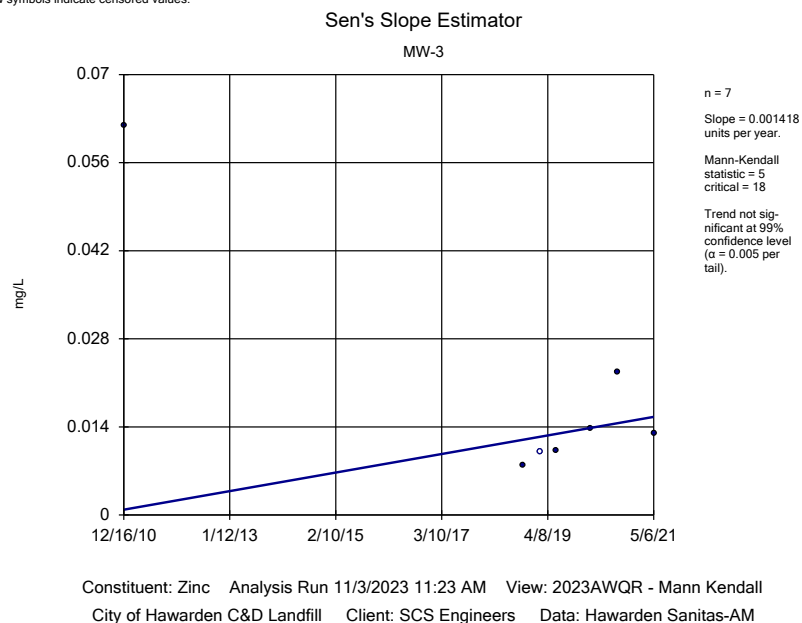
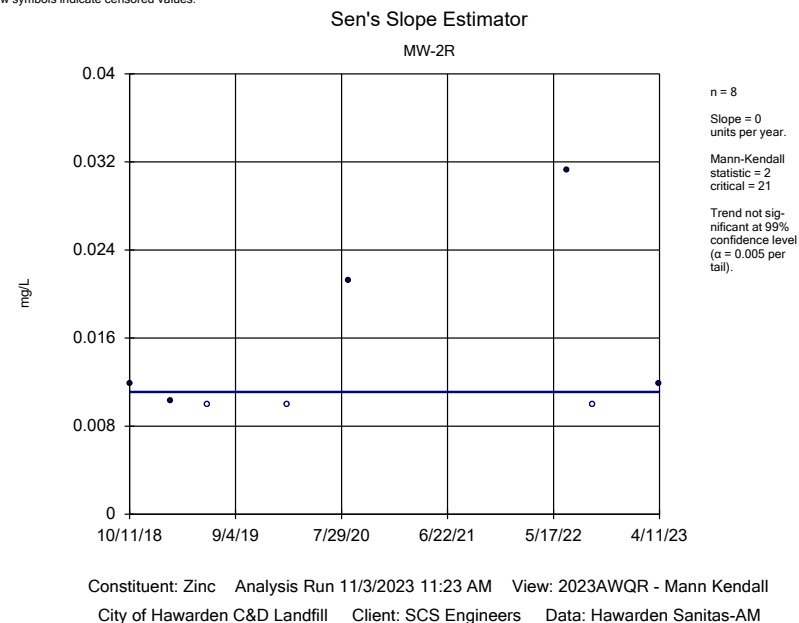
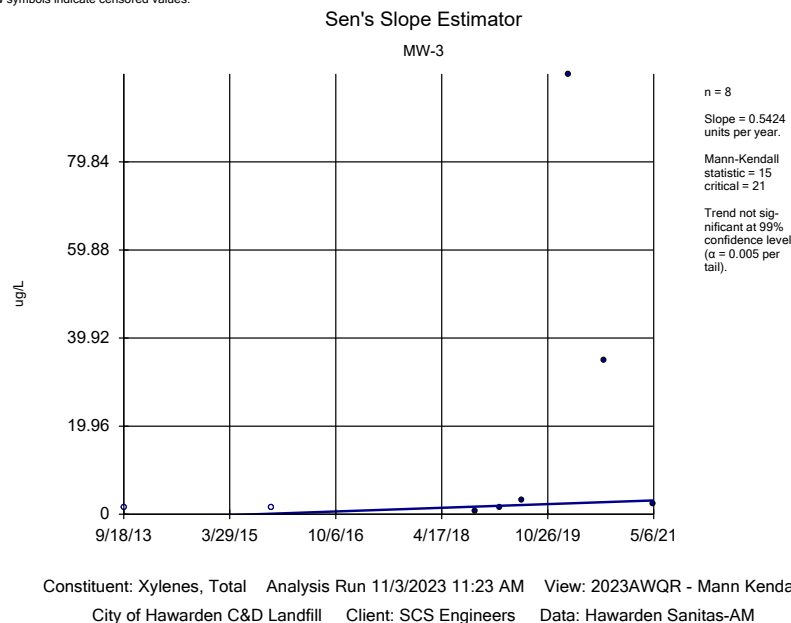
Constituent: Vanadium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Vanadium Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

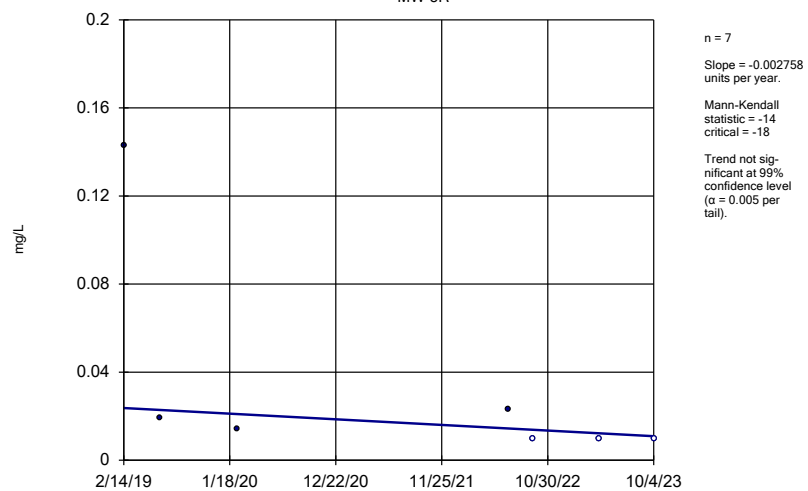


Constituent: Vinyl Chloride Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Sen's Slope Estimator

MW-5R



Constituent: Zinc Analysis Run 11/3/2023 11:23 AM View: 2023AWQR - Mann Kendall
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Attachment D
Confidence Interval Summary Table and Graphs

Confidence Interval

City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM Printed 11/3/2023, 12:13 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
1,1-Dichloroethane (ug/L)	MW-3	1.848	0.7064	140	No	8	25	No	0.01	Param.
1,4-Dichlorobenzene (ug/L)	MW-3	2.902	0.4164	75	No	8	37.5	No	0.01	Param.
2-Butanone (ug/L)	MW-3	68.3	5	4000	No	8	62.5	No	0.004	NP (NDs)
Acetone (ug/L)	MW-3	30.7	0.6477	6300	No	8	37.5	No	0.01	Param.
Acetone (ug/L)	MW-5R	28.3	5	6300	No	7	85.71	No	0.008	NP (NDs)
Arsenic (mg/L)	MW-2R	0.0128	0.000677	0.01	No	8	37.5	No	0.004	NP (normality)
Arsenic (mg/L)	MW-3	0.2583	-0.02376	0.01	No	8	12.5	No	0.01	Param.
Arsenic (mg/L)	MW-4R	0.007194	-0.00141	0.01	No	5	0	No	0.01	Param.
Arsenic (mg/L)	MW-5R	0.002749	0.001142	0.01	No	7	0	No	0.01	Param.
Barium (mg/L)	MW-2R	0.6019	0.01097	2	No	8	0	No	0.01	Param.
Barium (mg/L)	MW-3	3.485	0.6783	2	No	8	0	No	0.01	Param.
Barium (mg/L)	MW-4R	0.3781	-0.1383	2	No	5	0	No	0.01	Param.
Barium (mg/L)	MW-5R	1.853	-0.3445	2	No	7	0	No	0.01	Param.
Benzene (ug/L)	MW-3	3.678	0.2266	5	No	8	12.5	No	0.01	Param.
Cadmium (mg/L)	MW-2R	0.0001532	0.00008546	0.005	No	8	37.5	No	0.01	Param.
Cadmium (mg/L)	MW-3	0.0001933	0.00005793	0.005	No	7	28.57	No	0.01	Param.
Cadmium (mg/L)	MW-4R	0.0006288	0.00001544	0.005	No	5	20	No	0.01	Param.
Cadmium (mg/L)	MW-5R	0.00025	0.00005	0.005	No	7	57.14	No	0.008	NP (NDs)
Chromium (mg/L)	MW-4R	0.006654	-0.0005344	0.1	No	5	40	No	0.01	Param.
Chromium (mg/L)	MW-5R	0.00701	0.00122	0.1	No	7	57.14	No	0.008	NP (NDs)
Cis-1,2-Dichloroethene (ug/L)	MW-3	14.18	3.922	70	No	8	0	No	0.01	Param.
Cis-1,2-Dichloroethene (ug/L)	MW-5R	3.47	0.5	70	No	7	57.14	No	0.008	NP (NDs)
Cobalt (mg/L)	MW-2R	0.002375	0.00025	0.0021	No	8	37.5	No	0.004	NP (normality)
Cobalt (mg/L)	MW-3	0.06445	0.008321	0.0021	Yes	6	0	No	0.01	Param.
Cobalt (mg/L)	MW-4R	0.007152	-0.0003796	0.0021	No	5	20	No	0.01	Param.
Cobalt (mg/L)	MW-5R	0.004178	0.000609	0.0021	No	7	0	No	0.01	Param.
Copper (mg/L)	MW-2R	0.009028	0.001481	1.3	No	8	12.5	No	0.01	Param.
Copper (mg/L)	MW-3	0.004002	0.002008	1.3	No	7	42.86	No	0.01	Param.
Copper (mg/L)	MW-4R	0.05271	-0.01084	1.3	No	5	0	No	0.01	Param.
Copper (mg/L)	MW-5R	0.0102	0.0025	1.3	No	7	57.14	No	0.008	NP (NDs)
Ethylbenzene (ug/L)	MW-3	26.6	0.5	700	No	8	37.5	No	0.004	NP (normality)
Lead (mg/L)	MW-2R	0.002913	0.0003362	0.015	No	8	0	No	0.01	Param.
Lead (mg/L)	MW-3	0.005596	-0.0001422	0.015	No	7	14.29	No	0.01	Param.
Lead (mg/L)	MW-4R	0.01832	-0.004044	0.015	No	5	0	No	0.01	Param.
Lead (mg/L)	MW-5R	0.0131	0.00025	0.015	No	7	28.57	No	0.008	NP (normality)
Nickel (mg/L)	MW-2R	0.006224	0.000949	0.1	No	8	50	No	0.01	Param.
Nickel (mg/L)	MW-3	0.2226	-0.004039	0.1	No	6	0	No	0.01	Param.
Nickel (mg/L)	MW-4R	0.02261	-0.003012	0.1	No	5	40	No	0.01	Param.
Nickel (mg/L)	MW-5R	0.01597	0.006104	0.1	No	7	0	No	0.01	Param.
Selenium (mg/L)	MW-2R	0.005767	0.003963	0.05	No	8	0	No	0.01	Param.
Selenium (mg/L)	MW-4R	0.02601	-0.002555	0.05	No	5	0	No	0.01	Param.
Selenium (mg/L)	MW-5R	0.00377	0.0016	0.05	No	7	57.14	No	0.008	NP (NDs)
Toluene (ug/L)	MW-3	220	0.5	1000	No	8	37.5	No	0.004	NP (normality)
Trichloroethene (ug/L)	MW-3	5	0.455	5	No	8	50	No	0.004	NP (normality)
Vanadium (mg/L)	MW-2R	0.004373	0.001657	0.035	No	8	12.5	No	0.01	Param.
Vanadium (mg/L)	MW-4R	0.0215	0.00182	0.035	No	5	0	No	0.031	NP (normality)
Vanadium (mg/L)	MW-5R	0.005049	0.0009096	0.035	No	7	14.29	No	0.01	Param.
Vinyl Chloride (ug/L)	MW-3	5	0.5	2	No	8	50	No	0.004	NP (normality)
Xylenes, Total (ug/L)	MW-3	99.8	0.764	10000	No	8	25	No	0.004	NP (normality)
Zinc (mg/L)	MW-2R	0.03125	0.01	2	No	8	37.5	No	0.004	NP (normality)

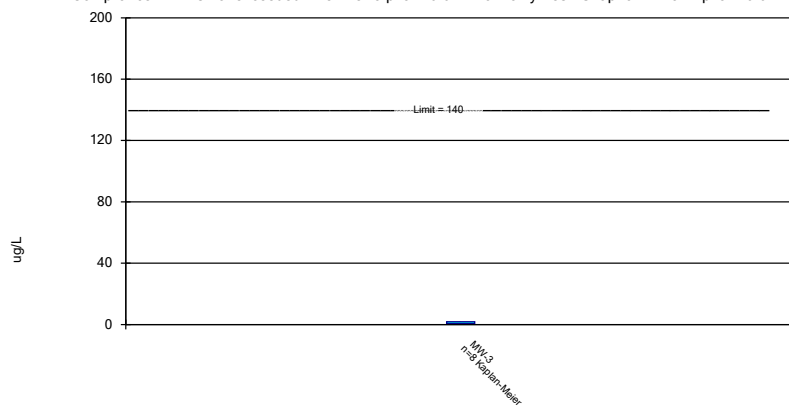
Confidence Interval

City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM Printed 11/3/2023, 12:13 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Zinc (mg/L)	MW-3	0.062	0.00799	2	No	7	14.29	No	0.008	NP (normality)
Zinc (mg/L)	MW-4R	0.05227	0.004785	2	No	5	20	No	0.01	Param.
Zinc (mg/L)	MW-5R	0.143	0.01	2	No	7	42.86	No	0.008	NP (normality)

Parametric Confidence Interval

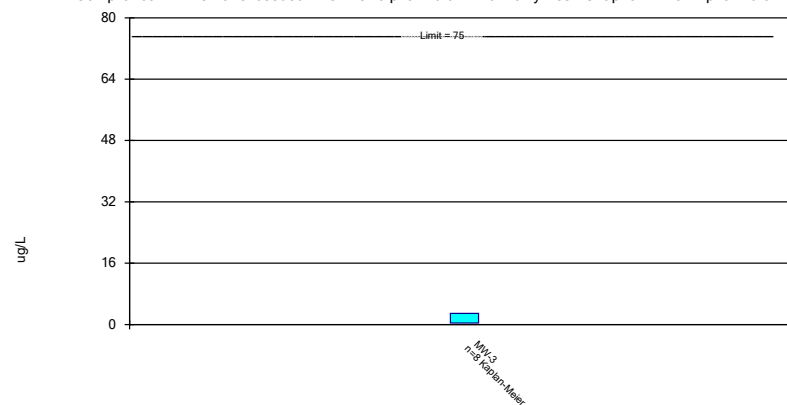
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk at Alpha = 0.01.



Constituent: 1,1-Dichloroethane Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interv
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric Confidence Interval

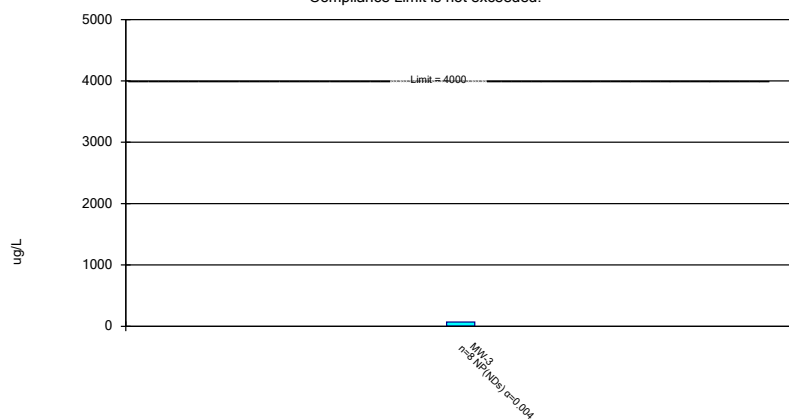
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Constituent: 1,4-Dichlorobenzene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Inter
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Non-Parametric Confidence Interval

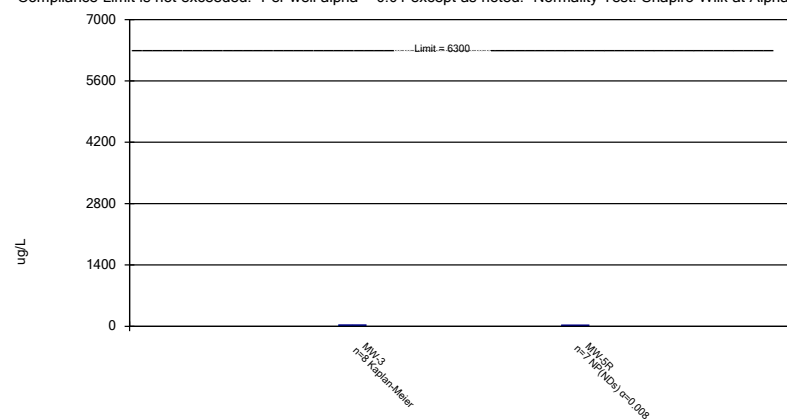
Compliance Limit is not exceeded.



Constituent: 2-Butanone Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

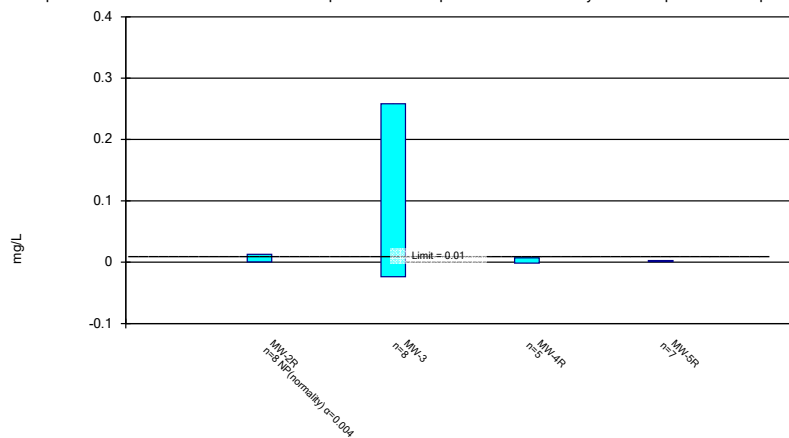
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Constituent: Acetone Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

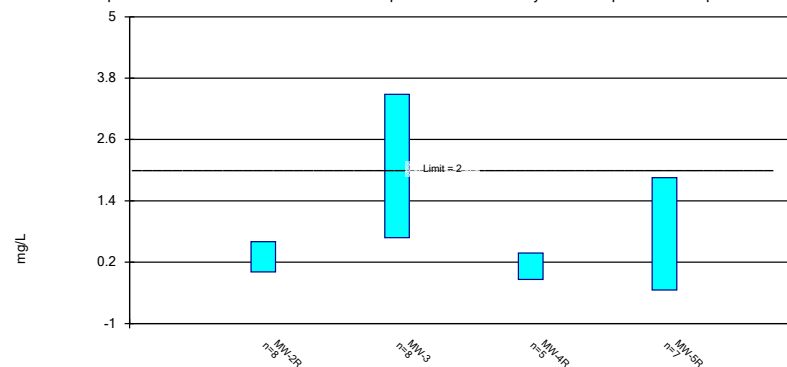
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk at Alpha = 0.01.



Constituent: Arsenic Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric Confidence Interval

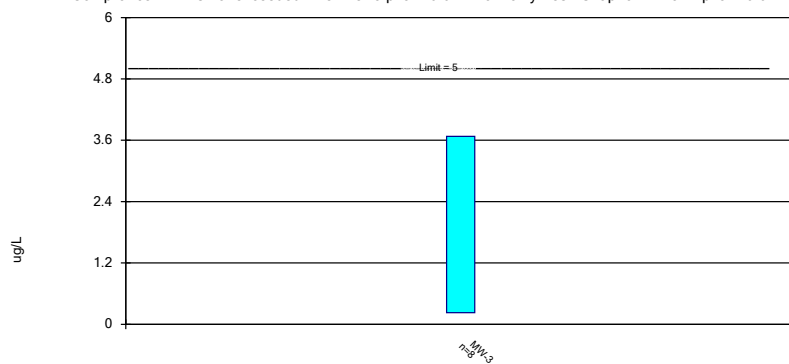
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Constituent: Barium Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric Confidence Interval

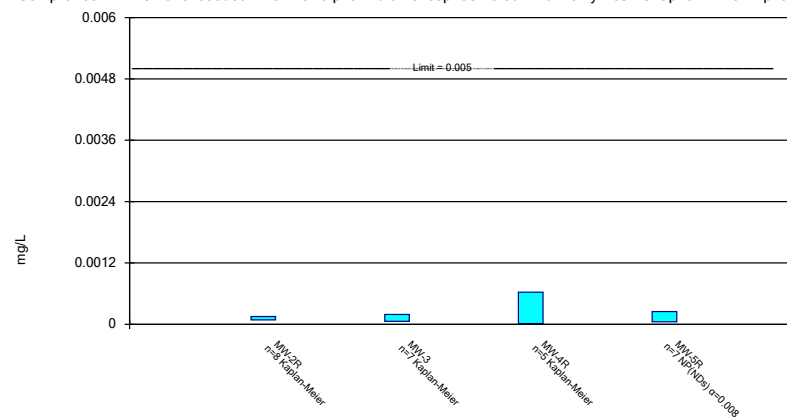
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk at Alpha = 0.01.



Constituent: Benzene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

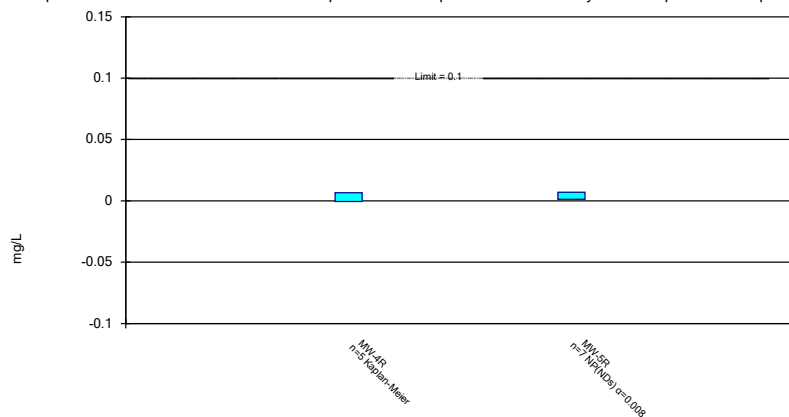
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Constituent: Cadmium Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

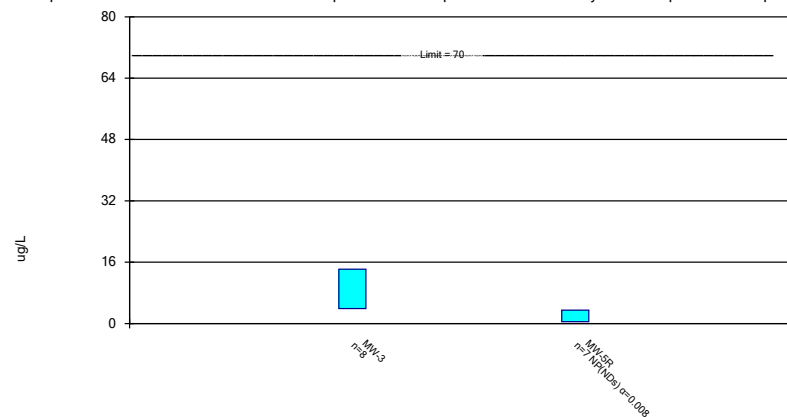
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Constituent: Chromium Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

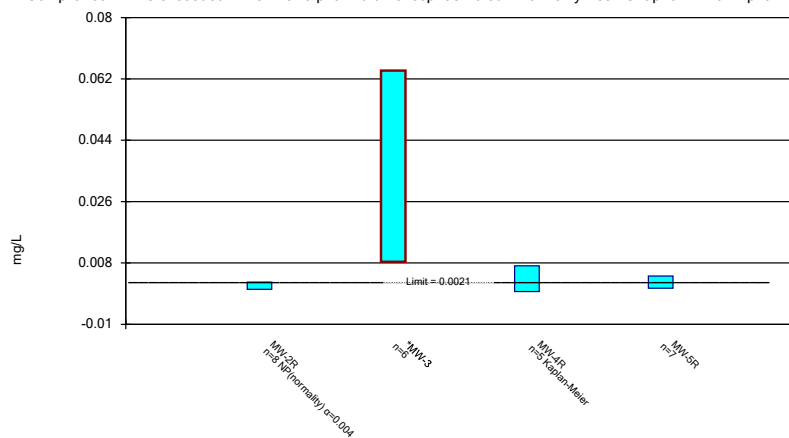
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Constituent: Cis-1,2-Dichloroethene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Int
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

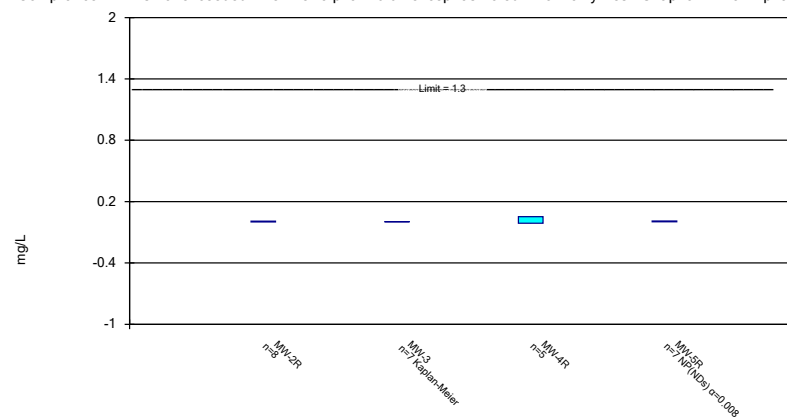
Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk at Alpha = 0.01.



Constituent: Cobalt Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

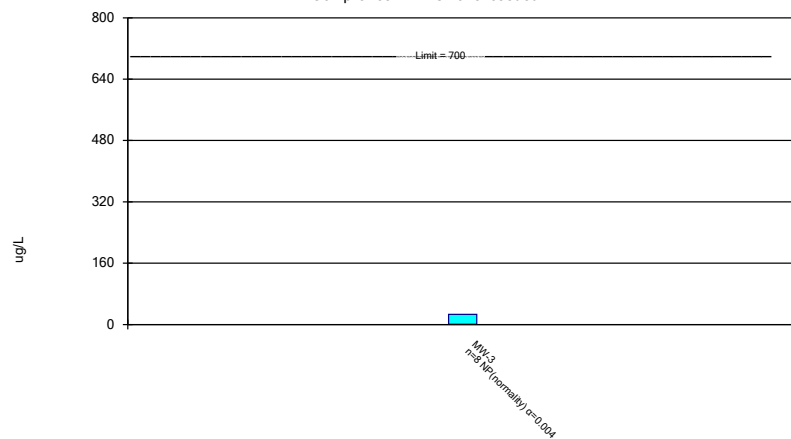
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Constituent: Copper Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Non-Parametric Confidence Interval

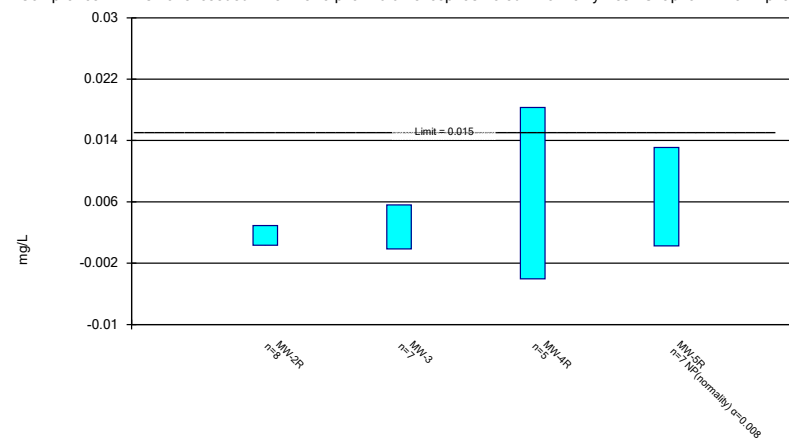
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Constituent: Ethylbenzene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

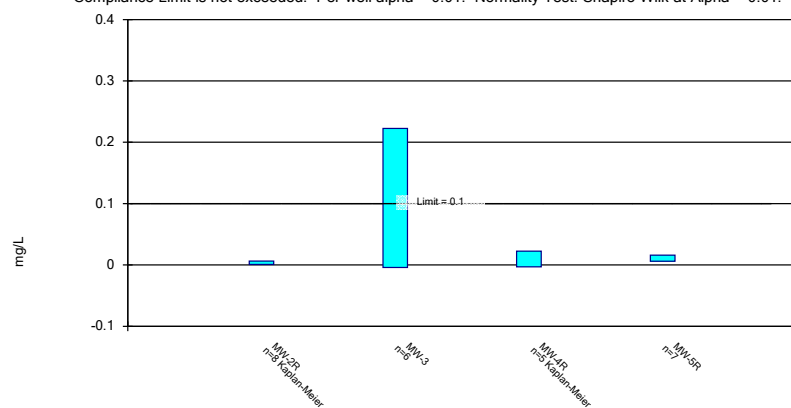
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Constituent: Lead Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric Confidence Interval

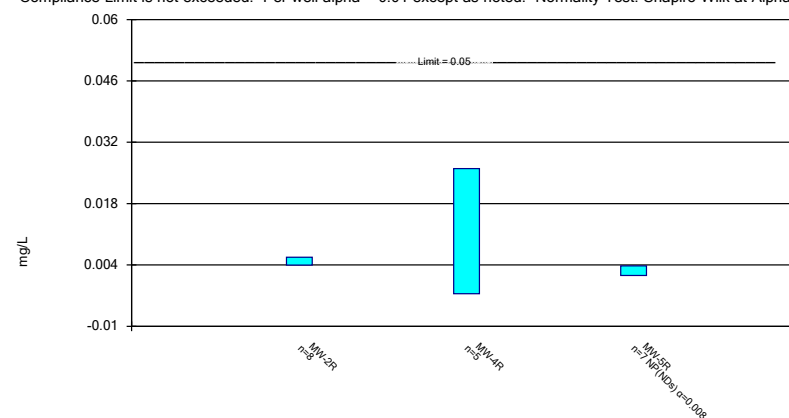
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Constituent: Nickel Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

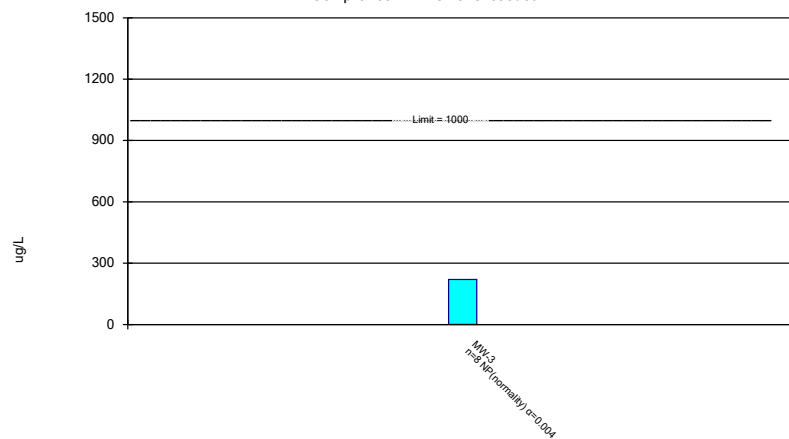
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Constituent: Selenium Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Non-Parametric Confidence Interval

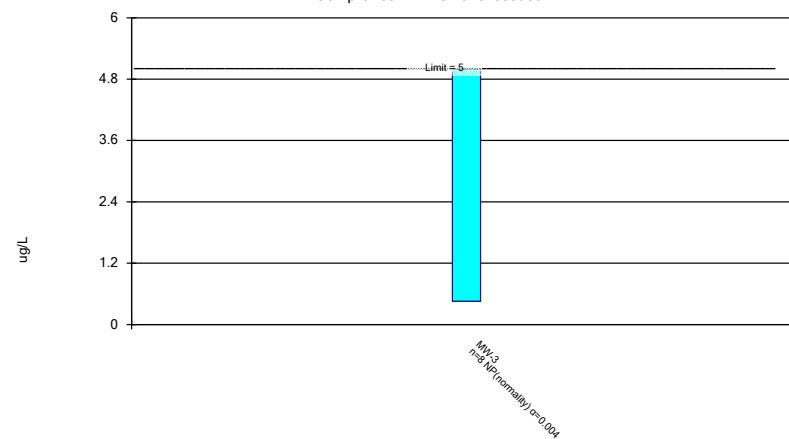
Compliance Limit is not exceeded.



Constituent: Toluene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Non-Parametric Confidence Interval

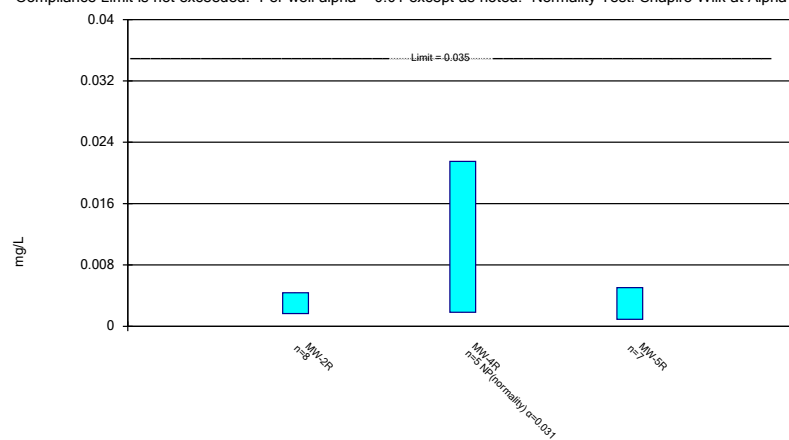
Compliance Limit is not exceeded.



Constituent: Trichloroethene Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Parametric and Non-Parametric (NP) Confidence Interval

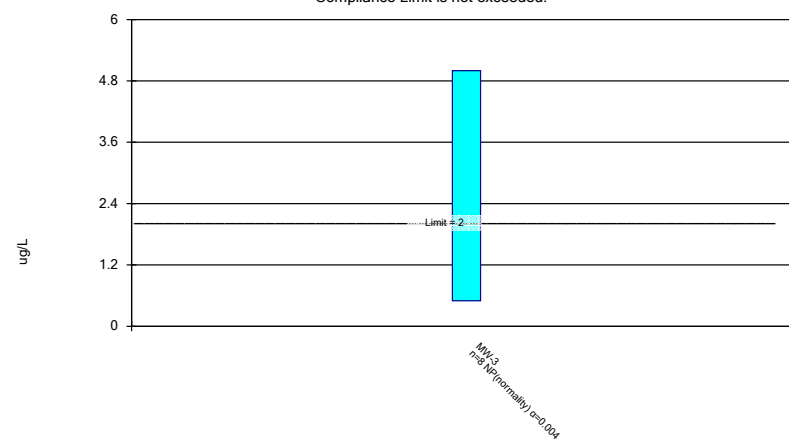
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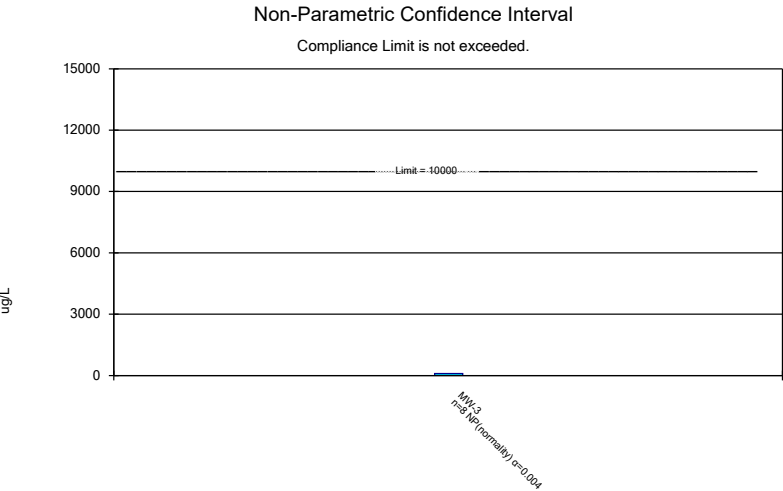
Constituent: Vanadium Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Non-Parametric Confidence Interval

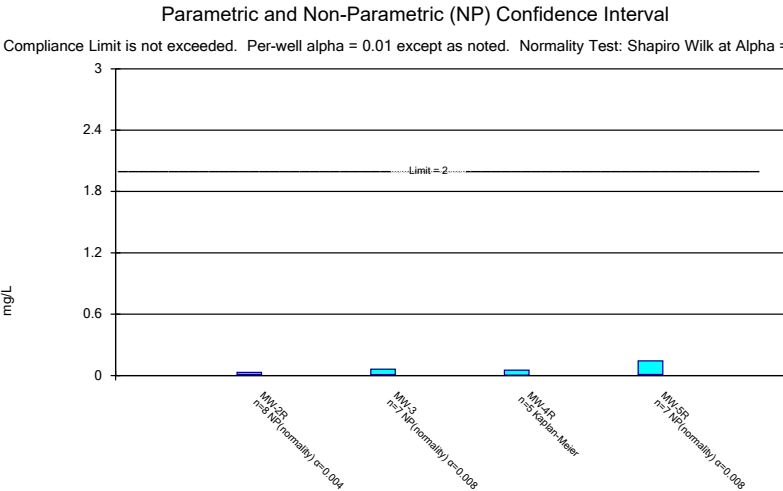
Compliance Limit is not exceeded.



Constituent: Vinyl Chloride Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Xylenes, Total Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM



Constituent: Zinc Analysis Run 11/3/2023 12:12 PM View: 2023AWQR - Confidence Interval
City of Hawarden C&D Landfill Client: SCS Engineers Data: Hawarden Sanitas-AM

Appendix E
2023 Landfill Gas Annual Report

Gas Monitoring Summary
2023 Gas Monitoring Report
City of Hawarden C&D Landfill
Permit No. 84-SDP-02-75C

Monitoring Points				Methane Results (% LEL)			
Name		Type	Description	3/31/2023	S (Y/N)	10/4/2023	S (Y/N)
#1	MW-1	Subsurface	Subsurface of MW-1	0%	N	0%	N
#2	MW-2	Subsurface	Subsurface of MW-2	0%	N	0%	N
#3	MW-3	Subsurface	Subsurface of MW-3	0%	N	0%	N
#4	MW-4	Subsurface	Subsurface of MW-4	0%	N	0%	N
#5	MW-5	Subsurface	Subsurface of MW-5	0%	N	0%	N
#6	MW-7	Subsurface	Subsurface of MW-7	0%	Y	0%	Y
#7	North on access road to grass	Outdoor	Near access road to grass	0%		0%	
#8	Shed	Indoor	Inside shed	0%		0%	

S(Y/N) - Was screen submerged, yes or no.

There were no actions necessary for gas monitoring during this reporting period as no gas was detected.

Path: C:\Users\hmadson\OneDrive - SCS Engineers\Desktop\GIS Maps\Site Maps\MWBDN\2023 MWBDN.mxd
User: hmadson
Date Saved: 11/22/2023 3:44 PM



Point No.	Sample Point	Type	Description
1	MW-1	Subsurface	Subsurface MW-1
2	MW-2	Subsurface	Subsurface MW-2
3	MW-3	Subsurface	Subsurface MW-3
4	MW-4	Subsurface	Subsurface MW-4
5	MW-5	Subsurface	Subsurface MW-5
6	MW-7	Subsurface	Subsurface MW-7
7	North on Access Road to Grass	Outdoor	Near access road to grass
8	Shed	Indoor	Inside shed

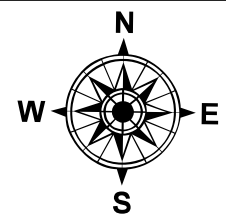


Methane Monitoring Network

Legend

- Approximate Location of Methane Monitoring Point
- Monitoring Well
- Approximate Waste Boundary
- Approximate Property Boundary

City of Hawarden C&D
Landfill (Closed)
Hawarden, IA
Project No: 27223170.00
Drawing Date: November
2023

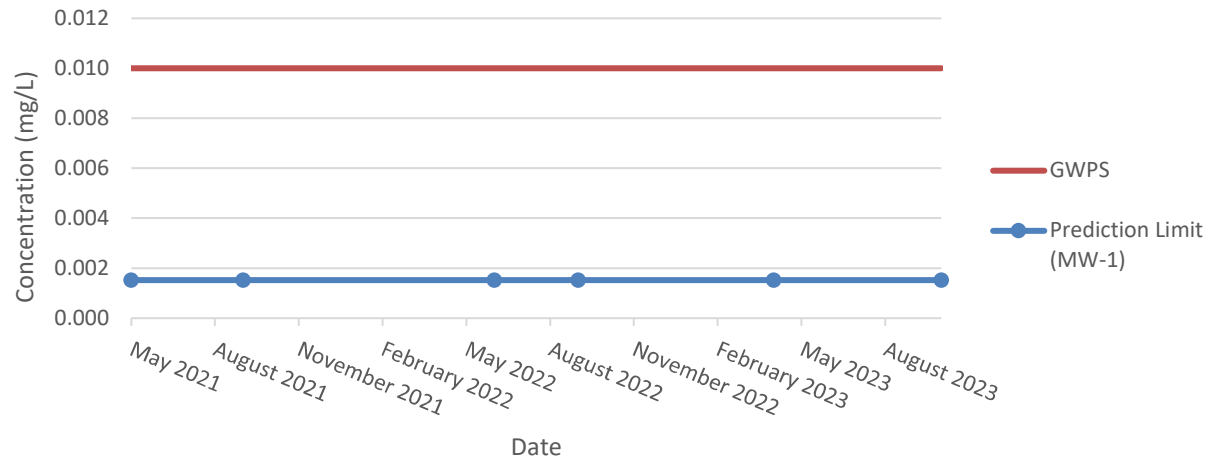


0 30 60 120 180 240
Feet

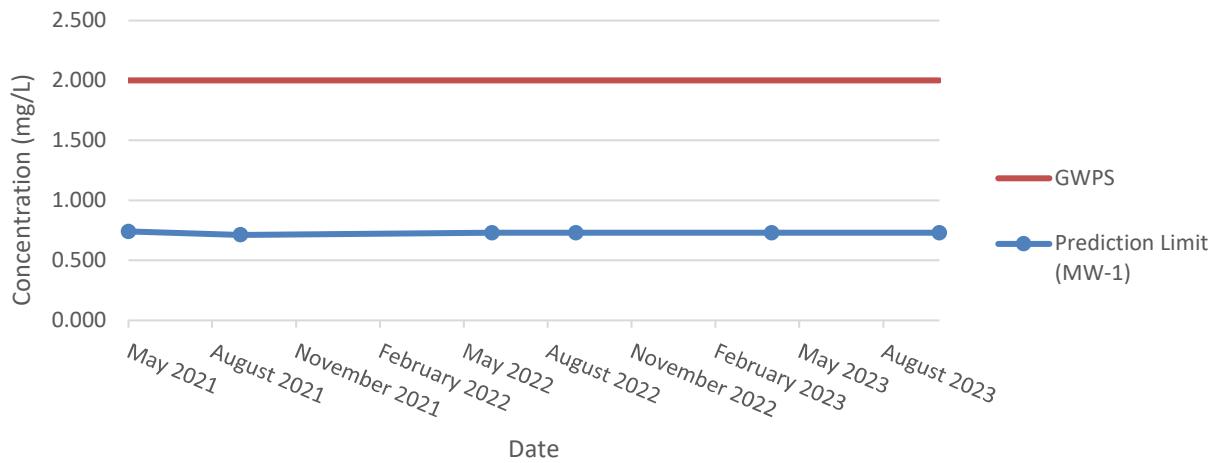
Figure 1

Appendix F
Standards History Graphs

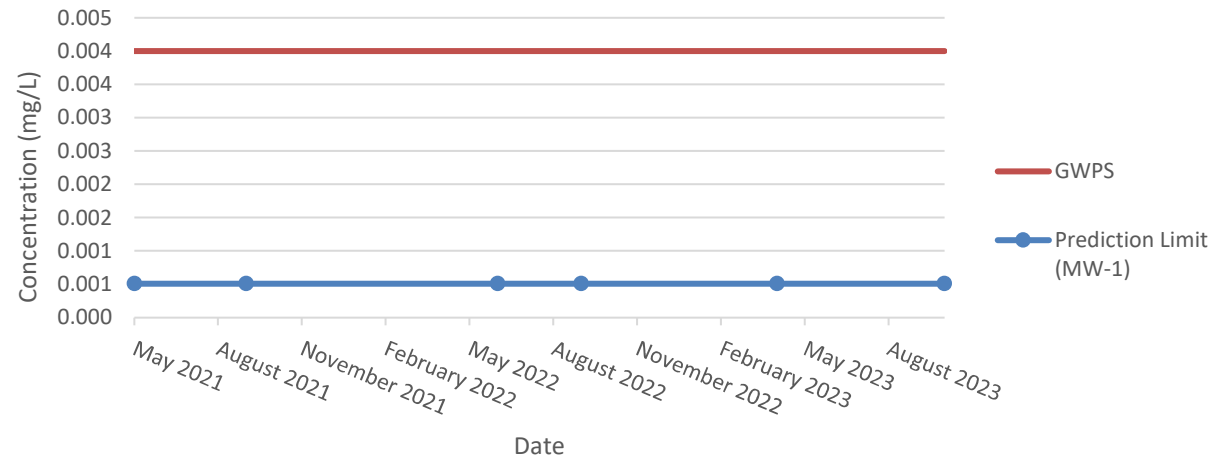
Arsenic Prediction Limit and GWPS vs. Time



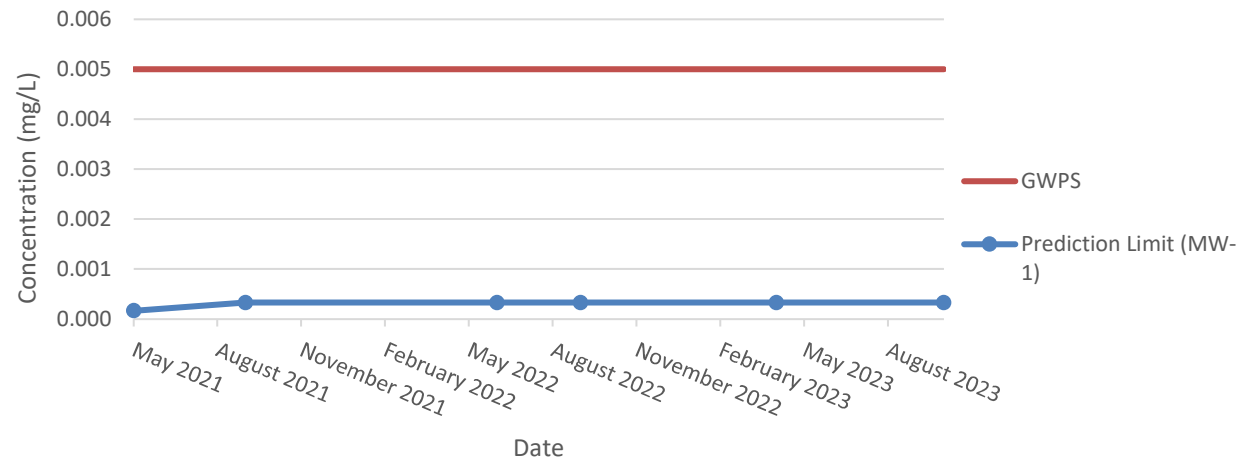
Barium Prediction Limit and GWPS vs. Time

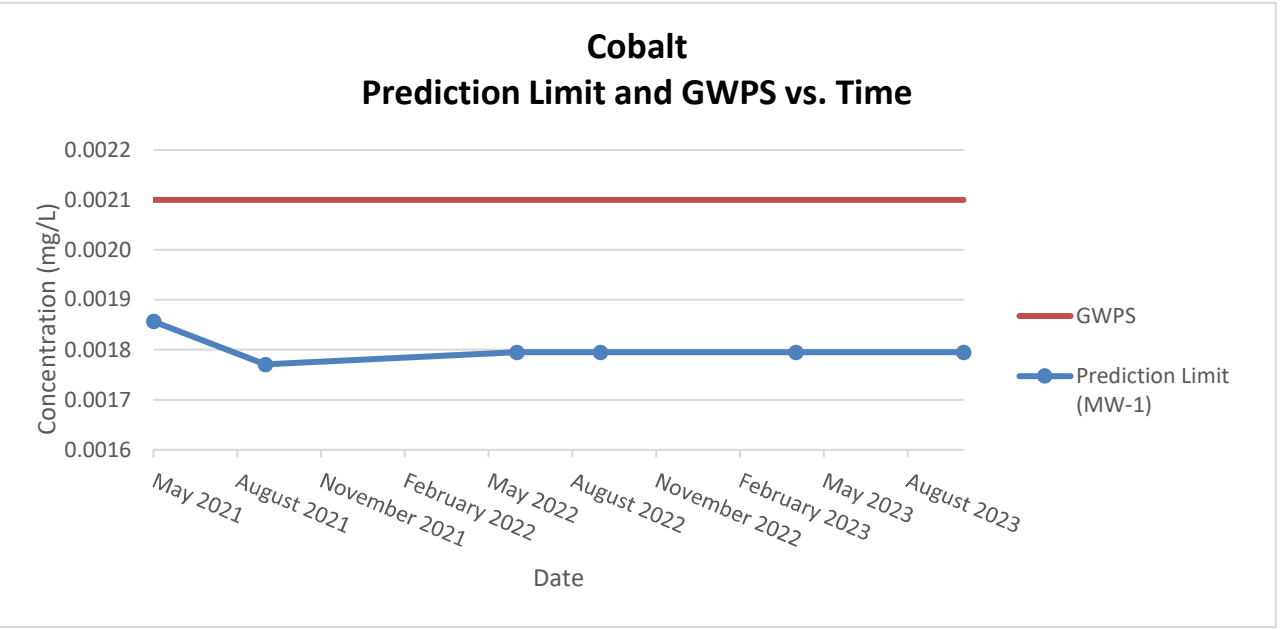
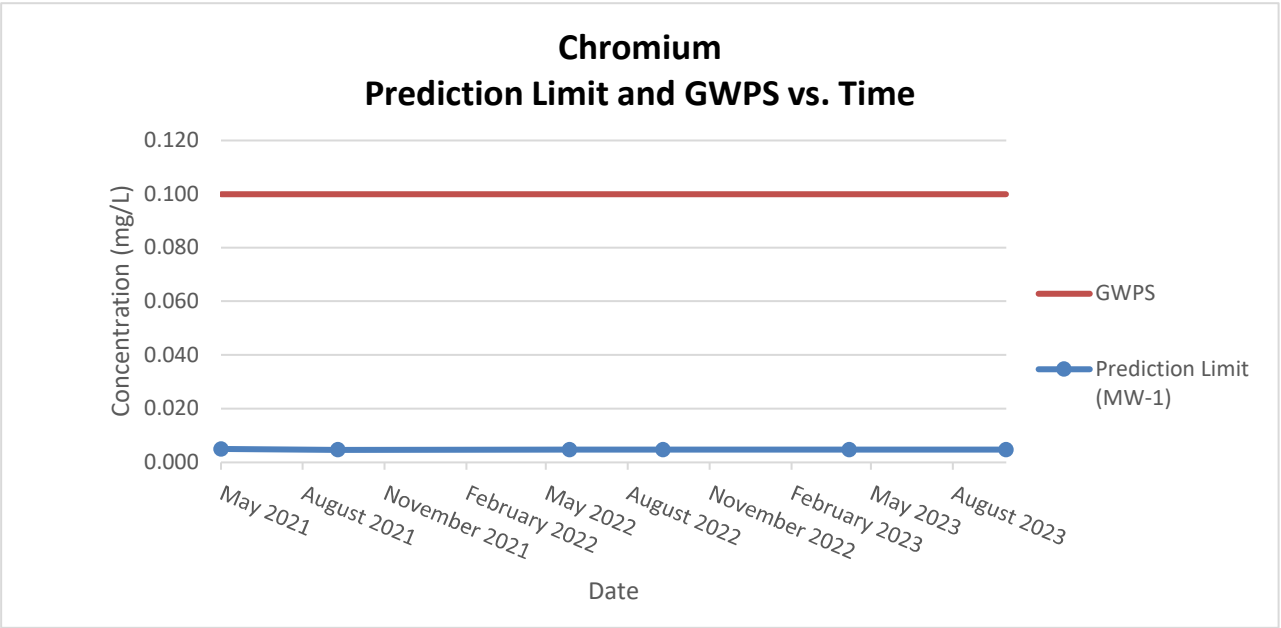


Beryllium Prediction Limit and GWPS vs. Time

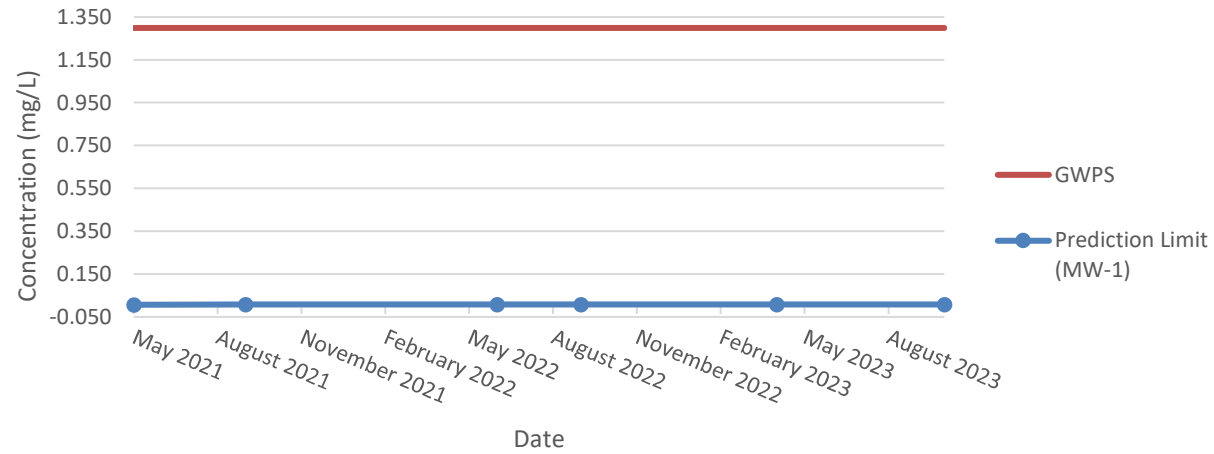


Cadmium Prediction Limit and GWPS vs. Time

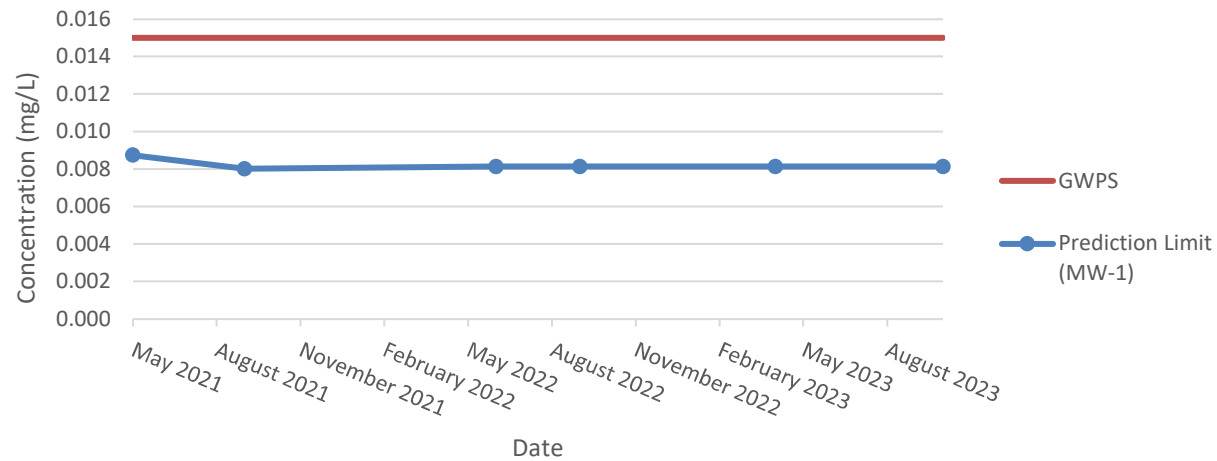


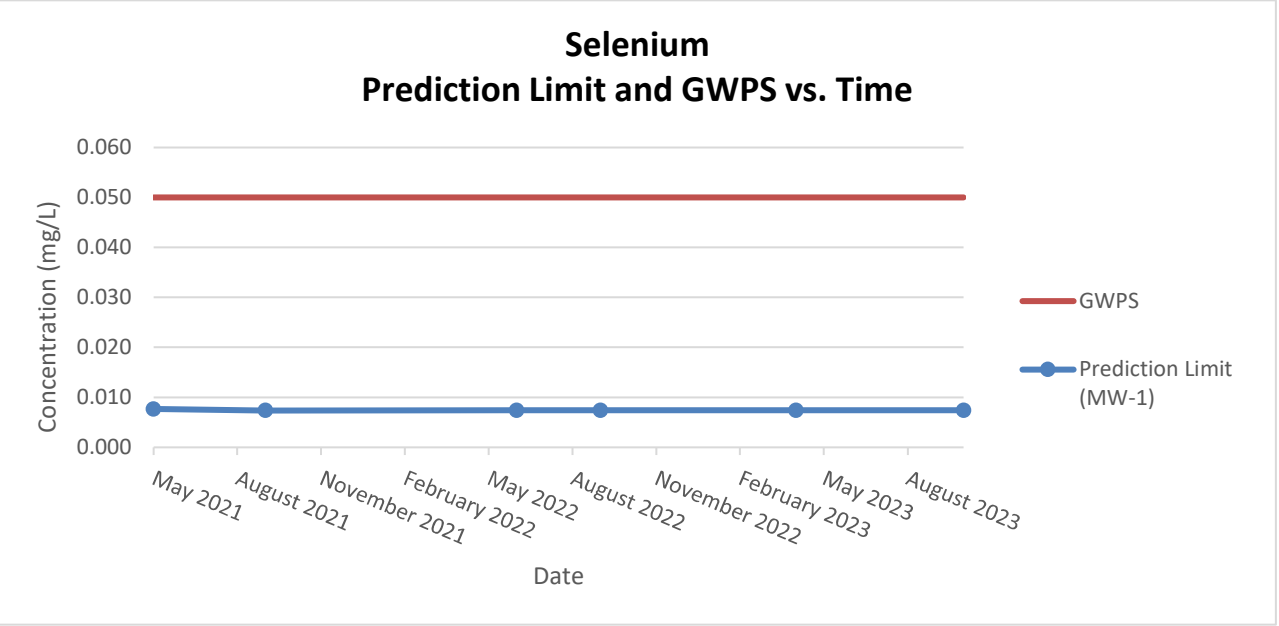
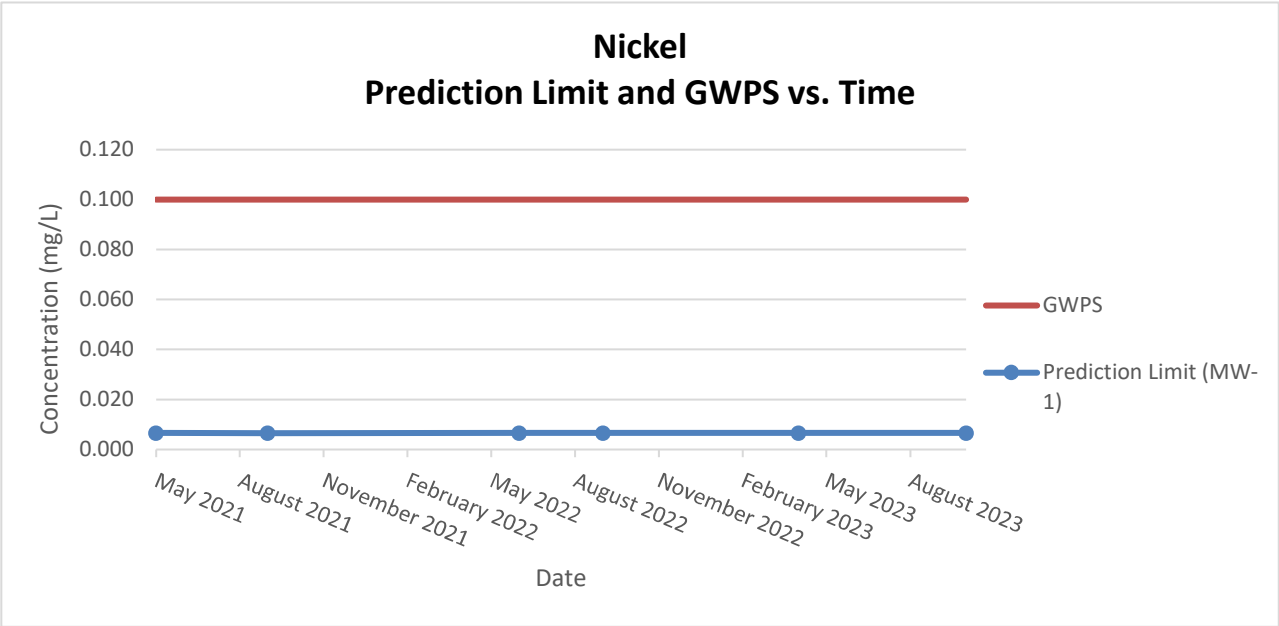


Copper Prediction Limit and GWPS vs. Time

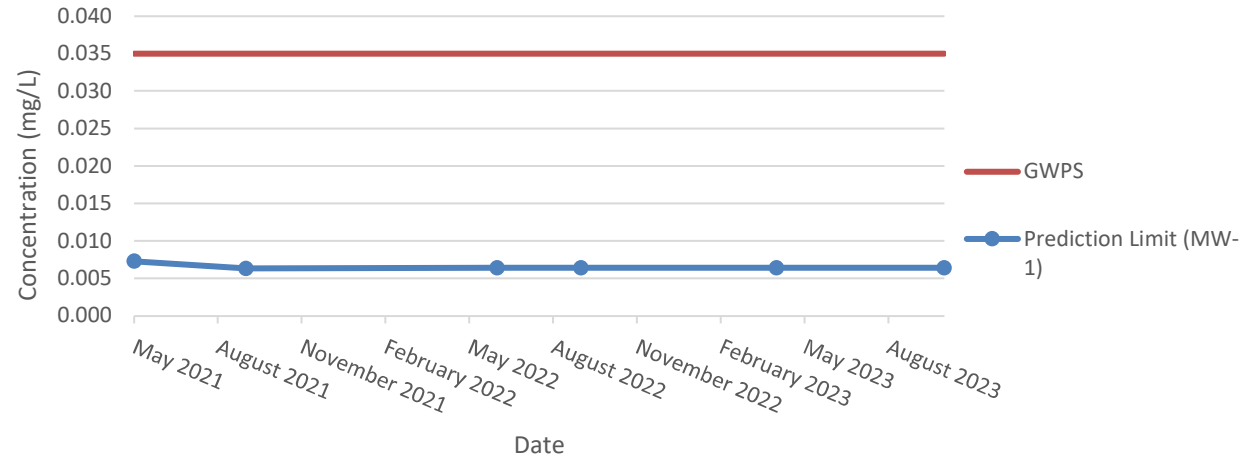


Lead Prediction Limit and GWPS vs. Time





Vanadium Prediction Limit and GWPS vs. Time



Zinc Prediction Limit and GWPS vs. Time

