December 12, 2018 Reference No. 11109628

Mr. Brian Sadowski
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

Dear Mr. Sadowski:

Re: 2018 Periodic Review Report
Cascades Containerboard Packaging Inc. - Frontier Site (formerly Norampac)
NYSDEC Site Number 932110

Pursuant to the Site Management Plan - Frontier Chemical Site, Niagara Falls, New York (SMP) dated April 23, 2014 by GHD (formerly Conestoga-Rovers & Associates [CRA]), this correspondence provides the 2018 Periodic Review Report (PRR) for the Cascades Containerboard Packaging Inc. (Cascades) Facility (Former Frontier Chemical Site) located in Niagara Falls, New York (Site Number 932110). This PRR and Institutional Controls/Engineering Controls (IC/EC) Certification presents the field activities and monitoring results for the annual monitoring period of November 18, 2017 through November 18, 2018.

1. Introduction

The Frontier Chemical Royal Avenue Site Potentially Responsible Party (PRP) Group (the Frontier Group) entered into an Order on Consent (Index #89-0571-00-01, executed on August 15, 2008) with the New York State Department of Environmental Conservation (NYSDEC) to perform additional Site characterization and remediation of the conditions at the Cascades site (Site). The Site was previously referred to as the Norampac Facility in the 2015 PRR. The Frontier Group consisted of the Site owner and numerous parties who performed the additional investigations and completed the remediation of the Site in accordance with the approved Remedial Design Report (CRA-February 2013). The Site is now owned and maintained by Cascades. The Site is a 9-acre property located in an industrialized area of Niagara Falls, New York.

Following completion of the additional Site characterization, the Frontier Group worked with the NYSDEC to develop and implement the various components of the Site remedy. The overburden and shallow bedrock groundwater remedy was implemented as specified in the 2006 Record of Decision (ROD). The deep bedrock groundwater, designated as OU2, was investigated, and a remedial action consisting of monitored natural attenuation was determined to be the appropriate remedy and set forth in the OU2 ROD (March 2011). For the source area soil, a remedy consisting of excavation and ex situ thermal treatment was selected and implemented as the appropriate remedy.

After completion of the remedial work described in the Remedial Design Report, the Remedial Action Objectives were met although some minimal residual contamination remains in place at subsurface

locations on the Site, which is hereafter referred to as "residual material". A SMP was prepared to manage the residual material at the Site until the Environmental Easement is removed in accordance with ECL Article 71, Title 36.

This 2018 PRR presents the measures taken in 2018 to evaluate the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site and to assess the conditions of the asphalt/concrete and soil cover system at the Site.

2. Site Overview

The Cascades Facility is located in an industrial area of the City of Niagara Falls, County of Niagara, New York and is identified as Block 1 and Lot 6 on the Niagara County Tax Map (160.09). The Site is an approximately 9-acre area parcel bordered to the north by property identified as owned by Sentry Metals, to the northwest by Cascades, to the west by the Greenpac Mill, to the south by Elkem Metal Company, and to the east by 47th Street, beyond which is an industrial site (Strator).

After Site remediation activities were completed in early 2014, the SMP provided a series of ECs and ICs. The ROD requires that the Site surface either be covered with the existing asphalt or concrete surface or 1 foot of clean fill material. At the completion of excavation activities associated with the source area soil remediation that was completed in 2014, the cover system was made compliant with the ROD. The existing undisturbed asphalt and concrete-covered areas were allowed to remain "as is". All previously existing soil cover areas and the area disturbed due to the excavation of the source area soil were covered with clean fill material. Recycled concrete and hard demolition material from the Site remediation project were also used as part of the 1 foot of clean surface material that was placed over all previously existing and post-excavation soil cover areas. The recycled concrete/demolition material was crushed to 2-inch-minus prior to placement and compacted in place. The remainder of the 1 foot of clean cover was completed using imported crushed stone from a quarry.

Adherence to these ICs on the Site is required by the Environmental Easement and is being implemented under the SMP. The ICs that are implemented are as follows:

- Compliance with the Environmental Easement and the SMP by the Grantor (Site owner) and the Grantor's successors and assigns (Cascades).
- All ECs must be operated and maintained as specified in the SMP.
- All ECs on the Controlled Property must be inspected at a frequency and in the manner defined in the SMP.
- Groundwater and other environmental or public health monitoring must be performed as defined in the SMP.
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in the manner defined in the SMP.

ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of ICs in the form of Site restrictions. Adherence to these ICs is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The industrial zoned property may only be used for industrial use provided that the long-term ECs and ICs included in the SMP are employed.
- The property may not be used for a higher level of use, such as unrestricted, restricted residential, or commercial use without additional evaluation (including possible additional remediation) and amendment of the Environmental Easement, as approved by the NYSDEC.
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP.
- The use of the groundwater underlying the property as a source of potable or process water is prohibited without treatment rendering it safe for the intended use as determined by the NYSDEC, New York State Department of Health (NYSDOH), or Niagara County Health Department.
- The potential for vapor intrusion must be evaluated for any building developed on the Site in the future, and any potential impacts that are identified must be monitored or managed through implementation of appropriate vapor mitigation measures.
- Vegetable gardens and farming on the property are prohibited.
- The Site owner will submit to NYSDEC a written statement that certifies, under penalty of perjury, that:
    - Controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC.
    - Nothing has occurred that impairs the ability of the controls to protect public health and the environment or that constitutes a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

3. Evaluate Remedy Performance, Effectiveness, and Protectiveness

In accordance with the SMP, annual inspections are made of the asphalt/concrete cover system, soil cover system, and monitoring wells at the Site. The 2018 annual inspection was conducted on October 3, 2018. A copy of the annual inspection report is presented in Attachment A. The 2018 inspection shows that the asphalt/concrete cover system is in fair condition; however, the inspection noted that portions of the eastern end of the Site were covered in loose garbage/debris, which had been dumped and reloaded into roll-offs for disposal. The inspection also indicated that well MW88-13A requires repairs to the well

casing, which is broken at the ground surface. Those repairs will be made in 2019 and will be documented in the 2019 PRR. No other items were noted during the annual inspection.

4. Monitoring Plan Compliance

Commencing in November 2010, groundwater samples have been collected on a semiannual basis from eight on-Site wells in the A-Zone and B-Zone of the bedrock formation at the Site, in accordance with the monitoring plan provided in the SMP. The results of the semiannual groundwater monitoring were used to calculate the volume of groundwater and the chemical loading associated with the groundwater that discharges into the Falls Street Tunnel and the 47th Street Tunnel, which are located immediately adjacent to the Cascades Site. Semiannual Groundwater Discharge Reports are submitted to the Niagara Falls Water Board (NFWB). In addition to the semiannual groundwater sampling, annual groundwater samples were collected from three on-Site deep groundwater monitoring wells (C-Zone). As stated in the SMP, the annual sampling of the deep groundwater monitoring wells will continue for a period of 5 years, starting in 2014 and continuing until 2018. Thereafter, a determination will be made as to the need for and frequency of future sampling.

4.1 Semiannual Groundwater Sampling

Semiannual groundwater sampling was performed on April 23-24, 2018 and October 3-4, 2018. The eight wells were sampled for Target Compound List (TCL) volatile organic compounds (VOCs), Target Analyte List (TAL) metals, and total phenols and in accordance with Environmental Protection Act (EPA) Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures. The calculated groundwater volumes and chemical loadings were presented in the Semiannual Groundwater Discharge Reports submitted to the NFWB on May 30, 2018 and November 26, 2018. The 2018 Semiannual Groundwater Discharge Reports are presented in Attachment B. There were no exceedances of the discharge limitations and monitoring requirements in either the May or November reports.

For both the May 2018 and November 2018 Semiannual Groundwater Discharge Reports, the calculated groundwater volumes and chemical loadings were compared to the discharge limitations and monitoring requirements presented in the NFWB Significant Industrial User (SIU) Permit #78, which was issued on October 1, 2015 by the NFWB to the Norampac-Frontier Site. SIU Permit #78 was revised on August 31, 2016 to accommodate the corporate name change from "Norampac Industries Inc. Niagara Falls Division" to "Cascades Containerboard Packaging Inc. - Frontier Site". SIU Permit #78 was further revised on September 6, 2016 in order to increase the daily maximum groundwater flow from 3,600 gallons per day to 4,000 gallons per day. There were no other changes to the limitations and requirements from the previous revision of SIU Permit #78.

4.2 Annual Groundwater Sampling

Annual sampling of three C-Zone wells (MW1-C-08, MW2-C-08, and MW3-C-08) was conducted on October 3-4, 2018. The wells were sampled in order to assess the bedrock groundwater quality over time.

The wells were sampled for VOCs in accordance with EPA Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures. Table 1 presents the 2018 analytical results for the groundwater samples from the three C-Zone wells.

The C-Zone wells had previously been sampled in December 2008 and March-April 2009, as described in the Remedial Pre-Investigation Design Report (CRA, September 2010), as well as in October 2014, October 2015, October 2016, and October 2017. Table 2 shows the 2018 analytical results for the three C-Zone wells as compared to the results from the 2008, 2009, 2014, 2015, 2016, and 2017 samples, as well as the New York State Technical and Operational Guidance Series (NYS TOGs) guidance values and standards. A discussion of the sample results for the three wells is presented below.

- ***MW1-C-08*** - As seen in Table 2, the 2018 sample from MW1-C-08 had VOC results that were below the NYS TOGs standards, as well as below the results from 2008, 2009, and 2014. The total VOC results have risen slightly each year since 2016, with a total VOC result at MW1-C-08 of 3.45 micrograms per liter (µg/L) in 2018.
- ***MW2-C-08*** - The 2018 sample results from MW2-C-08 exceeded the NYS TOGS standards for 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-chlorotouene, benzene, and chlorobenzene. The total VOC results for the 2018 sample at MW2-C-08 were lower than the 2017 total VOC results, and essentially the same as the 2016 total VOC results.
- ***MW3-C-08*** - The 2018 sample results for MW3-C-08 exceeded the NYS TOGs standards for 1,2-dichlorobenzene,1,3-dichlorobenzene 1,4-dichlorobenzene, benzene, chlorobenzene, 2-chlorotoluene, and 4-chlorotoluene. The results for those parameters were also higher in the 2018 sampling event than during the 2017 sampling event. The total VOC detections in the 2018 sampling event were 291.2 µg/L, as opposed to 78.49 µg/L for the 2017 sampling event. The increased detections were most noticeable for 1,2-dichlorobenzene,1,3-dichlorobenzene 1,4-dichlorobenzene, and chlorobenzene. It should be noted that MW3-C-08 is located on the western boundary of the former Frontier Site.

In accordance with the current schedule, semiannual sampling events will occur in April and October 2019. Semiannual groundwater discharge reports will be submitted to the NFWB in May and November 2019. The next annual sampling event, as well as the annual inspection, will occur in October 2019, followed by the preparation and submission of the next PRR.

4.2.1 Total Concentration Trends

GHD compared the 2018 total VOC concentrations from the three C-Zone wells (MW1-C-08, MW2-C-08, and MW3-C-08) to the historical total VOC concentrations at those wells. Figure 1 shows the total VOC concentrations at MW1-C-08 since measurements began in December 2008. Figure 2 shows the total VOC concentrations at MW2-C-08 since 2008, and Figure 3 shows the same for MW3-C-08.

Figure 1 shows that total VOC concentrations at MW1-C-08 have remained below 6 µg/L since the 2013/2014 source area soil remediation activities were completed, with a total VOC concentration of 3.45 µg/L in 2018. Figure 2 shows an increase of total VOCs at MW2-C-08 since the 2013/2014

remediation activities were completed, with a slight decrease in 2018, as the total VOC concentration at MW2-C-08 was 211.86 µg/L in 2018. Figure 3 shows that the 2018 total VOC concentration at MW3-C-08 was higher than the total VOC concentrations from 2008 through 2017.

4.2.2 Loading to the Sanitary Sewer System

As discussed in Section 4.1, semiannual discharge reports were submitted to the NFWB in May and November 2018. The discharge reports are included in Attachment B. Table 4 of the November 2018 discharge report lists the total chemical flux from all the A-Zone and B-Zone wells along Royal Avenue and 47th Street in order to determine the chemical loading (with regard to VOCs) to the tunnel sewer system. Based on the calculated loadings from the Royal Avenue West Side Mass Flux (Zone-A), the Royal Avenue East Side Mass Flux (Zone-A), the 47th Street Mass Flux (Zone-A), and the 47th Street Mass Flux (Zone-B), the total chemical loading (VOCs) to the tunnel sewer system for the November 2018 reporting period was 0.0758 pound/day. Table 4 of the May 2018 discharge report lists a total chemical flux of 0.0948 pound/day from all the A-Zone and B-Zone wells along Royal Avenue and 47th Street. The following table provides the average daily flow and total daily chemical loading (VOCs) to the tunnel sewer system from the A-Zone and B-Zone wells going back to 2014.

Reporting Period	Calculated Daily Flow (gal/day)	Total Chemical Loading (VOCs) from A-Zone and B-Zone Wells (pounds/day)
November 2018	1,882	0.0758
May 2018	2,414	0.0948
November 2017	2,019	0.1142
May 2017	2,435	0.1874
November 2016	1,809	0.0741
May 2016	3,457	0.2798
November 2015	2,097	0.1273
May 2015	2,395	0.1396
November 2014	3,220	0.0902
May 2014	3,077	0.1463

4.3 Vertical Gradients

Groundwater elevations were collected from wells in the C-Zone (MW1-C-08, MW2-C-08, and MW3-C-08) during the October 2018 semiannual and annual groundwater sampling activities. The groundwater elevations were compared to the groundwater contours in the B-Zone at the same locations of the C-Zone wells that were generated using groundwater elevations from B-Zone wells during the October 2018 sampling activities. The following table shows the groundwater elevations, which are measured in feet above mean sea level (ft AMSL), in the B-Zone and C-Zone at the locations of MW1-C-08, MW2-C-08, and MW3-C-08 in October 2018.

Zone	MW-1	MW-2	MW-3
B	546 ft AMSL	554 ft AMSL	554 ft AMSL
C	554.09 ft AMSL	554.34 ft AMSL	554.33 ft AMSL

The upward gradient between the C-Zone and B-Zone was confirmed by the groundwater elevations collected from the C-Zone wells and the B-Zone groundwater contours in October 2018.

4.4 Perfluorinated Chemicals (PFCs) and 1,4-Dioxane Sampling

As requested by the NYSDEC in a letter to Cascades dated November 22, 2017, Cascades completed a sampling program for PFCs at its Niagara Falls, New York Site. The sampling program was completed as part of a statewide evaluation of PFCs and their occurrence in water supplies. GHD completed the sampling and submitted the sampling results on behalf of Cascades to the NYSDEC in a letter report dated February 21, 2018.

A total of five groundwater samples were collected as part of the sampling program on January 23, 2018. The samples were analyzed for per- and polyfluoroalkyl substances (PFAS), with the laboratory analyzing for 21 individual PFCs, including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) via EPA Method 537. The samples were collected from the following wells, which were approved by the NYSDEC in an email dated December 28, 2017: MW-12, MW88-13A, MW01-9A, MW-9, and MW-13. The locations of the five wells are presented on Figures 4 (Zone A) and 5 (Zone B).

The results of the January 2018 PFC analysis from the groundwater samples collected from the five wells are presented in the attached Table 3. The analytical laboratory data report for the sample results is also presented in Attachment C.

Based on the results of the January 2018 PFC sampling, the NYSDEC requested (in an email dated April 10, 2018), that the full PFC suite analysis be added to the groundwater quality parameters that are sampled and analyzed for on an annual basis. As a result, samples from wells MW-12, MW88-13A, MW01-9A, MW-9, and MW-13 were collected on September 28, 2018 as part of the annual groundwater sampling activities and analyzed for the full PFC suite analysis. In addition to the PFC analysis, 1,4-dioxane was added to the annual analysis for each of the five groundwater samples, based on a request from the NYSDEC dated August 15, 2018.

The results of the October 2018 PFC sampling (as well as 1,4-dioxane) are included in Table 4. The results of the October 2018 sampling are presented next to the results of January 2018 sampling in Table 5 in order to compare the results of the two sampling events.

As shown in Table 5, each of the five wells had fewer total PFC detections in the September 2018 sampling than in the January 2018 sampling. The following table shows the total PFC detections at each well for both the January and September 2018 sampling events.

Monitoring Well	Total PFC Detections (ng/L) January 2018	Total PFC Detections (ng/L) September 2018
MW1-9A	10,722.04	5,756.57
MW-9	9,456.61	2,958.99
MW-12	1,600.46	1,499.54
MW-13	5,212.5	1,062.43
MW88-13A	4,897.58	4,109.48
Notes:		
ng/L - Nanograms per liter		

In evaluating the January 2018 and September 2018 sampling events, the results of two individual PFCs were compared between the two events: PFOA and PFOS. Currently, New York State does not have drinking water regulatory values for PFCs in place, but the New York State Drinking Water Quality Council is currently in the process of addressing PFC issues in the State. In the absence of current State regulatory values in New York State, the PFOA and PFOS results from the January 2018 and September 2018 sampling events were compared to the United States Environmental Protection Agency (USEPA) lifetime health advisory for drinking water (which is 70 ng/L for PFOA and PFOS), despite the fact that the Site groundwater is not used for drinking water.

For the PFOA analysis, the September 2018 results were lower than the January 2018 results at each of the five wells. For the January 2018 event, each of the five groundwater samples had PFOA results that either met or exceeded the USEPA lifetime advisory for drinking water level. For the September 2018 event, three of the five groundwater samples had PFOA results that either met or exceeded the USEPA lifetime advisory for drinking water level. The following table shows the PFOA detections at each well for both the January and September 2018 sampling events.

Monitoring Well	USEPA Lifetime Health Advisory Level (ng/L)	PFOA Results (ng/L) January 2018	PFOA Results (ng/L) September 2018
MW1-9A	70	460	230
MW-9	70	350	95
MW-12	70	70	44
MW-13	70	430	21
MW88-13A	70	110	100

For the PFOS analysis, the September 2018 results were lower than the January 2018 results at four of the five wells, with the exception being at monitoring well MW88-13A. For both the January 2018 and September 2018 sampling events, all of the five wells had PFOS results that were lower than the USEPA lifetime advisory for drinking water level. The following table shows the PFOS detections at each well for both the January and September 2018 sampling events.

Monitoring Well	USEPA Lifetime Health Advisory Level (ng/L)	PFOS Results (ng/L) January 2018	PFOS Results (ng/L) September 2018
MW1-9A	70	26	11
MW-9	70	23	7
MW-12	70	26	15
MW-13	70	49	4.9
MW88-13A	70	37	39

1,4-dioxane was not analyzed during the January 2018 sampling event. Therefore the 1,4-dioxane results from the September 2018 sampling event are presented in Tables 4 and 5 without comparison.

5. Overall Conclusions and Recommendations

All of the required work was completed and is reported herein. The remedy has effectively isolated and secured the residual material, and there is no risk to human health or the environment. It is noted that there are a few chemicals present in the C-Zone groundwater that exceed the NYS TOGS standards. However, there is an upward gradient from the C-Zone into the B-Zone that should protect the C-Zone from impact associated with any of the residual materials left in the Site soils. It is recommended that the annual groundwater monitoring of the C-Zone wells continue for an additional year as described in the SMP in order to track the current condition. An evaluation of the continued need for sampling of the C-Zone wells will be made after the 2019 sampling event. Semiannual groundwater monitoring and annual inspections will also continue as described in the SMP.

As required, a completed copy of the Site Management PRR Notice - Institutional and Engineering Controls Certificate Form is included as Attachment D.

Should there be any questions, please do not hesitate to contact myself at 716-205-1975 or Michelle Hamm of Cascades at 716-490-0595.

Sincerely,

GHD

Shaun McEvoy

SM/adh/1

Encl.

cc: Glenn May, NYSDEC
Michelle Hamm, Cascades
Bill Rajczak, Cascades
Richard Snyder, GHD

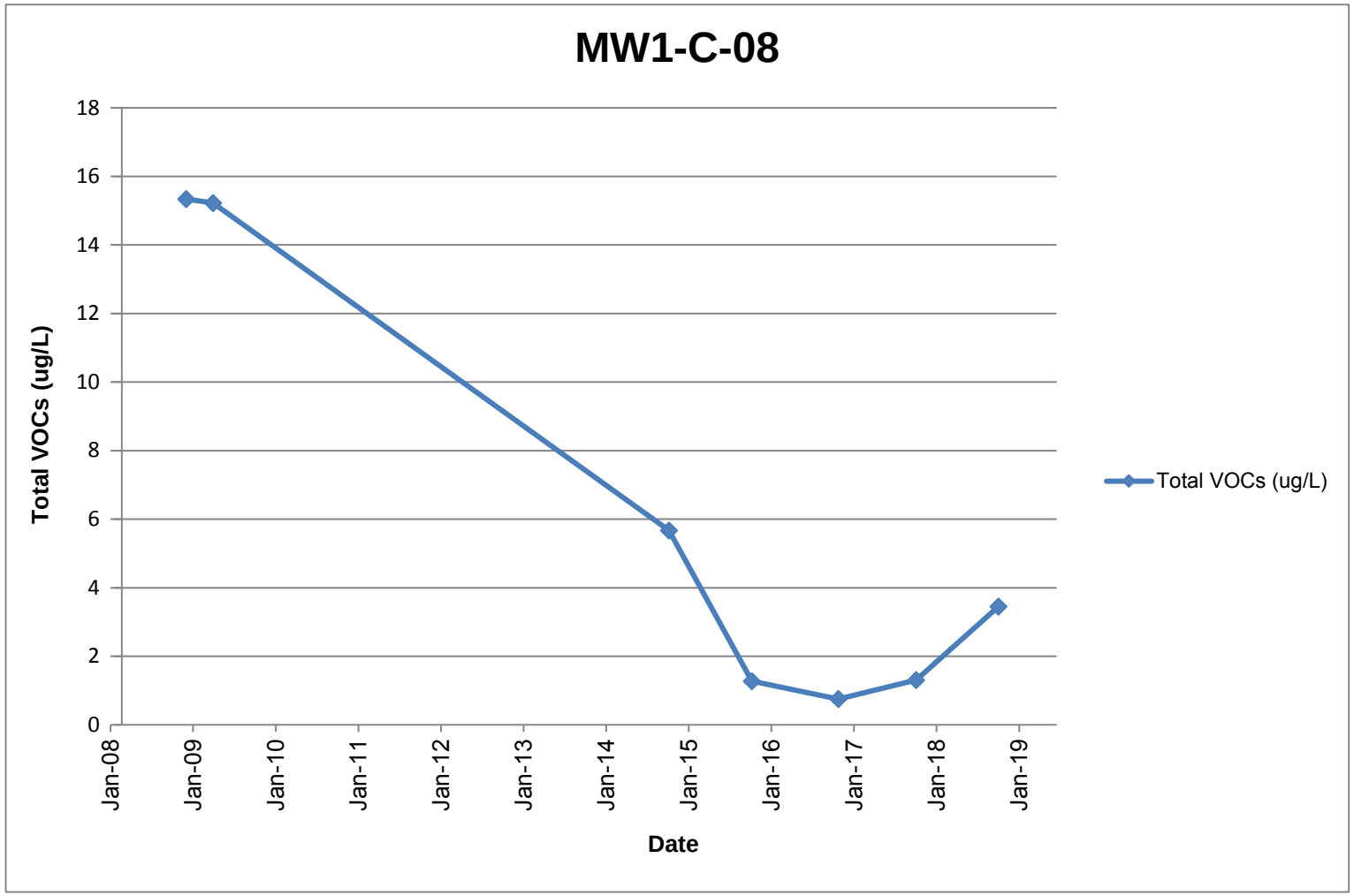


figure 1
Total VOC Concentration Trend, MW1-C-08 (2008 - 2017)
Cascades Containerboard Packaging Site
2018 Periodic Review Report
GHD

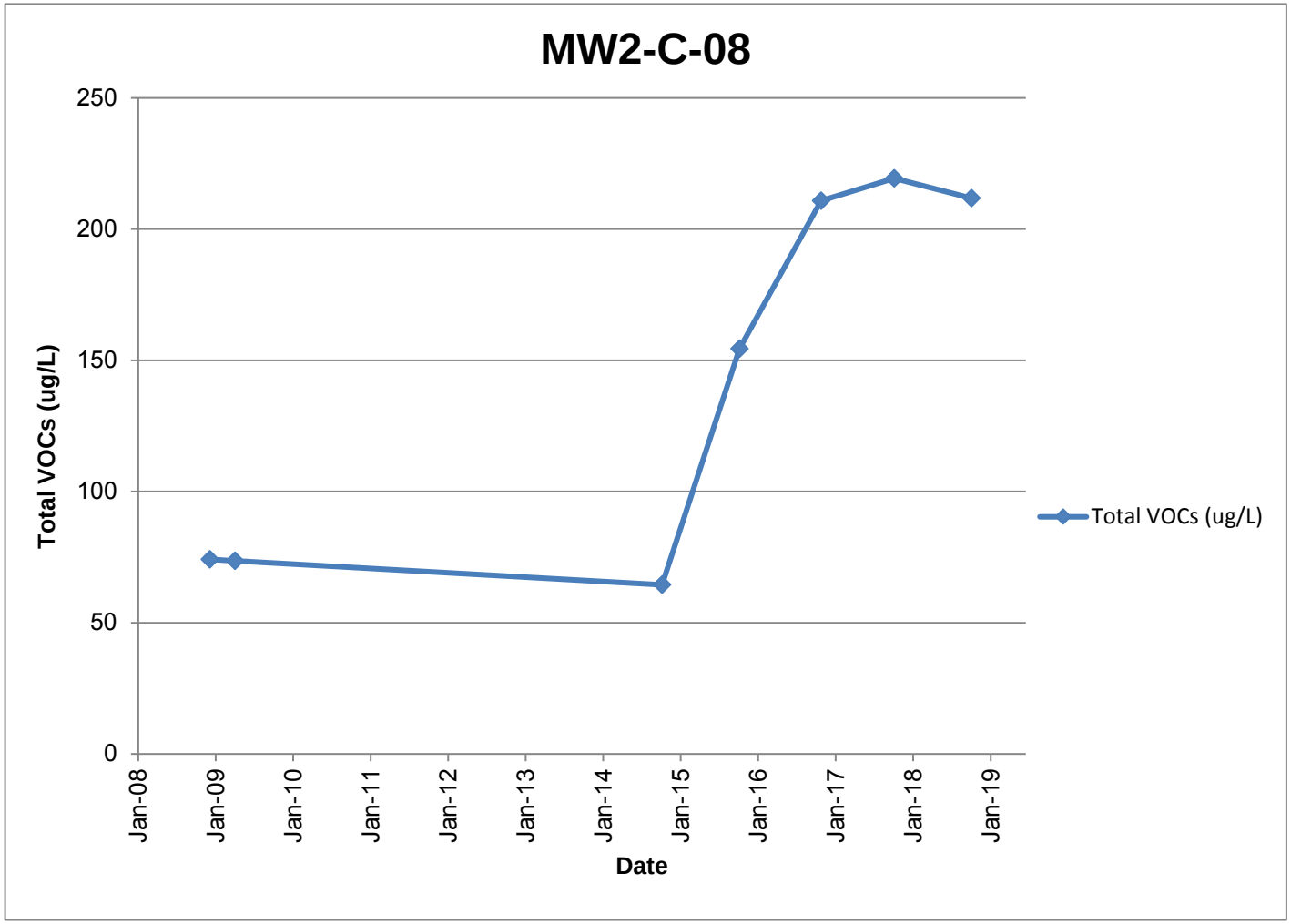


figure 2
Total VOC Concentration Trend, MW2-C-08 (2008 - 2017)
Cascades Containerboard Packaging Site
2018 Periodic Review Report
GHD

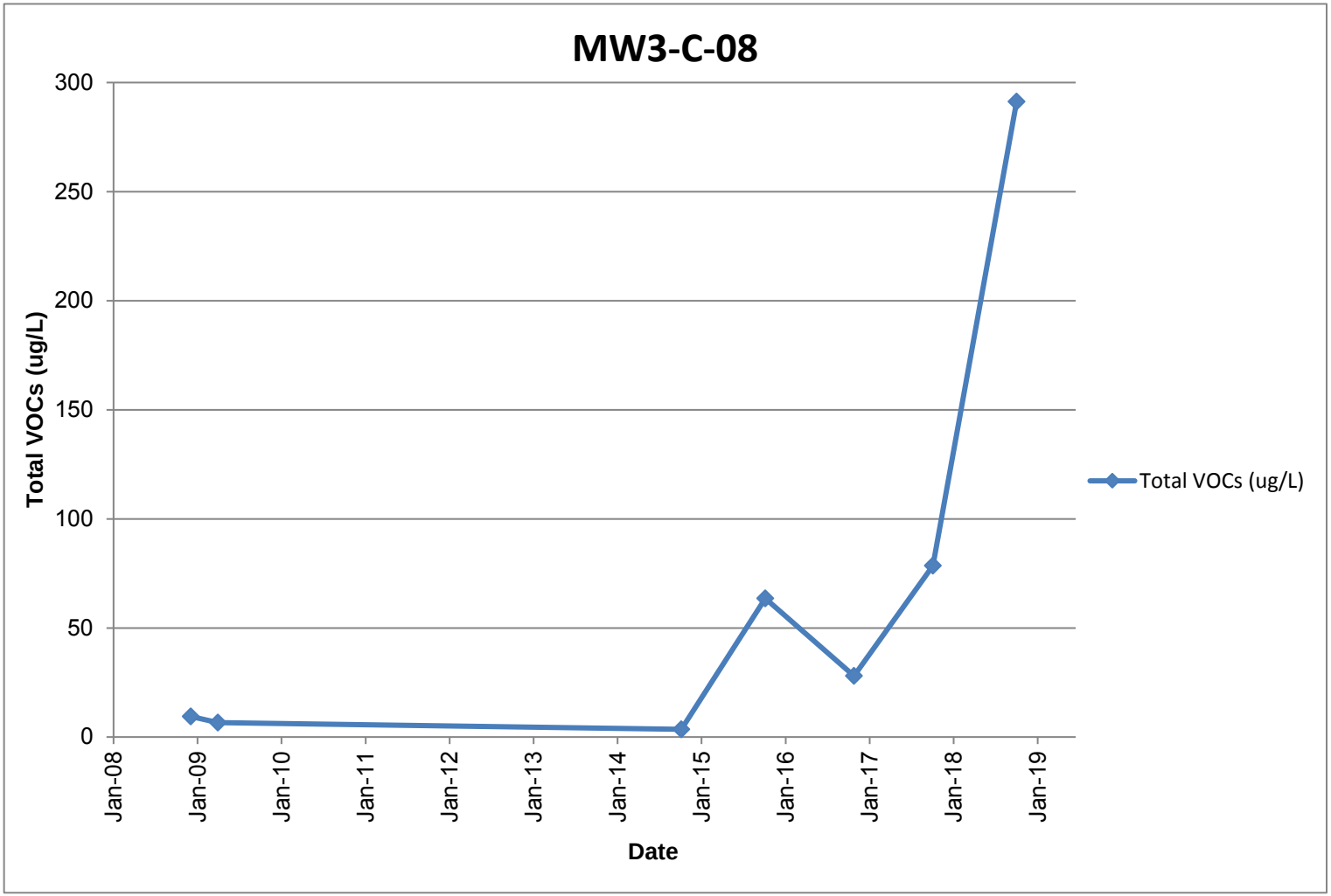


figure 3
Total VOC Concentration Trend, MW3-C-08 (2008 - 2017)
Cascades Containerboard Packaging Site
2018 Periodic Review Report
GHD

figure 4

PFC SAMPLING LOCATIONS - ZONE A
JANUARY AND SEPTEMBER 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York

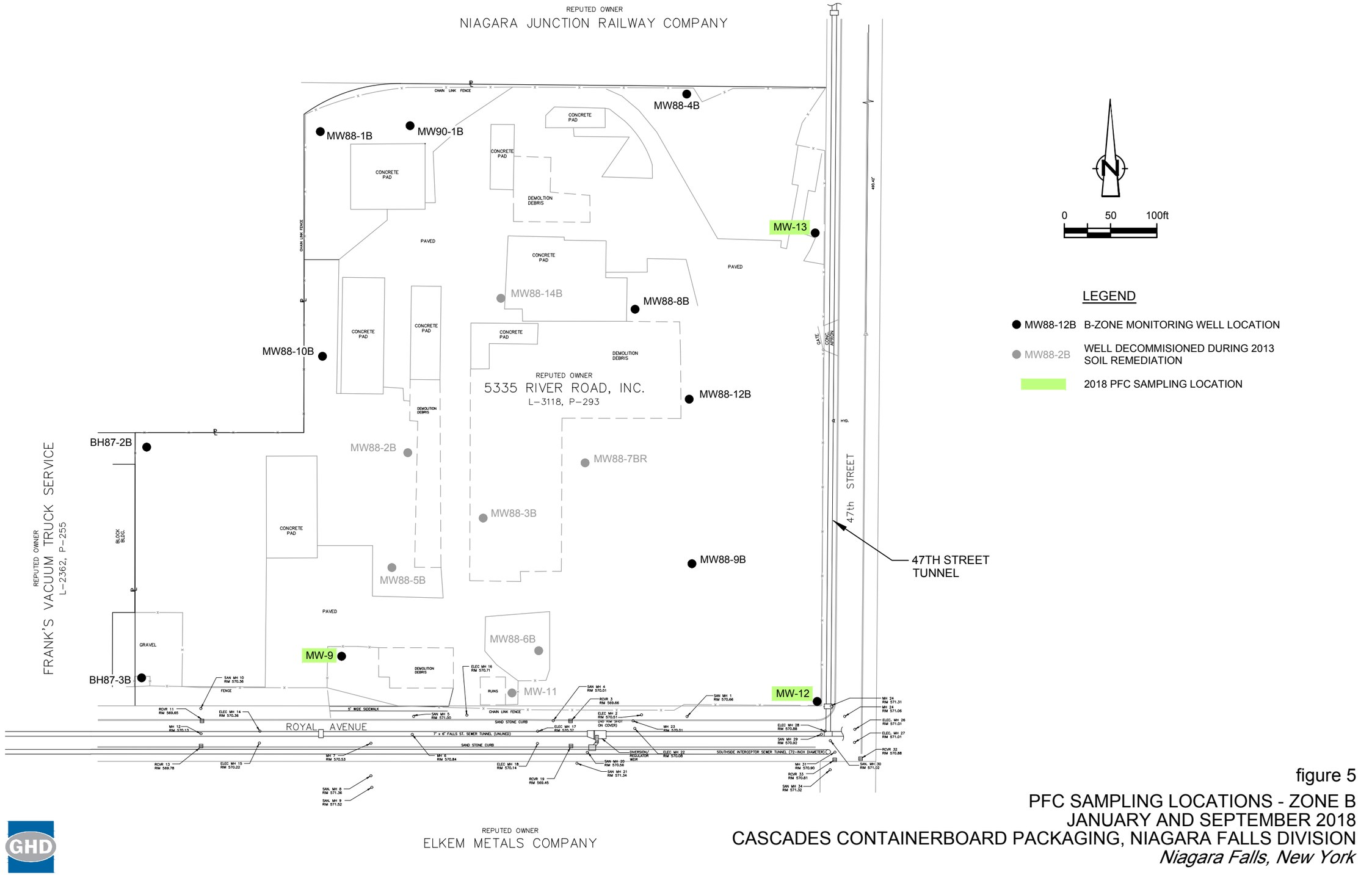


figure 5

PFC SAMPLING LOCATIONS - ZONE B
JANUARY AND SEPTEMBER 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York

Table 1

Analytical Results Summary - VOCs
C-Zone Groundwater Sampling
Cascades Containerboard Packaging Site
Niagara Falls, New York
October 2018

Location ID:		**MW1-C-08**	**MW2-C-08**	**MW3-C-08**
Sample Name:		**WG-11109628-100318-SG-010**	**WG-11109628-100318-SG-012**	**WG-11109628-100418-DT-017**
Sample Date:		**10/03/2018**	**10/03/2018**	**10/04/2018**
Parameters	**Unit**			
Volatile Organic Compounds				
1,1,1-Trichloroethane	µg/L	5.0 U	10 U	10 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	10 U	10 U
1,1,2-Trichloroethane	µg/L	5.0 U	10 U	10 U
1,1-Dichloroethane	µg/L	0.65 J	10 U	10 U
1,1-Dichloroethene	µg/L	5.0 U	10 U	10 U
1,2,4-Trichlorobenzene	µg/L	5.0 U	10 U	10 U
1,2-Dichlorobenzene	µg/L	5.0 U	6.2 J	42
1,2-Dichloroethane	µg/L	5.0 U	10 U	10 U
1,2-Dichloroethene (total)	µg/L	10 U	20 U	20 U
1,2-Dichloropropane	µg/L	5.0 U	10 U	10 U
1,3-Dichlorobenzene	µg/L	5.0 U	23	26
1,4-Dichlorobenzene	µg/L	5.0 U	40	140
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	25 U	50 U	50 U
2-Chlorotoluene	µg/L	5.0 U	18	16
2-Hexanone	µg/L	25 U	50 U	50 U
3-Chlorotoluene	µg/L	5.0 U	10 U	10 U
4-Chlorotoluene	µg/L	5.0 U	0.76 J	6.3 J
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	25 U	50 U	50 U
Acetone	µg/L	2.8 J	50 U	50 U
Benzene	µg/L	5.0 U	3.9 J	4.9 J
Bromodichloromethane	µg/L	5.0 U	10 U	10 U
Bromoform	µg/L	5.0 U	10 U	10 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	10 U	10 U
Carbon disulfide	µg/L	5.0 U	10 U	10 U
Carbon tetrachloride	µg/L	5.0 U	10 U	10 U
Chlorobenzene	µg/L	5.0 U	120	56
Chloroethane	µg/L	5.0 U	10 U	10 U
Chloroform (Trichloromethane)	µg/L	5.0 U	10 U	10 U

Table 1

Analytical Results Summary - VOCs
C-Zone Groundwater Sampling
Cascades Containerboard Packaging Site
Niagara Falls, New York
October 2018

	Location ID:	MW1-C-08	MW2-C-08	MW3-C-08
	Sample Name:	WG-11109628-100318-SG-010	WG-11109628-100318-SG-012	WG-11109628-100418-DT-017
	Sample Date:	10/03/2018	10/03/2018	10/04/2018
Parameters	**Unit**			
Volatile Organic Compounds				
Chloromethane (Methyl chloride)	µg/L	5.0 U	10 U	10 U
cis-1,2-Dichloroethene	µg/L	5.0 U	10 U	10 U
cis-1,3-Dichloropropene	µg/L	5.0 U	10 U	10 U
Dibromochloromethane	µg/L	5.0 U	10 U	10 U
Ethylbenzene	µg/L	5.0 U	10 U	10 U
Methylene chloride	µg/L	5.0 U	10 U	10 U
Styrene	µg/L	5.0 U	10 U	10 U
Tetrachloroethene	µg/L	5.0 U	10 U	10 U
Toluene	µg/L	5.0 U	10 U	10 U
trans-1,3-Dichloropropene	µg/L	5.0 U	10 U	10 U
Trichloroethene	µg/L	5.0 U	10 U	10 U
Vinyl chloride	µg/L	5.0 U	10 U	10 U
Xylenes (total)	µg/L	10 U	20 U	20 U

Notes:

J - Estimated concentration
U - Not detected at the associated reporting limit

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

Parameter	Units	New York State TOGs Guidance Value	New York State TOGs Standard	Location ID: MW1-C-08 Sample Name: GW-47392-120308-JJW-001 Sample Date: 12/03/2008	Location ID: MW1-C-08 Sample Name: GW-47392-033109-JJW-014 Sample Date: 03/31/2009	Location ID: MW1-C-08 Sample Name: GW-47392-033109-JJW-015 Sample Date: 03/31/2009 Duplicate
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	µg/L	NC	5	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	NC	1	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	µg/L	NC	5	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	NC	3	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	µg/L	NC	0.6	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC	-	-	-
1,2-Dichloropropane	µg/L	NC	1	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	NC	3	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	NC	3	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC	5.0 U	5.0 U	5.0 U
2-Chlorotoluene	ug/L	NC	5	1.0 U	1.0 U	1.0 U
2-Chloroethyl vinyl ether	µg/L	NC	NC	--	--	--
2-Hexanone	µg/L	50	NC	5.0 U	5.0 U	5.0 U
3-Chlorotoluene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC	5.0 U	5.0 U	5.0 U
Acetone	µg/L	50	NC	5.0 U	5.0 U	5.0 U
Acrolein	µg/L	NC	5	--	--	--
Acrylonitrile	µg/L	NC	5	--	--	--
Benzene	µg/L	NC	1	0.84 J	**3.1**	**2.6**
Bromodichloromethane	µg/L	50	NC	1.0 U	1.0 U	1.0 U
Bromoform	µg/L	50	NC	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Carbon disulfide	µg/L	60	NC	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Chlorobenzene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	NC	7	**10**	1.0 U	0.65 J
Chloromethane (Methyl Chloride)	µg/L	NC	5	1.0 U	1.0 UJ	1.0 UJ
cis-1,2-Dichloroethene	µg/L	NC	5	1.0 U	1.6	1.2
cis-1,3-Dichloropropene	µg/L	NC	NC	1.0 U	1.0 U	1.0 U

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

Parameter	Units	New York State TOGs Guidance Value	New York State TOGs Standard	Location ID: MW1-C-08 Sample Name: GW-47392-120308-JJW-001 Sample Date: 12/03/2008	MW1-C-08 GW-47392-033109-JJW-014 03/31/2009	MW1-C-08 GW-47392-033109-JJW-015 03/31/2009 Duplicate
Volatile Organic Compounds (VOCs)						
Cyclohexane	µg/L	NC	NC	1.1	1.0 U	1.0 U
Dibromochloromethane	µg/L	50	NC	1.0 U	1.0 U	1.0 U
Dibromodifluoromethane	µg/L	NC	NC	--	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5	1.0 U	--	--
Ethylbenzene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Isopropylbenzene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Methyl acetate	µg/L	NC	NC	1.0 U	1.0 U	1.0 U
Methyl cyclohexane	µg/L	NC	NC	1.8	1.0 U	1.0 U
Methyl Tert Butyl Ether	µg/L	10	NC	1.0 U	1.0 U	1.0 U
Methylene chloride	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Styrene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Toluene	µg/L	NC	5	1.6	4.7 J	**9.8 J**
Total Monochlorotoluenes	µg/L	NC	NC	1 U	1 U	1 U
trans-1,2-Dichloroethene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	NC	NC	1.0 U	1.0 U	1.0 U
Trichloroethene	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5	1.0 U	1.0 U	1.0 U
Vinyl chloride	µg/L	NC	2	1.0 U	1.5	0.97 J
Xylene (total)	µg/L	NC	NC	3.0 U	2.0 U	2.0 U
Total VOCs	µg/L	NC	NC	15.34	10.9	15.22

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW1-C-08	MW1-C-08	MW1-C-08
				Sample Name:	WG-47392-100714-DJT-010	WG-11109628-100815-SG-012	WG-11109628-102516-SG-003
				Sample Date:	10/07/2014	10/08/2015	10/25/2016
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	µg/L	NC	5		5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5		5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	NC	1		5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	NC	5		0.77J	0.65 J	0.75 J
1,1-Dichloroethene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04		--	--	5.0 U
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006		--	--	5.0 U
1,2-Dichlorobenzene	µg/L	NC	3		5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	µg/L	NC	0.6		5.0 U	5.0 U	5.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC		-	-	-
1,2-Dichloropropane	µg/L	NC	1		5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	µg/L	NC	3		5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	µg/L	NC	3		5.0 U	5.0 U	5.0 U
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC		--	--	25 U
2-Chlorotoluene	ug/L	NC	5		--	--	--
2-Chloroethyl vinyl ether	µg/L	NC	NC		25 U	25 U	--
2-Hexanone	µg/L	50	NC		--	--	25 U
3-Chlorotoluene	µg/L	NC	5		--	--	
4-Chlorotoluene	µg/L	NC	5		--	--	
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC		--	--	25 U
Acetone	µg/L	50	NC		25 U	25 U	25 U
Acrolein	µg/L	NC	5		100 U	100 U	--
Acrylonitrile	µg/L	NC	5		50 U	50 U	--
Benzene	µg/L	NC	1		**1.6 J**	0.62 J	5.0 U
Bromodichloromethane	µg/L	50	NC		5.0 U	5.0 U	5.0 U
Bromoform	µg/L	50	NC		5.0 U	5.0 U	5.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	60	NC		--	--	5.0 U
Carbon tetrachloride	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Chloroethane	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	NC	7		5.0 U	5.0 U	5.0 U
Chloromethane (Methyl Chloride)	µg/L	NC	5		5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	NC	5		0.84 J	5.0 U	5.0 U
cis-1,3-Dichloropropene	µg/L	NC	NC		5.0 U	5.0 U	5.0 U

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW1-C-08	MW1-C-08	MW1-C-08
				Sample Name:	WG-47392-100714-DJT-010	WG-11109628-100815-SG-012	WG-11109628-102516-SG-003
				Sample Date:	10/07/2014	10/08/2015	10/25/2016
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
Cyclohexane	µg/L	NC	NC		--	--	--
Dibromochloromethane	µg/L	50	NC		5.0 U	5.0 U	5.0 U
Dibromodifluoromethane	µg/L	NC	NC		--	--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5		--	--	5.0 U
Ethylbenzene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Isopropylbenzene	µg/L	NC	5		--	--	5.0 U
Methyl acetate	µg/L	NC	NC		--	--	--
Methyl cyclohexane	µg/L	NC	NC		--	--	--
Methyl Tert Butyl Ether	µg/L	10	NC		--	--	5.0 U
Methylene chloride	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Styrene	µg/L	NC	5		--	--	5.0 U
Tetrachloroethene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Toluene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Total Monochlorotoluenes	µg/L	NC	NC		5.0 U	5.0 U	25 U
trans-1,2-Dichloroethene	µg/L	NC	5		0.96 J	5.0 U	5.0 U
trans-1,3-Dichloropropene	µg/L	NC	NC		5.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	NC	5		5.0 U	5.0 U	5.0 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5		--	--	5.0 U
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5		--	--	5.0 U
Vinyl chloride	µg/L	NC	2		1.5 J	5.0 U	5.0 U
Xylene (total)	µg/L	NC	NC		--	--	10 U
Total VOCs	µg/L	NC	NC		5.67	1.27	0.75

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW1-C-08	MW1-C-08	MW2-C-08
				Sample Name:	WG-11109628-100417-SG-010	WG-11109628-100318-SG-010	GW-47392-120508-JJW-011
				Sample Date:	10/04/2017	10/03/2018	12/05/2008
		New York State TOGs					
Parameter	Units	Guidance Value	Standard				
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	µg/L	NC	5		1.0 U	5.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5		1.0 U	5.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	NC	1		1.0 U	5.0 U	1.0 U
1,1-Dichloroethane	µg/L	NC	5		0.67 J	0.65 J	1.0 U
1,1-Dichloroethene	µg/L	NC	5		1.0 U	5.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5		1.0 U	5.0 U	1.0 UJ
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04		1.0 U	--	1.0 U
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006		1.0 U	--	1.0 U
1,2-Dichlorobenzene	µg/L	NC	3		1.0 U	5.0 U	1.5
1,2-Dichloroethane	µg/L	NC	0.6		1.0 U	5.0 U	1.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC		-	10 U	--
1,2-Dichloropropane	µg/L	NC	1		1.0 U	5.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	NC	3		1.0 U	5.0 U	2.3
1,4-Dichlorobenzene	µg/L	NC	3		1.0 U	5.0 U	**3.6**
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC		5.0 U	25 U	5.0 U
2-Chlorotoluene	ug/L	NC	5		1.0 U	5.0 U	2.0
2-Chloroethyl vinyl ether	µg/L	NC	NC		--	--	--
2-Hexanone	µg/L	50	NC		5.0 U	25 U	5.0 U
3-Chlorotoluene	µg/L	NC	5		--	5.0 U	1.0 U
4-Chlorotoluene	µg/L	NC	5		1.0 U	5.0 U	1.0 U
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC		5.0 U	25 U	5.0 U
Acetone	µg/L	50	NC		5.0 U	2.8 J	5.0 UJ
Acrolein	µg/L	NC	5		--	--	--
Acrylonitrile	µg/L	NC	5		--	--	--
Benzene	µg/L	NC	1		0.18 J	5.0 U	**33**
Bromodichloromethane	µg/L	50	NC		1.0 U	5.0 U	1.0 U
Bromoform	µg/L	50	NC		1.0 U	5.0 U	1.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Carbon disulfide	µg/L	60	NC		1.0 U	5.0 U	0.57 J
Carbon tetrachloride	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Chlorobenzene	µg/L	NC	5		1.0 U	5.0 U	**24**
Chloroethane	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	NC	7		1.0 U	5.0 U	1.0 U
Chloromethane (Methyl Chloride)	µg/L	NC	5		0.46 J	5.0 U	1.0 U
cis-1,2-Dichloroethene	µg/L	NC	5		1.0 U	5.0 U	2.8
cis-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	5.0 U	1.0 U

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW1-C-08	MW1-C-08	MW2-C-08
				Sample Name:	WG-11109628-100417-SG-010	WG-11109628-100318-SG-010	GW-47392-120508-JJW-011
				Sample Date:	10/04/2017	10/03/2018	12/05/2008
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
Cyclohexane	µg/L	NC	NC		1.0 U	--	1.0 U
Dibromochloromethane	µg/L	50	NC		1.0 U	5.0 U	1.0 U
Dibromodifluoromethane	µg/L	NC	NC		--	--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5		1.0 U	--	1.0 U
Ethylbenzene	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Isopropylbenzene	µg/L	NC	5		1.0 U	--	1.0 U
Methyl acetate	µg/L	NC	NC		5.0 U	--	1.0 UJ
Methyl cyclohexane	µg/L	NC	NC		1.0 U	--	1.0 U
Methyl Tert Butyl Ether	µg/L	10	NC		1.0 U	--	1.0 U
Methylene chloride	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Styrene	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Tetrachloroethene	µg/L	NC	5		1.0 U	5.0 U	1.0 U
Toluene	µg/L	NC	5		1.0 U	5.0 U	1.0
Total Monochlorotoluenes	µg/L	NC	NC		-	5.0 U	2
trans-1,2-Dichloroethene	µg/L	NC	5		1.0 U	--	0.80 J
trans-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	5.0 U	1.0 U
Trichloroethene	µg/L	NC	5		1.0 U	5.0 U	0.63 J
Trichlorofluoromethane (CFC-11)	µg/L	NC	5		1.0 U	--	1.0 U
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5		1.0 U	--	1.0 U
Vinyl chloride	µg/L	NC	2		1.0 U	5.0 U	2.0
Xylene (total)	µg/L	NC	NC		2.0 U	10 U	3.0 U
Total VOCs	µg/L	NC	NC		1.31	3.45	74.2

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW2-C-08	MW2-C-08	MW2-C-08
				Sample Name:	GW-47392-040309-JJW-023	WG-47392-100714-SG-011	WG-11109628-100715-SG-008
				Sample Date:	04/03/2009	10/7/2014	10/07/2015
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	µg/L	NC	5		1.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5		1.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	NC	1		1.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	NC	5		1.0 U	5.0 U	5.0 U
1,1-Dichloroethene	µg/L	NC	5		1.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5		1.0 U	5.0 U	5.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04		1.0 U	--	--
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006		1.0 U	--	--
1,2-Dichlorobenzene	µg/L	NC	3		1.5	2.8 J	**6.2**
1,2-Dichloroethane	µg/L	NC	0.6		1.0 U	5.0 U	5.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC		-	-	-
1,2-Dichloropropane	µg/L	NC	1		1.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	µg/L	NC	3		**3.1**	**3.4 J**	**13**
1,4-Dichlorobenzene	µg/L	NC	3		**4.0**	**7.8**	**25**
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC		5.0 U	--	--
2-Chlorotoluene	ug/L	NC	5		1.0 U	--	--
2-Chloroethyl vinyl ether	µg/L	NC	NC		--	25 U	25 U
2-Hexanone	µg/L	50	NC		5.0 U	--	--
3-Chlorotoluene	µg/L	NC	5		2.3	--	--
4-Chlorotoluene	µg/L	NC	5		1.0 U	--	--
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC		5.0 U	--	--
Acetone	µg/L	50	NC		5.0 U	25 U	25 U
Acrolein	µg/L	NC	5		--	100 U	100 U
Acrylonitrile	µg/L	NC	5		--	50 U	50 U
Benzene	µg/L	NC	1		**30**	**8.6**	**12**
Bromodichloromethane	µg/L	50	NC		1.0 U	5.0 U	--
Bromoform	µg/L	50	NC		1.0 U	5.0 U	5.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	60	NC		1.0 U	--	--
Carbon tetrachloride	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	NC	5		**26**	**38**	**86**
Chloroethane	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	NC	7		1.0 U	5.0 U	5.0 U
Chloromethane (Methyl Chloride)	µg/L	NC	5		1.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	NC	5		2.6	5.0 U	0.67 J
cis-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	5.0 U	5.0 U

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW2-C-08	MW2-C-08	MW2-C-08
				Sample Name:	GW-47392-040309-JJW-023	WG-47392-100714-SG-011	WG-11109628-100715-SG-008
				Sample Date:	04/03/2009	10/7/2014	10/07/2015
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
Cyclohexane	µg/L	NC	NC		1.0 U	--	--
Dibromochloromethane	µg/L	50	NC		1.0 U	5.0 U	5.0 U
Dibromodifluoromethane	µg/L	NC	NC		1.0 U	--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5		--	--	--
Ethylbenzene	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Isopropylbenzene	µg/L	NC	5		1.0 U	--	--
Methyl acetate	µg/L	NC	NC		1.0 UJ	--	--
Methyl cyclohexane	µg/L	NC	NC		1.0 U	--	--
Methyl Tert Butyl Ether	µg/L	10	NC		1.0 U	--	--
Methylene chloride	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Styrene	µg/L	NC	5		1.0 U	--	--
Tetrachloroethene	µg/L	NC	5		1.0 U	5.0 U	5.0 U
Toluene	µg/L	NC	5		1.0 U	5.0 U	0.56 J
Total Monochlorotoluenes	µg/L	NC	NC		2.3	3.0 J	9.84 J
trans-1,2-Dichloroethene	µg/L	NC	5		0.61 J	5.0 U	5.0 U
trans-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	NC	5		0.52 J	5.0 U	5.0 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5		1.0 U	--	--
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5		1.0 U	--	--
Vinyl chloride	µg/L	NC	2		**3.0**	0.85 J	1.1 J
Xylene (total)	µg/L	NC	NC		2.0 U	--	--
Total VOCs	µg/L	NC	NC		73.63	64.45	154.37

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW2-C-08	MW2-C-08	MW2-C-08
				Sample Name:	WG-11109628-102516-SG-006	WG-11109628-100417-SG-011	WG-11109628-100318-SG-012
				Sample Date:	10/25/2016	10/04/2017	10/03/2018
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	µg/L	NC	5	20 U	1.0 U	10 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5	20 U	1.0 U	10 U
1,1,2-Trichloroethane	µg/L	NC	1	20 U	1.0 U	10 U
1,1-Dichloroethane	µg/L	NC	5	20 U	0.25 J	10 U
1,1-Dichloroethene	µg/L	NC	5	20 U	1.0 U	10 U
1,2,4-Trichlorobenzene	µg/L	NC	5	20 U	1.0 U	10 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04	20 U	1.0 U	--
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006	20 U	1.0 U	--
1,2-Dichlorobenzene	µg/L	NC	3	6.8 J	6.9	6.2 J
1,2-Dichloroethane	µg/L	NC	0.6	20 U	1.0 U	10 U
1,2-Dichloroethene (total)	µg/L	NC	NC	-	-	20 U
1,2-Dichloropropane	µg/L	NC	1	20 U	1.0 U	10 U
1,3-Dichlorobenzene	µg/L	NC	3	20	22	23
1,4-Dichlorobenzene	µg/L	NC	3	37	41	40
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC	100 U	5.0 U	50 U
2-Chlorotoluene	ug/L	NC	5	--	13	18
2-Chloroethyl vinyl ether	µg/L	NC	NC	--	--	--
2-Hexanone	µg/L	50	NC	100 U	5.0 U	50 U
3-Chlorotoluene	µg/L	NC	5	--	--	10 U
4-Chlorotoluene	µg/L	NC	5	--	0.90 J	0.76 J
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC	100 U	5.0 U	50 U
Acetone	µg/L	50	NC	100 U	5.7	50 U
Acrolein	µg/L	NC	5	--	--	--
Acrylonitrile	µg/L	NC	5	--	--	--
Benzene	µg/L	NC	1	13 J	6.5	3.9 J
Bromodichloromethane	µg/L	50	NC	20 U	1.0 U	10 U
Bromoform	µg/L	50	NC	20 U	1.0 U	10 U
Bromomethane (Methyl Bromide)	µg/L	NC	5	20 U	1.0 U	10 U
Carbon disulfide	µg/L	60	NC	20 U	1.0 U	10 U
Carbon tetrachloride	µg/L	NC	5	20 U	1.0 U	10 U
Chlorobenzene	µg/L	NC	5	120	120	120
Chloroethane	µg/L	NC	5	20 U	1.0 U	10 U
Chloroform (Trichloromethane)	µg/L	NC	7	20 U	1.0 U	10 U
Chloromethane (Methyl Chloride)	µg/L	NC	5	20 U	1.0 U	10 U
cis-1,2-Dichloroethene	µg/L	NC	5	20 U	0.56 J	10 U
cis-1,3-Dichloropropene	µg/L	NC	NC	20 U	1.0 U	10 U

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

			Location ID:	MW2-C-08	MW2-C-08	MW2-C-08
			Sample Name:	WG-11109628-102516-SG-006	WG-11109628-100417-SG-011	WG-11109628-100318-SG-012
			Sample Date:	10/25/2016	10/04/2017	10/03/2018
		New York State TOGs				
Parameter	**Units**	**Guidance Value**	**Standard**			
Volatile Organic Compounds (VOCs)						
Cyclohexane	µg/L	NC	NC	--	--	--
Dibromochloromethane	µg/L	50	NC	20 U	1.0 U	10 U
Dibromodifluoromethane	µg/L	NC	NC	--	--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5	20 U	1.0 U	--
Ethylbenzene	µg/L	NC	5	20 U	1.0 U	10 U
Isopropylbenzene	µg/L	NC	5	20 U	1.0 U	--
Methyl acetate	µg/L	NC	NC	--	5.0 U	--
Methyl cyclohexane	µg/L	NC	NC	--	1.0 U	--
Methyl Tert Butyl Ether	µg/L	10	NC	20 U	1.0 U	--
Methylene chloride	µg/L	NC	5	20 U	1.0 U	10 U
Styrene	µg/L	NC	5	20 U	1.0 U	10 U
Tetrachloroethene	µg/L	NC	5	20 U	0.92 J	10 U
Toluene	µg/L	NC	5	20 U	0.44 J	10 U
Total Monochlorotoluenes	µg/L	NC	NC	14 J	13.9	18.76
trans-1,2-Dichloroethene	µg/L	NC	5	20 U	1.0 U	--
trans-1,3-Dichloropropene	µg/L	NC	NC	20 U	1.0 U	10 U
Trichloroethene	µg/L	NC	5	20 U	0.62 J	10 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5	20 U	1.0 U	--
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5	20 U	1.0 U	--
Vinyl chloride	µg/L	NC	2	20 U	0.58 J	10 U
Xylene (total)	µg/L	NC	NC	40 U	2.0 U	20 U
Total VOCs	µg/L	NC	NC	210.8	219.37	211.86

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW3-C-08	MW3-C-08	MW3-C-08
				Sample Name:	GW-47392-120408-JJW-006	GW-47392-040109-JJW-019	WG-47392-100714-SG-012
				Sample Date:	12/04/2008	04/01/2009	10/7/2014
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	µg/L	NC	5		1.0 U	1.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5		1.0 U	1.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	NC	1		1.0 U	1.0 U	5.0 U
1,1-Dichloroethane	µg/L	NC	5		1.0 U	1.0 U	5.0 U
1,1-Dichloroethene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04		1.0 U	1.0 U	--
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006		1.0 U	1.0 U	--
1,2-Dichlorobenzene	µg/L	NC	3		0.54 J	0.58 J	5.0 U
1,2-Dichloroethane	µg/L	NC	0.6		1.0 U	1.0 U	5.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC		-	-	--
1,2-Dichloropropane	µg/L	NC	1		1.0 U	1.0 U	5.0 U
1,3-Dichlorobenzene	µg/L	NC	3		0.50 J	0.47 J	5.0 U
1,4-Dichlorobenzene	µg/L	NC	3		1.0	1.2	1.0 J
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC		5.0 U	5.0 U	--
2-Chlorotoluene	ug/L	NC	5		0.67 J	1.0 U	--
2-Chloroethyl vinyl ether	µg/L	NC	NC		--	--	25 U
2-Hexanone	µg/L	50	NC		5.0 U	5.0 U	--
3-Chlorotoluene	µg/L	NC	5		1.0 U	0.56 J	--
4-Chlorotoluene	µg/L	NC	5		1.0 U	1.0 U	--
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC		5.0 U	5.0 U	--
Acetone	µg/L	50	NC		5.0 U	5.0 U	25 U
Acrolein	µg/L	NC	5		--	--	100 U
Acrylonitrile	µg/L	NC	5		--	--	50 U
Benzene	µg/L	NC	1		0.83 J	1.0 U	5.0 U
Bromodichloromethane	µg/L	50	NC		1.0 U	1.0 U	5.0 U
Bromoform	µg/L	50	NC		1.0 U	1.0 U	5.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Carbon disulfide	µg/L	60	NC		1.0 U	1.0 U	--
Carbon tetrachloride	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Chlorobenzene	µg/L	NC	5		1.3	1.1	5.0 U
Chloroethane	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	NC	7		0.60 J	1.0 U	5.0 U
Chloromethane (Methyl Chloride)	µg/L	NC	5		1.0 U	1.0 UJ	5.0 U
cis-1,2-Dichloroethene	µg/L	NC	5		1.8	1.9	1.6 J
cis-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	1.0 U	5.0 U

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW3-C-08	MW3-C-08	MW3-C-08
				Sample Name:	GW-47392-120408-JJW-006	GW-47392-040109-JJW-019	WG-47392-100714-SG-012
				Sample Date:	12/04/2008	04/01/2009	10/7/2014
		New York State TOGs					
Parameter	**Units**	**Guidance Value**	**Standard**				
Volatile Organic Compounds (VOCs)							
Cyclohexane	µg/L	NC	NC		1.0 U	1.0 U	--
Dibromochloromethane	µg/L	50	NC		1.0 U	1.0 U	5.0 U
Dibromodifluoromethane	µg/L	NC	NC		--	1.0 U	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5		1.0 U	--	--
Ethylbenzene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Isopropylbenzene	µg/L	NC	5		1.0 U	1.0 U	--
Methyl acetate	µg/L	NC	NC		1.0 U	1.0 U	--
Methyl cyclohexane	µg/L	NC	NC		1.0 U	1.0 U	--
Methyl Tert Butyl Ether	µg/L	10	NC		1.0 U	1.0 U	--
Methylene chloride	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Styrene	µg/L	NC	5		1.0 U	1.0 U	--
Tetrachloroethene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Toluene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Total Monochlorotoluenes	µg/L	NC	NC		0.67 J	0.56 J	5.0 U
trans-1,2-Dichloroethene	µg/L	NC	5		0.54 J	0.73 J	5.0 U
trans-1,3-Dichloropropene	µg/L	NC	NC		1.0 U	1.0 U	5.0 U
Trichloroethene	µg/L	NC	5		1.0 U	1.0 U	5.0 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5		1.0 U	1.0 U	--
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5		1.0 U	1.0 U	--
Vinyl chloride	µg/L	NC	2		1.5	1.0 U	0.93 J
Xylene (total)	µg/L	NC	NC		3.0 U	2.0 U	--
Total VOCs	µg/L	NC	NC		9.28	6.54	3.53

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW3-C-08	MW3-C-08
				Sample Name:	WG-11109628-100715-DT-007	WG-11109628-102616-SG-008
				Sample Date:	10/07/2015	10/26/2016
		New York State TOGs				
Parameter	**Units**	**Guidance Value**	**Standard**			
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	µg/L	NC	5		5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5		5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	NC	1		5.0 U	5.0 U
1,1-Dichloroethane	µg/L	NC	5		5.0 U	5.0 U
1,1-Dichloroethene	µg/L	NC	5		5.0 U	5.0 U
1,2,4-Trichlorobenzene	µg/L	NC	5		5.0 U	5.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04		--	5.0 U
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006		--	5.0 U
1,2-Dichlorobenzene	µg/L	NC	3		0.98 J	**3.5 J**
1,2-Dichloroethane	µg/L	NC	0.6		5.0 U	5.0 U
1,2-Dichloroethene (total)	µg/L	NC	NC		-	--
1,2-Dichloropropane	µg/L	NC	1		5.0 U	5.0 U
1,3-Dichlorobenzene	µg/L	NC	3		1.7 J	**3.2 J**
1,4-Dichlorobenzene	µg/L	NC	3		**3.3 J**	**13**
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC		--	25 U
2-Chlorotoluene	ug/L	NC	5		--	--
2-Chloroethyl vinyl ether	µg/L	NC	NC		25 U	--
2-Hexanone	µg/L	50	NC		--	25 U
3-Chlorotoluene	µg/L	NC	5		--	25 U
4-Chlorotoluene	µg/L	NC	5		--	25 U
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC		--	25 U
Acetone	µg/L	50	NC		25 U	25 U
Acrolein	µg/L	NC	5		100 U	--
Acrylonitrile	µg/L	NC	5		50 U	--
Benzene	µg/L	NC	1		5.0 U	5.0 U
Bromodichloromethane	µg/L	50	NC		5.0 U	5.0 U
Bromoform	µg/L	50	NC		5.0 U	5.0 U
Bromomethane (Methyl Bromide)	µg/L	NC	5		5.0 U	5.0 U
Carbon disulfide	µg/L	60	NC		--	5.0 U
Carbon tetrachloride	µg/L	NC	5		5.0 U	5.0 U
Chlorobenzene	µg/L	NC	5		1.1 J	**5.6**
Chloroethane	µg/L	NC	5		5.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	NC	7		5.0 U	5.0 U
Chloromethane (Methyl Chloride)	µg/L	NC	5		5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	NC	5		**45**	5.0 U
cis-1,3-Dichloropropene	µg/L	NC	NC		5.0 U	5.0 U

Table 2

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

				Location ID:	MW3-C-08	MW3-C-08
				Sample Name:	WG-11109628-100715-DT-007	WG-11109628-102616-SG-008
				Sample Date:	10/07/2015	10/26/2016
		New York State TOGs				
Parameter	**Units**	**Guidance Value**	**Standard**			
Volatile Organic Compounds (VOCs)						
Cyclohexane	µg/L	NC	NC		--	--
Dibromochloromethane	µg/L	50	NC		5.0 U	5.0 U
Dibromodifluoromethane	µg/L	NC	NC		--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5		--	5.0 U
Ethylbenzene	µg/L	NC	5		5.0 U	5.0 U
Isopropylbenzene	µg/L	NC	5		--	5.0 U
Methyl acetate	µg/L	NC	NC		--	--
Methyl cyclohexane	µg/L	NC	NC		--	--
Methyl Tert Butyl Ether	µg/L	10	NC		--	5.0 U
Methylene chloride	µg/L	NC	5		5.0 U	5.0 U
Styrene	µg/L	NC	5		--	5.0 U
Tetrachloroethene	µg/L	NC	5		5.0 U	5.0 U
Toluene	µg/L	NC	5		5.0 U	5.0 U
Total Monochlorotoluenes	µg/L	NC	NC		5.0 U	2.75 J
trans-1,2-Dichloroethene	µg/L	NC	5		0.70 J	5.0 U
trans-1,3-Dichloropropene	µg/L	NC	NC		5.0 U	5.0 U
Trichloroethene	µg/L	NC	5		1.8 J	5.0 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5		--	5.0 U
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5		--	5.0 U
Vinyl chloride	µg/L	NC	2		9	5.0 U
Xylene (total)	µg/L	NC	NC		--	10 U
Total VOCs	µg/L	NC	NC		63.58	28.05

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

			Location ID:	**MW3-C-08**	**MW3-C-08**
			Sample Name:	**WG-11109628-100417-SG-009**	**WG-11109628-100418-DT-017**
			Sample Date:	**10/04/2017**	**10/04/2018**
		New York State TOGs			
Parameter	**Units**	**Guidance Value**	**Standard**		
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	µg/L	NC	5	1.0 U	10 U
1,1,2,2-Tetrachloroethane	µg/L	NC	5	1.0 U	10 U
1,1,2-Trichloroethane	µg/L	NC	1	1.0 U	10 U
1,1-Dichloroethane	µg/L	NC	5	0.88 J	10 U
1,1-Dichloroethene	µg/L	NC	5	1.0 U	10 U
1,2,4-Trichlorobenzene	µg/L	NC	5	1.0 U	10 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	NC	0.04	1.0 U	--
1,2-Dibromoethane (Ethylene Dibromide)	µg/L	NC	0.0006	1.0 U	--
1,2-Dichlorobenzene	µg/L	NC	3	**9.1 J**	**42**
1,2-Dichloroethane	µg/L	NC	0.6	1.0 U	10 U
1,2-Dichloroethene (total)	µg/L	NC	NC	--	20 U
1,2-Dichloropropane	µg/L	NC	1	1.0 U	10 U
1,3-Dichlorobenzene	µg/L	NC	3	**6.1 J**	**26**
1,4-Dichlorobenzene	µg/L	NC	3	**34 J**	**140**
2-Butanone (Methyl Ethyl Ketone)	µg/L	50	NC	5.0 U	50 U
2-Chlorotoluene	ug/L	NC	5	3.6 J	**16**
2-Chloroethyl vinyl ether	µg/L	NC	NC	--	--
2-Hexanone	µg/L	50	NC	5.0 U	50 U
3-Chlorotoluene	µg/L	NC	5	--	10 U
4-Chlorotoluene	µg/L	NC	5	1.4 J	**6.3 J**
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	NC	NC	5.0 U	50 U
Acetone	µg/L	50	NC	8.0 J	50 U
Acrolein	µg/L	NC	5	--	--
Acrylonitrile	µg/L	NC	5	--	--
Benzene	µg/L	NC	1	**2.2 J**	**4.9 J**
Bromodichloromethane	µg/L	50	NC	1.0 U	10 U
Bromoform	µg/L	50	NC	1.0 U	10 U
Bromomethane (Methyl Bromide)	µg/L	NC	5	1.0 U	10 U
Carbon disulfide	µg/L	60	NC	1.0 U	10 U
Carbon tetrachloride	µg/L	NC	5	1.0 U	10 U
Chlorobenzene	µg/L	NC	5	**13 J**	**56**
Chloroethane	µg/L	NC	5	1.0 U	10 U
Chloroform (Trichloromethane)	µg/L	NC	7	1.0 U	10 U
Chloromethane (Methyl Chloride)	µg/L	NC	5	1.0 U	10 U
cis-1,2-Dichloroethene	µg/L	NC	5	1.0 U	10 U
cis-1,3-Dichloropropene	µg/L	NC	NC	1.0 U	10 U

Summary of Deep Groundwater (C-Zone) Analytical VOC Results - 2018 and Historical
Cascades Containerboard Packaging Site
Niagara Falls, New York

			Location ID:	MW3-C-08	MW3-C-08
			Sample Name:	WG-11109628-100417-SG-009	WG-11109628-100418-DT-017
			Sample Date:	10/04/2017	10/04/2018
		New York State TOGs			
Parameter	**Units**	**Guidance Value**	**Standard**		
Volatile Organic Compounds (VOCs)					
Cyclohexane	µg/L	NC	NC	1.0 U	--
Dibromochloromethane	µg/L	50	NC	1.0 U	10 U
Dibromodifluoromethane	µg/L	NC	NC	--	--
Dichlorodifluoromethane (CFC-12)	µg/L	NC	5	1.0 U	--
Ethylbenzene	µg/L	NC	5	1.0 U	10 U
Isopropylbenzene	µg/L	NC	5	1.0 U	--
Methyl acetate	µg/L	NC	NC	1.0 U	--
Methyl cyclohexane	µg/L	NC	NC	1.0 U	--
Methyl Tert Butyl Ether	µg/L	10	NC	1.0 U	--
Methylene chloride	µg/L	NC	5	1.0 U	10 U
Styrene	µg/L	NC	5	1.0 U	10 U
Tetrachloroethene	µg/L	NC	5	1.0 U	10 U
Toluene	µg/L	NC	5	1.0 U	10 U
Total Monochlorotoluenes	µg/L	NC	NC	5	22.3
trans-1,2-Dichloroethene	µg/L	NC	5	0.21 J	--
trans-1,3-Dichloropropene	µg/L	NC	NC	1.0 U	10 U
Trichloroethene	µg/L	NC	5	1.0 U	10 U
Trichlorofluoromethane (CFC-11)	µg/L	NC	5	1.0 U	--
Trifluorotrichloroethane (Freon 113)	µg/L	NC	5	1.0 U	--
Vinyl chloride	µg/L	NC	2	1.0 U	10 U
Xylene (total)	µg/L	NC	NC	2.0 U	20 U
Total VOCs	µg/L	NC	NC	78.49	291.2

Notes:

6.24	- Concentration exceed NYS TOGs
U	- Not present at or above the associated MDL
J	- Estimated concentration between the MDL and Reporting Limit
MDL	- Method Detection Limit
NC	- No criteria
NYS TOGs	- New York State Technical and Operational Guidance Series
--	- Not analyzed

Table 3

Analytical Results Summary
Annual Groundwater Sampling - PFCs
Cascades Containerboard Packaging Company
Niagara Falls, New York
January 2018

Location ID:		**MW1-9A**	**MW9**	**MW12**
Sample Name:		**WG-11109628-012318-DT-003**	**WG-11109628-012318-DT-004**	**WG-11109628-012318-DT-001**
Sample Date:		**01/23/2018**	**01/23/2018**	**01/23/2018**
Parameters	**Unit**			
Perfluorinated Compounds				
Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	ng/L	820	730	2.3 J
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	20 U	21 U	20 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	20 U	21 U	20 U
Perfluorobutane sulfonate	ng/L	2.0 U	2.1 U	4.2
Perfluorobutanoic acid	ng/L	230 J	290 J	180
Perfluorodecanesulfonic acid	ng/L	2.0 U	2.1 U	2.0 U
Perfluorodecanoic acid	ng/L	9.8	9.2	1.4 J
Perfluorododecanoic acid	ng/L	2.0 U	2.1 U	2.0 U
Perfluoroheptane sulfonate	ng/L	0.84 J	0.71 J	0.36 J
Perfluoroheptanoic acid	ng/L	290	230	60
Perflurorohexane sulfonate	ng/L	5.5	12	11
Perfluorhexanoic acid	ng/L	750	650	290
Perfluorononanoic acid	ng/L	28	20	5.2
Perfluorooctane sulfonamide	ng/L	1.9 J	1.7 J	2.0 U
Perfluorooctane sulfonate	ng/L	26	23	26
Perfluoro-n-Octanoic acid	ng/L	460	350	70
Perfluoropentanoic acid	ng/L	1000	840	790
Perfluorotetradecanoic acid	ng/L	2.0 U	2.1 U	2.0 U
Perfluorotridecanoic acid	ng/L	2.0 U	2.1 U	2.0 U
Perfluoroundecanoic acid	ng/L	2.0 U	2.1 U	2.0 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	7100	6300	160 J

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 3

Analytical Results Summary
Annual Groundwater Sampling - PFCs
Cascades Containerboard Packaging Company
Niagara Falls, New York
January 2018

Location ID:		**MW13**	**MW88-13A**
Sample Name:		**WG-11109628-012318-DT-005**	**WG-11109628-012318-DT-002**
Sample Date:		**01/23/2018**	**01/23/2018**
Parameters	**Unit**		
Perfluorinated Compounds			
Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	ng/L	200	110 J
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	20 U	19 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	20 U	19 U
Perfluorobutane sulfonate	ng/L	2.0 U	2.0
Perfluorobutanoic acid	ng/L	200	1100 J
Perfluorodecanesulfonic acid	ng/L	2.0 U	1.9 U
Perfluorodecanoic acid	ng/L	21	1.9 U
Perfluorododecanoic acid	ng/L	2.0 U	1.9 U
Perfluoroheptane sulfonate	ng/L	2.0 U	0.68 J
Perfluoroheptanoic acid	ng/L	280	65
Perflurorohexane sulfonate	ng/L	2.5	21
Perfluorhexanoic acid	ng/L	410	180
Perfluoroononanoic acid	ng/L	120	1.9 U
Perfluorooctane sulfonamide	ng/L	2.0 U	1.9
Perfluorooctane sulfonate	ng/L	49	37
Perfluoro-n-Octanoic acid	ng/L	430	110
Perfluoropentanoic acid	ng/L	1100	270
Perfluorotetradecanoic acid	ng/L	2.0 U	1.9 U
Perfluorotridecanoic acid	ng/L	2.0 U	1.9 U
Perfluoroundecanoic acid	ng/L	2.0 U	1.9 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	2400	3000 J

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration

Table 4

Analytical Results Summary
Annual Groundwater Sampling - PFCs and 1,4-Dioxane
Cascades Containerboard Packaging Company
Niagara Falls, New York
September 2018

	Location ID:	MW1-9A	MW9	MW12
	Sample Name:	WG-11109628-092818-DT-004	WG-11109628-092818-DT-005	WG-11109628-092818-DT-002
	Sample Date:	09/28/2018	09/28/2018	09/28/2018
Parameters	**Unit**			
Per/Polyfluoroalkyl Substances (PFAS)				
Fluorotelomer sulfonic acid(8:2)	ng/L	390	66 J	83 U
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	17 U	16 U	17 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	17 U	16 U	17 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	1.5 J	1.1 J	2.9
Perfluorobutanoic acid (PFBA)	ng/L	230	140	140
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.7 U	1.6 U	1.7 U
Perfluorodecanoic acid (PFDA)	ng/L	3.9	0.89 J	1.7 U
Perfluorododecanoic acid (PFDoDA)	ng/L	1.7 U	1.6 U	1.7 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	0.77 J	1.6 U	1.7 U
Perfluoroheptanoic acid (PFHpA)	ng/L	140	62	34
Perfluorohexane sulfonic acid (PFHxS)	ng/L	4.8	2.4	20
Perfluorohexanoic acid (PFHxA)	ng/L	410	190	160
Perfluorononanoic acid (PFNA)	ng/L	14	4.6	1.7 U
Perfluorooctane sulfonamide (FOSA)	ng/L	0.60 J	1.6 U	0.64 J
Perfluorooctane sulfonic acid (PFOS)	ng/L	11	7.0	15
Perfluorooctanoic acid (PFOA)	ng/L	230	95	44
Perfluoropentanoic acid (PFPeA)	ng/L	620	290	320
Perfluorotetradecanoic acid (PFTeDA)	ng/L	1.7 U	1.6 U	1.7 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	1.7 U	1.6 U	1.7 U
Perfluoroundecanoic acid (PFUnA)	ng/L	1.7 U	1.6 U	1.7 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	3700	2100	680
Semi-volatile Organic Compounds, SIM				
1,4-Dioxane	µg/L	69	36	1.9

Notes:

J - Estimated concentration
U - Not detected at the associated reporting limit
SIM - Selective Ion Monitoring

Table 4

Analytical Results Summary
Annual Groundwater Sampling - PFCs and 1,4-Dioxane
Cascades Containerboard Packaging Company
Niagara Falls, New York
September 2018

	Location ID:	**MW13**	**MW88-13A**
	Sample Name:	**WG-11109628-092818-DT-001**	**WG-11109628-092818-DT-003**
	Sample Date:	**09/28/2018**	**09/28/2018**
Parameters	**Unit**		
Per/Polyfluoroalkyl Substances (PFAS)			
Fluorotelomer sulfonic acid(8:2)	ng/L	7.6 J	59 J
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	17 U	17 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	17 U	17 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	1.7 U	1.9
Perfluorobutanoic acid (PFBA)	ng/L	94	180 J
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.7 U	1.7 U
Perfluorodecanoic acid (PFDA)	ng/L	0.53 J	2.6
Perfluorododecanoic acid (PFDoDA)	ng/L	1.7 U	1.7 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	1.7 U	0.48 J
Perfluoroheptanoic acid (PFHpA)	ng/L	33	65
Perfluorohexane sulfonic acid (PFHxS)	ng/L	1.7 U	20
Perfluorohexanoic acid (PFHxA)	ng/L	160	180
Perfluorononanoic acid (PFNA)	ng/L	1.4 J	1.7 U
Perfluorooctane sulfonamide (FOSA)	ng/L	1.7 U	1.5 J
Perfluorooctane sulfonic acid (PFOS)	ng/L	4.9	39
Perfluorooctanoic acid (PFOA)	ng/L	21	100
Perfluoropentanoic acid (PFPeA)	ng/L	470	260
Perfluorotetradecanoic acid (PFTeDA)	ng/L	1.7 U	1.7 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	1.7 U	1.7 U
Perfluoroundecanoic acid (PFUnA)	ng/L	1.7 U	1.7 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	270	3200
Semi-volatile Organic Compounds, SIM			
1,4-Dioxane	µg/L	1.2	23

Notes:

J - Estimated concentration
U - Not detected at the associated reporting limit
SIM - Selective Ion Monitoring

Table 5

Summary of PFC ad 1,4-Dioxane Sampling Results - January and September 2018
Cascades Containerboard Packaging Site
Niagara Falls, New York

	Location ID:	MW1-9A	MW1-9A	MW9
	Sample Name:	WG-11109628-012318-DT-003	WG-11109628-092818-DT-004	WG-11109628-012318-DT-004
	Sample Date:	01/23/2018	09/28/2018	01/23/2018
Parameters	**Unit**			
Per/Polyfluoroalkyl Substances (PFAS)				
Fluorotelomer sulfonic acid(8:2)	ng/L	820	390	730
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	20 U	17 U	21 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	20 U	17 U	21 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	2.0 U	1.5 J	2.1 U
Perfluorobutanoic acid (PFBA)	ng/L	230 J	230	290 J
Perfluorodecanesulfonic acid (PFDS)	ng/L	2.0 U	1.7 U	2.1 U
Perfluorodecanoic acid (PFDA)	ng/L	9.8	3.9	9.2
Perfluorododecanoic acid (PFDoDA)	ng/L	2.0 U	1.7 U	2.1 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	0.84 J	0.77 J	0.71 J
Perfluoroheptanoic acid (PFHpA)	ng/L	290	140	230
Perfluorohexane sulfonic acid (PFHxS)	ng/L	5.5	4.8	12
Perfluorohexanoic acid (PFHxA)	ng/L	750	410	650
Perfluorononanoic acid (PFNA)	ng/L	28	14	20
Perfluorooctane sulfonamide (FOSA)	ng/L	1.9 J	0.60 J	1.7 J
Perfluorooctane sulfonic acid (PFOS)	ng/L	26	11	23
Perfluorooctanoic acid (PFOA)	ng/L	460	230	350
Perfluoropentanoic acid (PFPeA)	ng/L	1000	620	840
Perfluorotetradecanoic acid (PFTeDA)	ng/L	2.0 U	1.7 U	2.1 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	2.0 U	1.7 U	2.1 U
Perfluoroundecanoic acid (PFUnA)	ng/L	2.0 U	1.7 U	2.1 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	7100	3700	6300
Total Perfluorinated Compounds (PFCs)	ng/L	10,722.04	5,756.57	9,456.61
Semi-volatile Organic Compounds, SIM				
1,4-Dioxane	µg/L	-	69	-

Notes:

SIM - Selective Ion Monitoring
J - Estimated concentration
U - Not detected at the associated reporting limit
- - Not applicable

Table 5

Summary of PFC ad 1,4-Dioxane Sampling Results - January and September 2018
Cascades Containerboard Packaging Site
Niagara Falls, New York

	Location ID:	MW9	MW12	MW12
	Sample Name:	WG-11109628-092818-DT-005	WG-11109628-012318-DT-001	WG-11109628-092818-DT-002
	Sample Date:	09/28/2018	01/23/2018	09/28/2018
Parameters	**Unit**			
Per/Polyfluoroalkyl Substances (PFAS)				
Fluorotelomer sulfonic acid(8:2)	ng/L	66 J	2.3 J	83 U
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	16 U	20 U	17 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	16 U	20 U	17 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	1.1 J	4.2	2.9
Perfluorobutanoic acid (PFBA)	ng/L	140	180	140
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.6 U	2.0 U	1.7 U
Perfluorodecanoic acid (PFDA)	ng/L	0.89 J	1.4 J	1.7 U
Perfluorododecanoic acid (PFDoDA)	ng/L	1.6 U	2.0 U	1.7 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	1.6 U	0.36 J	1.7 U
Perfluoroheptanoic acid (PFHpA)	ng/L	62	60	34
Perfluorohexane sulfonic acid (PFHxS)	ng/L	2.4	11	20
Perfluorohexanoic acid (PFHxA)	ng/L	190	290	160
Perfluorononanoic acid (PFNA)	ng/L	4.6	5.2	1.7 U
Perfluorooctane sulfonamide (FOSA)	ng/L	1.6 U	2.0 U	0.64 J
Perfluorooctane sulfonic acid (PFOS)	ng/L	7.0	26	15
Perfluorooctanoic acid (PFOA)	ng/L	95	70	44
Perfluoropentanoic acid (PFPeA)	ng/L	290	790	320
Perfluorotetradecanoic acid (PFTeDA)	ng/L	1.6 U	2.0 U	1.7 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	1.6 U	2.0 U	1.7 U
Perfluoroundecanoic acid (PFUnA)	ng/L	1.6 U	2.0 U	1.7 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	2100	160 J	680
Total Perfluorinated Compounds (PFCs)	ng/L	2,958.99	1,600.46	1,499.54
Semi-volatile Organic Compounds, SIM				
1,4-Dioxane	µg/L	36		1.9

Notes:

SIM - Selective Ion Monitoring
J - Estimated concentration
U - Not detected at the associated reporting limit
- - Not applicable

Table 5

Summary of PFC ad 1,4-Dioxane Sampling Results - January and September 2018
Cascades Containerboard Packaging Site
Niagara Falls, New York

	Location ID:	**MW13**	**MW13**
	Sample Name:	**WG-11109628-012318-DT-005**	**WG-11109628-092818-DT-001**
	Sample Date:	**01/23/2018**	**09/28/2018**
Parameters	**Unit**		
Per/Polyfluoroalkyl Substances (PFAS)			
Fluorotelomer sulfonic acid(8:2)	ng/L	200	7.6 J
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	20 U	17 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	20 U	17 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	2.0 U	1.7 U
Perfluorobutanoic acid (PFBA)	ng/L	200	94
Perfluorodecanesulfonic acid (PFDS)	ng/L	2.0 U	1.7 U
Perfluorodecanoic acid (PFDA)	ng/L	21	0.53 J
Perfluorododecanoic acid (PFDoDA)	ng/L	2.0 U	1.7 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	2.0 U	1.7 U
Perfluoroheptanoic acid (PFHpA)	ng/L	280	33
Perfluorohexane sulfonic acid (PFHxS)	ng/L	2.5	1.7 U
Perfluorohexanoic acid (PFHxA)	ng/L	410	160
Perfluorononanoic acid (PFNA)	ng/L	120	1.4 J
Perfluorooctane sulfonamide (FOSA)	ng/L	2.0 U	1.7 U
Perfluorooctane sulfonic acid (PFOS)	ng/L	49	4.9
Perfluorooctanoic acid (PFOA)	ng/L	430	21
Perfluoropentanoic acid (PFPeA)	ng/L	1100	470
Perfluorotetradecanoic acid (PFTeDA)	ng/L	2.0 U	1.7 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	2.0 U	1.7 U
Perfluoroundecanoic acid (PFUnA)	ng/L	2.0 U	1.7 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	2400	270
Total Perfluorinated Compounds (PFCs)	ng/L	5,212.50	1,062.43
Semi-volatile Organic Compounds, SIM			
1,4-Dioxane	µg/L	-	1.2

Notes:

SIM - Selective Ion Monitoring
J - Estimated concentration
U - Not detected at the associated reporting limit
- - Not applicable

Table 5

Summary of PFC ad 1,4-Dioxane Sampling Results - January and September 2018
Cascades Containerboard Packaging Site
Niagara Falls, New York

Location ID:		**MW88-13A**	**MW88-13A**
Sample Name:		**WG-11109628-012318-DT-002**	**WG-11109628-092818-DT-003**
Sample Date:		**01/23/2018**	**09/28/2018**
Parameters	**Unit**		
Per/Polyfluoroalkyl Substances (PFAS)			
Fluorotelomer sulfonic acid(8:2)	ng/L	110 J	59 J
N-Ethyl perfluorooctane sulfonamidoacetic acid	ng/L	19 U	17 U
N-Methyl perfluorooctane sulfonamido acetic acid	ng/L	19 U	17 U
Perfluorobutane sulfonic acid (PFBS)	ng/L	2.0	1.9
Perfluorobutanoic acid (PFBA)	ng/L	1100 J	180 J
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.9 U	1.7 U
Perfluorodecanoic acid (PFDA)	ng/L	1.9 U	2.6
Perfluorododecanoic acid (PFDoDA)	ng/L	1.9 U	1.7 U
Perfluoroheptane sulfonic acid (PFHpS)	ng/L	0.68 J	0.48 J
Perfluoroheptanoic acid (PFHpA)	ng/L	65	65
Perfluorohexane sulfonic acid (PFHxS)	ng/L	21	20
Perfluorohexanoic acid (PFHxA)	ng/L	180	180
Perfluorononanoic acid (PFNA)	ng/L	1.9 U	1.7 U
Perfluorooctane sulfonamide (FOSA)	ng/L	1.9	1.5 J
Perfluorooctane sulfonic acid (PFOS)	ng/L	37	39
Perfluorooctanoic acid (PFOA)	ng/L	110	100
Perfluoropentanoic acid (PFPeA)	ng/L	270	260
Perfluorotetradecanoic acid (PFTeDA)	ng/L	1.9 U	1.7 U
Perfluorotridecanoic acid (PFTrDA)	ng/L	1.9 U	1.7 U
Perfluoroundecanoic acid (PFUnA)	ng/L	1.9 U	1.7 U
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	3000 J	3200
Total Perfluorinated Compounds (PFCs)	ng/L	4,897.58	4,109.48
Semi-volatile Organic Compounds, SIM			
1,4-Dioxane	µg/L	-	23

Notes:

SIM - Selective Ion Monitoring
J - Estimated concentration
U - Not detected at the associated reporting limit
- - Not applicable

Attachment A
October 2018 Site Inspection Form

SITE INSPECTION FORM
CASCADES CONTAINERBOARD PACKAGING SITE
NIAGARA FALLS, NEW YORK
NYSDEC SITE NO. 932110

INSPECTION DATE: 10/3/18

INSPECTED BY: D. Tyran

Overall Site

Has the Site use changed since the last inspection? *Yes* ✓ *No* ____

If yes, please describe the changes: Eastern end of site is covered in garbage which is being dumped and reloaded into different rolloffs

Have neighboring property uses changed? *Yes* ____ *No* ✓

If yes, please describe the changes: ____

Asphalt/Concrete Cover System

Potential Problems	***Concern***	***Corrective Action***
Potholes and cracks	• Deterioration of asphalt pavement or concrete • Safety hazard	• Use cold mix or hot mix asphalt and liquid bituminous material to patch, repair, or replace asphalt • For concrete, select repair method based on type and extent of damage
Ponding water	• Safety hazard	• No action required if ponding is minor • If ponding is significant, install drainage holes in asphalt/concrete pavement
Obstructions/Debris	• Safety hazard	• Remove obstructions as soon as possible

Inspect For	*Inspection Item Identified (circle one)*		*Action Required (circle one)*		*Comments*
Deterioration	Yes	(No)	Yes	(No)	
Obstruction/Debris	Yes	(No)	Yes	(No)	
Potholes	Yes	(No)	Yes	(No)	
Drainage/Puddles	Yes	(No)	Yes	(No)	
Other	Yes	(No)	Yes	(No)	

Dave J Tyran

SITE INSPECTION FORM
CASCADES CONTAINERBOARD PACKAGING SITE
NIAGARA FALLS, NEW YORK
NYSDEC SITE NO. 932110

INSPECTION DATE: 10/3/18

INSPECTED BY: D. Tyran

Soil Cover System

Potential Problems	***Concern***	***Corrective Action***
Erosion	• Deterioration of integrity of crushed concrete cover • Washed out cover	• Backfill with additional imported crushed stone as needed • If persistent erosion occurs, erosion control mats may be required in selected areas
Animal burrows	• Potential for crushed concrete erosion • Safety hazard	• Contract exterminator regarding trapping and relocation of persistent rodents • Fill all holes with crushed stone
Damage to fence	• Potential access to Site by unauthorized persons	• No action if damage is minor and does not allow access by unauthorized persons • Repair fence if appropriate

Inspect For	*Inspection Item Identified (circle one)*		*Action Required (circle one)*		*Comments*
Erosion	Yes	(No)	Yes	(No)	
Animal Burrows	Yes	(No)	Yes	(No)	
Damage to fence	Yes	(No)	Yes	(No)	
Other	Yes	(No)	Yes	(No)	

Dan J Tyran

SITE INSPECTION FORM
CASCADES CONTAINERBOARD PACKAGING SITE
NIAGARA FALLS, NEW YORK
NYSDEC SITE NO. 932110

INSPECTION DATE: 10/3/18

INSPECTED BY: D Tyran

Monitoring Wells

Potential Problems	***Concern***	***Corrective Action***
Missing locks	• Potential access by unauthorized persons	• Replace lock
Missing J-plugs	• Potential well contamination from surface water or rain water	• Replace J-plug
Concrete surface seal	• Damaged seal can allow water infiltration around casing and contamination of groundwater	• Contract drilling subcontractor to have surface seal replaced
Damaged flush-mount or stickup casing	• Damaged casing can result in damage to riser	• Contract drilling subcontractor to have casing replaced

Monitoring Well	*Well Condition (circle one)*			*Comments*
MW3C-08	(Good)	Fair	Needs Repair	
BH87-3A	(Good)	Fair	Needs Repair	
BH87-3B	(Good)	Fair	Needs Repair	
MW01-9A	(Good)	Fair	Needs Repair	
MW-9	Good	(Fair)	Needs Repair	
MW2C-08	(Good)	Fair	Needs Repair	
MW88-13A	Good	(Fair)	(Needs Repair)	Well Broken off @ Ground Surface
BH87-28	Good	(Fair)	Needs Repair	
MW-12	(Good)	Fair	Needs Repair	
MW1C-08	(Good)	Fair	Needs Repair	
MW-13	(Good)	Fair	Needs Repair	

Dave D Tyran

Attachment B
May 2018 and November 2018
Semiannual Groundwater Discharge Reports

May 30, 2018 Reference No. 11109628

Mr. Joel Paradise
Niagara Falls Water Board
5815 Buffalo Avenue
Niagara Falls, NY 14304

Dear Mr. Paradise:

Re: Semiannual Groundwater Discharge Report
SIU Permit #78
Cascades Containerboard Packaging, Inc. (Former Frontier Chemical Site)

This semiannual report has been prepared in accordance with Paragraph G of the Significant Industrial User Permit #78 issued on October 1, 2015 (modified August 31, 2016 and September 6, 2016) by the Niagara Falls Water Board to Cascades Containerboard Packaging, Inc. (formerly Norampac Industries, Inc. and formerly Frontier Chemical Site PRP Group) in Niagara Falls, New York (Site). The report presents the analytical data and field measurements taken for the semiannual period covering December 2017 through May 2018. The data collected have been used to calculate the volume of groundwater and the chemical loading associated with the groundwater that discharges into the Falls Street Tunnel (FST) and the 47th Street Tunnel, which are located immediately adjacent to the Frontier Chemical Site.

1. Data Collection

Groundwater levels were measured in all of the available monitoring wells in the A Zone and B Zone of the bedrock formation at the Site. The groundwater levels were measured on April 24, 2018, and the data are presented on attached Figures 1 and 2.

Groundwater samples were collected from the following monitoring wells on April 23 and 24, 2018 and analyzed for the list of parameters specified in Paragraphs F and G of the Permit.

A Zone

- MW01-9A
- MW88-13A
- BH87-28
- BH-87-3A

GHD
2055 Niagara Falls Boulevard Niagara Falls New York 14304 USA
T 716 297 6150 F 716 297 2265 W www.ghd.com

B Zone

- BH87-3B
- MW-9
- MW-12
- MW-13

2. Flow Calculation

The groundwater flow volume is calculated based upon the thickness of the bedrock aquifer through which the groundwater flows, the aquifer permeability, and the gradient (slope) of the groundwater table. These three factors are combined, using Darcy's Law of hydraulic flow, to determine the flow volume (flow = permeability x gradient x cross sectional saturated area). The groundwater gradients used in the flow calculation are presented on Figures 1 and 2. The calculation of groundwater flow is presented in Table 1. The Bedrock A Zone migration boundary along the south side of the Site has been divided into the west side and the east side. The April 2018 groundwater levels show that a portion of the A Zone groundwater discharge from the western half of the Site continues to discharge towards Royal Avenue. The most likely receiver of the A Zone groundwater in this area is the underlying B Zone, which is captured by the 47th Street Tunnel.

The calculated volume of groundwater discharge to the tunnels from the entire Site for the December 2017 through May 2018 time period is 2,414 gallons per day.

It is noted that the groundwater in the B Zone continues to flow to the east toward 47th Street with no migration to the south. This flow pattern is consistent with the pattern that developed after the closure of a portion of the FST and was first measured during the October 19, 2012 groundwater monitoring event.

3. Loading Calculation

The chemical loading to the tunnel sewer system is determined by multiplying groundwater flow volume by the concentration of the chemicals in the groundwater at the downgradient boundary of the Site, adjacent to where the groundwater enters the tunnels. Since there are multiple wells available along the tunnels, the chemical concentrations of this group of wells have been averaged to provide the best estimate of chemical loading. The concentrations of chemicals present in the April 2018 groundwater samples and the calculated chemical loadings to the tunnel sewers for each individual compound for each flow zone are presented in Tables 2a, 2b, 2c, 3a, and 3b. The total daily chemical loading for each compound is summarized in Table 4.

4. Discharge Limitations

The calculated volume of groundwater discharge to the tunnels and the associated chemical loadings have been compared to the limitations of the Permit (see Table 5). The calculations show that all parameters are within the Permit limits.

It is noted that while it is expected that the chemical loadings will decrease over time, some variability should be expected in the groundwater hydraulics and concentrations used to calculate the infiltration conditions and, therefore, some flexibility is needed in the Permit limits for the Site. It is believed that the Permit limits are reasonable, given the current conditions and making allowance for some continued variation over time. However, if conditions change, modifications may be necessary.

5. Next Report

The next semiannual report will be submitted to the Niagara Falls Water Board by November 30, 2018.

Should you have any questions, please contact me.

Sincerely,

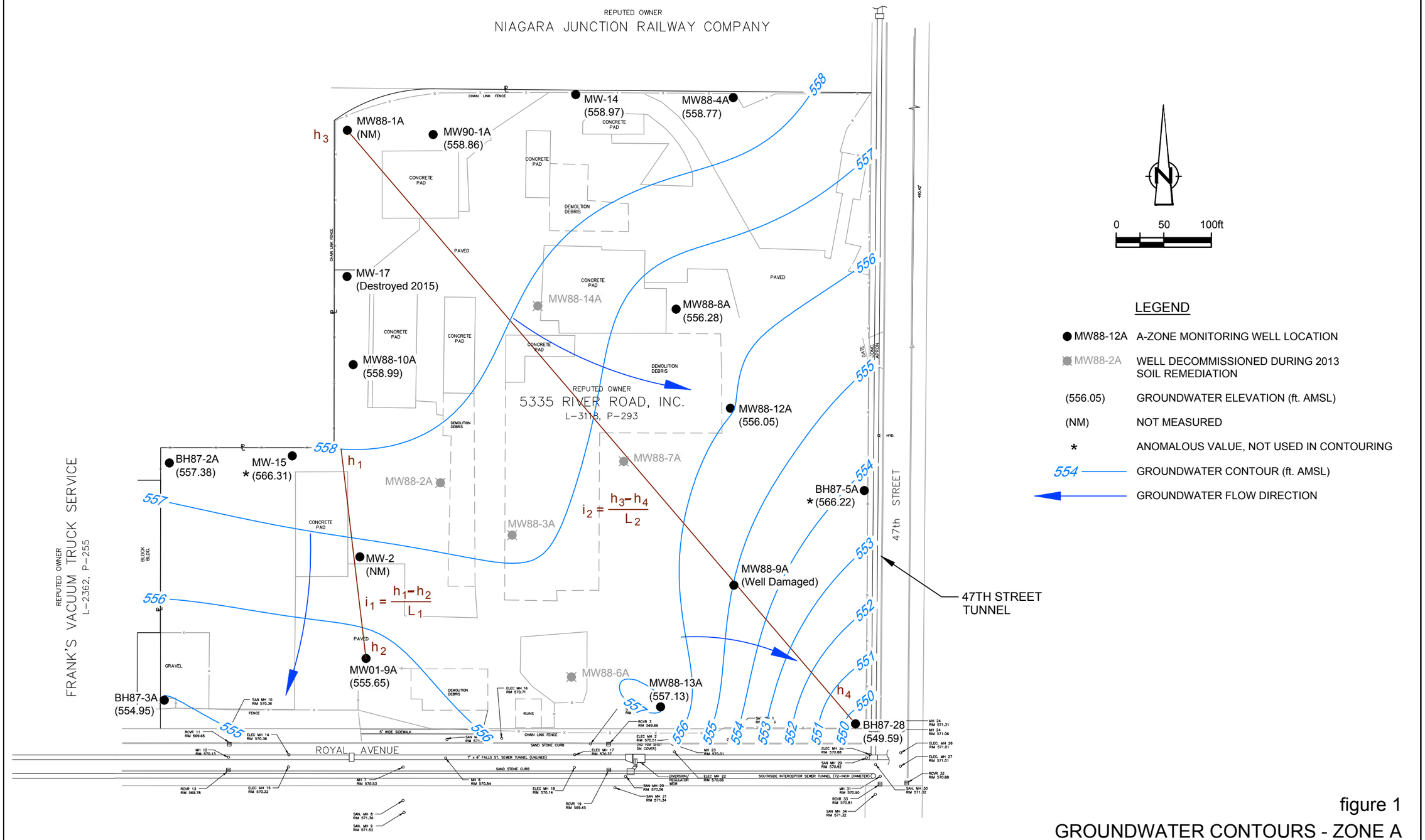
GHD

Shaun McEvoy

SM/adh/6

Encl. SIU Permit Calculations and Permit Submittal Sheets

cc: Rolfe Porter, Niagara Falls Water Board
Doug Williamson, Niagara Falls Water Board
Michelle Hamm, Cascades Containerboard Packaging, Inc.
Bill Rajczak, Cascades Containerboard Packaging, Inc.

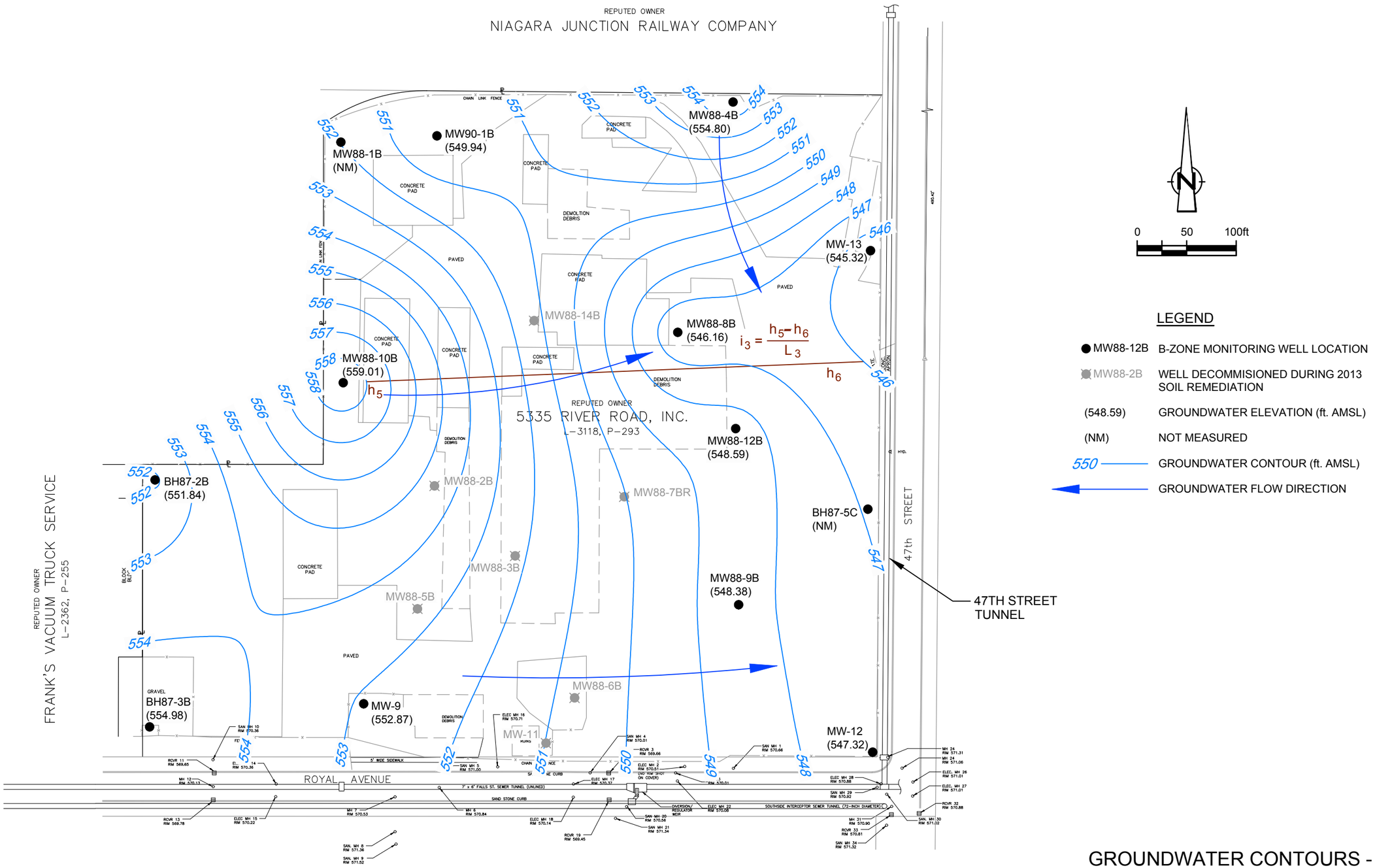


LEGEND

● MW88-12A	A-ZONE MONITORING WELL LOCATION
⊗ MW88-2A	WELL DECOMMISSIONED DURING 2013 SOIL REMEDIATION
(556.05)	GROUNDWATER ELEVATION (ft. AMSL)
(NM)	NOT MEASURED
*	ANOMALOUS VALUE, NOT USED IN CONTOURING
554	GROUNDWATER CONTOUR (ft. AMSL)
◄	GROUNDWATER FLOW DIRECTION

figure 1

GROUNDWATER CONTOURS - ZONE A
APRIL 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York



LEGEND

● MW88-12B	B-ZONE MONITORING WELL LOCATION
✱ MW88-2B	WELL DECOMMISIONED DURING 2013 SOIL REMEDIATION
(548.59)	GROUNDWATER ELEVATION (ft. AMSL)
(NM)	NOT MEASURED
550 ———	GROUNDWATER CONTOUR (ft. AMSL)
←———	GROUNDWATER FLOW DIRECTION

$$i_3 = \frac{h_5 - h_6}{L_3}$$

figure 2

GROUNDWATER CONTOURS - ZONE B
APRIL 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York

Table 1

April 2018 Groundwater Flow Rate Estimate
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

A) Bedrock A-Zone (Figure 1)

Royal Avenue West Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h1-h2
= 2.35 ft

Distance between h1 & h2 = 225 ft

i = 2.35/225 = 0.0104

Flow Width: 440 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.0104 x 440 ft x 5.2×10^{-5} ft/sec
= 1.19×10^{-3} ft^3/sec
= 772 US gal/day
= 281,850 US gal/year

Royal Avenue East Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h3-h4
= 9.27 ft

Distance between h3 & h4 = 825 ft

i = 9.27/825 = 0.0112

Flow Width: 320 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.0112 x 320 ft x 5.2×10^{-5} ft/sec
= 9.3×10^{-4} ft^3/sec
= 602 US gal/day
= 219,811 US gal/year

47th Street South Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h3-h4
=9.27ft

Distance between h_3 & h_4 = 825 ft

i = 9.27/825 = 0.0112

Flow Width: 400 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.0112 x 400 ft x 5.2×10^{-5} ft/sec
= 1.16×10^{-3} ft^3/sec
= 753 US gal/day
= 274,764 US gal/year

Note:

See Figure 1 for locations of h_1, h_2, h_3 and h_4.

Table 1

April 2018 Groundwater Flow Rate Estimate
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

B) Bedrock B-Zone (Figure 2)

Flow Thickness: 2-foot-thick fracture zone from 8 to 10 feet beneath A-Zone
Flow from B-Zone discharges to the east

• Easterly Flow:

Head Difference: = h_5-h_6 = 12 feet
Distance between h_5 & h_6 = 500 ft
Gradient (i): = 0.024
Flow Width: = 660 ft
Hydraulic Conductivity: = 1.4×10^{-5} ft/sec
Flow rate: = 2ft x 0.025 x 660 ft x 1.4×10^{-5} ft/sec
= 4.44×10^{-4} ft^3/sec
= 287 US gal/day
= 104,621 US gal/year

Note:

See Figure 2 for locations of h_5 and h_6.

Table 2A

A-Fracture Zone Bedrock, Royal Avenue West Side Discharge
April 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

	Adjacent Wells		Average Concentration (µg/L)	Mass Flux (pounds/day)
Analyte	**MW-01-9A 04/24/2018**	**BH87-3A 04/23/2018**	**Adjacent Wells**	**Adjacent Wells**
VOCs by Method OLM04.2 (µg/L)				
1,1-Dichloroethane	**380/410**	**13 J**	204.0	0.0013
1,2,4-Trichlorobenzene	**130 J/150**	50 U	72.5	0.0005
1,2-Dichlorobenzene	**1500/1500**	**190**	845.0	0.0054
1,3-Dichlorobenzene	**1800/1800**	**620**	1210.0	0.0078
1,4-Dichlorobenzene	**1800/1800**	**390**	1095.0	0.0071
Acetone	**1300 U/72 J**	250 U	63.0	0.0004
Benzene	**210 J/200**	**16 J**	110.5	0.0007
Chlorobenzene	**1200/1200**	**490**	845.0	0.0054
cis-1,2-Dichloroethene	**710/770**	**32 J**	386.0	0.0025
Tetrachloroethene	**110 J/100**	**9.4 J**	57.2	0.0004
Toluene	**270/260**	50 U	135.0	0.0009
Trichloroethene	**74 J/79 J**	**31 J**	54.3	0.0003
Vinyl chloride	**210 J/230**	50 U	112.5	0.0007
Monochlorotoluene	**4825/4610**	**94 J**	2406.0	0.0155
SVOCs by Method OLM04.2 (µg/L)				
Phenol	**439/409**	**11.6**	217.8	0.0014
TAL Metals by Method ILM04.0 (µg/L)				
Arsenic	**68.9/67.7**	15 U	34.9	0.0002
Iron	**1100/1120**	**113**	611.5	0.0039
Potassium	**839000/835000**	**581000**	709000.0	4.5661
Sodium	**337000/344000**	**144000**	242250.0	1.5601

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 772 US gallons/day
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concertation

Table 2B

A-Fracture Zone Bedrock, Royal Avenue East Side Discharge
April 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells BH87-28 04/24/2018	MW-88-6A	MW-88-13A 04/23/2018	Average Concentration (µg/L) Adjacent Wells	Mass Flux (pounds/day) Adjacent Wells
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	25 U	**NS**	**300 J**	151.3	0.0008
1,2,4-Trichlorobenzene	25 U	**NS**	**210 J**	106.3	0.0005
1,2-Dichlorobenzene	**63**	**NS**	**3000**	1531.5	0.0077
1,3-Dichlorobenzene	**140**	**NS**	**1000**	570.0	0.0029
1,4-Dichlorobenzene	**100**	**NS**	**1900**	1000.0	0.0050
Acetone	130 U	**NS**	2000 U	0.0	0.0000
Benzene	**20 J**	**NS**	**1100**	560.0	0.0028
Chlorobenzene	**130**	**NS**	**1300**	715.0	0.0036
cis-1,2-Dichloroethene	**4.9 J**	**NS**	**400**	202.5	0.0010
Tetrachloroethene	25 U	**NS**	**740**	371.3	0.0019
Toluene	**3.5 J**	**NS**	**300 J**	151.8	0.0008
Trichloroethene	25 U	**NS**	**1400**	701.3	0.0035
Vinyl chloride	25 U	**NS**	400 U	0.0	0.0000
Monochlorotoluene	**72 J**	**NS**	**4640**	2356.0	0.0118
SVOCs by Method OLM04.2 (µg/L)					
Phenol	**19.2**	**NS**	**192**	105.6	0.0005
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	**15.1**	**NS**	**131**	73.1	0.0004
Iron	**323**	**NS**	**2180**	1251.5	0.0063
Potassium	**3330000**	**NS**	**1470000**	2400000.0	12.0528
Sodium	**258000**	**NS**	**252000**	255000.0	1.2806

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 602 US gallons/day
NS - Not sampleable (Abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 2C

A-Fracture Zone Bedrock, 47th Street Discharge
April 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells BH87-28 04/24/2018	Adjacent Wells BH87-5C	Average Concentration (µg/L) Adjacent Wells	Mass Flux (pounds/day) Adjacent Wells
VOCs by Method OLM04.2 (µg/L)				
1,1-Dichloroethane	25 U	NS	0.0	0.00000
1,2,4-Trichlorobenzene	25 U	NS	0.0	0.00000
1,2-Dichlorobenzene	**63**	NS	63.0	0.00040
1,3-Dichlorobenzene	**140**	NS	140.0	0.00088
1,4-Dichlorobenzene	**100**	NS	100.0	0.00063
Acetone	130 U	NS	0.0	0.00000
Benzene	**20 J**	NS	20.0	0.00013
Chlorobenzene	**130**	NS	130.0	0.00082
cis-1,2-Dichloroethene	**4.9 J**	NS	4.9	0.00003
Tetrachloroethene	25 U	NS	0.0	0.00000
Toluene	**3.5 J**	NS	3.5	0.00002
Trichloroethene	25 U	NS	0.0	0.00000
Vinyl chloride	25 U	NS	0.0	0.00000
Monochlorotoluene	**72 J**	NS	72.0	0.00045
SVOCs by Method OLM04.2 (µg/L)				
Phenol	**19.2**	NS	19.2	0.00012
TAL Metals by Method ILM04.0 (µg/L)				
Arsenic	**15.1**	NS	15.1	0.00009
Iron	**323**	NS	323.0	0.00203
Potassium	**3330000**	NS	3330000.0	20.91798
Sodium	**258000**	NS	258000.0	1.62067

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 753 US gallons/day
NS - Well not sampleable
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 3A

B-Fracture Zone Bedrock - Southerly Discharge
April 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells					Average Concentration (µg/L) Southerly Discharge	Mass Flux (pounds/day) Adjacent Wells
	MW-9 04/23/2018	MW-11	MW-12 04/23/2018	BH87-3B 04/23/2018	MW-88-6B		
VOCs by Method OLM04.2 (µg/L)							
1,1-Dichloroethane	**190**	**NS**	25 U	**12 J**	**NS**	68.2	0.0000
1,2,4-Trichlorobenzene	40 U	**NS**	25 U	50 U	**NS**	0.0	0.0000
1,2-Dichlorobenzene	**54**	**NS**	25 U	**48 J**	**NS**	34.8	0.0000
1,3-Dichlorobenzene	**70**	**NS**	25 U	**140**	**NS**	70.8	0.0000
1,4-Dichlorobenzene	**63**	**NS**	25 U	**220**	**NS**	95.2	0.0000
Acetone	**84 J**	**NS**	130 U	250 U	**NS**	44.0	0.0000
Benzene	**24 J**	**NS**	25 U	**11 J**	**NS**	12.5	0.0000
Chlorobenzene	**82**	**NS**	25 U	**550**	**NS**	211.5	0.0000
cis-1,2-Dichloroethene	**230**	**NS**	25 U	**20 J**	**NS**	84.2	0.0000
Tetrachloroethene	**3.2 J**	**NS**	25 U	**9.6 J**	**NS**	5.1	0.0000
Toluene	**17 J**	**NS**	25 U	50 U	**NS**	8.2	0.0000
Trichloroethene	**6.3 J**	**NS**	25 U	**33 J**	**NS**	13.9	0.0000
Vinyl chloride	**18 J**	**NS**	25 U	50 U	**NS**	8.5	0.0000
Monochlorotoluene	**158**	**NS**	25 U	**45 J**	**NS**	68.5	0.0000
SVOCs by Method OLM04.2 (µg/L)							
Phenol	**180**	**NS**	**5.5 J**	**9.4 J**	**NS**	65.0	0.0000
TAL Metals by Method ILM04.0 (µg/L)							
Arsenic	**56.9**	**NS**	15 U	15 U	**NS**	20.0	0.0000
Iron	**808**	**NS**	**93.2**	**149**	**NS**	350.1	0.0000
Potassium	**1640000**	**NS**	**3200000**	**620000**	**NS**	1820000.0	0.0000
Sodium	**338000**	**NS**	**289000**	**155000**	**NS**	214166.7	0.0000

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed well, the average concentration was set to 0 µg/L
(3) - Flow rate = 0 US gallons/day
NS - Not sampleable (Abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 3B

B-Fracture Zone Bedrock - Easterly Discharge
April 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells MW-12 04/23/2018	Adjacent Wells MW-13 04/23/2018	BH87-5A	Average Concentration (µg/L) Easterly Discharge	Mass Flux (pounds/day) Adjacent Wells
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	25 U	40 U	NS	0.0	0
1,2,4-Trichlorobenzene	25 U	40 U	NS	0.0	0
1,2-Dichlorobenzene	25 U	40 U	NS	0.0	0
1,3-Dichlorobenzene	25 U	40 U	NS	0.0	0
1,4-Dichlorobenzene	25 U	**4.2 J**	NS	3.4	8.02061E-06
Acetone	130 U	200 U	NS	0.0	0
Benzene	25 U	40 U	NS	0.0	0
Chlorobenzene	25 U	40 U	NS	0.0	0
cis-1,2-Dichloroethene	25 U	**23 J**	NS	12.8	3.05262E-05
Tetrachloroethene	25 U	40 U	NS	0.0	0
Toluene	25 U	40 U	NS	0.0	0
Trichloroethene	25 U	40 U	NS	0.0	0
Vinyl chloride	25 U	**12 J**	NS	7.3	1.7358E-05
Monochlorotoluene	25 U	**208**	NS	105.3	0.000251991
SVOCs by Method OLM04.2 (µg/L)					
Phenol	**5.5 J**	10 U	NS	3.3	7.78119E-06
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	15 U	15 U	NS	0.0	0
Iron	**93.2**	**870**	NS	481.6	0.001153052
Potassium	**3200000**	**19600**	NS	1609800.0	3.854201512
Sodium	**289000**	**120000**	NS	204500.0	0.489616231

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed well, the average concentration was set to 0 µg/L
(3) - Flow rate = 287 US gallons/day
NS - Not sampleable (Abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 4

Total Chemical Flux
April 2018
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Zone A Royal Ave West Side Mass Flux Adjacent Wells (pounds/day)	Zone A Royal Avenue East Side Mass Flux Adjacent Wells (pounds/day)	Zone A 47th Street Mass Flux Adjacent Wells (pounds/day)	Zone B Easterly Flow Mass Flux Adjacent Wells (pounds/day)	Total (pounds/day)
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	0.0013	0.0008	0.0000	0	0.0021
1,2,4-Trichlorobenzene	0.0005	0.0005	0.0000	0	0.0010
1,2-Dichlorobenzene	0.0054	0.0077	0.0004	0	0.0135
1,3-Dichlorobenzene	0.0078	0.0029	0.0009	0	0.0115
1,4-Dichlorobenzene	0.0071	0.0050	0.0006	<0.0001	0.0127
Acetone	0.0004	0.0000	0.0000	0	0.0004
Benzene	0.0007	0.0028	0.0001	0	0.0036
Chlorobenzene	0.0054	0.0036	0.0008	0	0.0098
cis-1,2-Dichloroethene	0.0025	0.0010	0.0000	<0.0001	0.0035
Tetrachloroethene	0.0004	0.0019	0.0000	0	0.0022
Toluene	0.0009	0.0008	0.0000	0	0.0017
Trichloroethene	0.0003	0.0035	0.0000	0	0.0039
Vinyl chloride	0.0007	0.0000	0.0000	<0.0001	0.0007
Monochlorotoluene	0.0155	0.0118	0.0005	0.0003	0.0280
TOTAL VOCs	0.0489	0.0423	0.0034	0.0003	0.0948
SVOCs by Method OLM04.2 (µg/L)					
Phenol	0.0014	0.0005	0.0001	<0.0001	0.0021
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	0.0002	0.0004	0.0001	0	0.0007
Iron	0.0039	0.0063	0.0020	0.0012	0.0134
Potassium	4.5661	12.0528	20.9180	3.8542	41.3911
Sodium	1.5601	1.2806	1.6207	0.4896	4.9510

Notes:

VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List

Table 5

Comparisons of Loading to Interim Discharge Limitations
Cascades Containerboard Packaging, Inc. - Frontier Site - April 2018
Niagara Falls, New York

Outfall Number Effluent Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements		Calculated Daily Discharge April 2018 pounds/day Except as noted (gallons/day)
	Annual Average	Daily Maximum		Measurement Frequency	Sample Type	
MS #1 Flow		4000	gallons/day	2 per year	See E-2	2414
MS #1 Arsenic		0.008	pounds/day	2 per year	See E-3	0.0007
MS#1 Iron		0.24	pounds/day	2 per year	See E-3	0.0134
MS #1 Potassium		400	pounds/day	2 per year	See E-3	41.3911
MS #1 Sodium		40	pounds/day	2 per year	See E-3	4.951
MS #1 T. Phenol		0.05	pounds/day	2 per year	See E-3	0.0021
MS #1 1,1-Dichloroethane		0.13	pounds/day	2 per year	See E-3	0.0021
MS#1 1,2,4-Trichlorobenzene		0.026	pounds/day	2 per year	See E-3	0.001
MS #1 1,2-Dichlorobenzene		0.26	pounds/day	2 per year	See E-3	0.0135
MS #1 1,3-Dichlorobenzene		0.11	pounds/day	2 per year	See E-3	0.0115
MS#1 1,4-Dichlorobenzene		0.17	pounds/day	2 per year	See E-3	0.0127
MS #1 Acetone		0.026	pounds/day	2 per year	See E-3	0.0004
MS #1 Benzene		0.15	pounds/day	2 per year	See E-3	0.0036
MS #1 Chlorobenzene		0.1	pounds/day	2 per year	See E-3	0.0098
MS #1 Cis-1,2-Dichloroethene		0.06	pounds/day	2 per year	See E-3	0.0035
MS #1 Tetrachloroethene		0.05	pounds/day	2 per year	See E-3	0.0022
MS#1 Toluene		0.03	pounds/day	2 per year	See E-3	0.0017
MS #1 Trichloroethene		0.15	pounds/day	2 per year	See E-3	0.0039
MS #1 Vinyl Chloride		0.012	pounds/day	2 per year	See E-3	0.0007
MS #1 Monochlorotoluene		0.2	pounds/day	2 per year	See E-3	0.028

Attachment A

NIAGARA FALLS WATER BOARD
WASTEWATER FACILITIES
ENFORCEMENT DIVISION

SELF-MONITORING REPORT
SIGNIFICANT INDUSTRIAL USERS

PERMIT NO. 078 SEMI-ANNUAL DECEMBER 2017 – MAY 2018

INDUSTRY NAME: Cascades Containerboard Packaging, Inc. – Frontier Site

Pursuant to federal pretreatment reporting requirements and the Niagara Falls Water Board Regulations Part 1960, Significant Industrial Users shall submit periodic self-monitoring and compliance reports. Such reports shall be submitted using this form, according to the following schedule:

Quarterly	-	1st Quarter by February 28th
	-	2nd Quarter by May 31st
	-	3rd Quarter by August 31st
	-	4th Quarter by November 30th
Semi-Annual	-	by May 31st and
	-	by November 30th

Each section of this report form shall be filled out for those parameters listed in Section "G" of the company's Wastewater Discharge Permit. The analysis results must be reported in both concentration and mass. In addition, the calculated annual average load (pounds/day) for each pollutant shall also be reported.

The samples shall be collected at the monitoring points identified in the user permit. Identification of those points in this report should be as listed on page two (2) of the User Permit.

SELF-MONITORING REPORT
Significant Industrial Users (SIUs)

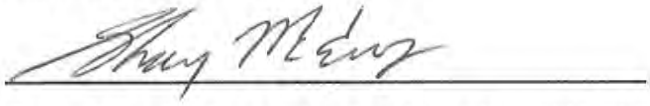
PAGE 2

PART II of the report is the Compliance Monitoring section. The user is obligated to determine if the analysis results indicates compliance. All violations noted should be brought to the Niagara Falls Water Board – Wastewater Facilities attention immediately upon noting and should also be reported in this section. The analysis result should be compared against all applicable federal, state and local standards and limitations. If no violations are noted then **"NO VIOLATIONS"** should appear on the report.

Pursuant to 40 CFR Part 403.12g of the Federal Standards, all violations noted must be followed up by a sample recollect/analysis and the results submitted to the Niagara Falls Water Board within thirty (30) days of first becoming aware of the violation.

Pursuant to 40 CFR Part 403.12g all Periodic Self-Monitoring Reports must be signed by a "responsible company official" certifying the following statement:

> I, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: 

Title: Consultant for Cascades Containerboard Packaging, Inc.

Date: May 30, 2018

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A Zone Royal Avenue- West Side**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.00077				0.00071	
BENZENE	111		0.0007		141	0.0008
MONOCHLOROBENZENE	845		0.0054		1,635	0.0093
1,2 – DICHLOROBENZENE	845		0.0054		912	0.0054
1,3 – DICHLOROBENZENE	1,210		0.0078		1,418	0.0083
1,4 – DICHLOROBENZENE	1,095		0.0071		1,673	0.0097
1,2,4 - TRICHLOROBENZENE	72.5		0.0005		76.3	0.0005
1,1 - DICHLOROETHANE	204		0.0013		302	0.0018
CIS – 1,2 - DICHLOROETHYLENE	386		0.0025		604	0.0035
ACETONE	63		0.0004		134	0.0008
TETRACHLOROETHYLENE	57.2		0.0004		74.9	0.0005
TOLUENE	135		0.0009		154	0.0009
TRICHLOROETHYLENE	54.3		0.0003		65.9	0.0004
VINYL CHLORIDE	113		0.0007		119	0.0007
MONOCHLOROTOLUENES	2,406		0.0155		2,782	0.0163
TOTAL PHENOL	218		0.0014		226	0.0014
ARSENIC	34.9		0.0002		32.8	0.0002
IRON	612		0.0039		649	0.0038
POTASSIUM	709,000		4.5661		724,000	4.2805
SODIUM	242,250		1.5601		215,455	1.2898

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A Zone - Royal Avenue East Side**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.00060				0.00054	
BENZENE	560		0.0028		545	0.0025
MONOCHLOROBENZENE	715		0.0036		778	0.0035
1,2 - DICHLOROBENZENE	1,532		0.0077		1,744	0.0077
1,3 - DICHLOROBENZENE	570		0.0029		643	0.0029
1,4 - DICHLOROBENZENE	1,000		0.0050		1,080	0.0048
1,2,4 - TRICHLOROBENZENE	106		0.0005		121	0.0005
1,1 - DICHLOROETHANE	151		0.0008		223	0.0010
CIS – 1,2 - DICHLOROETHYLENE	203		0.0010		244	0.0011
ACETONE	0		0.0000		58	0.0003
TETRACHLOROETHYLENE	371		0.0019		466	0.0021
TOLUENE	152		0.0008		161	0.0008
TRICHLOROETHYLENE	701		0.0035		881	0.0039
VINYL CHLORIDE	0		0.0000		11.8	0.0001
MONOCHLOROTOLUENES	2356		0.0118		2,389	0.0107
TOTAL PHENOL	106		0.0005		113	0.0005
ARSENIC	73.1		0.0004		79.5	0.0004
IRON	1,252		0.0063		1,280	0.0058
POTASSIUM	2,400,000		12.0528		2,542,500	11.1961
SODIUM	255,000		1.2806		253,500	1.1396

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A-Zone 47th Street**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.00075				0.00069	
BENZENE	20		0.00013		39	0.00022
MONOCHLOROBENZENE	130		0.00082		205	0.00116
1,2 - DICHLOROBENZENE	63		0.00040		82	0.00045
1,3 - DICHLOROBENZENE	140		0.00088		185	0.00104
1,4 - DICHLOROBENZENE	100		0.00063		135	0.00077
1,2,4 - TRICHLOROBENZENE	0		0.00000		0	0.00000
1,1-DICHLOROETHANE	0		0.00000		0	0.00000
CIS – 1,2 - DICHLOROETHYLENE	4.9		<0.0001		2.5	<0.0001
ACETONE	0		0.00000		0	0.00000
TETRACHLOROETHYLENE	0		0.00000		0	0.00000
TOLUENE	3.5		<0.0001		1.8	<0.0001
TRICHLOROETHYLENE	0		0.00000		0	0.00000
VINYL CHLORIDE	0		0.00000		0	0.00000
MONOCHLOROTOLUENES	72		0.00045		107	0.00058
TOTAL PHENOL	19.2		0.00012		29.6	0.00016
ARSENIC	15.1		<0.0001		21	0.00010
IRON	323		0.00203		198	0.00122
POTASSIUM	3,330,000		20.9180		3,655,000	20.9674
SODIUM	258,000		1.62067		263,000	1.51794

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock B Zone (South)**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.000000[1]				0.000000	
BENZENE	12.5		0.0000		27.3	0.0000
MONOCHLOROBENZENE	211		0.0000		339	0.0000
1,2 – DICHLOROBENZENE	34.8		0.0000		64.6	0.0000
1,3 - DICHLOROBENZENE	70.8		0.0000		112	0.0000
1,4 - DICHLOROBENZENE	95.2		0.0000		152	0.0000
1,2,4 - TRICHLOROBENZENE	0.0		0.0000		12.9	0.0000
1,1 - DICHLOROETHANE	68.2		0.0000		107	0.0000
CIS – 1,2 - DICHLOROETHYLENE	84.2		0.0000		115	0.0000
ACETONE	44		0.0000		109	0.0000
TETRACHLOROETHYLENE	5.1		0.0000		15.5	0.0000
TOLUENE	8.2		0.0000		21.1	0.0000
TRICHLOROETHYLENE	13.9		0.0000		19.9	0.0000
VINYL CHLORIDE	8.5		0.0000		31.1	0.0000
MONOCHLOROTOLUENES	68.5		0.0000		99.3	0.0000
TOTAL PHENOL	65		0.0000		49.3	0.0000
						0.0000
ARSENIC	20		0.0000		22.2	0.0000
IRON	350		0.0000		357	0.0000
POTASSIUM	1,820,000		0.0000		2,227,335	0.0000
SODIUM	214,167		0.0000		246,667	0.0000

[1] No discharge to south for the time period December 2017 through May 2018.

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock B Zone (East)**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.00029				0.00027	
BENZENE	0.0		0.0		0.0	0.0
MONOCHLOROBENZENE	0.0		0.0		16.8	<0.0001
1,2 - DICHLOROBENZENE	0.0		0.0		0.0	0.0
1,3 - DICHLOROBENZENE	0.0		0.0		14.6	<0.0001
1,4 - DICHLOROBENZENE	3.4		<0.0001		17.7	<0.0001
1,2,4 - TRICHLOROBENZENE	0.0		0.0		0.0	0.0
1,1 - DICHLOROETHANE	0.0		0.0		0.0	0.0
CIS – 1,2 - DICHLOROETHYLENE	12.8		<0.0001		23.4	<0.0001
ACETONE	0.0		0		0.0	0.0
TETRACHLOROETHYLENE	0.0		0.0		0.0	0.0
TOLUENE	0.0		0.0		0.0	0.0
TRICHLOROETHYLENE	0.0		0.0		0.0	0.0
VINYL CHLORIDE	7.3		<0.0001		3.7	<0.0001
MONOCHLOROTOLUENES	105		0.00025		68.3	0.00013
TOTAL PHENOL	3.3		<0.0001		10.9	<0.0001
ARSENIC	0.0		0.0		4.2	<0.0001
IRON	482		0.00115		359	0.00083
POTASSIUM	1,609,800		3.8542		2,246,025	5.0890
SODIUM	204,500		0.4896		244,250	0.5564

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Total Sum of Bedrock A and B Zones**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: April 23-24, 2018						
24-HOUR FLOW IN MGD	0.002414				0.002227	
BENZENE			0.0036			0.0035
MONOCHLOROBENZENE			0.0098			0.0139
1,2 - DICHLOROBENZENE			0.0135			0.0136
1,3 - DICHLOROBENZENE			0.0115			0.0122
1,4 - DICHLOROBENZENE			0.0127			0.0152
1,2,4 - TRICHLOROBENZENE			0.0010			0.0010
1,1 - DICHLOROETHANE			0.0021			0.0027
CIS – 1,2 - DICHLOROETHYLENE			0.0035			0.0046
ACETONE			0.0004			0.0010
TETRACHLOROETHYLENE			0.0022			0.0025
TOLUENE			0.0017			0.0017
TRICHLOROETHYLENE			0.0039			0.0043
VINYL CHLORIDE			0.0007			0.0008
MONOCHLOROTOLUENES			0.0280			0.0278
TOTAL PHENOL			0.0021			0.0020
ARSENIC			0.0007			0.0007
IRON			0.0134			0.0116
POTASSIUM			41.3911			41.6830
SODIUM			4.9510			4.5037

PART II

COMPLIANCE MONITORING

SIU NAME: Cascades Containerboard Packaging, Inc. – Frontier Site

PERMIT NO.: 078

NO VIOLATIONS

VIOLATION PARAMETER	DATE	FLOW [MGD]	SAMPLE POINT LOCATION	ACTUAL* DISCHARGE	PERMIT LIMIT	TYPE** LIMIT VIOLATED

NOTE:

* - Actual discharge – list actual analytical results and appropriate units.

** - Type Limit Violated – List Type:

A.A. = Annual Average

D.M. = Daily Maximum

L.L. = Local Limits (Regulation 1960.5)

ADMIN\WINWORD\PARADISE\SIU\SELF-MONITORING REPORT FORM - BLANK

TestAmerica Amherst
10 Hazelwood Drive

Amherst, NY 14228
Phone: 716.691.2600 Fax: 716.691.7991

Chain of Custody Record 252825

TestAm
THE LEADER IN ENVIR
TestAmerica La

480-134746 COC

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: S. McEvoy	Site Contact:	Date: 4/23/18	COC No:
Company Name: GHD	Tel/Fax:	Lab Contact: Melissa Deyo	Carrier:	1 of 1 COCs
Address: 2055 Niagara Falls Blvd	Analysis Turnaround Time			Sampler: D.Tyran S.Gardner
City/State/Zip: Niagara Falls NY 14304	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 716 297-6150	TAT if different from Below			Walk-in Client:
Fax:	☒ 2 weeks			Lab Sampling:
Project Name: Frontier Chemical	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	8260B VOCs	6010B Metals	Total Rec. Phenolics	Sample Specific Notes:
WG-11109628-042318-DT-001	4-23-18	1150	G	WG	5	N	N	X	X	X	
WG-11109628-042318-SG-002	4-23-18	1130	G	WG	5	N	N	X	X	X	
WG-11109628-042318-DT-003	4-23-18	1255	G	WG	15	N	Y	X	X	X	MS/MSD
TB-11109628-042318-DT	4-23-18		G	WGQ	1	N	N	X			
WG-11109628-042318-SG-004	4-23-18	1230	G	WG	5	N	N	X	X	X	
WG-11109628-042318-DT-005	4-23-18	1420	G	WG	5	N	N	X	X	X	
WG-11109628-042318-SG-006	4-23-18	1415	G	WG	5	N	N	X	X	X	
WG-11109628-042418-DT-007	4-24-18	0935	G	WG	5	N	N	X	X	X	
WG-11109628-042418-SG-008	4-24-18	0925	G	WG	5	N	N	X	X	X	
WG-11109628-042418-SG-010	4-24-18	0925	G	WG	5	N	N	X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 2.9 Corr'd: 3.1 | Therm ID No.:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
D. Tyran	GHD	4/24/18 1145	Emil	TAD	4/24/18 11:45pm
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

5/10/2018

November 26, 2018 Reference No. 11109628

Mr. Joel Paradise
Niagara Falls Water Board
5815 Buffalo Avenue
Niagara Falls, NY14304

Dear Mr. Paradise:

Re: Semiannual Groundwater Discharge Report
SIU Permit #78
Cascades Containerboard Packaging, Inc. (Former Frontier Chemical Site)

This semiannual report has been prepared in accordance with Paragraph G of the Significant Industrial User Permit #78 issued on October 1, 2015 (modified August 31, 2016 and September 6, 2016) by the Niagara Falls Water Board to Cascades Containerboard Packaging, Inc. (formerly Norampac Industries, Inc. and formerly Frontier Chemical Site PRP Group) in Niagara Falls, New York (Site). The report presents the analytical data and field measurements taken for the semiannual period covering June 2018 through November 2018. The data collected have been used to calculate the volume of groundwater and the chemical loading associated with the groundwater that discharges into the Falls Street Tunnel (FST) and the 47th Street Tunnel, which are located immediately adjacent to the Frontier Chemical Site.

1. Data Collection

Groundwater levels were measured in all of the available monitoring wells in the A Zone and B Zone of the bedrock formation at the Site. The groundwater levels were measured on September 26, 2018, and the data are presented on attached Figures 1 and 2.

Groundwater samples were collected from the following monitoring wells on October 3 and 4, 2018 and analyzed for the list of parameters specified in Paragraphs F and G of the Permit.

A Zone

- MW01-9A
- MW88-13A
- BH87-28
- BH-87-3A

B Zone

- BH87-3B
- MW-9

GHD
2055 Niagara Falls Boulevard Niagara Falls New York 14304 USA
T 716 297 6150 F 716 297 2265 W www.ghd.com

- MW-12
- MW-13

2. Flow Calculation

The groundwater flow volume is calculated based upon the thickness of the bedrock aquifer through which the groundwater flows, the aquifer permeability, and the gradient (slope) of the groundwater table. These three factors are combined, using Darcy's Law of hydraulic flow, to determine the flow volume (flow = permeability x gradient x cross sectional saturated area). The groundwater gradients used in the flow calculation are presented on Figures 1 and 2. The calculation of groundwater flow is presented in Table 1. The Bedrock A Zone migration boundary along the south side of the Site has been divided into the west side and the east side. The October 2017 groundwater levels show that a portion of the A Zone groundwater discharge from the western half of the Site continues to discharge towards Royal Avenue. The most likely receiver of the A Zone groundwater in this area is the underlying B Zone, which is captured by the 47th Street Tunnel.

The calculated volume of groundwater discharge to the tunnels from the entire Site for the June 2018 through November 2018 time period is 1,882 gallons per day.

It is noted that the groundwater in the B Zone continues to flow to the east toward 47th Street with no migration to the south. This flow pattern is consistent with the pattern that developed after the closure of a portion of the FST and was first measured during the October 19, 2012 groundwater monitoring event.

3. Loading Calculation

The chemical loading to the tunnel sewer system is determined by multiplying groundwater flow volume by the concentration of the chemicals in the groundwater at the downgradient boundary of the Site, adjacent to where the groundwater enters the tunnels. Since there are multiple wells available along the tunnels, the chemical concentrations of this group of wells have been averaged to provide the best estimate of chemical loading. The concentrations of chemicals present in the October 2018 groundwater samples and the calculated chemical loadings to the tunnel sewers for each individual compound for each flow zone are presented in Tables 2a, 2b, 2c, 3a, and 3b. The total daily chemical loading for each compound is summarized in Table 4.

4. Discharge Limitations

The calculated volume of groundwater discharge to the tunnels and the associated chemical loadings have been compared to the limitations of the Permit (see Table 5). The calculations show that all parameters are within the Permit limits.

It is noted that, while it is expected that the chemical loadings will decrease over time, some variability should be expected in the groundwater hydraulics and concentrations used to calculate the infiltration conditions and, therefore, some flexibility is needed in the Permit limits for the Site. It is believed that the Permit limits are reasonable, given the current conditions and making allowance for some continued variation over time. However, if conditions change, modifications may be necessary.

5. Next Report

The next semiannual report will be submitted to the Niagara Falls Water Board by May 31, 2019.

Should you have any questions, please contact me.

Sincerely,

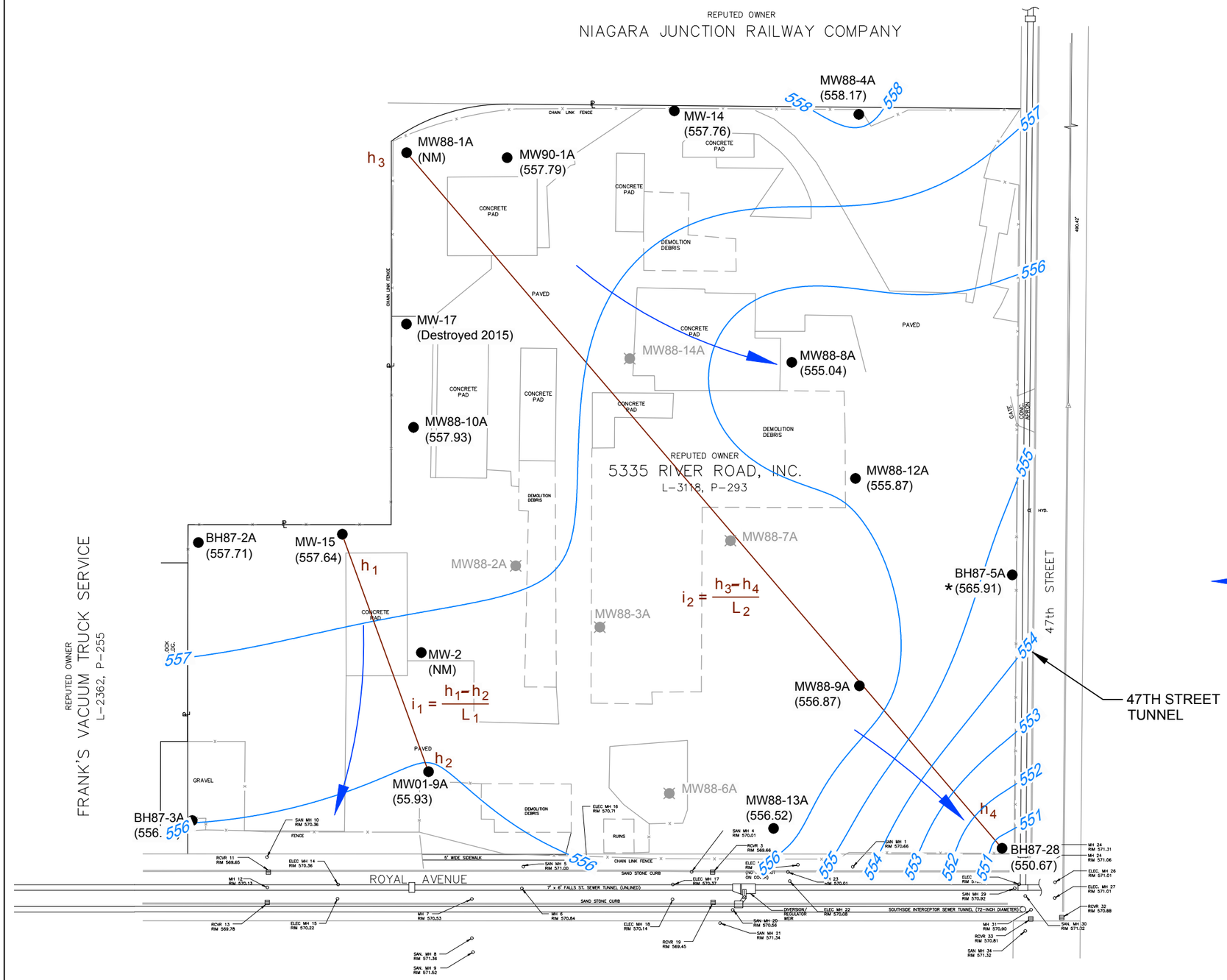
GHD

Shaun McEvoy

SM/adh/7

Encl.: SIU Permit Calculations and Permit Submittal Sheets

cc: Rolfe Porter, Niagara Falls Water Board
Doug Williamson, Niagara Falls Water Board
Michelle Hamm, Cascades Containerboard Packaging, Inc.
Bill Rajczak, Cascades Containerboard Packaging, Inc.



LEGEND

● MW88-12A	A-ZONE MONITORING WELL LOCATION
⊗ MW88-2A	WELL DECOMMISSIONED DURING 2013 SOIL REMEDIATION
(556.05)	GROUNDWATER ELEVATION (ft. AMSL)
(NM)	NOT MEASURED
*	ANOMALOUS VALUE, NOT USED IN CONTOURING
554	GROUNDWATER CONTOUR (ft. AMSL)
	GROUNDWATER FLOW DIRECTION

REPUTED OWNER
ELKEM METALS COMPANY

figure 1

GROUNDWATER CONTOURS - ZONE A
SEPTEMBER 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York

11109628-00(PARA007)GN-WA001 OCT 31, 2018

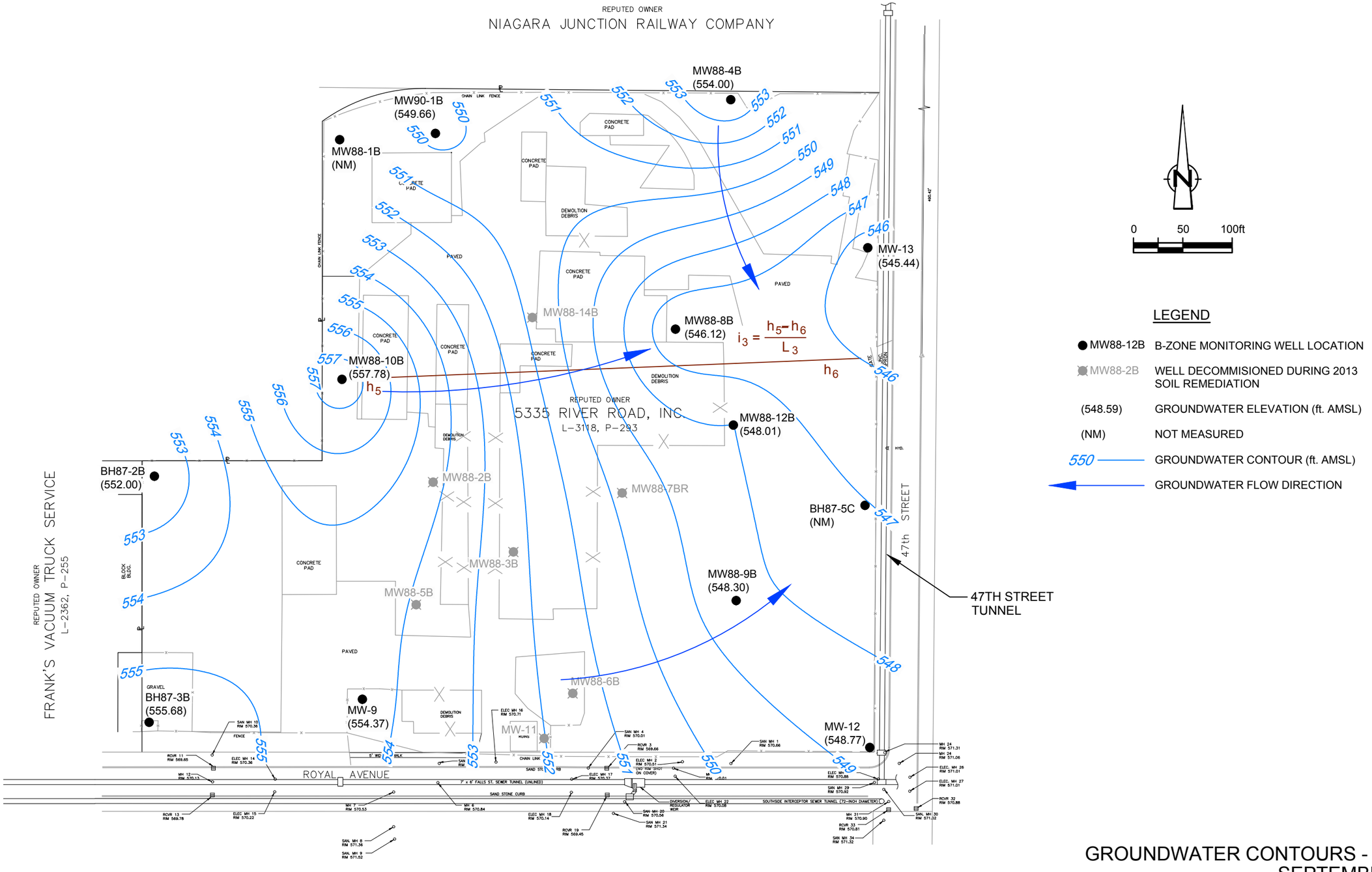


figure 2

GROUNDWATER CONTOURS - ZONE B
SEPTEMBER 2018
CASCADES CONTAINERBOARD PACKAGING, NIAGARA FALLS DIVISION
Niagara Falls, New York

Table 1

October 2018 Groundwater Flow Rate Estimate
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

A) Bedrock A-Zone (Figure 1)

Royal Avenue West Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h1-h2
1.71

Distance between h1 & h2 = 226 ft

i = 1.71/226 = 0.00757

Flow Width: 440 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.00757 x 440 ft x 5.2×10^{-5} ft/sec
= 8.656×10^{-4} ft^3/sec
= 559 USgal/day
= 204,185 USgal/year

Royal Avenue East Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h3-h4
= 7.12 ft

Distance between h3 & h4 = 821 ft

i = 7.73/821 = 0.00867

Flow Width: 310 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.00867 x 310 ft x 5.2×10^{-5} ft/sec
= 7.00×10^{-4} ft^3/sec
= 452 USgal/day
= 164,885 USgal/year

47th Street South Side
Flow Thickness: Upper 3 to 5 feet of bedrock
Head Difference: = h3-h4
=7.12ft

Distance between h_3 & h_4 = 821 ft

i = 7.73/821 = 0.00867

Flow Width: 400 ft
K = 2.5×10^{-5} to 5.2×10^{-5} ft/sec
Flow rate: = 5ft x 0.00867x 400 ft x 5.2×10^{-5} ft/sec
= 9.02×10^{-4} ft^3/sec
= 583 USgal/day
= 212,754 USgal/year

Notes:

See Figure 1 for locations of h_1, h_2, h_3 and h_4

Table 1

October 2018 Groundwater Flow Rate Estimate
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

B) Bedrock B-Zone (Figure 2)

Flow Thickness: 2-foot thick fracture zone from 8 to 10 feet beneath A-Zone
Flow from B-Zone discharges to the east

• Easterly Flow:

Head Difference: = h_5-h_6 = 11.78 feet
Distance between h_5 & h_6 = 520 ft
Gradient (i): = 0.0227
Flow Width: = 7000 ft
Hydraulic Conductivity: = 1.4 x 10^{-5} ft/sec
Flow rate: = 2ft x 0.0227 x 7000 ft x 1.4 x 10^{-5} ft/sec
= 4.45 x 10^{-4} ft^3/sec
= 288 USgal/day
= 104,952 USgal/year

Notes:

See Figure 2 for locations of h_5 and h_6

Table 2A

A-Fracture Zone Bedrock, Royal Avenue West Side Discharge
October 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

	Adjacent Wells		Average Concentration (µg/L)	Mass Flux (pounds/day)
Analyte	**MW-01-9A 10/04/2018**	**BH87-3A 10/03/2018**	**Adjacent Wells**	**Adjacent Wells**
VOCs by Method OLM04.2 (µg/L)				
1,1-Dichloroethane	**220**	200 U/50 U	116.3	0.0005
1,2,4-Trichlorobenzene	**31 J**	200 U/50 U	21.8	0.0001
1,2-Dichlorobenzene	**490**	**350/330**	415.0	0.0019
1,3-Dichlorobenzene	**840**	**2100/2600**	1595.0	0.0074
1,4-Dichlorobenzene	**820**	**3700/4500**	2460.0	0.0115
Acetone	**29 J**	1000 U/250 U	45.8	0.0002
Benzene	**65**	**57 J/56**	170.5	0.0008
Chlorobenzene	**780**	**3600/4000**	2290.0	0.0107
cis-1,2-Dichloroethene	**150**	**29 J/28 J**	89.3	0.0004
Tetrachloroethene	**4.9 J**	200 U/**4.9 J**	8.7	0.0000
Toluene	**50**	200 U/50 U	31.3	0.0001
Trichloroethene	**15 J**	200 U/**15 J**	16.3	0.0001
Vinyl chloride	**190**	200 U/50 U	101.3	0.0005
Monochlorotoluene	**1905**	**480 J/399 J**	1172.5	0.0055
SVOCs by Method OLM04.2 (µg/L)				
Phenol	**102**	**64.5/45.9**	78.6	0.0004
TAL Metals by Method ILM04.0 (µg/L)				
Arsenic	**50.5**	15 U/15 U	26.0	0.0001
Iron	**1140**	**477/321**	769.5	0.0036
Potassium	**1260000**	**207000/208000**	733750.0	3.4217
Sodium	**332000**	**77700/81900**	205900.0	0.9602

Notes:

(1) - For U values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 559 US gallons/day
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 2B

A-Fracture Zone Bedrock, Royal Avenue East Side Discharge
October 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells BH87-28 10/03/2018	MW-88-6A	MW-88-13A 10/04/2018	Average Concentration (µg/L) Adjacent Wells	Mass Flux (pounds/day) Adjacent Wells
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	50 U	**NS**	**300**	152.5	0.0006
1,2,4-Trichlorobenzene	50 U	**NS**	**220**	112.5	0.0004
1,2-Dichlorobenzene	**73**	**NS**	**4000**	2036.5	0.0077
1,3-Dichlorobenzene	**100**	**NS**	**860**	480.0	0.0018
1,4-Dichlorobenzene	**84**	**NS**	**2300**	1192.0	0.0045
Acetone	250 U	**NS**	**54 J**	39.5	0.0001
Benzene	**25 J**	**NS**	**790**	407.5	0.0015
Chlorobenzene	**110**	**NS**	**970**	540.0	0.0020
cis-1,2-Dichloroethene	**13 J**	**NS**	**380**	196.5	0.0007
Tetrachloroethene	50 U	**NS**	**650**	327.5	0.0012
Toluene	**5.9 J**	**NS**	**230**	118.0	0.0004
Trichloroethene	50 U	**NS**	**1800**	902.5	0.0034
Vinyl chloride	50 U	**NS**	**21 J**	13.0	0.0000
Monochlorotoluene	**62 J**	**NS**	**4505**	2283.5	0.0086
SVOCs by Method OLM04.2 (µg/L)					
Phenol	**28.2**	**NS**	**160**	94.1	0.0004
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	**13.3 J**	**NS**	**130**	71.7	0.0003
Iron	**147**	**NS**	**1630**	888.5	0.0034
Potassium	**3480000**	**NS**	**1280000**	2380000.0	8.9742
Sodium	**262000**	**NS**	**215000**	238500.0	0.8993

Notes:

(1) - For U values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 452 US gallons/day
NS - Not sampleable (abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 2C

A-Fracture Zone Bedrock, 47th Street Discharge
October 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

	Adjacent Wells		Average Concentration (µg/L)	Mass Flux (pounds/day)
Analyte	**BH87-28 10/03/2018**	**BH87-5C**	**Adjacent Wells**	**Adjacent Wells**
VOCs by Method OLM04.2 (µg/L)				
1,1-Dichloroethane	50 U	NS	0.0	0.00000
1,2,4-Trichlorobenzene	50 U	NS	0.0	0.00000
1,2-Dichlorobenzene	**73**	NS	73.0	0.00036
1,3-Dichlorobenzene	**100**	NS	100.0	0.00049
1,4-Dichlorobenzene	**84**	NS	84.0	0.00041
Acetone	250 U	NS	0.0	0.00000
Benzene	**25 J**	NS	25.0	0.00012
Chlorobenzene	**110**	NS	110.0	0.00053
cis-1,2-Dichloroethene	**13 J**	NS	13.0	0.00006
Tetrachloroethene	50 U	NS	0.0	0.00000
Toluene	**5.9 J**	NS	5.9	0.00003
Trichloroethene	50 U	NS	0.0	0.00000
Vinyl chloride	50 U	NS	0.0	0.00000
Monochlorotoluene	**62 J**	NS	62.0	0.00030
SVOCs by Method OLM04.2 (µg/L)				
Phenol	**28.2**	NS	28.2	0.00014
TAL Metals by Method ILM04.0 (µg/L)				
Arsenic	**13.3 J**	NS	13.3	0.00006
Iron	**147**	NS	147.0	0.00071
Potassium	**3480000**	NS	3480000.0	16.92499
Sodium	**262000**	NS	262000.0	1.27424

Notes:

(1) - For U values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed wells, the average concentration was set to 0 µg/L
(3) - Flow rate = 583 US gallons/day
NS - Well not sampleable
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL Target Analyte List
J - Estimated concentration

Table 3A

B-Fracture Zone Bedrock - Southerly Discharge
October 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells					Average Concentration (µg/L) Southerly Discharge	Mass Flux (pounds/day) Adjacent Wells
	MW-9 10/03/2018	MW-11	MW-12 10/03/2018	BH87-3B 10/03/2018	MW-88-6B		
VOCs by Method OLM04.2 (µg/L)							
1,1-Dichloroethane	**280**	**NS**	**6.2 J**	50 U	**NS**	97.1	0.0000
1,2,4-Trichlorobenzene	50 U	**NS**	10 U	50 U	**NS**	0.0	0.0000
1,2-Dichlorobenzene	**390**	**NS**	**21**	**69**	**NS**	132.0	0.0000
1,3-Dichlorobenzene	**590**	**NS**	**87**	**120**	**NS**	265.7	0.0000
1,4-Dichlorobenzene	**570**	**NS**	**29**	**190**	**NS**	263.0	0.0000
Acetone	**24 J**	**NS**	**5 J**	250 U	**NS**	18.0	0.0000
Benzene	**90**	**NS**	**27**	**7.8 J**	**NS**	41.6	0.0000
Chlorobenzene	**620**	**NS**	**99**	**370 J**	**NS**	363.0	0.0000
cis-1,2-Dichloroethene	**73**	**NS**	**1.3 J**	**27 J**	**NS**	33.8	0.0000
Tetrachloroethene	50 U	**NS**	10 U	**10 J**	**NS**	5.3	0.0000
Toluene	**51**	**NS**	**1.5 J**	50 U	**NS**	19.2	0.0000
Trichloroethene	50 U	**NS**	10 U	**25 J**	**NS**	10.3	0.0000
Vinyl chloride	**260**	**NS**	**18**	50 U	**NS**	94.3	0.0000
Monochlorotoluene	**1785**	**NS**	**39**	**36 J**	**NS**	620.0	0.0000
SVOCs by Method OLM04.2 (µg/L)							
Phenol	**59.8**	**NS**	**20.4**	**6.4 J**	**NS**	28.9	0.0000
TAL Metals by Method ILM04.0 (µg/L)							
Arsenic	**36.6**	**NS**	**9.4 J**	15 U	**NS**	15.8	0.0000
Iron	**190**	**NS**	**116**	**228**	**NS**	178.0	0.0000
Potassium	**1450000**	**NS**	**3790000**	**172000**	**NS**	1804000.0	0.0000
Sodium	**288000**	**NS**	**291000**	**97300**	**NS**	225433.3	0.0000

Notes:

(1) - For U values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed well, the average concentration was set to 0 µg/L
(3) - Flow rate = 0 US gallons/day
NS - Not sampleable (abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 3B

B-Fracture Zone Bedrock - Easterly Discharge
October 2018 Chemical Flux
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Adjacent Wells MW-12 10/03/2018	Adjacent Wells MW-13 10/03/2018	Adjacent Wells BH87-5A	Average Concentration (µg/L) Easterly Discharge	Mass Flux (pounds/day) Adjacent Wells
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	**6.2 J**	25 U	NS	4.4	1.04511E-05
1,2,4-Trichlorobenzene	10 U	25 U	NS	0.0	0
1,2-Dichlorobenzene	**21**	25 U	NS	11.8	2.823E-05
1,3-Dichlorobenzene	**87**	**2.7 J**	NS	44.9	0.000107755
1,4-Dichlorobenzene	**29**	**4.2 J**	NS	16.6	3.98824E-05
Acetone	**5 J**	130 U	NS	9.0	2.1623E-05
Benzene	**27**	25 U	NS	14.8	3.54377E-05
Chlorobenzene	**99**	**25 U**	NS	50.8	0.00012193
cis-1,2-Dichloroethene	**1.3 J**	**12 J**	NS	6.7	1.5977E-05
Tetrachloroethene	10 U	25 U	NS	0.0	0
Toluene	**1.5 J**	25 U	NS	2.0	4.80511E-06
Trichloroethene	10 U	25 U	NS	0.0	0
Vinyl chloride	**18**	25 U	NS	10.3	2.46262E-05
Monochlorotoluene	**39**	**195**	NS	117.0	0.000281099
SVOCs by Method OLM04.2 (µg/L)					
Phenol	**20.4**	**13.1**	NS	16.8	4.02428E-05
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	**9.4 J**	15 U	NS	5.5	1.30939E-05
Iron	**116**	**2760**	NS	1438.0	0.003454872
Potassium	**3790000**	**27200**	NS	1908600.0	4.585513801
Sodium	**291000**	**134000**	NS	212500.0	0.51054264

Notes:

(1) - For U Values where compound was detected in one or more of the listed wells, 10 percent of U value was used to calculate average concentration
(2) - For U values where compound was not detected in any listed well, the average concentration was set to 0 µg/L
(3) - Flow rate = 288 US gallons/day
NS - Not sampleable (abandoned)
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List
J - Estimated concentration

Table 4

Total Chemical Flux
October 2018
Cascades Containerboard Packaging, Inc. - Frontier Site
Niagara Falls, New York

Analyte	Zone A Royal Ave West Side Mass Flux Adjacent Wells (pounds/day)	Zone A Royal Avenue East Side Mass Flux Adjacent Wells (pounds/day)	Zone A 47th Street Mass Flux Adjacent Wells (pounds/day)	Zone B Easterly Flow Mass Flux Adjacent Wells (pounds/day)	Total (pounds/day)
VOCs by Method OLM04.2 (µg/L)					
1,1-Dichloroethane	0.0005	0.0006	0.0000	<0.0001	0.0011
1,2,4-Trichlorobenzene	0.0001	0.0004	0.0000	0	0.0005
1,2-Dichlorobenzene	0.0019	0.0077	0.0004	<0.0001	0.0100
1,3-Dichlorobenzene	0.0074	0.0018	0.0005	0.0001	0.0097
1,4-Dichlorobenzene	0.0115	0.0045	0.0004	<0.0001	0.0164
Acetone	0.0002	0.0001	0.0000	<0.0001	0.0004
Benzene	0.0008	0.0015	0.0001	<0.0001	0.0025
Chlorobenzene	0.0107	0.0020	0.0005	0.0001	0.0133
cis-1,2-Dichloroethene	0.0004	0.0007	0.0001	<0.0001	0.0012
Tetrachloroethene	0.0000	0.0012	0.0000	0	0.0013
Toluene	0.0001	0.0004	0.0000	<0.0001	0.0006
Trichloroethene	0.0001	0.0034	0.0000	0	0.0035
Vinyl chloride	0.0005	0.0000	0.0000	<0.0001	0.0005
Monochlorotoluene	0.0055	0.0086	0.0003	0.0003	0.0147
TOTAL VOCs	0.0398	0.0332	0.0023	0.0005	0.0758
SVOCs by Method OLM04.2 (µg/L)					
Phenol	0.0014	0.0004	0.00014	<0.0001	0.0020
TAL Metals by Method ILM04.0 (µg/L)					
Arsenic	0.0001	0.0003	0.0001	0.0000	0.0005
Iron	0.0036	0.0034	0.0007	0.00345	0.0111
Potassium	3.4217	8.9742	16.9250	4.58551	33.9064
Sodium	0.9602	0.8993	1.2742	0.51054	3.6443

Notes:

VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
TAL - Target Analyte List

Table 5

Comparisons of Loading to Interim Discharge Limitations
Cascades Containerboard Packaging, Inc. - Frontier Site - October 2018
Niagara Falls, New York

Outfall Number Effluent Parameter	Discharge Limitations Annual Average	 Daily Maximum	Units	Minimum Monitoring Requirements Measurement Frequency	 Sample Type	Calculated Daily Discharge October 2018 Pounds/Day Except as Noted (Gallons/Day)
MS #1 Flow		4000	gallons/day	2 per year	See E-2	1882
MS #1 Arsenic		0.008	pounds/day	2 per year	See E-3	0.0005
MS#1 Iron		0.24	pounds/day	2 per year	See E-3	0.011
MS #1 Potassium		400	pounds/day	2 per year	See E-3	33.9064
MS #1 Sodium		40	pounds/day	2 per year	See E-3	3.6443
MS #1 T. Phenol		0.05	pounds/day	2 per year	See E-3	0.002
MS #1 1,1-Dichloroethane		0.13	pounds/day	2 per year	See E-3	0.0011
MS#1 1,2,4-Trichlorobenzene		0.026	pounds/day	2 per year	See E-3	0.0005
MS #1 1,2-Dichlorobenzene		0.26	pounds/day	2 per year	See E-3	0.01
MS #1 1,3-Dichlorobenzene		0.11	pounds/day	2 per year	See E-3	0.0097
MS#1 1,4-Dichlorobenzene		0.17	pounds/day	2 per year	See E-3	0.0164
MS #1 Acetone		0.026	pounds/day	2 per year	See E-3	0.0004
MS #1 Benzene		0.15	pounds/day	2 per year	See E-3	0.0025
MS #1 Chlorobenzene		0.1	pounds/day	2 per year	See E-3	0.0133
MS #1 Cis-1,2-Dichloroethene		0.06	pounds/day	2 per year	See E-3	0.0012
MS #1 Tetrachloroethene		0.05	pounds/day	2 per year	See E-3	0.0013
MS#1 Toluene		0.03	pounds/day	2 per year	See E-3	0.0006
MS #1 Trichloroethene		0.15	pounds/day	2 per year	See E-3	0.0035
MS #1 Vinyl Chloride		0.012	pounds/day	2 per year	See E-3	0.0005
MS #1 Monochlorotoluene		0.2	pounds/day	2 per year	See E-3	0.0758

NIAGARA FALLS WATER BOARD
WASTEWATER FACILITIES
ENFORCEMENT DIVISION

SELF-MONITORING REPORT
SIGNIFICANT INDUSTRIAL USERS

PERMIT NO. 078 SEMI-ANNUAL JUNE 2018 – NOVEMBER 2018

INDUSTRY NAME: Cascades Containerboard Packaging, Inc. – Frontier Site

Pursuant to federal pretreatment reporting requirements and the Niagara Falls Water Board Regulations Part 1960, Significant Industrial Users shall submit periodic self-monitoring and compliance reports. Such reports shall be submitted using this form, according to the following schedule:

Quarterly	-	1st Quarter by February 28th
	-	2nd Quarter by May 31st
	-	3rd Quarter by August 31st
	-	4th Quarter by November 30th
Semi-Annual	-	by May 31st
		and
	-	by November 30th

Each section of this report form shall be filled out for those parameters listed in Section "G" of the company's Wastewater Discharge Permit. The analysis results must be reported in both concentration and mass. In addition, the calculated annual average load (pounds/day) for each pollutant shall also be reported.

The samples shall be collected at the monitoring points identified in the user permit. Identification of those points in this report should be as listed on page two (2) of the User Permit.

SELF-MONITORING REPORT
Significant Industrial Users (SIUs)

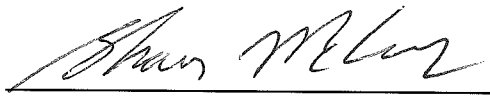
PAGE 2

PART II of the report is the Compliance Monitoring section. The user is obligated to determine if the analysis results indicates compliance. All violations noted should be brought to the Niagara Falls Water Board – Wastewater Facilities attention immediately upon noting and should also be reported in this section. The analysis result should be compared against all applicable federal, state and local standards and limitations. If no violations are noted then **"NO VIOLATIONS"** should appear on the report.

Pursuant to 40 CFR Part 403.12g of the Federal Standards, all violations noted must be followed up by a sample recollect/analysis and the results submitted to the Niagara Falls Water Board within thirty (30) days of first becoming aware of the violation.

Pursuant to 40 CFR Part 403.12g all Periodic Self-Monitoring Reports must be signed by a "responsible company official" certifying the following statement:

I, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: 

Title: Consultant for Cascades Containerboard Packaging, Inc.

Date: November 26, 2018

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A Zone Royal Avenue- West Side**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3-4, 2018						
24-HOUR FLOW IN MGD	0.00056				0.00067	
BENZENE	116		0.0005		114	0.0008
MONOCHLOROBENZENE	2290		0.0107		1,568	0.0081
1,2 – DICHLOROBENZENE	415		0.0019		630	0.0037
1,3 – DICHLOROBENZENE	1,595		0.0074		1,403	0.0076
1,4 – DICHLOROBENZENE	2,460		0.0115		1,778	0.0093
1,2,4 - TRICHLOROBENZENE	21.8		0.0001		47.2	0.0003
1,1 - DICHLOROETHANE	116		0.0005		160	0.0009
CIS – 1,2 - DICHLOROETHYLENE	89.3		0.0004		238	0.0015
ACETONE	45.8		0.0002		54.4	0.0003
TETRACHLOROETHYLENE	8.7		0.0000		33	0.0002
TOLUENE	31.3		0.0001		83	0.0005
TRICHLOROETHYLENE	16.3		0.0001		35.3	0.0002
VINYL CHLORIDE	101		0.0005		107	0.0005
MONOCHLOROTOLUENES	1,173		0.0055		1,790	0.0105
TOTAL PHENOL	78.6		0.0004		148	0.0009
ARSENIC	26		0.0001		30.5	0.0002
IRON	770		0.0036		691	0.0038
POTASSIUM	733,750		3.4217		721,375	3.9939
SODIUM	205,900		0.9602		224,075	1.2602

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A Zone - Royal Avenue East Side**

	RESULTS µg/L / µg/L		RESULTS pounds/day/pounds/day		ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3-4, 2018						
24-HOUR FLOW IN MGD	0.00045				0.00053	
BENZENE	408		0.0015		484	0.0022
MONOCHLOROBENZENE	540		0.0020		628	0.0028
1,2 - DICHLOROBENZENE	2,037		0.0077		1,785	0.0077
1,3 - DICHLOROBENZENE	480		0.0018		525	0.0024
1,4 - DICHLOROBENZENE	1,192		0.0045		1,096	0.0048
1,2,4 - TRICHLOROBENZENE	113		0.0004		110	0.0005
1,1 - DICHLOROETHANE	153		0.0006		152	0.0007
CIS – 1,2 - DICHLOROETHYLENE	197		0.0007		200	0.0009
ACETONE	39.5		0.0001		19.8	0.0001
TETRACHLOROETHYLENE	328		0.0012		350	0.0016
TOLUENE	118		0.0004		135	0.0006
TRICHLOROETHYLENE	903		0.0035		802	0.0035
VINYL CHLORIDE	13		0.0000		6.5	0.0000
MONOCHLOROTOLUENES	2284		0.0086		2,320	0.0102
TOTAL PHENOL	94		0.0004		100	0.0005
ARSENIC	71.7		0.0003		72.4	0.0004
IRON	889		0.0034		1,071	0.0049
POTASSIUM	2,380,000		8.9742		2,390,000	10.5135
SODIUM	238,500		0.8993		246,750	1.0900

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock A-Zone 47th Street**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3, 2018						
24-HOUR FLOW IN MGD	0.00058				0.00067	
BENZENE	25		0.0001		22.5	0.0001
MONOCHLOROBENZENE	110		0.0005		120	0.0007
1,2 - DICHLOROBENZENE	73		0.0004		68	0.0004
1,3 - DICHLOROBENZENE	100		0.0005		120	0.0007
1,4 - DICHLOROBENZENE	84		0.0004		92	0.0005
1,2,4 - TRICHLOROBENZENE	0		0.0000		0	0.0000
1,1-DICHLOROETHANE	0		0.0000		0	0.0000
CIS – 1,2 - DICHLOROETHYLENE	13		< 0.0001		9.0	< 0.0001
ACETONE	0		0.0000		0	0.0000
TETRACHLOROETHYLENE	0		0.0000		0	0.0000
TOLUENE	5.9		< 0.0001		4.7	< 0.0001
TRICHLOROETHYLENE	0		0.0000		0	0.0000
VINYL CHLORIDE	0		0.0000		0	0.0000
MONOCHLOROTOLUENES	62		0.0003		67	0.0004
TOTAL PHENOL	28.2		0.0001		23.7	0.0001
ARSENIC	13.3		< 0.0001		14.2	< 0.0001
IRON	147		0.00071		235	0.0014
POTASSIUM	3,480,000		16.92499		3,405,000	18.92150
SODIUM	262,000		1.2742		260,000	1.4475

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock B Zone (South)**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3, 2018						
24-HOUR FLOW IN MGD	0.000000[1]				0.000000	
BENZENE	41.6		0.0000		27.1	0.0000
MONOCHLOROBENZENE	363		0.0000		287	0.0000
1,2 - DICHLOROBENZENE	132		0.0000		83.4	0.0000
1,3 - DICHLOROBENZENE	266		0.0000		168	0.0000
1,4 - DICHLOROBENZENE	263		0.0000		179	0.0000
1,2,4 - TRICHLOROBENZENE	0		0.0000		0	0.0000
1,1 - DICHLOROETHANE	97.1		0.0000		82.7	0.0000
CIS - 1,2 - DICHLOROETHYLENE	33.8		0.0000		59	0.0000
ACETONE	18		0.0000		31	0.0000
TETRACHLOROETHYLENE	5.3		0.0000		5.2	0.0000
TOLUENE	19.2		0.0000		13.7	0.0000
TRICHLOROETHYLENE	10.3		0.0000		12.1	0.0000
VINYL CHLORIDE	94.3		0.0000		51.4	0.0000
MONOCHLOROTOLUENES	620		0.0000		344	0.0000
TOTAL PHENOL	28.9		0.0000		47	0.0000
						0.0000
ARSENIC	15.8		0.0000		17.9	0.0000
IRON	178		0.0000		264	0.0000
POTASSIUM	1,804,000		0.0000		1,812,000	0.0000
SODIUM	225,433		0.0000		219,800	0.0000

[1] No discharge to south for the time period June 2018 through November 2018.

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Monitoring Wells in Bedrock B Zone (East)**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3, 2018						
24-HOUR FLOW IN MGD	0.00029				0.00029	
BENZENE	14.8		<0.0001		7.4	<0.0001
MONOCHLOROBENZENE	50.8		0.00012		25.4	<0.0001
1,2 - DICHLOROBENZENE	11.8		<0.0001		5.9	<0.0001
1,3 - DICHLOROBENZENE	44.9		0.00011		22.5	<0.0001
1,4 - DICHLOROBENZENE	16.6		<0.0001		10.0	<0.0001
1,2,4 - TRICHLOROBENZENE	0.0		0.0		0.0	0.0
1,1 - DICHLOROETHANE	4.4		<0.0001		2.2	<0.0001
CIS – 1,2 - DICHLOROETHYLENE	6.7		<0.0001		9.8	<0.0001
ACETONE	9.0		<0.0001		4.5	<0.0001
TETRACHLOROETHYLENE	0.0		0.0		0	0.0
TOLUENE	2.0		<0.0001		1.0	<0.0001
TRICHLOROETHYLENE	0.0		0.0		0.0	0.0
VINYL CHLORIDE	10.3		<0.0001		8.8	<0.0001
MONOCHLOROTOLUENES	117		0.00028		111	0.00027
TOTAL PHENOL	16.8		<0.0001		10.1	<0.0001
ARSENIC	5.5		<0.0001		2.8	<0.0001
IRON	1438		0.00035		960	0.00075
POTASSIUM	1,908,600		4.5855		1,759,200	4.2199
SODIUM	212,500		0.5105		208,500	0.500

PART I

ANALYTICAL RESULTS

SIU PERMIT NAME: **Cascades Containerboard Packaging, Inc. – Frontier Site**

SIU PERMIT NO.: **078**

SAMPLE LOCATION: **Total Sum of Bedrock A and B Zones**

	RESULTS µg/L	/ µg/L	RESULTS pounds/day	/pounds/day	ANNUAL AVERAGE µg/L	ANNUAL AVERAGE pounds/day
DATE SAMPLED: October 3-4, 2018						
24-HOUR FLOW IN MGD	0.001882				0.002148	
BENZENE			0.0025			0.0031
MONOCHLOROBENZENE			0.0133			0.0115
1,2 - DICHLOROBENZENE			0.0100			0.0118
1,3 - DICHLOROBENZENE			0.0097			0.0106
1,4 - DICHLOROBENZENE			0.0164			0.0146
1,2,4 - TRICHLOROBENZENE			0.0005			0.0008
1,1 - DICHLOROETHANE			0.0011			0.0016
CIS – 1,2 - DICHLOROETHYLENE			0.0012			0.0026
ACETONE			0.0004			0.0004
TETRACHLOROETHYLENE			0.0013			0.0018
TOLUENE			0.0006			0.0012
TRICHLOROETHYLENE			0.0035			0.0037
VINYL CHLORIDE			0.0005			0.0006
MONOCHLOROTOLUENES			0.0147			0.0214
TOTAL PHENOL			0.0020			0.0021
ARSENIC			0.0005			0.0006
IRON			0.0111			0.0123
POTASSIUM			33.9064			37.6488
SODIUM			3.6443			4.2977

PART II

COMPLIANCE MONITORING

SIU NAME: Cascades Containerboard Packaging, Inc. – Frontier Site

PERMIT NO.: 078

NO VIOLATIONS

VIOLATION PARAMETER	DATE	FLOW [MGD]	SAMPLE POINT LOCATION	ACTUAL* DISCHARGE	PERMIT LIMIT	TYPE** LIMIT VIOLATED

NOTE:

* - Actual discharge – list actual analytical results and appropriate units.

** - Type Limit Violated – List Type:

A.A. = Annual Average

D.M. = Daily Maximum

L.L. = Local Limits (Regulation 1960.5)

ADMIN\WINWORD\PARADISE\SIU\SELF-MONITORING REPORT FORM - BLANK

CHAIN OF CUSTODY RECORD

COC NO.: 58605

PAGE 1 OF 2

Address:

Phone: **Fax:**

Project No/ Phase/Task Code:	**Laboratory Name:**	**Lab Location:**	**SSOW ID:**
Project Name:	**Lab Contact:**		**Cooler No:**
Project Location:	**SAMPLE TYPE** / **ANALYSIS REQUESTED** (See Back of COC for Definitions)		**Carrier:**
GHD Chemistry Contact:			**Airbill No:**
Sampler(s):			**Total # of Containers:**

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd//yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)								
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☑ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.				1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

GHD Form: COC-10B (20110804)

CHAIN OF CUSTODY RECORD

COC NO.: 58605

Address: NF office

PAGE 2 OF 2

Phone: Fax:

Project No/ Phase/Task Code: 11109628 04	Laboratory Name: Test America Buffalo	Lab Location: Amherst NY	SSOW ID:
Project Name: Frontier Chemical Annual GW	Lab Contact: Melissa Deyo		Cooler No:
Project Location: 47th Street and Royal Ave			Carrier: Hand Delivered
GHD Chemistry Contact: Sheri Finn			Airbill No:
Sampler(s): S. Swanson D. Tyson			Total # of Containers: 6+6+3+55 - 70

ANALYSIS REQUESTED (See Back of COC for Definitions)

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd//yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	SSPL VOC	Phenols	SSPL Metals	1,4 Dioxane									Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)						HC	H2	HN												
1	WG 11109628 100418 SG-014	10 4 18	1015	WG	G	N	X	X	X	X									6		
2	WG 11109628 100418 SG-016	10 4 18	1115	WG	G	N	X	X	X	X									6		
3	WG 11109628 100418 DT 017	10 4 18	1005	WG	G	N	X												3		
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1. D. Tyson	GHD	10/4/18	1305	1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

GHD Form: COC-10B (20110804)

Attachment C
January and September 2018 PFC Sampling Laboratory Analytical Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-35381-1
Client Project/Site: 11109628-03, Cascades/Frontier

For:
GHD Services Inc.
2055 Niagara Falls Blvd., Suite 3
Niagara Falls, New York 14304

Attn: Sheri Finn

Authorized for release by:
2/8/2018 4:30:22 PM
Rebecca Jones, Project Management Assistant I
rebecca.jones@testamericainc.com

Designee for

Melissa Deyo, Project Manager I
(716)504-9874
melissa.deyo@testamericainc.com

Table of Contents

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Qualifiers

LCMS

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.
*	Isotope Dilution analyte is outside acceptance limits.
B	Compound was found in the blank and sample.

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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Job ID: 320-35381-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-35381-1

Comments
No additional comments.

Receipt
The samples were received on 1/25/2018 9:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1º C.

LCMS
Method(s) 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for 6:2FTS and/or 8:2FTS the following samples: WG-11109628-012318-DT-001 (320-35381-1). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit for 13C4 PFBA: WG-11109628-012318-DT-002 (320-35381-2). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

Method(s) 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for M2-6:2FTS in the following sample: WG-11109628-012318-DT-002 (320-35381-2). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit for 13C4 PFBA: WG-11109628-012318-DT-003 (320-35381-3) and WG-11109628-012318-DT-004 (320-35381-4). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

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

Organic Prep
Method(s) 3535: Approximately 250mL of the following samples, WG-11109628-012318-DT-001 (320-35381-1), WG-11109628-012318-DT-002 (320-35381-2) and WG-11109628-012318-DT-005 (320-35381-5), were decanted into new polypropylene bottles prior to extraction due to excessive sediment which had the potential to clog the solid-phase column. Samples are associated with method 3535_PFC in preparation batch 320-206479
3535_PFC
Aqueous

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

Detection Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Client Sample ID: WG-11109628-012318-DT-001 — Lab Sample ID: 320-35381-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	180	B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	290		2.0	0.59	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	60		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	70		2.0	0.86	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	5.2		2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	1.4	J	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	4.2		2.0	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.36	J	2.0	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		2.0	0.55	ng/L	1		537 (modified)	Total/NA
6:2FTS	160		20	2.0	ng/L	1		537 (modified)	Total/NA
8:2FTS	2.3	J	20	2.0	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	790		20	5.0	ng/L	10		537 (modified)	Total/NA

Client Sample ID: WG-11109628-012318-DT-002 — Lab Sample ID: 320-35381-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoropentanoic acid (PFPeA)	270		1.9	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	180		1.9	0.56	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	65		1.9	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	110		1.9	0.82	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.0		1.9	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21	B	1.9	0.16	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.68	J	1.9	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	37		1.9	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	1.9		1.9	0.34	ng/L	1		537 (modified)	Total/NA
Perfluorobutanoic acid (PFBA) - DL	1100	B	19	3.4	ng/L	10		537 (modified)	Total/NA
6:2FTS - DL	3000		190	19	ng/L	10		537 (modified)	Total/NA
8:2FTS - DL	110	J	190	19	ng/L	10		537 (modified)	Total/NA

Client Sample ID: WG-11109628-012318-DT-003 — Lab Sample ID: 320-35381-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	230	B	2.0	0.34	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	290		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	28		2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	9.8		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.5	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.84	J	2.0	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		2.0	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	1.9	J	2.0	0.34	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	1000		39	9.6	ng/L	20		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	750		39	11	ng/L	20		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA) - DL	460		39	17	ng/L	20		537 (modified)	Total/NA
6:2FTS - DL	7100		390	39	ng/L	20		537 (modified)	Total/NA
8:2FTS - DL	820		390	39	ng/L	20		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Client Sample ID: WG-11109628-012318-DT-004 — Lab Sample ID: 320-35381-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	290	B	2.1	0.36	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	230		2.1	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	350		2.1	0.87	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	20		2.1	0.28	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	9.2		2.1	0.32	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12	B	2.1	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.71	J	2.1	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	23		2.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	1.7	J	2.1	0.36	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	840		41	10	ng/L	20		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	650		41	12	ng/L	20		537 (modified)	Total/NA
6:2FTS - DL	6300		410	41	ng/L	20		537 (modified)	Total/NA
8:2FTS - DL	730		410	41	ng/L	20		537 (modified)	Total/NA

Client Sample ID: WG-11109628-012318-DT-005 — Lab Sample ID: 320-35381-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	200	B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	280		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	120		2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	21		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.5	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	49		2.0	0.55	ng/L	1		537 (modified)	Total/NA
8:2FTS	200		20	2.0	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	1100		20	4.9	ng/L	10		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	410		20	5.9	ng/L	10		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA) - DL	430		20	8.6	ng/L	10		537 (modified)	Total/NA
6:2FTS - DL	2400		200	20	ng/L	10		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-012318-DT-001
Date Collected: 01/23/18 10:00
Date Received: 01/25/18 09:55

Lab Sample ID: 320-35381-1
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**180**	**B**	2.0	0.35	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorohexanoic acid (PFHxA)	**290**		2.0	0.59	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluoroheptanoic acid (PFHpA)	**60**		2.0	0.25	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorooctanoic acid (PFOA)	**70**		2.0	0.86	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorononanoic acid (PFNA)	**5.2**		2.0	0.27	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorodecanoic acid (PFDA)	**1.4**	**J**	2.0	0.31	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.56	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorobutanesulfonic acid (PFBS)	**4.2**		2.0	0.20	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorohexanesulfonic acid (PFHxS)	**11**	**B**	2.0	0.17	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.36**	**J**	2.0	0.19	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorooctanesulfonic acid (PFOS)	**26**		2.0	0.55	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		02/01/18 09:45	02/05/18 17:17	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		02/01/18 09:45	02/05/18 17:17	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		02/01/18 09:45	02/05/18 17:17	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		02/01/18 09:45	02/05/18 17:17	1
6:2FTS	**160**		20	2.0	ng/L		02/01/18 09:45	02/05/18 17:17	1
8:2FTS	**2.3**	**J**	20	2.0	ng/L		02/01/18 09:45	02/05/18 17:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*32*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C2 PFHxA	*70*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C4-PFHpA	*73*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C4 PFOA	*85*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C5 PFNA	*95*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C2 PFDA	*107*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C2 PFUnA	*91*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C2 PFDoA	*84*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C2-PFTeDA	*71*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C3-PFBS	*74*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
18O2 PFHxS	*92*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C4 PFOS	*93*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
13C8 FOSA	*90*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
d3-NMeFOSAA	*100*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
d5-NEtFOSAA	*86*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
M2-6:2FTS	*165*	*	*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*
M2-8:2FTS	*156*	*	*25 - 150*	*02/01/18 09:45*	*02/05/18 17:17*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**790**		20	5.0	ng/L		02/01/18 09:45	02/06/18 21:12	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*84*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:12*	*10*

Client Sample ID: WG-11109628-012318-DT-002
Date Collected: 01/23/18 11:30
Date Received: 01/25/18 09:55

Lab Sample ID: 320-35381-2
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**270**		1.9	0.48	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorohexanoic acid (PFHxA)	**180**		1.9	0.56	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluoroheptanoic acid (PFHpA)	**65**		1.9	0.24	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorooctanoic acid (PFOA)	**110**		1.9	0.82	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.26	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.30	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.1	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.53	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorotridecanoic Acid (PFTriA)	ND		1.9	1.3	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.28	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorobutanesulfonic acid (PFBS)	**2.0**		1.9	0.19	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorohexanesulfonic acid (PFHxS)	**21**	**B**	1.9	0.16	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.68**	**J**	1.9	0.18	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorooctanesulfonic acid (PFOS)	**37**		1.9	0.52	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.9	0.31	ng/L		02/01/18 09:45	02/05/18 17:25	1
Perfluorooctane Sulfonamide (FOSA)	**1.9**		1.9	0.34	ng/L		02/01/18 09:45	02/05/18 17:25	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		19	3.0	ng/L		02/01/18 09:45	02/05/18 17:25	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		19	1.8	ng/L		02/01/18 09:45	02/05/18 17:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*46*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C2 PFHxA	*68*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C4-PFHpA	*75*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C4 PFOA	*87*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C5 PFNA	*112*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C2 PFDA	*129*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C2 PFUnA	*136*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C2 PFDoA	*125*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C2-PFTeDA	*93*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C3-PFBS	*104*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
18O2 PFHxS	*116*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C4 PFOS	*133*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
13C8 FOSA	*98*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
d3-NMeFOSAA	*121*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*
d5-NEtFOSAA	*136*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:25*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**1100**	**B**	19	3.4	ng/L		02/01/18 09:45	02/06/18 21:20	10
6:2FTS	**3000**		190	19	ng/L		02/01/18 09:45	02/06/18 21:20	10
8:2FTS	**110**	**J**	190	19	ng/L		02/01/18 09:45	02/06/18 21:20	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*5*	*	*25 - 150*	*02/01/18 09:45*	*02/06/18 21:20*	*10*
M2-6:2FTS	*194*	*	*25 - 150*	*02/01/18 09:45*	*02/06/18 21:20*	*10*
M2-8:2FTS	*110*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:20*	*10*

Client Sample ID: WG-11109628-012318-DT-003
Date Collected: 01/23/18 12:20
Date Received: 01/25/18 09:55

Lab Sample ID: 320-35381-3
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**230**	**B**	2.0	0.34	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluoroheptanoic acid (PFHpA)	**290**		2.0	0.25	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorononanoic acid (PFNA)	**28**		2.0	0.27	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorodecanoic acid (PFDA)	**9.8**		2.0	0.30	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.54	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorohexanesulfonic acid (PFHxS)	**5.5**	**B**	2.0	0.17	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.84**	**J**	2.0	0.19	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorooctanesulfonic acid (PFOS)	**26**		2.0	0.53	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.31	ng/L		02/01/18 09:45	02/05/18 17:32	1
Perfluorooctane Sulfonamide (FOSA)	**1.9**	**J**	2.0	0.34	ng/L		02/01/18 09:45	02/05/18 17:32	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		20	3.0	ng/L		02/01/18 09:45	02/05/18 17:32	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		02/01/18 09:45	02/05/18 17:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*14*	*	*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C4-PFHpA	*66*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C5 PFNA	*94*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C2 PFDA	*114*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C2 PFUnA	*118*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C2 PFDoA	*113*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C2-PFTeDA	*78*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C3-PFBS	*97*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
18O2 PFHxS	*110*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C4 PFOS	*118*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
13C8 FOSA	*94*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
d3-NMeFOSAA	*113*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*
d5-NEtFOSAA	*125*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:32*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**1000**		39	9.6	ng/L		02/01/18 09:45	02/06/18 21:27	20
Perfluorohexanoic acid (PFHxA)	**750**		39	11	ng/L		02/01/18 09:45	02/06/18 21:27	20
Perfluorooctanoic acid (PFOA)	**460**		39	17	ng/L		02/01/18 09:45	02/06/18 21:27	20
6:2FTS	**7100**		390	39	ng/L		02/01/18 09:45	02/06/18 21:27	20
8:2FTS	**820**		390	39	ng/L		02/01/18 09:45	02/06/18 21:27	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*63*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:27*	*20*
13C2 PFHxA	*70*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:27*	*20*
13C4 PFOA	*71*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:27*	*20*
M2-6:2FTS	*130*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:27*	*20*
M2-8:2FTS	*83*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:27*	*20*

Client Sample ID: WG-11109628-012318-DT-004
Date Collected: 01/23/18 13:15
Date Received: 01/25/18 09:55

Lab Sample ID: 320-35381-4
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**290**	**B**	2.1	0.36	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluoroheptanoic acid (PFHpA)	**230**		2.1	0.26	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorooctanoic acid (PFOA)	**350**		2.1	0.87	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorononanoic acid (PFNA)	**20**		2.1	0.28	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorodecanoic acid (PFDA)	**9.2**		2.1	0.32	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluoroundecanoic acid (PFUnA)	ND		2.1	1.1	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorododecanoic acid (PFDoA)	ND		2.1	0.56	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.1	1.3	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.1	0.30	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.1	0.21	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorohexanesulfonic acid (PFHxS)	**12**	**B**	2.1	0.17	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.71**	**J**	2.1	0.19	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorooctanesulfonic acid (PFOS)	**23**		2.1	0.55	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.1	0.33	ng/L		02/01/18 09:45	02/05/18 17:40	1
Perfluorooctane Sulfonamide (FOSA)	**1.7**	**J**	2.1	0.36	ng/L		02/01/18 09:45	02/05/18 17:40	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		21	3.2	ng/L		02/01/18 09:45	02/05/18 17:40	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		21	1.9	ng/L		02/01/18 09:45	02/05/18 17:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*16*	*	*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C4-PFHpA	*66*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C4 PFOA	*71*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C5 PFNA	*97*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C2 PFDA	*107*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C2 PFUnA	*109*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C2 PFDoA	*111*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C2-PFTeDA	*64*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C3-PFBS	*89*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
18O2 PFHxS	*101*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C4 PFOS	*111*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
13C8 FOSA	*95*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
d3-NMeFOSAA	*109*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*
d5-NEtFOSAA	*122*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:40*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**840**		41	10	ng/L		02/01/18 09:45	02/06/18 21:35	20
Perfluorohexanoic acid (PFHxA)	**650**		41	12	ng/L		02/01/18 09:45	02/06/18 21:35	20
6:2FTS	**6300**		410	41	ng/L		02/01/18 09:45	02/06/18 21:35	20
8:2FTS	**730**		410	41	ng/L		02/01/18 09:45	02/06/18 21:35	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*65*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:35*	*20*
13C2 PFHxA	*65*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:35*	*20*
M2-6:2FTS	*110*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:35*	*20*
M2-8:2FTS	*68*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:35*	*20*

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Client Sample ID: WG-11109628-012318-DT-005
Date Collected: 01/23/18 14:25
Date Received: 01/25/18 09:55

Lab Sample ID: 320-35381-5
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**200**	**B**	2.0	0.35	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluoroheptanoic acid (PFHpA)	**280**		2.0	0.25	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorononanoic acid (PFNA)	**120**		2.0	0.27	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorodecanoic acid (PFDA)	**21**		2.0	0.31	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.56	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**	**B**	2.0	0.17	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorooctanesulfonic acid (PFOS)	**49**		2.0	0.55	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		02/01/18 09:45	02/05/18 17:56	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		02/01/18 09:45	02/05/18 17:56	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		02/01/18 09:45	02/05/18 17:56	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		02/01/18 09:45	02/05/18 17:56	1
8:2FTS	**200**		20	2.0	ng/L		02/01/18 09:45	02/05/18 17:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*72*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C4-PFHpA	*90*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C5 PFNA	*95*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C2 PFDA	*103*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C2 PFUnA	*95*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C2 PFDoA	*94*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C2-PFTeDA	*101*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C3-PFBS	*96*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
18O2 PFHxS	*100*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C4 PFOS	*99*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
13C8 FOSA	*86*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
d3-NMeFOSAA	*101*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*
M2-8:2FTS	*108*		*25 - 150*	*02/01/18 09:45*	*02/05/18 17:56*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**1100**		20	4.9	ng/L		02/01/18 09:45	02/06/18 21:51	10
Perfluorohexanoic acid (PFHxA)	**410**		20	5.9	ng/L		02/01/18 09:45	02/06/18 21:51	10
Perfluorooctanoic acid (PFOA)	**430**		20	8.6	ng/L		02/01/18 09:45	02/06/18 21:51	10
6:2FTS	**2400**		200	20	ng/L		02/01/18 09:45	02/06/18 21:51	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*96*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:51*	*10*
13C2 PFHxA	*94*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:51*	*10*
13C4 PFOA	*91*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:51*	*10*
M2-6:2FTS	*109*		*25 - 150*	*02/01/18 09:45*	*02/06/18 21:51*	*10*

Isotope Dilution Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFBA (25-150)	PFPeA (25-150)	PFHxA (25-150)	PFHpA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)
320-35381-1	WG-11109628-012318-DT-001	32		70	73	85	95	107	91
320-35381-1 - DL	WG-11109628-012318-DT-001		84						
320-35381-2	WG-11109628-012318-DT-002		46	68	75	87	112	129	136
320-35381-2 - DL	WG-11109628-012318-DT-002	5 *							
320-35381-3	WG-11109628-012318-DT-003	14 *			66		94	114	118
320-35381-3 - DL	WG-11109628-012318-DT-003		63	70		71			
320-35381-4	WG-11109628-012318-DT-004	16 *			66	71	97	107	109
320-35381-4 - DL	WG-11109628-012318-DT-004		65	65					
320-35381-5	WG-11109628-012318-DT-005	72			90		95	103	95
320-35381-5 - DL	WG-11109628-012318-DT-005		96	94		91			
LCS 320-206479/2-A	Lab Control Sample	84	81	80	81	81	88	89	80
LCSD 320-206479/3-A	Lab Control Sample Dup	105	99	103	101	100	105	109	96
MB 320-206479/1-A	Method Blank	83	86	86	85	86	85	91	83

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDoA (25-150)	PFTDA (25-150)	3C3-PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	PFOSA (25-150)	-NMeFOSA (25-150)	-NEtFOSA (25-150)
320-35381-1	WG-11109628-012318-DT-001	84	71	74	92	93	90	100	86
320-35381-1 - DL	WG-11109628-012318-DT-001								
320-35381-2	WG-11109628-012318-DT-002	125	93	104	116	133	98	121	136
320-35381-2 - DL	WG-11109628-012318-DT-002								
320-35381-3	WG-11109628-012318-DT-003	113	78	97	110	118	94	113	125
320-35381-3 - DL	WG-11109628-012318-DT-003								
320-35381-4	WG-11109628-012318-DT-004	111	64	89	101	111	95	109	122
320-35381-4 - DL	WG-11109628-012318-DT-004								
320-35381-5	WG-11109628-012318-DT-005	94	101	96	100	99	86	101	96
320-35381-5 - DL	WG-11109628-012318-DT-005								
LCS 320-206479/2-A	Lab Control Sample	84	85	87	84	85	80	80	80
LCSD 320-206479/3-A	Lab Control Sample Dup	102	101	106	99	100	90	99	97
MB 320-206479/1-A	Method Blank	89	88	89	87	87	82	87	83

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	M262FTS (25-150)	M282FTS (25-150)						
320-35381-1	WG-11109628-012318-DT-001	165 *	156 *						
320-35381-1 - DL	WG-11109628-012318-DT-001								
320-35381-2	WG-11109628-012318-DT-002								
320-35381-2 - DL	WG-11109628-012318-DT-002	194 *	110						
320-35381-3	WG-11109628-012318-DT-003								
320-35381-3 - DL	WG-11109628-012318-DT-003	130	83						
320-35381-4	WG-11109628-012318-DT-004								
320-35381-4 - DL	WG-11109628-012318-DT-004	110	68						
320-35381-5	WG-11109628-012318-DT-005		108						
320-35381-5 - DL	WG-11109628-012318-DT-005	109							
LCS 320-206479/2-A	Lab Control Sample	77	96						
LCSD 320-206479/3-A	Lab Control Sample Dup	99	117						
MB 320-206479/1-A	Method Blank	84	96						

Surrogate Legend

PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA

Isotope Dilution Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

PFHxA = 13C2 PFHxA
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2-PFTeDA
13C3-PFBS = 13C3-PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
PFOSA = 13C8 FOSA
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA
M262FTS = M2-6:2FTS
M282FTS = M2-8:2FTS

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-206479/1-A
Matrix: Water
Analysis Batch: 207004

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206479

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	0.402	J	2.0	0.35	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorohexanesulfonic acid (PFHxS)	0.291	J	2.0	0.17	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		02/01/18 09:45	02/05/18 15:27	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		02/01/18 09:45	02/05/18 15:27	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		02/01/18 09:45	02/05/18 15:27	1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		02/01/18 09:45	02/05/18 15:27	1
6:2FTS	ND		20	2.0	ng/L		02/01/18 09:45	02/05/18 15:27	1
8:2FTS	ND		20	2.0	ng/L		02/01/18 09:45	02/05/18 15:27	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*83*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C5 PFPeA	*86*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C2 PFHxA	*86*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C4-PFHpA	*85*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C4 PFOA	*86*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C5 PFNA	*85*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C2 PFDA	*91*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C2 PFUnA	*83*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C2 PFDoA	*89*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C2-PFTeDA	*88*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C3-PFBS	*89*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
18O2 PFHxS	*87*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C4 PFOS	*87*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
13C8 FOSA	*82*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
d3-NMeFOSAA	*87*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
d5-NEtFOSAA	*83*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
M2-6:2FTS	*84*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*
M2-8:2FTS	*96*		*25 - 150*	*02/01/18 09:45*	*02/05/18 15:27*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-206479/2-A
Matrix: Water
Analysis Batch: 207004

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206479

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	40.0	37.3		ng/L		93	78 - 138
Perfluoropentanoic acid (PFPeA)	40.0	35.6		ng/L		89	66 - 136
Perfluorohexanoic acid (PFHxA)	40.0	36.6		ng/L		91	76 - 136
Perfluoroheptanoic acid (PFHpA)	40.0	35.8		ng/L		90	78 - 138
Perfluorooctanoic acid (PFOA)	40.0	37.1		ng/L		93	70 - 130
Perfluorononanoic acid (PFNA)	40.0	35.9		ng/L		90	77 - 137
Perfluorodecanoic acid (PFDA)	40.0	36.1		ng/L		90	74 - 134
Perfluoroundecanoic acid (PFUnA)	40.0	31.7		ng/L		79	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	38.0		ng/L		95	72 - 132
Perfluorotridecanoic Acid (PFTriA)	40.0	39.6		ng/L		99	56 - 163
Perfluorotetradecanoic acid (PFTeA)	40.0	38.7		ng/L		97	63 - 123
Perfluorobutanesulfonic acid (PFBS)	35.4	32.7		ng/L		92	79 - 139
Perfluorohexanesulfonic acid (PFHxS)	36.4	30.4		ng/L		84	77 - 137
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	36.5		ng/L		96	83 - 143
Perfluorooctanesulfonic acid (PFOS)	37.1	34.0		ng/L		92	74 - 134
Perfluorodecanesulfonic acid (PFDS)	38.6	32.5		ng/L		84	75 - 135
Perfluorooctane Sulfonamide (FOSA)	40.0	35.6		ng/L		89	82 - 142
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	36.9		ng/L		92	77 - 137
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	37.4		ng/L		94	79 - 139
6:2FTS	37.9	33.9		ng/L		89	82 - 142
8:2FTS	38.3	37.0		ng/L		97	80 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C4 PFBA	*84*		*25 - 150*
13C5 PFPeA	*81*		*25 - 150*
13C2 PFHxA	*80*		*25 - 150*
13C4-PFHpA	*81*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C5 PFNA	*88*		*25 - 150*
13C2 PFDA	*89*		*25 - 150*
13C2 PFUnA	*80*		*25 - 150*
13C2 PFDoA	*84*		*25 - 150*
13C2-PFTeDA	*85*		*25 - 150*
13C3-PFBS	*87*		*25 - 150*
18O2 PFHxS	*84*		*25 - 150*
13C4 PFOS	*85*		*25 - 150*
13C8 FOSA	*80*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-206479/2-A
Matrix: Water
Analysis Batch: 207004

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206479

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
d3-NMeFOSAA	*80*		*25 - 150*
d5-NEtFOSAA	*80*		*25 - 150*
M2-6:2FTS	*77*		*25 - 150*
M2-8:2FTS	*96*		*25 - 150*

Lab Sample ID: LCSD 320-206479/3-A
Matrix: Water
Analysis Batch: 207004

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 206479

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)			40.0	38.7		ng/L		97	78 - 138	4	30
Perfluoropentanoic acid (PFPeA)			40.0	37.8		ng/L		95	66 - 136	6	30
Perfluorohexanoic acid (PFHxA)			40.0	36.7		ng/L		92	76 - 136	0	30
Perfluoroheptanoic acid (PFHpA)			40.0	38.9		ng/L		97	78 - 138	8	30
Perfluorooctanoic acid (PFOA)			40.0	37.5		ng/L		94	70 - 130	1	30
Perfluorononanoic acid (PFNA)			40.0	37.4		ng/L		93	77 - 137	4	30
Perfluorodecanoic acid (PFDA)			40.0	37.6		ng/L		94	74 - 134	4	30
Perfluoroundecanoic acid (PFUnA)			40.0	34.0		ng/L		85	68 - 128	7	30
Perfluorododecanoic acid (PFDoA)			40.0	37.1		ng/L		93	72 - 132	2	30
Perfluorotridecanoic Acid (PFTriA)			40.0	39.5		ng/L		99	56 - 163	0	30
Perfluorotetradecanoic acid (PFTeA)			40.0	41.3		ng/L		103	63 - 123	6	30
Perfluorobutanesulfonic acid (PFBS)			35.4	34.0		ng/L		96	79 - 139	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.3		ng/L		94	77 - 137	12	30
Perfluoroheptanesulfonic Acid (PFHpS)			38.1	37.0		ng/L		97	83 - 143	2	30
Perfluorooctanesulfonic acid (PFOS)			37.1	35.4		ng/L		95	74 - 134	4	30
Perfluorodecanesulfonic acid (PFDS)			38.6	35.6		ng/L		92	75 - 135	9	30
Perfluorooctane Sulfonamide (FOSA)			40.0	39.0		ng/L		98	82 - 142	9	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	38.2		ng/L		95	77 - 137	3	30
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	39.1		ng/L		98	79 - 139	4	30
6:2FTS			37.9	33.5		ng/L		88	82 - 142	1	30
8:2FTS			38.3	33.5		ng/L		88	80 - 140	10	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFBA	*105*		*25 - 150*
13C5 PFPeA	*99*		*25 - 150*
13C2 PFHxA	*103*		*25 - 150*
13C4-PFHpA	*101*		*25 - 150*
13C4 PFOA	*100*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-206479/3-A
Matrix: Water
Analysis Batch: 207004

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 206479

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C5 PFNA	105		25 - 150
13C2 PFDA	109		25 - 150
13C2 PFUnA	96		25 - 150
13C2 PFDoA	102		25 - 150
13C2-PFTeDA	101		25 - 150
13C3-PFBS	106		25 - 150
18O2 PFHxS	99		25 - 150
13C4 PFOS	100		25 - 150
13C8 FOSA	90		25 - 150
d3-NMeFOSAA	99		25 - 150
d5-NEtFOSAA	97		25 - 150
M2-6:2FTS	99		25 - 150
M2-8:2FTS	117		25 - 150

QC Association Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

LCMS

Prep Batch: 206479

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35381-1	WG-11109628-012318-DT-001	Total/NA	Water	3535	
320-35381-1 - DL	WG-11109628-012318-DT-001	Total/NA	Water	3535	
320-35381-2 - DL	WG-11109628-012318-DT-002	Total/NA	Water	3535	
320-35381-2	WG-11109628-012318-DT-002	Total/NA	Water	3535	
320-35381-3	WG-11109628-012318-DT-003	Total/NA	Water	3535	
320-35381-3 - DL	WG-11109628-012318-DT-003	Total/NA	Water	3535	
320-35381-4 - DL	WG-11109628-012318-DT-004	Total/NA	Water	3535	
320-35381-4	WG-11109628-012318-DT-004	Total/NA	Water	3535	
320-35381-5	WG-11109628-012318-DT-005	Total/NA	Water	3535	
320-35381-5 - DL	WG-11109628-012318-DT-005	Total/NA	Water	3535	
MB 320-206479/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-206479/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-206479/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 207004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35381-1	WG-11109628-012318-DT-001	Total/NA	Water	537 (modified)	206479
320-35381-2	WG-11109628-012318-DT-002	Total/NA	Water	537 (modified)	206479
320-35381-3	WG-11109628-012318-DT-003	Total/NA	Water	537 (modified)	206479
320-35381-4	WG-11109628-012318-DT-004	Total/NA	Water	537 (modified)	206479
320-35381-5	WG-11109628-012318-DT-005	Total/NA	Water	537 (modified)	206479
MB 320-206479/1-A	Method Blank	Total/NA	Water	537 (modified)	206479
LCS 320-206479/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	206479
LCSD 320-206479/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	206479

Analysis Batch: 207295

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35381-1 - DL	WG-11109628-012318-DT-001	Total/NA	Water	537 (modified)	206479
320-35381-2 - DL	WG-11109628-012318-DT-002	Total/NA	Water	537 (modified)	206479
320-35381-3 - DL	WG-11109628-012318-DT-003	Total/NA	Water	537 (modified)	206479
320-35381-4 - DL	WG-11109628-012318-DT-004	Total/NA	Water	537 (modified)	206479
320-35381-5 - DL	WG-11109628-012318-DT-005	Total/NA	Water	537 (modified)	206479

Lab Chronicle

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Client Sample ID: WG-11109628-012318-DT-001
Lab Sample ID: 320-35381-1
Date Collected: 01/23/18 10:00
Matrix: Water
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			207004	02/05/18 17:17	JRB	TAL SAC
Total/NA	Prep	3535	DL		247 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			207295	02/06/18 21:12	JRB	TAL SAC

Client Sample ID: WG-11109628-012318-DT-002
Lab Sample ID: 320-35381-2
Date Collected: 01/23/18 11:30
Matrix: Water
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			257.6 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			207004	02/05/18 17:25	JRB	TAL SAC
Total/NA	Prep	3535	DL		257.6 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			207295	02/06/18 21:20	JRB	TAL SAC

Client Sample ID: WG-11109628-012318-DT-003
Lab Sample ID: 320-35381-3
Date Collected: 01/23/18 12:20
Matrix: Water
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			254.1 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			207004	02/05/18 17:32	JRB	TAL SAC
Total/NA	Prep	3535	DL		254.1 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20			207295	02/06/18 21:27	JRB	TAL SAC

Client Sample ID: WG-11109628-012318-DT-004
Lab Sample ID: 320-35381-4
Date Collected: 01/23/18 13:15
Matrix: Water
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			243.8 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			207004	02/05/18 17:40	JRB	TAL SAC
Total/NA	Prep	3535	DL		243.8 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20			207295	02/06/18 21:35	JRB	TAL SAC

Client Sample ID: WG-11109628-012318-DT-005
Lab Sample ID: 320-35381-5
Date Collected: 01/23/18 14:25
Matrix: Water
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247.5 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			207004	02/05/18 17:56	JRB	TAL SAC
Total/NA	Prep	3535	DL		247.5 mL	10.00 mL	206479	02/01/18 09:45	J1S	TAL SAC

Lab Chronicle

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Client Sample ID: WG-11109628-012318-DT-005 — **Lab Sample ID: 320-35381-5**
Date Collected: 01/23/18 14:25 — **Matrix: Water**
Date Received: 01/25/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	537 (modified)	DL	10			207295	02/06/18 21:51	JRB	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Laboratory: TestAmerica Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	11666	04-01-18

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
537 (modified)	3535	Water	6:2FTS
537 (modified)	3535	Water	8:2FTS
537 (modified)	3535	Water	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)
537 (modified)	3535	Water	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)
537 (modified)	3535	Water	Perfluorobutanesulfonic acid (PFBS)
537 (modified)	3535	Water	Perfluorobutanoic acid (PFBA)
537 (modified)	3535	Water	Perfluorodecanesulfonic acid (PFDS)
537 (modified)	3535	Water	Perfluorodecanoic acid (PFDA)
537 (modified)	3535	Water	Perfluorododecanoic acid (PFDoA)
537 (modified)	3535	Water	Perfluoroheptanesulfonic Acid (PFHpS)
537 (modified)	3535	Water	Perfluoroheptanoic acid (PFHpA)
537 (modified)	3535	Water	Perfluorohexanesulfonic acid (PFHxS)
537 (modified)	3535	Water	Perfluorohexanoic acid (PFHxA)
537 (modified)	3535	Water	Perfluorononanoic acid (PFNA)
537 (modified)	3535	Water	Perfluorooctane Sulfonamide (FOSA)
537 (modified)	3535	Water	Perfluorooctanesulfonic acid (PFOS)
537 (modified)	3535	Water	Perfluorooctanoic acid (PFOA)
537 (modified)	3535	Water	Perfluoropentanoic acid (PFPeA)
537 (modified)	3535	Water	Perfluorotetradecanoic acid (PFTeA)
537 (modified)	3535	Water	Perfluorotridecanoic Acid (PFTriA)
537 (modified)	3535	Water	Perfluoroundecanoic acid (PFUnA)

Laboratory: TestAmerica Buffalo

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arkansas DEQ	State Program	6	88-0686	07-06-18
California	State Program	9	2931	04-01-18
Connecticut	State Program	1	PH-0568	09-30-18
Florida	NELAP	4	E87672	06-30-18
Georgia	State Program	4	10026 (NY)	03-31-18 *
Georgia	State Program	4	956	03-31-18 *
Illinois	NELAP	5	200003	09-30-18
Iowa	State Program	7	374	03-01-19
Kansas	NELAP	7	E-10187	01-31-19
Kentucky (DW)	State Program	4	90029	12-31-18
Kentucky (UST)	State Program	4	30	03-31-18 *
Kentucky (WW)	State Program	4	90029	12-31-18
Louisiana	NELAP	6	02031	06-30-18
Maine	State Program	1	NY00044	12-04-18
Maryland	State Program	3	294	03-31-18 *
Massachusetts	State Program	1	M-NY044	06-30-18
Michigan	State Program	5	9937	03-31-18 *
Minnesota	NELAP	5	036-999-337	12-31-18
New Hampshire	NELAP	1	2337	11-17-18

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: GHD Services Inc. TestAmerica Job ID: 320-35381-1
Project/Site: 11109628-03, Cascades/Frontier

Laboratory: TestAmerica Buffalo (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
New Jersey	NELAP	2	NY455	06-30-18
New York	NELAP	2	10026	03-31-18 *
North Dakota	State Program	8	R-176	03-31-18 *
Oklahoma	State Program	6	9421	08-31-18
Oregon	NELAP	10	NY200003	06-09-18
Pennsylvania	NELAP	3	68-00281	07-31-18
Rhode Island	State Program	1	LAO00328	12-30-18
Tennessee	State Program	4	TN02970	03-31-18 *
Texas	NELAP	6	T104704412-15-6	07-31-18
USDA	Federal		P330-11-00386	11-26-17 *
Virginia	NELAP	3	460185	09-14-18
Washington	State Program	10	C784	02-10-18 *
Wisconsin	State Program	5	998310390	08-31-18

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: GHD Services Inc.
Project/Site: 11109628-03, Cascades/Frontier

TestAmerica Job ID: 320-35381-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35381-1	WG-11109628-012318-DT-001	Water	01/23/18 10:00	01/25/18 09:55
320-35381-2	WG-11109628-012318-DT-002	Water	01/23/18 11:30	01/25/18 09:55
320-35381-3	WG-11109628-012318-DT-003	Water	01/23/18 12:20	01/25/18 09:55
320-35381-4	WG-11109628-012318-DT-004	Water	01/23/18 13:15	01/25/18 09:55
320-35381-5	WG-11109628-012318-DT-005	Water	01/23/18 14:25	01/25/18 09:55

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Dave Tyran	Lab PM: Deyo, Melissa L	Carrier Tracking No(s):	COC No: 480-108437-25263.1
Client Contact: David Tyran	Phone: 716-297-6150	E-Mail: melissa.deyo@testamericainc.com		Page: Page 1 of 1
Company: GHD Services Inc.		Analysis Requested		Job #:
Address: 2055 Niagara Falls Blvd., Suite 3	Due Date Requested:			Preservation Codes:
City: Niagara Falls	TAT Requested (days): 2 week			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: NY, 14304				
Phone: 716-297-6150(Tel)	PO #: Purchase Order Requested			Other:
Email: david.tyran@ghd.com	WO #: 11109628			
Project Name: 11109628-03, Cascades/Frontier	Project #: 48017427			
Site: 47th st & Royal Ave Niagara Falls	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 Analytes)	Total Number of containers	Special Instructions/Note:
			Preservation Code:		N	N	N		
WG-11109628-012318-DT-001	1/23/18	1000	G	Water	N	N	X	2	
WG-11109628-012318-DT-002	1/23/18	1130	G	Water	N	N	X	2	
WG-11109628-012318-DT-003	1/23/18	1220	G	Water	N	N	X	2	
WG-11109628-012318-DT-004	1/23/18	1315	G	Water	N	N	X	2	
WG-11109628-012318-DT-005	1/23/18	1425	G	Water	N	N	X	2	
				Water					
				Water					
				Water					

320-35381 Chain of Custody

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Dave Tyran	1/23/18 1510	GHD		1/23/18 1510	TAS
2		1/24/18 1600	TAS		1/25/18 955	TA Sac
3		Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2-1

Ver: 08/04/2016

2/8/2018

* Test America Buffalo to ship samples to Test America Sacramento as per Melissa Deyo

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 320-35381-1

Login Number: 35381
List Number: 1
Creator: Turpen, Troy

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	009565
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 sample IDs on the containers 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	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-142900-1
Client Project/Site: 11109628, Frontier Chemical - NF POTW
Revision: 1

For:
GHD Services Inc.
2055 Niagara Falls Blvd., Suite 3
Niagara Falls, New York 14304

Attn: Sheri Finn

Melissa Deyo

Authorized for release by:
11/13/2018 8:30:27 AM

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Table of Contents

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.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
E	Result exceeded calibration range.

LCMS

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.
B	Compound was found in the blank and sample.
*	Isotope Dilution analyte is outside acceptance limits.

Metals

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-142900-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-142900-1

Revision I
This report was revised to include additional VOC analytes for the following samples: TB-11109628-100318-DT (480-142900-6), WG-11109628-100318-DT-010 (480-142900-7), WG-11109628-100318-SG-012 (480-142900-10) and WG-11109628-100418-DT-017 (480-142900-13).

Receipt
The samples were received on 10/4/2018 1:05 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.4º C and 3.8º C.

GC/MS VOA
Method(s) 624.1: The following samples were diluted to bring the concentration of target analytes within the calibration range: WG-11109628-100318-DT-007 (480-142900-2), WG-11109628-100318-DT-009 (480-142900-4), WG-11109628-100418-SG-014 (480-142900-11) and WG-11109628-100418-SG-016 (480-142900-12). Elevated reporting limits (RLs) are provided.

Method(s) 624.1: The following volatiles samples were diluted due to foaming at the time of purging during the original sample analysis: WG-11109628-100318-DT-015 (480-142900-8) and WG-11109628-100318-DT-013 (480-142900-9). Elevated reporting limits (RLs) are provided.

Method(s) 624.1: The following samples were diluted to bring the concentration of target analytes within the calibration range: WG-11109628-100318-SG-006 (480-142900-1), WG-11109628-100318-SG-008 (480-142900-3), WG-11109628-100318-DT-011 (480-142900-5), WG-11109628-100318-DT-013 (480-142900-9), WG-11109628-100318-SG-012 (480-142900-10), WG-11109628-100418-SG-014 (480-142900-11), WG-11109628-100418-SG-016 (480-142900-12) and WG-11109628-100418-DT-017 (480-142900-13). Elevated reporting limits (RLs) are provided.

Method(s) 624.1: The following samples were diluted to bring the concentration of target analytes within the calibration range: WG-11109628-100318-DT-009 (480-142900-4), WG-11109628-100318-DT-011 (480-142900-5[MS]) and WG-11109628-100318-DT-011 (480-142900-5[MSD]). Elevated reporting limits (RLs) are provided.

Method(s) 624.1: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 480-438347 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

GC/MS Semi VOA
Method(s) 8270D SIM ID: The 1,4-Dioxane result reported for samples WG-11109628-100318-SG-006 (480-142900-1) and WG-11109628-100418-SG-014 (480-142900-11) have an E flag qualifier indicating the results are over the calibration range on the raw data. The actual amounts are within the calibration range; however, the E flag is generated based upon the bias corrected concentration. The LIMS system calculates a bias correction based on the recovery of the 1,4-Dioxane-d8 isotope.

Method(s) 8270D SIM ID: The following samples were diluted to bring the concentration of target analytes within the calibration range: WG-11109628-100318-SG-008 (480-142900-3) and WG-11109628-100418-SG-014 (480-142900-11). Elevated reporting limits (RLs) are provided.

Method(s) 8270D SIM ID: The following samples were diluted to bring the concentration of target analytes within the calibration range: WG-11109628-100318-DT-013 (480-142900-9) and WG-11109628-100418-SG-016 (480-142900-12). Elevated reporting limits (RLs) are provided.

Method(s) 8270D SIM ID: The 1,4-Dioxane result reported for samples WG-11109628-100318-DT-013 (480-142900-9) and WG-11109628-100418-SG-016 (480-142900-12) have an E flag qualifier indicating the results are over the calibration range on the raw data. The actual amounts are within the calibration range; however, the E flag is generated based upon the bias corrected concentration. The LIMS system calculates a bias correction based on the recovery of the 1,4-Dioxane-d8 isotope.

Job ID: 480-142900-1 (Continued)

Laboratory: TestAmerica Buffalo (Continued)

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

Metals
Method(s) 200.7 Rev 4.4: The continuing calibration blank (CCB 480-438330/37) contained Total Potassium above the reporting limit (RL). All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples WG-11109628-100318-DT-007 (480-142900-2), WG-11109628-100318-DT-009 (480-142900-4), WG-11109628-100318-DT-011 (480-142900-5), WG-11109628-100318-DT-011 (480-142900-5[MS]), WG-11109628-100318-DT-011 (480-142900-5[MSD]) and (480-142900-C-1-A PDS) was not performed.

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

LCMS
Method(s) 537 (modified): Results for samples WG-11109628-092818-DT-001 (480-142900-14), WG-11109628-092818-DT-002 (480-142900-15), WG-11109628-092818-DT-003 (480-142900-16), WG-11109628-092818-DT-004 (480-142900-17) and WG-11109628-092818-DT-005 (480-142900-18) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit for 13C4 PFBA: WG-11109628-092818-DT-003 (480-142900-16). This sample was re-analyzed at dilution with concurring results. Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

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

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

Organic Prep
Method(s) 3535: The following samples are a yellow color and contains sediment prior to extraction: WG-11109628-092818-DT-002 (480-142900-15), WG-11109628-092818-DT-003 (480-142900-16), WG-11109628-092818-DT-004 (480-142900-17) and WG-11109628-092818-DT-005 (480-142900-18).

Method(s) 3535: The following sample is a gray color prior to extraction: WG-11109628-092818-DT-001 (480-142900-14).

Method(s) 3535: The following samples had non-settleable particulate matter which plugged the SPE extraction disk. The amount of sample remaining plus the weight of the bottle are recorded in the "Notes" field of the prep batch. The "Tare Weight" recorded is the weight of the emptied bottle: WG-11109628-092818-DT-001 (480-142900-14), WG-11109628-092818-DT-002 (480-142900-15), WG-11109628-092818-DT-003 (480-142900-16) and WG-11109628-092818-DT-004 (480-142900-17). The reporting limits (RLs) have been adjusted proportionately.

Method(s) 3535: The following samples appear to be a light yellow color after extraction: WG-11109628-092818-DT-002 (480-142900-15), WG-11109628-092818-DT-003 (480-142900-16), WG-11109628-092818-DT-004 (480-142900-17) and WG-11109628-092818-DT-005 (480-142900-18).

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

Detection Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-100318-SG-006 — Lab Sample ID: 480-142900-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,3-Dichlorobenzene	2.7	J	25	2.7	ug/L	5		624.1	Total/NA
1,4-Dichlorobenzene	4.2	J	25	2.5	ug/L	5		624.1	Total/NA
2-Chlorotoluene	190		25	1.6	ug/L	5		624.1	Total/NA
cis-1,2-Dichloroethene	12	J	25	2.9	ug/L	5		624.1	Total/NA
1,4-Dioxane	1.2	E	0.19	0.095	ug/L	1		8270D SIM ID	Total/NA
Iron	2760		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	27200		500	100	ug/L	1		200.7 Rev 4.4	Total/NA
Sodium	134000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	13.1		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-DT-007 — Lab Sample ID: 480-142900-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	350		200	18	ug/L	40		624.1	Total/NA
1,3-Dichlorobenzene	2100		200	22	ug/L	40		624.1	Total/NA
1,4-Dichlorobenzene	3700		200	20	ug/L	40		624.1	Total/NA
2-Chlorotoluene	360		200	13	ug/L	40		624.1	Total/NA
4-Chlorotoluene	100	J	200	11	ug/L	40		624.1	Total/NA
Benzene	57	J	200	24	ug/L	40		624.1	Total/NA
Chlorobenzene	3600		200	19	ug/L	40		624.1	Total/NA
cis-1,2-Dichloroethene	29	J	200	23	ug/L	40		624.1	Total/NA
Iron	477		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	207000	^	500	100	ug/L	1		200.7 Rev 4.4	Total/NA
Sodium	77700		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	64.5		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-SG-008 — Lab Sample ID: 480-142900-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethane	6.2	J	10	1.2	ug/L	2		624.1	Total/NA
1,2-Dichlorobenzene	21		10	0.89	ug/L	2		624.1	Total/NA
1,3-Dichlorobenzene	87		10	1.1	ug/L	2		624.1	Total/NA
1,4-Dichlorobenzene	49		10	1.0	ug/L	2		624.1	Total/NA
2-Chlorotoluene	27		10	0.66	ug/L	2		624.1	Total/NA
4-Chlorotoluene	11		10	0.55	ug/L	2		624.1	Total/NA
Acetone	5.0	J	50	4.0	ug/L	2		624.1	Total/NA
Benzene	27		10	1.2	ug/L	2		624.1	Total/NA
Chlorobenzene	99		10	0.95	ug/L	2		624.1	Total/NA
cis-1,2-Dichloroethene	1.3	J	10	1.1	ug/L	2		624.1	Total/NA
Toluene	1.5	J	10	0.91	ug/L	2		624.1	Total/NA
Vinyl chloride	18		10	1.5	ug/L	2		624.1	Total/NA
1,4-Dioxane	1.9		0.95	0.48	ug/L	5		8270D SIM ID	Total/NA
Arsenic	9.4	J	15.0	5.6	ug/L	1		200.7 Rev 4.4	Total/NA
Iron	116		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	3790000		5000	1000	ug/L	10		200.7 Rev 4.4	Total/NA
Sodium	291000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	20.4		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-DT-009 — Lab Sample ID: 480-142900-4

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-100318-DT-009 (Continued) — Lab Sample ID: 480-142900-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	330		50	4.4	ug/L	10		624.1	Total/NA
2-Chlorotoluene	310		50	3.3	ug/L	10		624.1	Total/NA
4-Chlorotoluene	84		50	2.7	ug/L	10		624.1	Total/NA
Benzene	56		50	6.0	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	28	J	50	5.7	ug/L	10		624.1	Total/NA
Tetrachloroethene	4.9	J	50	3.4	ug/L	10		624.1	Total/NA
Trichloroethene	15	J	50	6.0	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene - DL	2600		400	43	ug/L	80		624.1	Total/NA
1,4-Dichlorobenzene - DL	4500		400	41	ug/L	80		624.1	Total/NA
Chlorobenzene - DL	4000		400	38	ug/L	80		624.1	Total/NA
Iron	321		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	208000	^	500	100	ug/L	1		200.7 Rev 4.4	Total/NA
Sodium	81900		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	45.9	F1	10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-DT-011 — Lab Sample ID: 480-142900-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	69	F2	50	4.4	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene	120	F1 F2	50	5.4	ug/L	10		624.1	Total/NA
1,4-Dichlorobenzene	190	F2	50	5.1	ug/L	10		624.1	Total/NA
2-Chlorotoluene	27	J F1 F2	50	3.3	ug/L	10		624.1	Total/NA
4-Chlorotoluene	3.6	J F1 F2	50	2.7	ug/L	10		624.1	Total/NA
Benzene	7.8	J F1 F2	50	6.0	ug/L	10		624.1	Total/NA
Chlorobenzene	370	F1	50	4.8	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	27	J F1	50	5.7	ug/L	10		624.1	Total/NA
Tetrachloroethene	10	J F1 F2	50	3.4	ug/L	10		624.1	Total/NA
Trichloroethene	25	J F1 F2	50	6.0	ug/L	10		624.1	Total/NA
Iron	228		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	172000	^	500	100	ug/L	1		200.7 Rev 4.4	Total/NA
Sodium	97300		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	6.4	J	10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: TB-11109628-100318-DT — Lab Sample ID: 480-142900-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,3-Dichlorobenzene	0.56	J	5.0	0.54	ug/L	1		624.1	Total/NA
1,4-Dichlorobenzene	0.85	J	5.0	0.51	ug/L	1		624.1	Total/NA

Client Sample ID: WG-11109628-100318-SG-010 — Lab Sample ID: 480-142900-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethane	0.65	J	5.0	0.59	ug/L	1		624.1	Total/NA
Acetone	2.8	J	25	2.0	ug/L	1		624.1	Total/NA

Client Sample ID: WG-11109628-100318-DT-015 — Lab Sample ID: 480-142900-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	73		50	4.4	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene	100		50	5.4	ug/L	10		624.1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-100318-DT-015 (Continued) — Lab Sample ID: 480-142900-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,4-Dichlorobenzene	84		50	5.1	ug/L	10		624.1	Total/NA
2-Chlorotoluene	42	J	50	3.3	ug/L	10		624.1	Total/NA
4-Chlorotoluene	15	J	50	2.7	ug/L	10		624.1	Total/NA
Benzene	25	J	50	6.0	ug/L	10		624.1	Total/NA
Chlorobenzene	110		50	4.8	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	13	J	50	5.7	ug/L	10		624.1	Total/NA
Toluene	5.9	J	50	4.5	ug/L	10		624.1	Total/NA
Arsenic	13.3	J	15.0	5.6	ug/L	1		200.7 Rev 4.4	Total/NA
Iron	147		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	3480000		5000	1000	ug/L	10		200.7 Rev 4.4	Total/NA
Sodium	262000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	28.2		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-DT-013 — Lab Sample ID: 480-142900-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethane	280		50	5.9	ug/L	10		624.1	Total/NA
1,2-Dichlorobenzene	390		50	4.4	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene	590		50	5.4	ug/L	10		624.1	Total/NA
1,4-Dichlorobenzene	570		50	5.1	ug/L	10		624.1	Total/NA
4-Chlorotoluene	580		50	2.7	ug/L	10		624.1	Total/NA
Acetone	24	J	250	20	ug/L	10		624.1	Total/NA
Benzene	90		50	6.0	ug/L	10		624.1	Total/NA
Chlorobenzene	620		50	4.8	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	73		50	5.7	ug/L	10		624.1	Total/NA
Toluene	51		50	4.5	ug/L	10		624.1	Total/NA
Vinyl chloride	260		50	7.5	ug/L	10		624.1	Total/NA
2-Chlorotoluene - DL	1200		100	6.6	ug/L	20		624.1	Total/NA
1,4-Dioxane	36	E	3.8	1.9	ug/L	20		8270D SIM ID	Total/NA
Arsenic	36.6		15.0	5.6	ug/L	1		200.7 Rev 4.4	Total/NA
Iron	190		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	1450000		2500	500	ug/L	5		200.7 Rev 4.4	Total/NA
Sodium	288000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	59.8		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100318-SG-012 — Lab Sample ID: 480-142900-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	6.2	J	10	0.89	ug/L	2		624.1	Total/NA
1,3-Dichlorobenzene	23		10	1.1	ug/L	2		624.1	Total/NA
1,4-Dichlorobenzene	40		10	1.0	ug/L	2		624.1	Total/NA
2-Chlorotoluene	18		10	0.66	ug/L	2		624.1	Total/NA
4-Chlorotoluene	0.76	J	10	0.55	ug/L	2		624.1	Total/NA
Benzene	3.9	J	10	1.2	ug/L	2		624.1	Total/NA
Chlorobenzene	120		10	0.95	ug/L	2		624.1	Total/NA

Client Sample ID: WG-11109628-100418-SG-014 — Lab Sample ID: 480-142900-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethane	300		50	5.9	ug/L	10		624.1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-100418-SG-014 (Continued)

Lab Sample ID: 480-142900-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2,4-Trichlorobenzene	220		50	3.9	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene	860		50	5.4	ug/L	10		624.1	Total/NA
Acetone	54	J	250	20	ug/L	10		624.1	Total/NA
Benzene	790		50	6.0	ug/L	10		624.1	Total/NA
Chlorobenzene	970		50	4.8	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	380		50	5.7	ug/L	10		624.1	Total/NA
Tetrachloroethene	650		50	3.4	ug/L	10		624.1	Total/NA
Toluene	230		50	4.5	ug/L	10		624.1	Total/NA
Vinyl chloride	21	J	50	7.5	ug/L	10		624.1	Total/NA
1,2-Dichlorobenzene - DL	4000		200	18	ug/L	40		624.1	Total/NA
1,4-Dichlorobenzene - DL	2300		200	20	ug/L	40		624.1	Total/NA
2-Chlorotoluene - DL	3100		200	13	ug/L	40		624.1	Total/NA
4-Chlorotoluene - DL	1400		200	11	ug/L	40		624.1	Total/NA
Trichloroethene - DL	1800		200	24	ug/L	40		624.1	Total/NA
1,4-Dioxane	23	E	0.95	0.48	ug/L	5		8270D SIM ID	Total/NA
Arsenic	130		15.0	5.6	ug/L	1		200.7 Rev 4.4	Total/NA
Iron	1630		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	1280000		2500	500	ug/L	5		200.7 Rev 4.4	Total/NA
Sodium	215000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	160		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100418-SG-016

Lab Sample ID: 480-142900-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethane	220		50	5.9	ug/L	10		624.1	Total/NA
1,2,4-Trichlorobenzene	31	J	50	3.9	ug/L	10		624.1	Total/NA
1,2-Dichlorobenzene	490		50	4.4	ug/L	10		624.1	Total/NA
1,3-Dichlorobenzene	840		50	5.4	ug/L	10		624.1	Total/NA
1,4-Dichlorobenzene	820		50	5.1	ug/L	10		624.1	Total/NA
4-Chlorotoluene	500		50	2.7	ug/L	10		624.1	Total/NA
Acetone	29	J	250	20	ug/L	10		624.1	Total/NA
Benzene	65		50	6.0	ug/L	10		624.1	Total/NA
Chlorobenzene	780		50	4.8	ug/L	10		624.1	Total/NA
cis-1,2-Dichloroethene	150		50	5.7	ug/L	10		624.1	Total/NA
Tetrachloroethene	4.9	J	50	3.4	ug/L	10		624.1	Total/NA
Toluene	50		50	4.5	ug/L	10		624.1	Total/NA
Trichloroethene	15	J	50	6.0	ug/L	10		624.1	Total/NA
Vinyl chloride	190		50	7.5	ug/L	10		624.1	Total/NA
2-Chlorotoluene - DL	1400		100	6.6	ug/L	20		624.1	Total/NA
1,4-Dioxane	69	E	3.8	1.9	ug/L	20		8270D SIM ID	Total/NA
Arsenic	50.5		15.0	5.6	ug/L	1		200.7 Rev 4.4	Total/NA
Iron	1140		50.0	19.3	ug/L	1		200.7 Rev 4.4	Total/NA
Potassium	1260000		2500	500	ug/L	5		200.7 Rev 4.4	Total/NA
Sodium	332000		1000	324	ug/L	1		200.7 Rev 4.4	Total/NA
Total Recoverable Phenolics	102		10.0	5.0	ug/L	1		420.1	Total/NA

Client Sample ID: WG-11109628-100418-DT-017

Lab Sample ID: 480-142900-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,2-Dichlorobenzene	42		10	0.89	ug/L	2		624.1	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-100418-DT-017 (Continued) — Lab Sample ID: 480-142900-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,3-Dichlorobenzene	26		10	1.1	ug/L	2		624.1	Total/NA
1,4-Dichlorobenzene	140		10	1.0	ug/L	2		624.1	Total/NA
2-Chlorotoluene	16		10	0.66	ug/L	2		624.1	Total/NA
4-Chlorotoluene	6.3	J	10	0.55	ug/L	2		624.1	Total/NA
Benzene	4.9	J	10	1.2	ug/L	2		624.1	Total/NA
Chlorobenzene	56		10	0.95	ug/L	2		624.1	Total/NA

Client Sample ID: WG-11109628-092818-DT-001 — Lab Sample ID: 480-142900-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	94		1.7	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	160		1.7	0.50	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	33		1.7	0.21	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	21		1.7	0.73	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	1.7	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.53	J	1.7	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.6	J B	1.7	0.15	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.9		1.7	0.46	ng/L	1		537 (modified)	Total/NA
6:2 FTS	270		17	1.7	ng/L	1		537 (modified)	Total/NA
8:2 FTS	7.6	J	17	1.7	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	470		3.4	0.84	ng/L	2		537 (modified)	Total/NA

Client Sample ID: WG-11109628-092818-DT-002 — Lab Sample ID: 480-142900-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	140		1.7	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	320		1.7	0.41	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	160		1.7	0.48	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	34		1.7	0.21	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	44		1.7	0.70	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.9		1.7	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20	B	1.7	0.14	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		1.7	0.45	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	0.64	J	1.7	0.29	ng/L	1		537 (modified)	Total/NA
6:2 FTS - DL	680		83	8.3	ng/L	5		537 (modified)	Total/NA

Client Sample ID: WG-11109628-092818-DT-003 — Lab Sample ID: 480-142900-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	180		1.7	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	260		1.7	0.41	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	180		1.7	0.49	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	65		1.7	0.21	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	100		1.7	0.71	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	2.6		1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.9		1.7	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20	B	1.7	0.14	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.48	J	1.7	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	39		1.7	0.45	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	1.5	J	1.7	0.29	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-092818-DT-003 (Continued)

Lab Sample ID: 480-142900-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
6:2 FTS - DL	3200		340	34	ng/L	20		537 (modified)	Total/NA
8:2 FTS - DL	59	J	340	34	ng/L	20		537 (modified)	Total/NA

Client Sample ID: WG-11109628-092818-DT-004

Lab Sample ID: 480-142900-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	230		1.7	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	140		1.7	0.21	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	230		1.7	0.71	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	14		1.7	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	3.9		1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.7	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.8	B	1.7	0.14	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.77	J	1.7	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11		1.7	0.45	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	0.60	J	1.7	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA) - DL	620		33	8.2	ng/L	20		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	410		33	9.7	ng/L	20		537 (modified)	Total/NA
6:2 FTS - DL	3700		330	33	ng/L	20		537 (modified)	Total/NA
8:2 FTS - DL	390		330	33	ng/L	20		537 (modified)	Total/NA

Client Sample ID: WG-11109628-092818-DT-005

Lab Sample ID: 480-142900-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	140		1.6	0.28	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	290		1.6	0.40	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	190		1.6	0.47	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	62		1.6	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	95		1.6	0.69	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	4.6		1.6	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.89	J	1.6	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.6	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.4	B	1.6	0.14	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.0		1.6	0.44	ng/L	1		537 (modified)	Total/NA
6:2 FTS - DL	2100		160	16	ng/L	10		537 (modified)	Total/NA
8:2 FTS - DL	66	J	160	16	ng/L	10		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WG-11109628-100318-SG-006

Lab Sample ID: 480-142900-1

Date Collected: 10/03/18 10:15

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		25	2.9	ug/L			10/08/18 16:56	5
1,2,4-Trichlorobenzene	ND		25	2.0	ug/L			10/08/18 16:56	5
1,2-Dichlorobenzene	ND		25	2.2	ug/L			10/08/18 16:56	5
1,3-Dichlorobenzene	**2.7**	**J**	25	2.7	ug/L			10/08/18 16:56	5
1,4-Dichlorobenzene	**4.2**	**J**	25	2.5	ug/L			10/08/18 16:56	5
2-Chlorotoluene	**190**		25	1.6	ug/L			10/08/18 16:56	5
3-Chlorotoluene	ND		25	1.5	ug/L			10/08/18 16:56	5
4-Chlorotoluene	ND		25	1.4	ug/L			10/08/18 16:56	5
Acetone	ND		130	9.9	ug/L			10/08/18 16:56	5
Benzene	ND		25	3.0	ug/L			10/08/18 16:56	5
Chlorobenzene	ND		25	2.4	ug/L			10/08/18 16:56	5
cis-1,2-Dichloroethene	**12**	**J**	25	2.9	ug/L			10/08/18 16:56	5
Tetrachloroethene	ND		25	1.7	ug/L			10/08/18 16:56	5
Toluene	ND		25	2.3	ug/L			10/08/18 16:56	5
Trichloroethene	ND		25	3.0	ug/L			10/08/18 16:56	5
Vinyl chloride	ND		25	3.7	ug/L			10/08/18 16:56	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*68 - 130*		*10/08/18 16:56*	*5*
4-Bromofluorobenzene (Surr)	*98*		*76 - 123*		*10/08/18 16:56*	*5*
Dibromofluoromethane (Surr)	*91*		*75 - 123*		*10/08/18 16:56*	*5*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/08/18 16:56*	*5*

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	**1.2**	**E**	0.19	0.095	ug/L		10/09/18 07:33	10/11/18 21:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*24*		*15 - 110*	*10/09/18 07:33*	*10/11/18 21:41*	*1*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:11	1
Iron	**2760**		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:11	1
Potassium	**27200**		500	100	ug/L		10/06/18 08:53	10/08/18 13:11	1
Sodium	**134000**		1000	324	ug/L		10/06/18 08:53	10/08/18 13:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	**13.1**		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:37	1

Client Sample ID: WG-11109628-100318-DT-007

Lab Sample ID: 480-142900-2

Date Collected: 10/03/18 10:00

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		200	24	ug/L			10/05/18 15:01	40
1,2,4-Trichlorobenzene	ND		200	16	ug/L			10/05/18 15:01	40
1,2-Dichlorobenzene	**350**		200	18	ug/L			10/05/18 15:01	40
1,3-Dichlorobenzene	**2100**		200	22	ug/L			10/05/18 15:01	40

Client Sample ID: WG-11109628-100318-DT-007

Lab Sample ID: 480-142900-2

Date Collected: 10/03/18 10:00

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	3700		200	20	ug/L			10/05/18 15:01	40
2-Chlorotoluene	360		200	13	ug/L			10/05/18 15:01	40
3-Chlorotoluene	ND		200	12	ug/L			10/05/18 15:01	40
4-Chlorotoluene	100	J	200	11	ug/L			10/05/18 15:01	40
Acetone	ND		1000	79	ug/L			10/05/18 15:01	40
Benzene	57	J	200	24	ug/L			10/05/18 15:01	40
Chlorobenzene	3600		200	19	ug/L			10/05/18 15:01	40
cis-1,2-Dichloroethene	29	J	200	23	ug/L			10/05/18 15:01	40
Tetrachloroethene	ND		200	14	ug/L			10/05/18 15:01	40
Toluene	ND		200	18	ug/L			10/05/18 15:01	40
Trichloroethene	ND		200	24	ug/L			10/05/18 15:01	40
Vinyl chloride	ND		200	30	ug/L			10/05/18 15:01	40

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/05/18 15:01*	*40*
4-Bromofluorobenzene (Surr)	*97*		*76 - 123*		*10/05/18 15:01*	*40*
Dibromofluoromethane (Surr)	*94*		*75 - 123*		*10/05/18 15:01*	*40*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/05/18 15:01*	*40*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:33	1
Iron	477		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:33	1
Potassium	207000	^	500	100	ug/L		10/06/18 08:53	10/08/18 13:33	1
Sodium	77700		1000	324	ug/L		10/06/18 08:53	10/08/18 13:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	64.5		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:37	1

Client Sample ID: WG-11109628-100318-SG-008

Lab Sample ID: 480-142900-3

Date Collected: 10/03/18 11:55

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	6.2	J	10	1.2	ug/L			10/08/18 17:20	2
1,2,4-Trichlorobenzene	ND		10	0.78	ug/L			10/08/18 17:20	2
1,2-Dichlorobenzene	21		10	0.89	ug/L			10/08/18 17:20	2
1,3-Dichlorobenzene	87		10	1.1	ug/L			10/08/18 17:20	2
1,4-Dichlorobenzene	49		10	1.0	ug/L			10/08/18 17:20	2
2-Chlorotoluene	27		10	0.66	ug/L			10/08/18 17:20	2
3-Chlorotoluene	ND		10	0.62	ug/L			10/08/18 17:20	2
4-Chlorotoluene	11		10	0.55	ug/L			10/08/18 17:20	2
Acetone	5.0	J	50	4.0	ug/L			10/08/18 17:20	2
Benzene	27		10	1.2	ug/L			10/08/18 17:20	2
Chlorobenzene	99		10	0.95	ug/L			10/08/18 17:20	2
cis-1,2-Dichloroethene	1.3	J	10	1.1	ug/L			10/08/18 17:20	2
Tetrachloroethene	ND		10	0.68	ug/L			10/08/18 17:20	2
Toluene	1.5	J	10	0.91	ug/L			10/08/18 17:20	2

Client Sample ID: WG-11109628-100318-SG-008 — Lab Sample ID: 480-142900-3

Date Collected: 10/03/18 11:55 **Matrix: Water**
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	ND		10	1.2	ug/L			10/08/18 17:20	2
Vinyl chloride	**18**		10	1.5	ug/L			10/08/18 17:20	2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/08/18 17:20*	*2*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 17:20*	*2*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/08/18 17:20*	*2*
Toluene-d8 (Surr)	*89*		*77 - 120*		*10/08/18 17:20*	*2*

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	**1.9**		0.95	0.48	ug/L		10/09/18 07:33	10/11/18 22:04	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*26*		*15 - 110*	*10/09/18 07:33*	*10/11/18 22:04*	*5*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**9.4**	**J**	15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:37	1
Iron	**116**		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:37	1
Potassium	**3790000**		5000	1000	ug/L		10/06/18 08:53	10/09/18 09:51	10
Sodium	**291000**		1000	324	ug/L		10/06/18 08:53	10/08/18 13:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	**20.4**		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:37	1

Client Sample ID: WG-11109628-100318-DT-009 — Lab Sample ID: 480-142900-4

Date Collected: 10/03/18 10:00 **Matrix: Water**
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		50	5.9	ug/L			10/05/18 15:48	10
1,2,4-Trichlorobenzene	ND		50	3.9	ug/L			10/05/18 15:48	10
1,2-Dichlorobenzene	**330**		50	4.4	ug/L			10/05/18 15:48	10
2-Chlorotoluene	**310**		50	3.3	ug/L			10/05/18 15:48	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/05/18 15:48	10
4-Chlorotoluene	**84**		50	2.7	ug/L			10/05/18 15:48	10
Acetone	ND		250	20	ug/L			10/05/18 15:48	10
Benzene	**56**		50	6.0	ug/L			10/05/18 15:48	10
cis-1,2-Dichloroethene	**28**	**J**	50	5.7	ug/L			10/05/18 15:48	10
Tetrachloroethene	**4.9**	**J**	50	3.4	ug/L			10/05/18 15:48	10
Toluene	ND		50	4.5	ug/L			10/05/18 15:48	10
Trichloroethene	**15**	**J**	50	6.0	ug/L			10/05/18 15:48	10
Vinyl chloride	ND		50	7.5	ug/L			10/05/18 15:48	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/05/18 15:48*	*10*
4-Bromofluorobenzene (Surr)	*98*		*76 - 123*		*10/05/18 15:48*	*10*
Dibromofluoromethane (Surr)	*92*		*75 - 123*		*10/05/18 15:48*	*10*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/05/18 15:48*	*10*

Method: 624.1 - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichlorobenzene	2600		400	43	ug/L			10/09/18 13:49	80
1,4-Dichlorobenzene	4500		400	41	ug/L			10/09/18 13:49	80
Chlorobenzene	4000		400	38	ug/L			10/09/18 13:49	80

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*92*		*68 - 130*		*10/09/18 13:49*	*80*
4-Bromofluorobenzene (Surr)	*99*		*76 - 123*		*10/09/18 13:49*	*80*
Dibromofluoromethane (Surr)	*91*		*75 - 123*		*10/09/18 13:49*	*80*
Toluene-d8 (Surr)	*89*		*77 - 120*		*10/09/18 13:49*	*80*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:41	1
Iron	321		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:41	1
Potassium	208000	^	500	100	ug/L		10/06/18 08:53	10/08/18 13:41	1
Sodium	81900		1000	324	ug/L		10/06/18 08:53	10/08/18 13:41	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	45.9	F1	10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:37	1

Client Sample ID: WG-11109628-100318-DT-011 — Lab Sample ID: 480-142900-5

Date Collected: 10/03/18 11:08 **Matrix: Water**
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND	F1 F2	50	5.9	ug/L			10/08/18 18:08	10
1,2,4-Trichlorobenzene	ND	F1	50	3.9	ug/L			10/08/18 18:08	10
1,2-Dichlorobenzene	69	F2	50	4.4	ug/L			10/08/18 18:08	10
1,3-Dichlorobenzene	120	F1 F2	50	5.4	ug/L			10/08/18 18:08	10
1,4-Dichlorobenzene	190	F2	50	5.1	ug/L			10/08/18 18:08	10
2-Chlorotoluene	27	J F1 F2	50	3.3	ug/L			10/08/18 18:08	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/08/18 18:08	10
4-Chlorotoluene	3.6	J F1 F2	50	2.7	ug/L			10/08/18 18:08	10
Acetone	ND	F1	250	20	ug/L			10/08/18 18:08	10
Benzene	7.8	J F1 F2	50	6.0	ug/L			10/08/18 18:08	10
Chlorobenzene	370	F1	50	4.8	ug/L			10/08/18 18:08	10
cis-1,2-Dichloroethene	27	J F1	50	5.7	ug/L			10/08/18 18:08	10
Tetrachloroethene	10	J F1 F2	50	3.4	ug/L			10/08/18 18:08	10
Toluene	ND	F1 F2	50	4.5	ug/L			10/08/18 18:08	10
Trichloroethene	25	J F1 F2	50	6.0	ug/L			10/08/18 18:08	10
Vinyl chloride	ND	F2	50	7.5	ug/L			10/08/18 18:08	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/08/18 18:08*	*10*
4-Bromofluorobenzene (Surr)	*101*		*76 - 123*		*10/08/18 18:08*	*10*
Dibromofluoromethane (Surr)	*92*		*75 - 123*		*10/08/18 18:08*	*10*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/08/18 18:08*	*10*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:45	1
Iron	228		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:45	1
Potassium	172000	^	500	100	ug/L		10/06/18 08:53	10/08/18 13:45	1

Client Sample ID: WG-11109628-100318-DT-011

Lab Sample ID: 480-142900-5

Date Collected: 10/03/18 11:08

Matrix: Water

Date Received: 10/04/18 13:05

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	**97300**		1000	324	ug/L		10/06/18 08:53	10/08/18 13:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	**6.4**	**J**	10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:43	1

Client Sample ID: TB-11109628-100318-DT

Lab Sample ID: 480-142900-6

Date Collected: 10/03/18 00:00

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/05/18 16:36	1
1,2,4-Trichlorobenzene	ND		5.0	0.39	ug/L			10/05/18 16:36	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/05/18 16:36	1
1,3-Dichlorobenzene	**0.56**	**J**	5.0	0.54	ug/L			10/05/18 16:36	1
1,4-Dichlorobenzene	**0.85**	**J**	5.0	0.51	ug/L			10/05/18 16:36	1
2-Chlorotoluene	ND		5.0	0.33	ug/L			10/05/18 16:36	1
3-Chlorotoluene	ND		5.0	0.31	ug/L			10/05/18 16:36	1
4-Chlorotoluene	ND		5.0	0.27	ug/L			10/05/18 16:36	1
Acetone	ND		25	2.0	ug/L			10/05/18 16:36	1
Benzene	ND		5.0	0.60	ug/L			10/05/18 16:36	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/05/18 16:36	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/05/18 16:36	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/05/18 16:36	1
Toluene	ND		5.0	0.45	ug/L			10/05/18 16:36	1
Trichloroethene	ND		5.0	0.60	ug/L			10/05/18 16:36	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/05/18 16:36	1
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/05/18 16:36	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/05/18 16:36	1
Carbon disulfide	ND		5.0	0.29	ug/L			10/05/18 16:36	1
Bromoform	ND		5.0	0.47	ug/L			10/05/18 16:36	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/05/18 16:36	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/05/18 16:36	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/05/18 16:36	1
4-Methyl-2-pentanone (MIBK)	ND		25	1.3	ug/L			10/05/18 16:36	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/05/18 16:36	1
Chloromethane	ND		5.0	0.64	ug/L			10/05/18 16:36	1
Bromomethane	ND		5.0	1.2	ug/L			10/05/18 16:36	1
Chlorodibromomethane	ND		5.0	0.41	ug/L			10/05/18 16:36	1
1,2-Dichloroethene, Total	ND		10	3.2	ug/L			10/05/18 16:36	1
Styrene	ND		5.0	0.38	ug/L			10/05/18 16:36	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/05/18 16:36	1
Chloroethane	ND		5.0	0.87	ug/L			10/05/18 16:36	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/05/18 16:36	1
2-Hexanone	ND		25	2.0	ug/L			10/05/18 16:36	1
2-Butanone (MEK)	ND		25	1.8	ug/L			10/05/18 16:36	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/05/18 16:36	1
Xylenes, Total	ND		10	1.1	ug/L			10/05/18 16:36	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/05/18 16:36	1

Client Sample ID: TB-11109628-100318-DT

Lab Sample ID: 480-142900-6

Date Collected: 10/03/18 00:00

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	ND		5.0	0.54	ug/L			10/05/18 16:36	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/05/18 16:36	1
Dichlorobromomethane	ND		5.0	0.54	ug/L			10/05/18 16:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*68 - 130*		*10/05/18 16:36*	*1*
4-Bromofluorobenzene (Surr)	*99*		*76 - 123*		*10/05/18 16:36*	*1*
Dibromofluoromethane (Surr)	*96*		*75 - 123*		*10/05/18 16:36*	*1*
Toluene-d8 (Surr)	*92*		*77 - 120*		*10/05/18 16:36*	*1*

Client Sample ID: WG-11109628-100318-SG-010

Lab Sample ID: 480-142900-7

Date Collected: 10/03/18 14:50

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	**0.65**	**J**	5.0	0.59	ug/L			10/08/18 13:09	1
1,2,4-Trichlorobenzene	ND		5.0	0.39	ug/L			10/08/18 13:09	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/08/18 13:09	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/08/18 13:09	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/08/18 13:09	1
2-Chlorotoluene	ND		5.0	0.33	ug/L			10/08/18 13:09	1
3-Chlorotoluene	ND		5.0	0.31	ug/L			10/08/18 13:09	1
4-Chlorotoluene	ND		5.0	0.27	ug/L			10/08/18 13:09	1
Acetone	**2.8**	**J**	25	2.0	ug/L			10/08/18 13:09	1
Benzene	ND		5.0	0.60	ug/L			10/08/18 13:09	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/08/18 13:09	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/08/18 13:09	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/08/18 13:09	1
Toluene	ND		5.0	0.45	ug/L			10/08/18 13:09	1
Trichloroethene	ND		5.0	0.60	ug/L			10/08/18 13:09	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/08/18 13:09	1
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/08/18 13:09	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/08/18 13:09	1
Carbon disulfide	ND		5.0	0.29	ug/L			10/08/18 13:09	1
Bromoform	ND		5.0	0.47	ug/L			10/08/18 13:09	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/08/18 13:09	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/08/18 13:09	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/08/18 13:09	1
4-Methyl-2-pentanone (MIBK)	ND		25	1.3	ug/L			10/08/18 13:09	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/08/18 13:09	1
Chloromethane	ND		5.0	0.64	ug/L			10/08/18 13:09	1
Bromomethane	ND		5.0	1.2	ug/L			10/08/18 13:09	1
Chlorodibromomethane	ND		5.0	0.41	ug/L			10/08/18 13:09	1
1,2-Dichloroethene, Total	ND		10	3.2	ug/L			10/08/18 13:09	1
Styrene	ND		5.0	0.38	ug/L			10/08/18 13:09	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/08/18 13:09	1
Chloroethane	ND		5.0	0.87	ug/L			10/08/18 13:09	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/08/18 13:09	1
2-Hexanone	ND		25	2.0	ug/L			10/08/18 13:09	1

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-100318-SG-010

Lab Sample ID: 480-142900-7

Date Collected: 10/03/18 14:50

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Butanone (MEK)	ND		25	1.8	ug/L			10/08/18 13:09	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/08/18 13:09	1
Xylenes, Total	ND		10	1.1	ug/L			10/08/18 13:09	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/08/18 13:09	1
Chloroform	ND		5.0	0.54	ug/L			10/08/18 13:09	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/08/18 13:09	1
Dichlorobromomethane	ND		5.0	0.54	ug/L			10/08/18 13:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*97*		*68 - 130*		*10/08/18 13:09*	*1*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 13:09*	*1*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/08/18 13:09*	*1*
Toluene-d8 (Surr)	*91*		*77 - 120*		*10/08/18 13:09*	*1*

Client Sample ID: WG-11109628-100318-DT-015

Lab Sample ID: 480-142900-8

Date Collected: 10/03/18 14:40

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		50	5.9	ug/L			10/05/18 17:23	10
1,2,4-Trichlorobenzene	ND		50	3.9	ug/L			10/05/18 17:23	10
1,2-Dichlorobenzene	**73**		50	4.4	ug/L			10/05/18 17:23	10
1,3-Dichlorobenzene	**100**		50	5.4	ug/L			10/05/18 17:23	10
1,4-Dichlorobenzene	**84**		50	5.1	ug/L			10/05/18 17:23	10
2-Chlorotoluene	**42**	**J**	50	3.3	ug/L			10/05/18 17:23	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/05/18 17:23	10
4-Chlorotoluene	**15**	**J**	50	2.7	ug/L			10/05/18 17:23	10
Acetone	ND		250	20	ug/L			10/05/18 17:23	10
Benzene	**25**	**J**	50	6.0	ug/L			10/05/18 17:23	10
Chlorobenzene	**110**		50	4.8	ug/L			10/05/18 17:23	10
cis-1,2-Dichloroethene	**13**	**J**	50	5.7	ug/L			10/05/18 17:23	10
Tetrachloroethene	ND		50	3.4	ug/L			10/05/18 17:23	10
Toluene	**5.9**	**J**	50	4.5	ug/L			10/05/18 17:23	10
Trichloroethene	ND		50	6.0	ug/L			10/05/18 17:23	10
Vinyl chloride	ND		50	7.5	ug/L			10/05/18 17:23	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*97*		*68 - 130*		*10/05/18 17:23*	*10*
4-Bromofluorobenzene (Surr)	*99*		*76 - 123*		*10/05/18 17:23*	*10*
Dibromofluoromethane (Surr)	*94*		*75 - 123*		*10/05/18 17:23*	*10*
Toluene-d8 (Surr)	*92*		*77 - 120*		*10/05/18 17:23*	*10*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**13.3**	**J**	15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:56	1
Iron	**147**		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:56	1
Potassium	**3480000**		5000	1000	ug/L		10/06/18 08:53	10/09/18 09:54	10
Sodium	**262000**		1000	324	ug/L		10/06/18 08:53	10/08/18 13:56	1

Client Sample ID: WG-11109628-100318-DT-015

Lab Sample ID: 480-142900-8

Date Collected: 10/03/18 14:40

Matrix: Water

Date Received: 10/04/18 13:05

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	28.2		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:43	1

Client Sample ID: WG-11109628-100318-DT-013

Lab Sample ID: 480-142900-9

Date Collected: 10/03/18 12:50

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	280		50	5.9	ug/L			10/05/18 17:47	10
1,2,4-Trichlorobenzene	ND		50	3.9	ug/L			10/05/18 17:47	10
1,2-Dichlorobenzene	390		50	4.4	ug/L			10/05/18 17:47	10
1,3-Dichlorobenzene	590		50	5.4	ug/L			10/05/18 17:47	10
1,4-Dichlorobenzene	570		50	5.1	ug/L			10/05/18 17:47	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/05/18 17:47	10
4-Chlorotoluene	580		50	2.7	ug/L			10/05/18 17:47	10
Acetone	24	J	250	20	ug/L			10/05/18 17:47	10
Benzene	90		50	6.0	ug/L			10/05/18 17:47	10
Chlorobenzene	620		50	4.8	ug/L			10/05/18 17:47	10
cis-1,2-Dichloroethene	73		50	5.7	ug/L			10/05/18 17:47	10
Tetrachloroethene	ND		50	3.4	ug/L			10/05/18 17:47	10
Toluene	51		50	4.5	ug/L			10/05/18 17:47	10
Trichloroethene	ND		50	6.0	ug/L			10/05/18 17:47	10
Vinyl chloride	260		50	7.5	ug/L			10/05/18 17:47	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/05/18 17:47*	*10*
4-Bromofluorobenzene (Surr)	*98*		*76 - 123*		*10/05/18 17:47*	*10*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/05/18 17:47*	*10*
Toluene-d8 (Surr)	*91*		*77 - 120*		*10/05/18 17:47*	*10*

Method: 624.1 - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	1200		100	6.6	ug/L			10/08/18 18:32	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*68 - 130*		*10/08/18 18:32*	*20*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 18:32*	*20*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/08/18 18:32*	*20*
Toluene-d8 (Surr)	*91*		*77 - 120*		*10/08/18 18:32*	*20*

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	36	E	3.8	1.9	ug/L		10/09/18 07:33	10/16/18 14:19	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*28*		*15 - 110*	*10/09/18 07:33*	*10/16/18 14:19*	*20*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	36.6		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 14:00	1
Iron	190		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 14:00	1
Potassium	1450000		2500	500	ug/L		10/06/18 08:53	10/09/18 09:58	5

Client Sample ID: WG-11109628-100318-DT-013

Lab Sample ID: 480-142900-9

Date Collected: 10/03/18 12:50

Matrix: Water

Date Received: 10/04/18 13:05

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	**288000**		1000	324	ug/L		10/06/18 08:53	10/08/18 14:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	**59.8**		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:43	1

Client Sample ID: WG-11109628-100318-SG-012

Lab Sample ID: 480-142900-10

Date Collected: 10/03/18 16:10

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		10	1.2	ug/L			10/08/18 18:56	2
1,2,4-Trichlorobenzene	ND		10	0.78	ug/L			10/08/18 18:56	2
1,2-Dichlorobenzene	**6.2**	**J**	10	0.89	ug/L			10/08/18 18:56	2
1,3-Dichlorobenzene	**23**		10	1.1	ug/L			10/08/18 18:56	2
1,4-Dichlorobenzene	**40**		10	1.0	ug/L			10/08/18 18:56	2
2-Chlorotoluene	**18**		10	0.66	ug/L			10/08/18 18:56	2
3-Chlorotoluene	ND		10	0.62	ug/L			10/08/18 18:56	2
4-Chlorotoluene	**0.76**	**J**	10	0.55	ug/L			10/08/18 18:56	2
Acetone	ND		50	4.0	ug/L			10/08/18 18:56	2
Benzene	**3.9**	**J**	10	1.2	ug/L			10/08/18 18:56	2
Chlorobenzene	**120**		10	0.95	ug/L			10/08/18 18:56	2
cis-1,2-Dichloroethene	ND		10	1.1	ug/L			10/08/18 18:56	2
Tetrachloroethene	ND		10	0.68	ug/L			10/08/18 18:56	2
Toluene	ND		10	0.91	ug/L			10/08/18 18:56	2
Trichloroethene	ND		10	1.2	ug/L			10/08/18 18:56	2
Vinyl chloride	ND		10	1.5	ug/L			10/08/18 18:56	2
1,1,1-Trichloroethane	ND		10	0.77	ug/L			10/08/18 18:56	2
cis-1,3-Dichloropropene	ND		10	0.66	ug/L			10/08/18 18:56	2
Carbon disulfide	ND		10	0.57	ug/L			10/08/18 18:56	2
Bromoform	ND		10	0.94	ug/L			10/08/18 18:56	2
1,2-Dichloroethane	ND		10	1.2	ug/L			10/08/18 18:56	2
1,2-Dichloropropane	ND		10	1.2	ug/L			10/08/18 18:56	2
1,1,2-Trichloroethane	ND		10	0.96	ug/L			10/08/18 18:56	2
4-Methyl-2-pentanone (MIBK)	ND		50	2.6	ug/L			10/08/18 18:56	2
Methylene Chloride	ND		10	1.6	ug/L			10/08/18 18:56	2
Chloromethane	ND		10	1.3	ug/L			10/08/18 18:56	2
Bromomethane	ND		10	2.4	ug/L			10/08/18 18:56	2
Chlorodibromomethane	ND		10	0.83	ug/L			10/08/18 18:56	2
1,2-Dichloroethene, Total	ND		20	6.4	ug/L			10/08/18 18:56	2
Styrene	ND		10	0.76	ug/L			10/08/18 18:56	2
1,1,2,2-Tetrachloroethane	ND		10	0.52	ug/L			10/08/18 18:56	2
Chloroethane	ND		10	1.7	ug/L			10/08/18 18:56	2
1,1-Dichloroethene	ND		10	1.7	ug/L			10/08/18 18:56	2
2-Hexanone	ND		50	3.9	ug/L			10/08/18 18:56	2
2-Butanone (MEK)	ND		50	3.5	ug/L			10/08/18 18:56	2
Ethylbenzene	ND		10	0.93	ug/L			10/08/18 18:56	2
Xylenes, Total	ND		20	2.2	ug/L			10/08/18 18:56	2
trans-1,3-Dichloropropene	ND		10	0.88	ug/L			10/08/18 18:56	2

Client Sample ID: WG-11109628-100318-SG-012 — Lab Sample ID: 480-142900-10

Date Collected: 10/03/18 16:10 **Matrix: Water**
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	ND		10	1.1	ug/L			10/08/18 18:56	2
Carbon tetrachloride	ND		10	1.0	ug/L			10/08/18 18:56	2
Dichlorobromomethane	ND		10	1.1	ug/L			10/08/18 18:56	2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*91*		*68 - 130*		*10/08/18 18:56*	*2*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 18:56*	*2*
Dibromofluoromethane (Surr)	*89*		*75 - 123*		*10/08/18 18:56*	*2*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/08/18 18:56*	*2*

Client Sample ID: WG-11109628-100418-SG-014 — Lab Sample ID: 480-142900-11

Date Collected: 10/04/18 10:15 **Matrix: Water**
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	**300**		50	5.9	ug/L			10/05/18 18:34	10
1,2,4-Trichlorobenzene	**220**		50	3.9	ug/L			10/05/18 18:34	10
1,3-Dichlorobenzene	**860**		50	5.4	ug/L			10/05/18 18:34	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/05/18 18:34	10
Acetone	**54**	**J**	250	20	ug/L			10/05/18 18:34	10
Benzene	**790**		50	6.0	ug/L			10/05/18 18:34	10
Chlorobenzene	**970**		50	4.8	ug/L			10/05/18 18:34	10
cis-1,2-Dichloroethene	**380**		50	5.7	ug/L			10/05/18 18:34	10
Tetrachloroethene	**650**		50	3.4	ug/L			10/05/18 18:34	10
Toluene	**230**		50	4.5	ug/L			10/05/18 18:34	10
Vinyl chloride	**21**	**J**	50	7.5	ug/L			10/05/18 18:34	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*93*		*68 - 130*		*10/05/18 18:34*	*10*
4-Bromofluorobenzene (Surr)	*97*		*76 - 123*		*10/05/18 18:34*	*10*
Dibromofluoromethane (Surr)	*92*		*75 - 123*		*10/05/18 18:34*	*10*
Toluene-d8 (Surr)	*90*		*77 - 120*		*10/05/18 18:34*	*10*

Method: 624.1 - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	**4000**		200	18	ug/L			10/08/18 19:20	40
1,4-Dichlorobenzene	**2300**		200	20	ug/L			10/08/18 19:20	40
2-Chlorotoluene	**3100**		200	13	ug/L			10/08/18 19:20	40
4-Chlorotoluene	**1400**		200	11	ug/L			10/08/18 19:20	40
Trichloroethene	**1800**		200	24	ug/L			10/08/18 19:20	40

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*94*		*68 - 130*		*10/08/18 19:20*	*40*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 19:20*	*40*
Dibromofluoromethane (Surr)	*92*		*75 - 123*		*10/08/18 19:20*	*40*
Toluene-d8 (Surr)	*89*		*77 - 120*		*10/08/18 19:20*	*40*

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	**23**	**E**	0.95	0.48	ug/L		10/09/18 07:33	10/11/18 22:51	5

Client Sample ID: WG-11109628-100418-SG-014

Lab Sample ID: 480-142900-11

Date Collected: 10/04/18 10:15

Matrix: Water

Date Received: 10/04/18 13:05

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	28		15 - 110	10/09/18 07:33	10/11/18 22:51	5

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	130		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 14:15	1
Iron	1630		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 14:15	1
Potassium	1280000		2500	500	ug/L		10/06/18 08:53	10/09/18 10:02	5
Sodium	215000		1000	324	ug/L		10/06/18 08:53	10/08/18 14:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	160		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:43	1

Client Sample ID: WG-11109628-100418-SG-016

Lab Sample ID: 480-142900-12

Date Collected: 10/04/18 11:15

Matrix: Water

Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	220		50	5.9	ug/L			10/05/18 18:58	10
1,2,4-Trichlorobenzene	31	J	50	3.9	ug/L			10/05/18 18:58	10
1,2-Dichlorobenzene	490		50	4.4	ug/L			10/05/18 18:58	10
1,3-Dichlorobenzene	840		50	5.4	ug/L			10/05/18 18:58	10
1,4-Dichlorobenzene	820		50	5.1	ug/L			10/05/18 18:58	10
3-Chlorotoluene	ND		50	3.1	ug/L			10/05/18 18:58	10
4-Chlorotoluene	500		50	2.7	ug/L			10/05/18 18:58	10
Acetone	29	J	250	20	ug/L			10/05/18 18:58	10
Benzene	65		50	6.0	ug/L			10/05/18 18:58	10
Chlorobenzene	780		50	4.8	ug/L			10/05/18 18:58	10
cis-1,2-Dichloroethene	150		50	5.7	ug/L			10/05/18 18:58	10
Tetrachloroethene	4.9	J	50	3.4	ug/L			10/05/18 18:58	10
Toluene	50		50	4.5	ug/L			10/05/18 18:58	10
Trichloroethene	15	J	50	6.0	ug/L			10/05/18 18:58	10
Vinyl chloride	190		50	7.5	ug/L			10/05/18 18:58	10

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		68 - 130		10/05/18 18:58	10
4-Bromofluorobenzene (Surr)	97		76 - 123		10/05/18 18:58	10
Dibromofluoromethane (Surr)	92		75 - 123		10/05/18 18:58	10
Toluene-d8 (Surr)	91		77 - 120		10/05/18 18:58	10

Method: 624.1 - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	1400		100	6.6	ug/L			10/08/18 19:44	20

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	93		68 - 130		10/08/18 19:44	20
4-Bromofluorobenzene (Surr)	98		76 - 123		10/08/18 19:44	20
Dibromofluoromethane (Surr)	90		75 - 123		10/08/18 19:44	20
Toluene-d8 (Surr)	90		77 - 120		10/08/18 19:44	20

Client Sample ID: WG-11109628-100418-SG-016

Lab Sample ID: 480-142900-12

Date Collected: 10/04/18 11:15
Matrix: Water
Date Received: 10/04/18 13:05

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	69	E	3.8	1.9	ug/L		10/09/18 07:33	10/16/18 14:43	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*21*		*15 - 110*	*10/09/18 07:33*	*10/16/18 14:43*	*20*

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	50.5		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 14:19	1
Iron	1140		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 14:19	1
Potassium	1260000		2500	500	ug/L		10/06/18 08:53	10/09/18 10:06	5
Sodium	332000		1000	324	ug/L		10/06/18 08:53	10/08/18 14:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	102		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:43	1

Client Sample ID: WG-11109628-100418-DT-017

Lab Sample ID: 480-142900-13

Date Collected: 10/04/18 10:05
Matrix: Water
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		10	1.2	ug/L			10/08/18 20:08	2
1,2,4-Trichlorobenzene	ND		10	0.78	ug/L			10/08/18 20:08	2
1,2-Dichlorobenzene	42		10	0.89	ug/L			10/08/18 20:08	2
1,3-Dichlorobenzene	26		10	1.1	ug/L			10/08/18 20:08	2
1,4-Dichlorobenzene	140		10	1.0	ug/L			10/08/18 20:08	2
2-Chlorotoluene	16		10	0.66	ug/L			10/08/18 20:08	2
3-Chlorotoluene	ND		10	0.62	ug/L			10/08/18 20:08	2
4-Chlorotoluene	6.3	J	10	0.55	ug/L			10/08/18 20:08	2
Acetone	ND		50	4.0	ug/L			10/08/18 20:08	2
Benzene	4.9	J	10	1.2	ug/L			10/08/18 20:08	2
Chlorobenzene	56		10	0.95	ug/L			10/08/18 20:08	2
cis-1,2-Dichloroethene	ND		10	1.1	ug/L			10/08/18 20:08	2
Tetrachloroethene	ND		10	0.68	ug/L			10/08/18 20:08	2
Toluene	ND		10	0.91	ug/L			10/08/18 20:08	2
Trichloroethene	ND		10	1.2	ug/L			10/08/18 20:08	2
Vinyl chloride	ND		10	1.5	ug/L			10/08/18 20:08	2
1,1,1-Trichloroethane	ND		10	0.77	ug/L			10/08/18 20:08	2
cis-1,3-Dichloropropene	ND		10	0.66	ug/L			10/08/18 20:08	2
Carbon disulfide	ND		10	0.57	ug/L			10/08/18 20:08	2
Bromoform	ND		10	0.94	ug/L			10/08/18 20:08	2
1,2-Dichloroethane	ND		10	1.2	ug/L			10/08/18 20:08	2
1,2-Dichloropropane	ND		10	1.2	ug/L			10/08/18 20:08	2
1,1,2-Trichloroethane	ND		10	0.96	ug/L			10/08/18 20:08	2
4-Methyl-2-pentanone (MIBK)	ND		50	2.6	ug/L			10/08/18 20:08	2
Methylene Chloride	ND		10	1.6	ug/L			10/08/18 20:08	2
Chloromethane	ND		10	1.3	ug/L			10/08/18 20:08	2
Bromomethane	ND		10	2.4	ug/L			10/08/18 20:08	2
Chlorodibromomethane	ND		10	0.83	ug/L			10/08/18 20:08	2
1,2-Dichloroethene, Total	ND		20	6.4	ug/L			10/08/18 20:08	2

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-100418-DT-017

Lab Sample ID: 480-142900-13

Date Collected: 10/04/18 10:05
Matrix: Water
Date Received: 10/04/18 13:05

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	ND		10	0.76	ug/L			10/08/18 20:08	2
1,1,2,2-Tetrachloroethane	ND		10	0.52	ug/L			10/08/18 20:08	2
Chloroethane	ND		10	1.7	ug/L			10/08/18 20:08	2
1,1-Dichloroethene	ND		10	1.7	ug/L			10/08/18 20:08	2
2-Hexanone	ND		50	3.9	ug/L			10/08/18 20:08	2
2-Butanone (MEK)	ND		50	3.5	ug/L			10/08/18 20:08	2
Ethylbenzene	ND		10	0.93	ug/L			10/08/18 20:08	2
Xylenes, Total	ND		20	2.2	ug/L			10/08/18 20:08	2
trans-1,3-Dichloropropene	ND		10	0.88	ug/L			10/08/18 20:08	2
Chloroform	ND		10	1.1	ug/L			10/08/18 20:08	2
Carbon tetrachloride	ND		10	1.0	ug/L			10/08/18 20:08	2
Dichlorobromomethane	ND		10	1.1	ug/L			10/08/18 20:08	2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*92*		*68 - 130*		*10/08/18 20:08*	*2*
4-Bromofluorobenzene (Surr)	*98*		*76 - 123*		*10/08/18 20:08*	*2*
Dibromofluoromethane (Surr)	*91*		*75 - 123*		*10/08/18 20:08*	*2*
Toluene-d8 (Surr)	*88*		*77 - 120*		*10/08/18 20:08*	*2*

Client Sample ID: WG-11109628-092818-DT-001

Lab Sample ID: 480-142900-14

Date Collected: 09/28/18 09:45
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**94**		1.7	0.30	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorohexanoic acid (PFHxA)	**160**		1.7	0.50	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluoroheptanoic acid (PFHpA)	**33**		1.7	0.21	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorooctanoic acid (PFOA)	**21**		1.7	0.73	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.7	0.23	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorodecanoic acid (PFDA)	**0.53**	**J**	1.7	0.27	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.95	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.47	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.25	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorohexanesulfonic acid (PFHxS)	**1.6**	**J B**	1.7	0.15	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.16	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorooctanesulfonic acid (PFOS)	**4.9**		1.7	0.46	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.27	ng/L		10/12/18 09:47	10/16/18 00:56	1
Perfluorooctanesulfonamide (FOSA)	ND		1.7	0.30	ng/L		10/12/18 09:47	10/16/18 00:56	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	2.7	ng/L		10/12/18 09:47	10/16/18 00:56	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.6	ng/L		10/12/18 09:47	10/16/18 00:56	1
6:2 FTS	**270**		17	1.7	ng/L		10/12/18 09:47	10/16/18 00:56	1
8:2 FTS	**7.6**	**J**	17	1.7	ng/L		10/12/18 09:47	10/16/18 00:56	1

Client Sample ID: WG-11109628-092818-DT-001

Lab Sample ID: 480-142900-14

Date Collected: 09/28/18 09:45
Matrix: Water
Date Received: 10/04/18 13:05

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*69*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C2 PFHxA	*85*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C4 PFHpA	*93*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C4 PFOA	*94*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C5 PFNA	*91*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C2 PFDA	*85*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C2 PFUnA	*78*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C2 PFDoA	*67*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C2 PFTeDA	*57*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C3 PFBS	*87*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
18O2 PFHxS	*93*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C4 PFOS	*87*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
13C8 FOSA	*84*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
d3-NMeFOSAA	*102*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
d5-NEtFOSAA	*86*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
M2-6:2 FTS	*120*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*
M2-8:2 FTS	*92*		*25 - 150*	*10/12/18 09:47*	*10/16/18 00:56*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**470**		3.4	0.84	ng/L		10/12/18 09:47	10/19/18 10:51	2

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*83*		*25 - 150*	*10/12/18 09:47*	*10/19/18 10:51*	*2*

Client Sample ID: WG-11109628-092818-DT-002

Lab Sample ID: 480-142900-15

Date Collected: 09/28/18 10:10
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**140**		1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluoropentanoic acid (PFPeA)	**320**		1.7	0.41	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorohexanoic acid (PFHxA)	**160**		1.7	0.48	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluoroheptanoic acid (PFHpA)	**34**		1.7	0.21	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorooctanoic acid (PFOA)	**44**		1.7	0.70	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.22	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.26	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.91	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.45	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.24	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorobutanesulfonic acid (PFBS)	**2.9**		1.7	0.17	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorohexanesulfonic acid (PFHxS)	**20**	**B**	1.7	0.14	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.16	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorooctanesulfonic acid (PFOS)	**15**		1.7	0.45	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.26	ng/L		10/12/18 09:47	10/16/18 01:03	1
Perfluorooctanesulfonamide (FOSA)	**0.64**	**J**	1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:03	1

Client Sample ID: WG-11109628-092818-DT-002

Lab Sample ID: 480-142900-15

Date Collected: 09/28/18 10:10
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	2.6	ng/L		10/12/18 09:47	10/16/18 01:03	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.6	ng/L		10/12/18 09:47	10/16/18 01:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*30*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C5 PFPeA	*57*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C2 PFHxA	*65*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C4 PFHpA	*77*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C4 PFOA	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C5 PFNA	*95*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C2 PFDA	*99*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C2 PFUnA	*94*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C2 PFDoA	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C2 PFTeDA	*59*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C3 PFBS	*81*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
18O2 PFHxS	*84*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C4 PFOS	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
13C8 FOSA	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
d3-NMeFOSAA	*121*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*
d5-NEtFOSAA	*120*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:03*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
6:2 FTS	**680**		83	8.3	ng/L		10/12/18 09:47	10/19/18 10:59	5
8:2 FTS	ND		83	8.3	ng/L		10/12/18 09:47	10/19/18 10:59	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*142*		*25 - 150*	*10/12/18 09:47*	*10/19/18 10:59*	*5*
M2-8:2 FTS	*106*		*25 - 150*	*10/12/18 09:47*	*10/19/18 10:59*	*5*

Client Sample ID: WG-11109628-092818-DT-003

Lab Sample ID: 480-142900-16

Date Collected: 09/28/18 10:30
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**180**		1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluoropentanoic acid (PFPeA)	**260**		1.7	0.41	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorohexanoic acid (PFHxA)	**180**		1.7	0.49	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluoroheptanoic acid (PFHpA)	**65**		1.7	0.21	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorooctanoic acid (PFOA)	**100**		1.7	0.71	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorodecanoic acid (PFDA)	**2.6**		1.7	0.26	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.92	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.46	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.24	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorobutanesulfonic acid (PFBS)	**1.9**		1.7	0.17	ng/L		10/12/18 09:47	10/16/18 01:11	1

Client Sample ID: WG-11109628-092818-DT-003
Lab Sample ID: 480-142900-16
Date Collected: 09/28/18 10:30
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**20**	**B**	1.7	0.14	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.48**	**J**	1.7	0.16	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorooctanesulfonic acid (PFOS)	**39**		1.7	0.45	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.27	ng/L		10/12/18 09:47	10/16/18 01:11	1
Perfluorooctanesulfonamide (FOSA)	**1.5**	**J**	1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	2.6	ng/L		10/12/18 09:47	10/16/18 01:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.6	ng/L		10/12/18 09:47	10/16/18 01:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*7*	*	*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C5 PFPeA	*46*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C2 PFHxA	*59*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C4 PFHpA	*74*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C4 PFOA	*81*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C5 PFNA	*87*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C2 PFDA	*98*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C2 PFUnA	*95*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C2 PFDoA	*87*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C2 PFTeDA	*57*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C3 PFBS	*81*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
18O2 PFHxS	*85*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C4 PFOS	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
13C8 FOSA	*84*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
d3-NMeFOSAA	*105*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*
d5-NEtFOSAA	*115*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:11*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
6:2 FTS	**3200**		340	34	ng/L		10/12/18 09:47	10/19/18 11:06	20
8:2 FTS	**59**	**J**	340	34	ng/L		10/12/18 09:47	10/19/18 11:06	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*110*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:06*	*20*
M2-8:2 FTS	*106*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:06*	*20*

Client Sample ID: WG-11109628-092818-DT-004
Lab Sample ID: 480-142900-17
Date Collected: 09/28/18 10:55
Matrix: Water
Date Received: 10/04/18 13:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**230**		1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluoroheptanoic acid (PFHpA)	**140**		1.7	0.21	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorooctanoic acid (PFOA)	**230**		1.7	0.71	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorononanoic acid (PFNA)	**14**		1.7	0.22	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorodecanoic acid (PFDA)	**3.9**		1.7	0.26	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.92	ng/L		10/12/18 09:47	10/16/18 01:25	1

Client Sample ID: WG-11109628-092818-DT-004
Date Collected: 09/28/18 10:55
Date Received: 10/04/18 13:05

Lab Sample ID: 480-142900-17
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.46	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.24	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.7	0.17	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorohexanesulfonic acid (PFHxS)	**4.8**	**B**	1.7	0.14	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluoroheptanesulfonic Acid (PFHpS)	**0.77**	**J**	1.7	0.16	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorooctanesulfonic acid (PFOS)	**11**		1.7	0.45	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.27	ng/L		10/12/18 09:47	10/16/18 01:25	1
Perfluorooctanesulfonamide (FOSA)	**0.60**	**J**	1.7	0.29	ng/L		10/12/18 09:47	10/16/18 01:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	2.6	ng/L		10/12/18 09:47	10/16/18 01:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.6	ng/L		10/12/18 09:47	10/16/18 01:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*28*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C4 PFHpA	*80*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C4 PFOA	*89*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C5 PFNA	*101*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C2 PFDA	*111*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C2 PFUnA	*106*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C2 PFDoA	*96*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C2 PFTeDA	*65*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C3 PFBS	*88*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
18O2 PFHxS	*96*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C4 PFOS	*99*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
13C8 FOSA	*95*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
d3-NMeFOSAA	*128*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*
d5-NEtFOSAA	*133*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:25*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	**620**		33	8.2	ng/L		10/12/18 09:47	10/19/18 11:14	20
Perfluorohexanoic acid (PFHxA)	**410**		33	9.7	ng/L		10/12/18 09:47	10/19/18 11:14	20
6:2 FTS	**3700**		330	33	ng/L		10/12/18 09:47	10/19/18 11:14	20
8:2 FTS	**390**		330	33	ng/L		10/12/18 09:47	10/19/18 11:14	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C5 PFPeA	*85*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:14*	*20*
13C2 PFHxA	*86*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:14*	*20*
M2-6:2 FTS	*121*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:14*	*20*
M2-8:2 FTS	*66*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:14*	*20*

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-092818-DT-005
Date Collected: 09/28/18 11:09
Date Received: 10/04/18 13:05

Lab Sample ID: 480-142900-18
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**140**		1.6	0.28	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluoropentanoic acid (PFPeA)	**290**		1.6	0.40	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorohexanoic acid (PFHxA)	**190**		1.6	0.47	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluoroheptanoic acid (PFHpA)	**62**		1.6	0.20	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorooctanoic acid (PFOA)	**95**		1.6	0.69	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorononanoic acid (PFNA)	**4.6**		1.6	0.22	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorodecanoic acid (PFDA)	**0.89**	**J**	1.6	0.25	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluoroundecanoic acid (PFUnA)	ND		1.6	0.90	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorododecanoic acid (PFDoA)	ND		1.6	0.45	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorotridecanoic acid (PFTriA)	ND		1.6	1.1	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.6	0.24	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.6	0.16	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorohexanesulfonic acid (PFHxS)	**2.4**	**B**	1.6	0.14	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.6	0.15	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorooctanesulfonic acid (PFOS)	**7.0**		1.6	0.44	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.6	0.26	ng/L		10/12/18 09:47	10/16/18 01:33	1
Perfluorooctanesulfonamide (FOSA)	ND		1.6	0.28	ng/L		10/12/18 09:47	10/16/18 01:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		16	2.5	ng/L		10/12/18 09:47	10/16/18 01:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		16	1.5	ng/L		10/12/18 09:47	10/16/18 01:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*36*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C5 PFPeA	*66*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C2 PFHxA	*75*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C4 PFHpA	*87*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C4 PFOA	*96*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C5 PFNA	*111*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C2 PFDA	*115*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C2 PFUnA	*112*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C2 PFDoA	*106*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C2 PFTeDA	*75*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C3 PFBS	*101*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
18O2 PFHxS	*96*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C4 PFOS	*105*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
13C8 FOSA	*102*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
d3-NMeFOSAA	*148*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*
d5-NEtFOSAA	*145*		*25 - 150*	*10/12/18 09:47*	*10/16/18 01:33*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
6:2 FTS	**2100**		160	16	ng/L		10/12/18 09:47	10/19/18 11:21	10
8:2 FTS	**66**	**J**	160	16	ng/L		10/12/18 09:47	10/19/18 11:21	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*144*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:21*	*10*
M2-8:2 FTS	*92*		*25 - 150*	*10/12/18 09:47*	*10/19/18 11:21*	*10*

Surrogate Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(68-130)	(76-123)	(75-123)	(77-120)
480-142900-1	WG-11109628-100318-SG-006	96	98	91	90
480-142900-2	WG-11109628-100318-DT-007	95	97	94	90
480-142900-3	WG-11109628-100318-SG-008	95	100	93	89
480-142900-4	WG-11109628-100318-DT-009	95	98	92	90
480-142900-4 - DL	WG-11109628-100318-DT-009	92	99	91	89
480-142900-5	WG-11109628-100318-DT-011	95	101	92	90
480-142900-5 MS	WG-11109628-100318-DT-011	88	100	89	89
480-142900-5 MSD	WG-11109628-100318-DT-011	89	100	89	88
480-142900-6	TB-11109628-100318-DT	99	99	96	92
480-142900-7	WG-11109628-100318-SG-010	97	100	93	91
480-142900-8	WG-11109628-100318-DT-015	97	99	94	92
480-142900-9	WG-11109628-100318-DT-013	95	98	93	91
480-142900-9 - DL	WG-11109628-100318-DT-013	95	100	93	91
480-142900-10	WG-11109628-100318-SG-012	91	100	89	90
480-142900-11	WG-11109628-100418-SG-014	93	97	92	90
480-142900-11 - DL	WG-11109628-100418-SG-014	94	100	92	89
480-142900-12	WG-11109628-100418-SG-016	97	97	92	91
480-142900-12 - DL	WG-11109628-100418-SG-016	93	98	90	90
480-142900-13	WG-11109628-100418-DT-017	92	98	91	88
LCS 480-437821/5	Lab Control Sample	94	100	96	92
LCS 480-438162/5	Lab Control Sample	97	104	99	93
LCS 480-438347/5	Lab Control Sample	89	103	93	91
MB 480-437821/51	Method Blank	98	97	93	91
MB 480-438162/8	Method Blank	94	100	93	89
MB 480-438347/7	Method Blank	94	101	93	89

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

Isotope Dilution Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		DXE							
Lab Sample ID	Client Sample ID	(15-110)							
480-142900-1	WG-11109628-100318-SG-006	24							
480-142900-3	WG-11109628-100318-SG-008	26							
480-142900-9	WG-11109628-100318-DT-013	28							
480-142900-11	WG-11109628-100418-SG-014	28							
480-142900-12	WG-11109628-100418-SG-016	21							
LCS 480-438341/2-A	Lab Control Sample	35							
MB 480-438341/1-A	Method Blank	37							

Surrogate Legend

DXE = 1,4-Dioxane-d8

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
480-142900-14	WG-11109628-092818-DT-001	69		85	93	94	91	85	78
480-142900-14 - DL	WG-11109628-092818-DT-001		83						
480-142900-15	WG-11109628-092818-DT-002	30	57	65	77	89	95	99	94
480-142900-15 - DL	WG-11109628-092818-DT-002								
480-142900-16	WG-11109628-092818-DT-003	7 *	46	59	74	81	87	98	95
480-142900-16 - DL	WG-11109628-092818-DT-003								
480-142900-17	WG-11109628-092818-DT-004	28			80	89	101	111	106
480-142900-17 - DL	WG-11109628-092818-DT-004		85	86					
480-142900-18	WG-11109628-092818-DT-005	36	66	75	87	96	111	115	112
480-142900-18 - DL	WG-11109628-092818-DT-005								
LCS 320-251626/2-A	Lab Control Sample	102	103	100	102	103	100	102	99
LCSD 320-251626/3-A	Lab Control Sample Dup	97	102	98	103	99	108	97	98
MB 320-251626/1-A	Method Blank	92	96	91	97	100	98	93	92

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFDoA	PFTDA	13C3-PFBS	PFHxS	PFOS	PFOSA	-NMeFOSA	5-NEtFOSA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
480-142900-14	WG-11109628-092818-DT-001	67	57	87	93	87	84	102	86
480-142900-14 - DL	WG-11109628-092818-DT-001								
480-142900-15	WG-11109628-092818-DT-002	89	59	81	84	89	89	121	120
480-142900-15 - DL	WG-11109628-092818-DT-002								
480-142900-16	WG-11109628-092818-DT-003	87	57	81	85	89	84	105	115
480-142900-16 - DL	WG-11109628-092818-DT-003								
480-142900-17	WG-11109628-092818-DT-004	96	65	88	96	99	95	128	133
480-142900-17 - DL	WG-11109628-092818-DT-004								
480-142900-18	WG-11109628-092818-DT-005	106	75	101	96	105	102	148	145
480-142900-18 - DL	WG-11109628-092818-DT-005								
LCS 320-251626/2-A	Lab Control Sample	97	103	103	101	102	97	115	120
LCSD 320-251626/3-A	Lab Control Sample Dup	99	101	103	102	101	92	115	109
MB 320-251626/1-A	Method Blank	88	91	91	96	95	86	102	104

Isotope Dilution Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)									
		M262FTS	M282FTS								
Lab Sample ID	Client Sample ID	(25-150)	(25-150)								
480-142900-14	WG-11109628-092818-DT-001	120	92								
480-142900-14 - DL	WG-11109628-092818-DT-001										
480-142900-15	WG-11109628-092818-DT-002										
480-142900-15 - DL	WG-11109628-092818-DT-002	142	106								
480-142900-16	WG-11109628-092818-DT-003										
480-142900-16 - DL	WG-11109628-092818-DT-003	110	106								
480-142900-17	WG-11109628-092818-DT-004										
480-142900-17 - DL	WG-11109628-092818-DT-004	121	66								
480-142900-18	WG-11109628-092818-DT-005										
480-142900-18 - DL	WG-11109628-092818-DT-005	144	92								
LCS 320-251626/2-A	Lab Control Sample	121	119								
LCSD 320-251626/3-A	Lab Control Sample Dup	112	104								
MB 320-251626/1-A	Method Blank	117	99								

Surrogate Legend

PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA
PFHxA = 13C2 PFHxA
PFHpA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
13C3-PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
PFOSA = 13C8 FOSA
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-437821/51
Matrix: Water
Analysis Batch: 437821

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/05/18 11:28	1
1,2,4-Trichlorobenzene	ND		5.0	0.39	ug/L			10/05/18 11:28	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/05/18 11:28	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/05/18 11:28	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/05/18 11:28	1
2-Chlorotoluene	ND		5.0	0.33	ug/L			10/05/18 11:28	1
3-Chlorotoluene	ND		5.0	0.31	ug/L			10/05/18 11:28	1
4-Chlorotoluene	ND		5.0	0.27	ug/L			10/05/18 11:28	1
Acetone	ND		25	2.0	ug/L			10/05/18 11:28	1
Benzene	ND		5.0	0.60	ug/L			10/05/18 11:28	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/05/18 11:28	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/05/18 11:28	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/05/18 11:28	1
Toluene	ND		5.0	0.45	ug/L			10/05/18 11:28	1
Trichloroethene	ND		5.0	0.60	ug/L			10/05/18 11:28	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/05/18 11:28	1
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/05/18 11:28	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/05/18 11:28	1
Carbon disulfide	ND		5.0	0.29	ug/L			10/05/18 11:28	1
Bromoform	ND		5.0	0.47	ug/L			10/05/18 11:28	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/05/18 11:28	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/05/18 11:28	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/05/18 11:28	1
4-Methyl-2-pentanone (MIBK)	ND		25	1.3	ug/L			10/05/18 11:28	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/05/18 11:28	1
Chloromethane	ND		5.0	0.64	ug/L			10/05/18 11:28	1
Bromomethane	ND		5.0	1.2	ug/L			10/05/18 11:28	1
Chlorodibromomethane	ND		5.0	0.41	ug/L			10/05/18 11:28	1
1,2-Dichloroethene, Total	ND		10	3.2	ug/L			10/05/18 11:28	1
Styrene	ND		5.0	0.38	ug/L			10/05/18 11:28	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/05/18 11:28	1
Chloroethane	ND		5.0	0.87	ug/L			10/05/18 11:28	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/05/18 11:28	1
2-Hexanone	ND		25	2.0	ug/L			10/05/18 11:28	1
2-Butanone (MEK)	ND		25	1.8	ug/L			10/05/18 11:28	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/05/18 11:28	1
Xylenes, Total	ND		10	1.1	ug/L			10/05/18 11:28	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/05/18 11:28	1
Chloroform	ND		5.0	0.54	ug/L			10/05/18 11:28	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/05/18 11:28	1
Dichlorobromomethane	ND		5.0	0.54	ug/L			10/05/18 11:28	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*68 - 130*		*10/05/18 11:28*	*1*
4-Bromofluorobenzene (Surr)	*97*		*76 - 123*		*10/05/18 11:28*	*1*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/05/18 11:28*	*1*
Toluene-d8 (Surr)	*91*		*77 - 120*		*10/05/18 11:28*	*1*

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 480-437821/5
Matrix: Water
Analysis Batch: 437821

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	20.0	18.8		ug/L		94	59 - 155
1,2-Dichlorobenzene	20.0	18.9		ug/L		95	18 - 190
1,3-Dichlorobenzene	20.0	18.9		ug/L		94	59 - 156
1,4-Dichlorobenzene	20.0	18.9		ug/L		94	18 - 190
Benzene	20.0	18.5		ug/L		92	37 - 151
Chlorobenzene	20.0	18.5		ug/L		93	37 - 160
Tetrachloroethene	20.0	16.8		ug/L		84	64 - 148
Toluene	20.0	17.7		ug/L		89	47 - 150
Trichloroethene	20.0	18.5		ug/L		93	71 - 157
Vinyl chloride	20.0	16.9		ug/L		84	1 - 251
1,1,1-Trichloroethane	20.0	17.7		ug/L		88	52 - 162
cis-1,3-Dichloropropene	20.0	18.6		ug/L		93	1 - 227
Bromoform	20.0	16.8		ug/L		84	45 - 169
1,2-Dichloroethane	20.0	20.7		ug/L		104	49 - 155
1,2-Dichloropropane	20.0	18.4		ug/L		92	1 - 210
1,1,2-Trichloroethane	20.0	19.3		ug/L		97	52 - 150
Methylene Chloride	20.0	18.7		ug/L		93	1 - 221
Chloromethane	20.0	18.6		ug/L		93	1 - 273
Bromomethane	20.0	17.8		ug/L		89	1 - 242
Chlorodibromomethane	20.0	18.3		ug/L		92	53 - 149
1,1,2,2-Tetrachloroethane	20.0	20.2		ug/L		101	46 - 157
Chloroethane	20.0	18.2		ug/L		91	14 - 230
1,1-Dichloroethene	20.0	17.0		ug/L		85	1 - 234
Ethylbenzene	20.0	17.8		ug/L		89	37 - 162
trans-1,3-Dichloropropene	20.0	18.5		ug/L		92	17 - 183
Chloroform	20.0	19.0		ug/L		95	51 - 138
Carbon tetrachloride	20.0	17.2		ug/L		86	70 - 140
Dichlorobromomethane	20.0	19.4		ug/L		97	35 - 155

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*94*		*68 - 130*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*
Dibromofluoromethane (Surr)	*96*		*75 - 123*
Toluene-d8 (Surr)	*92*		*77 - 120*

Lab Sample ID: MB 480-438162/8
Matrix: Water
Analysis Batch: 438162

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/08/18 12:22	1
1,2,4-Trichlorobenzene	ND		5.0	0.39	ug/L			10/08/18 12:22	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/08/18 12:22	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/08/18 12:22	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/08/18 12:22	1
2-Chlorotoluene	ND		5.0	0.33	ug/L			10/08/18 12:22	1
3-Chlorotoluene	ND		5.0	0.31	ug/L			10/08/18 12:22	1
4-Chlorotoluene	ND		5.0	0.27	ug/L			10/08/18 12:22	1

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 480-438162/8
Matrix: Water
Analysis Batch: 438162

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	ND		25	2.0	ug/L			10/08/18 12:22	1
Benzene	ND		5.0	0.60	ug/L			10/08/18 12:22	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/08/18 12:22	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/08/18 12:22	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/08/18 12:22	1
Toluene	ND		5.0	0.45	ug/L			10/08/18 12:22	1
Trichloroethene	ND		5.0	0.60	ug/L			10/08/18 12:22	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/08/18 12:22	1
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/08/18 12:22	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/08/18 12:22	1
Carbon disulfide	ND		5.0	0.29	ug/L			10/08/18 12:22	1
Bromoform	ND		5.0	0.47	ug/L			10/08/18 12:22	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/08/18 12:22	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/08/18 12:22	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/08/18 12:22	1
4-Methyl-2-pentanone (MIBK)	ND		25	1.3	ug/L			10/08/18 12:22	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/08/18 12:22	1
Chloromethane	ND		5.0	0.64	ug/L			10/08/18 12:22	1
Bromomethane	ND		5.0	1.2	ug/L			10/08/18 12:22	1
Chlorodibromomethane	ND		5.0	0.41	ug/L			10/08/18 12:22	1
1,2-Dichloroethene, Total	ND		10	3.2	ug/L			10/08/18 12:22	1
Styrene	ND		5.0	0.38	ug/L			10/08/18 12:22	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/08/18 12:22	1
Chloroethane	ND		5.0	0.87	ug/L			10/08/18 12:22	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/08/18 12:22	1
2-Hexanone	ND		25	2.0	ug/L			10/08/18 12:22	1
2-Butanone (MEK)	ND		25	1.8	ug/L			10/08/18 12:22	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/08/18 12:22	1
Xylenes, Total	ND		10	1.1	ug/L			10/08/18 12:22	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/08/18 12:22	1
Chloroform	ND		5.0	0.54	ug/L			10/08/18 12:22	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/08/18 12:22	1
Dichlorobromomethane	ND		5.0	0.54	ug/L			10/08/18 12:22	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*94*		*68 - 130*		*10/08/18 12:22*	*1*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*		*10/08/18 12:22*	*1*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/08/18 12:22*	*1*
Toluene-d8 (Surr)	*89*		*77 - 120*		*10/08/18 12:22*	*1*

Lab Sample ID: LCS 480-438162/5
Matrix: Water
Analysis Batch: 438162

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	20.0	18.0		ug/L		90	59 - 155
1,2-Dichlorobenzene	20.0	19.0		ug/L		95	18 - 190
1,3-Dichlorobenzene	20.0	18.4		ug/L		92	59 - 156

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 480-438162/5
Matrix: Water
Analysis Batch: 438162

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	20.0	18.7		ug/L		93	18 - 190
Benzene	20.0	17.9		ug/L		90	37 - 151
Chlorobenzene	20.0	18.0		ug/L		90	37 - 160
Tetrachloroethene	20.0	15.4		ug/L		77	64 - 148
Toluene	20.0	17.1		ug/L		86	47 - 150
Trichloroethene	20.0	17.3		ug/L		86	71 - 157
Vinyl chloride	20.0	14.9		ug/L		75	1 - 251
1,1,1-Trichloroethane	20.0	16.3		ug/L		81	52 - 162
cis-1,3-Dichloropropene	20.0	18.8		ug/L		94	1 - 227
Bromoform	20.0	16.3		ug/L		81	45 - 169
1,2-Dichloroethane	20.0	21.3		ug/L		106	49 - 155
1,2-Dichloropropane	20.0	19.0		ug/L		95	1 - 210
1,1,2-Trichloroethane	20.0	19.6		ug/L		98	52 - 150
Methylene Chloride	20.0	19.6		ug/L		98	1 - 221
Chloromethane	20.0	17.0		ug/L		85	1 - 273
Bromomethane	20.0	17.6		ug/L		88	1 - 242
Chlorodibromomethane	20.0	18.1		ug/L		91	53 - 149
1,1,2,2-Tetrachloroethane	20.0	19.4		ug/L		97	46 - 157
Chloroethane	20.0	16.9		ug/L		84	14 - 230
1,1-Dichloroethene	20.0	15.1		ug/L		76	1 - 234
Ethylbenzene	20.0	16.8		ug/L		84	37 - 162
trans-1,3-Dichloropropene	20.0	18.8		ug/L		94	17 - 183
Chloroform	20.0	19.5		ug/L		97	51 - 138
Carbon tetrachloride	20.0	14.6		ug/L		73	70 - 140
Dichlorobromomethane	20.0	19.5		ug/L		97	35 - 155

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*97*		*68 - 130*
4-Bromofluorobenzene (Surr)	*104*		*76 - 123*
Dibromofluoromethane (Surr)	*99*		*75 - 123*
Toluene-d8 (Surr)	*93*		*77 - 120*

Lab Sample ID: MB 480-438347/7
Matrix: Water
Analysis Batch: 438347

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/09/18 11:10	1
1,2,4-Trichlorobenzene	ND		5.0	0.39	ug/L			10/09/18 11:10	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/09/18 11:10	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/09/18 11:10	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/09/18 11:10	1
2-Chlorotoluene	ND		5.0	0.33	ug/L			10/09/18 11:10	1
3-Chlorotoluene	ND		5.0	0.31	ug/L			10/09/18 11:10	1
4-Chlorotoluene	ND		5.0	0.27	ug/L			10/09/18 11:10	1
Acetone	ND		25	2.0	ug/L			10/09/18 11:10	1
Benzene	ND		5.0	0.60	ug/L			10/09/18 11:10	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/09/18 11:10	1

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 480-438347/7
Matrix: Water
Analysis Batch: 438347

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/09/18 11:10	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/09/18 11:10	1
Toluene	ND		5.0	0.45	ug/L			10/09/18 11:10	1
Trichloroethene	ND		5.0	0.60	ug/L			10/09/18 11:10	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/09/18 11:10	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*94*		*68 - 130*		*10/09/18 11:10*	*1*
4-Bromofluorobenzene (Surr)	*101*		*76 - 123*		*10/09/18 11:10*	*1*
Dibromofluoromethane (Surr)	*93*		*75 - 123*		*10/09/18 11:10*	*1*
Toluene-d8 (Surr)	*89*		*77 - 120*		*10/09/18 11:10*	*1*

Lab Sample ID: LCS 480-438347/5
Matrix: Water
Analysis Batch: 438347

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	20.0	18.8		ug/L		94	59 - 155
1,2-Dichlorobenzene	20.0	19.3		ug/L		96	18 - 190
1,3-Dichlorobenzene	20.0	19.0		ug/L		95	59 - 156
1,4-Dichlorobenzene	20.0	19.3		ug/L		97	18 - 190
Benzene	20.0	18.6		ug/L		93	37 - 151
Chlorobenzene	20.0	18.5		ug/L		92	37 - 160
Tetrachloroethene	20.0	17.1		ug/L		85	64 - 148
Toluene	20.0	18.2		ug/L		91	47 - 150
Trichloroethene	20.0	18.0		ug/L		90	71 - 157
Vinyl chloride	20.0	18.1		ug/L		91	1 - 251

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*89*		*68 - 130*
4-Bromofluorobenzene (Surr)	*103*		*76 - 123*
Dibromofluoromethane (Surr)	*93*		*75 - 123*
Toluene-d8 (Surr)	*91*		*77 - 120*

Lab Sample ID: 480-142900-5 MS
Matrix: Water
Analysis Batch: 438347

Client Sample ID: WG-11109628-100318-DT-011
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	ND	F1 F2	200	198		ug/L		99	59 - 155
1,2-Dichlorobenzene	69	F2	200	333		ug/L		132	18 - 190
1,3-Dichlorobenzene	120	F1 F2	200	423		ug/L		150	59 - 156
1,4-Dichlorobenzene	190	F2	200	538		ug/L		175	18 - 190
Benzene	7.8	J F1 F2	200	206		ug/L		99	37 - 151
Chlorobenzene	370	F1	200	925	F1	ug/L		276	37 - 160
Tetrachloroethene	10	J F1 F2	200	200		ug/L		95	64 - 148
Toluene	ND	F1 F2	200	192		ug/L		96	47 - 150
Trichloroethene	25	J F1 F2	200	237		ug/L		106	71 - 157

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 480-142900-5 MS
Matrix: Water
Analysis Batch: 438347

Client Sample ID: WG-11109628-100318-DT-011
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Vinyl chloride	ND	F2	200	186		ug/L		93	1 - 251

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*88*		*68 - 130*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*
Dibromofluoromethane (Surr)	*89*		*75 - 123*
Toluene-d8 (Surr)	*89*		*77 - 120*

Lab Sample ID: 480-142900-5 MSD
Matrix: Water
Analysis Batch: 438347

Client Sample ID: WG-11109628-100318-DT-011
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-Dichloroethane	ND	F1 F2	200	195		ug/L		97	59 - 155	2	15
1,2-Dichlorobenzene	69	F2	200	341		ug/L		136	18 - 190	2	15
1,3-Dichlorobenzene	120	F1 F2	200	426		ug/L		151	59 - 156	1	15
1,4-Dichlorobenzene	190	F2	200	552		ug/L		182	18 - 190	3	15
Benzene	7.8	J F1 F2	200	201		ug/L		97	37 - 151	2	15
Chlorobenzene	370	F1	200	901	F1	ug/L		264	37 - 160	3	15
Tetrachloroethene	10	J F1 F2	200	195		ug/L		92	64 - 148	3	15
Toluene	ND	F1 F2	200	185		ug/L		92	47 - 150	4	15
Trichloroethene	25	J F1 F2	200	227		ug/L		101	71 - 157	5	15
Vinyl chloride	ND	F2	200	180		ug/L		90	1 - 251	3	15

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*89*		*68 - 130*
4-Bromofluorobenzene (Surr)	*100*		*76 - 123*
Dibromofluoromethane (Surr)	*89*		*75 - 123*
Toluene-d8 (Surr)	*88*		*77 - 120*

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Lab Sample ID: MB 480-438341/1-A
Matrix: Water
Analysis Batch: 438984

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 438341

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		10/09/18 07:33	10/11/18 19:44	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*37*		*15 - 110*	*10/09/18 07:33*	*10/11/18 19:44*	*1*

Lab Sample ID: LCS 480-438341/2-A
Matrix: Water
Analysis Batch: 438984

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 438341

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	1.00	1.10		ug/L		110	40 - 140

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
1,4-Dioxane-d8	35		15 - 110

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-251626/1-A
Matrix: Water
Analysis Batch: 252402

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 251626

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		2.0	0.35	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorohexanesulfonic acid (PFHxS)	0.314	J	2.0	0.17	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		10/12/18 08:46	10/16/18 00:04	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.35	ng/L		10/12/18 08:46	10/16/18 00:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		10/12/18 08:46	10/16/18 00:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		10/12/18 08:46	10/16/18 00:04	1
6:2 FTS	ND		20	2.0	ng/L		10/12/18 08:46	10/16/18 00:04	1
8:2 FTS	ND		20	2.0	ng/L		10/12/18 08:46	10/16/18 00:04	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	92		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C5 PFPeA	96		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C2 PFHxA	91		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C4 PFHpA	97		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C4 PFOA	100		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C5 PFNA	98		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C2 PFDA	93		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C2 PFUnA	92		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C2 PFDoA	88		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C2 PFTeDA	91		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C3 PFBS	91		25 - 150	10/12/18 08:46	10/16/18 00:04	1
18O2 PFHxS	96		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C4 PFOS	95		25 - 150	10/12/18 08:46	10/16/18 00:04	1
13C8 FOSA	86		25 - 150	10/12/18 08:46	10/16/18 00:04	1
d3-NMeFOSAA	102		25 - 150	10/12/18 08:46	10/16/18 00:04	1
d5-NEtFOSAA	104		25 - 150	10/12/18 08:46	10/16/18 00:04	1
M2-6:2 FTS	117		25 - 150	10/12/18 08:46	10/16/18 00:04	1
M2-8:2 FTS	99		25 - 150	10/12/18 08:46	10/16/18 00:04	1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-251626/2-A
Matrix: Water
Analysis Batch: 252402

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 251626

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	40.0	39.7		ng/L		99	70 - 130
Perfluoropentanoic acid (PFPeA)	40.0	37.9		ng/L		95	66 - 126
Perfluorohexanoic acid (PFHxA)	40.0	40.5		ng/L		101	66 - 126
Perfluoroheptanoic acid (PFHpA)	40.0	40.7		ng/L		102	66 - 126
Perfluorooctanoic acid (PFOA)	40.0	42.3		ng/L		106	64 - 124
Perfluorononanoic acid (PFNA)	40.0	43.5		ng/L		109	68 - 128
Perfluorodecanoic acid (PFDA)	40.0	40.8		ng/L		102	69 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	36.4		ng/L		91	60 - 120
Perfluorododecanoic acid (PFDoA)	40.0	39.7		ng/L		99	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	40.3		ng/L		101	72 - 132
Perfluorotetradecanoic acid (PFTeA)	40.0	36.1		ng/L		90	68 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	34.0		ng/L		96	73 - 133
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.2		ng/L		91	63 - 123
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	38.0		ng/L		100	68 - 128
Perfluorooctanesulfonic acid (PFOS)	37.1	34.8		ng/L		94	67 - 127
Perfluorodecanesulfonic acid (PFDS)	38.6	38.7		ng/L		100	68 - 128
Perfluorooctanesulfonamide (FOSA)	40.0	37.3		ng/L		93	70 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	35.1		ng/L		88	67 - 127
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	34.9		ng/L		87	65 - 125
6:2 FTS	37.9	35.2		ng/L		93	66 - 126
8:2 FTS	38.3	35.2		ng/L		92	67 - 127

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C4 PFBA	*102*		*25 - 150*
13C5 PFPeA	*103*		*25 - 150*
13C2 PFHxA	*100*		*25 - 150*
13C4 PFHpA	*102*		*25 - 150*
13C4 PFOA	*103*		*25 - 150*
13C5 PFNA	*100*		*25 - 150*
13C2 PFDA	*102*		*25 - 150*
13C2 PFUnA	*99*		*25 - 150*
13C2 PFDoA	*97*		*25 - 150*
13C2 PFTeDA	*103*		*25 - 150*
13C3 PFBS	*103*		*25 - 150*
18O2 PFHxS	*101*		*25 - 150*
13C4 PFOS	*102*		*25 - 150*
13C8 FOSA	*97*		*25 - 150*
d3-NMeFOSAA	*115*		*25 - 150*
d5-NEtFOSAA	*120*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-251626/2-A
Matrix: Water
Analysis Batch: 252402

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 251626

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
M2-6:2 FTS	121		25 - 150
M2-8:2 FTS	119		25 - 150

Lab Sample ID: LCSD 320-251626/3-A
Matrix: Water
Analysis Batch: 252402

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 251626

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)			40.0	40.6		ng/L		101	70 - 130	2	30
Perfluoropentanoic acid (PFPeA)			40.0	39.2		ng/L		98	66 - 126	3	30
Perfluorohexanoic acid (PFHxA)			40.0	36.0		ng/L		90	66 - 126	12	30
Perfluoroheptanoic acid (PFHpA)			40.0	38.6		ng/L		96	66 - 126	5	30
Perfluorooctanoic acid (PFOA)			40.0	40.9		ng/L		102	64 - 124	4	30
Perfluorononanoic acid (PFNA)			40.0	37.5		ng/L		94	68 - 128	15	30
Perfluorodecanoic acid (PFDA)			40.0	41.0		ng/L		103	69 - 129	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	37.4		ng/L		93	60 - 120	3	30
Perfluorododecanoic acid (PFDoA)			40.0	37.2		ng/L		93	71 - 131	6	30
Perfluorotridecanoic acid (PFTriA)			40.0	38.8		ng/L		97	72 - 132	4	30
Perfluorotetradecanoic acid (PFTeA)			40.0	37.3		ng/L		93	68 - 128	3	30
Perfluorobutanesulfonic acid (PFBS)			35.4	32.6		ng/L		92	73 - 133	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.4		ng/L		89	63 - 123	2	30
Perfluoroheptanesulfonic Acid (PFHpS)			38.1	35.8		ng/L		94	68 - 128	6	30
Perfluorooctanesulfonic acid (PFOS)			37.1	34.8		ng/L		94	67 - 127	0	30
Perfluorodecanesulfonic acid (PFDS)			38.6	37.0		ng/L		96	68 - 128	5	30
Perfluorooctanesulfonamide (FOSA)			40.0	39.6		ng/L		99	70 - 130	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	35.3		ng/L		88	67 - 127	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	39.9		ng/L		100	65 - 125	13	30
6:2 FTS			37.9	37.2		ng/L		98	66 - 126	6	30
8:2 FTS			38.3	38.6		ng/L		101	67 - 127	9	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFBA	97		25 - 150
13C5 PFPeA	102		25 - 150
13C2 PFHxA	98		25 - 150
13C4 PFHpA	103		25 - 150
13C4 PFOA	99		25 - 150
13C5 PFNA	108		25 - 150
13C2 PFDA	97		25 - 150
13C2 PFUnA	98		25 - 150

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-251626/3-A
Matrix: Water
Analysis Batch: 252402

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 251626

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C2 PFDoA	99		25 - 150
13C2 PFTeDA	101		25 - 150
13C3 PFBS	103		25 - 150
18O2 PFHxS	102		25 - 150
13C4 PFOS	101		25 - 150
13C8 FOSA	92		25 - 150
d3-NMeFOSAA	115		25 - 150
d5-NEtFOSAA	109		25 - 150
M2-6:2 FTS	112		25 - 150
M2-8:2 FTS	104		25 - 150

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 480-437962/1-A
Matrix: Water
Analysis Batch: 438330

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 437962

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		15.0	5.6	ug/L		10/06/18 08:53	10/08/18 13:03	1
Iron	ND		50.0	19.3	ug/L		10/06/18 08:53	10/08/18 13:03	1
Potassium	ND		500	100	ug/L		10/06/18 08:53	10/08/18 13:03	1
Sodium	ND		1000	324	ug/L		10/06/18 08:53	10/08/18 13:03	1

Lab Sample ID: LCS 480-437962/2-A
Matrix: Water
Analysis Batch: 438330

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 437962

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	203.1		ug/L		102	85 - 115
Iron	10000	10180		ug/L		102	85 - 115
Potassium	10000	9448		ug/L		94	85 - 115
Sodium	10000	9932		ug/L		99	85 - 115

Lab Sample ID: 480-142900-5 MS
Matrix: Water
Analysis Batch: 438330

Client Sample ID: WG-11109628-100318-DT-011
Prep Type: Total/NA
Prep Batch: 437962

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		200	208.5		ug/L		104	70 - 130
Iron	228		10000	10050		ug/L		98	70 - 130
Potassium	172000	^	10000	173700	4	ug/L		20	70 - 130
Sodium	97300		10000	103200	4	ug/L		59	70 - 130

Lab Sample ID: 480-142900-5 MSD
Matrix: Water
Analysis Batch: 438330

Client Sample ID: WG-11109628-100318-DT-011
Prep Type: Total/NA
Prep Batch: 437962

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		200	213.9		ug/L		107	70 - 130	3	20

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: 480-142900-5 MSD — **Client Sample ID: WG-11109628-100318-DT-011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438330 — **Prep Batch: 437962**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Iron	228		10000	10190		ug/L		100	70 - 130	1	20
Potassium	172000	^	10000	181700	4	ug/L		100	70 - 130	4	20
Sodium	97300		10000	103400	4	ug/L		60	70 - 130	0	20

Method: 420.1 - Phenolics, Total Recoverable

Lab Sample ID: MB 480-437939/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438468 — **Prep Batch: 437939**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Recoverable Phenolics	ND		10.0	5.0	ug/L		10/05/18 13:56	10/09/18 11:37	1

Lab Sample ID: LCS 480-437939/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438468 — **Prep Batch: 437939**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Recoverable Phenolics	100	98.55		ug/L		99	90 - 110

Lab Sample ID: 480-142900-4 MS — **Client Sample ID: WG-11109628-100318-DT-009**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438468 — **Prep Batch: 437939**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Recoverable Phenolics	45.9	F1	100	134.8	F1	ug/L		89	90 - 110

Lab Sample ID: 480-142900-5 MS — **Client Sample ID: WG-11109628-100318-DT-011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438468 — **Prep Batch: 437939**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Recoverable Phenolics	6.4	J	100	100.6		ug/L		94	90 - 110

Lab Sample ID: 480-142900-5 MSD — **Client Sample ID: WG-11109628-100318-DT-011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438468 — **Prep Batch: 437939**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Recoverable Phenolics	6.4	J	100	106.6		ug/L		100	90 - 110	6	20

GC/MS VOA

Analysis Batch: 437821

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-2	WG-11109628-100318-DT-007	Total/NA	Water	624.1	
480-142900-4	WG-11109628-100318-DT-009	Total/NA	Water	624.1	
480-142900-6	TB-11109628-100318-DT	Total/NA	Water	624.1	
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	624.1	
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	624.1	
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	624.1	
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	624.1	
MB 480-437821/51	Method Blank	Total/NA	Water	624.1	
LCS 480-437821/5	Lab Control Sample	Total/NA	Water	624.1	

Analysis Batch: 438162

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	624.1	
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	624.1	
480-142900-5	WG-11109628-100318-DT-011	Total/NA	Water	624.1	
480-142900-7	WG-11109628-100318-SG-010	Total/NA	Water	624.1	
480-142900-9 - DL	WG-11109628-100318-DT-013	Total/NA	Water	624.1	
480-142900-10	WG-11109628-100318-SG-012	Total/NA	Water	624.1	
480-142900-11 - DL	WG-11109628-100418-SG-014	Total/NA	Water	624.1	
480-142900-12 - DL	WG-11109628-100418-SG-016	Total/NA	Water	624.1	
480-142900-13	WG-11109628-100418-DT-017	Total/NA	Water	624.1	
MB 480-438162/8	Method Blank	Total/NA	Water	624.1	
LCS 480-438162/5	Lab Control Sample	Total/NA	Water	624.1	

Analysis Batch: 438347

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-4 - DL	WG-11109628-100318-DT-009	Total/NA	Water	624.1	
MB 480-438347/7	Method Blank	Total/NA	Water	624.1	
LCS 480-438347/5	Lab Control Sample	Total/NA	Water	624.1	
480-142900-5 MS	WG-11109628-100318-DT-011	Total/NA	Water	624.1	
480-142900-5 MSD	WG-11109628-100318-DT-011	Total/NA	Water	624.1	

GC/MS Semi VOA

Prep Batch: 438341

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	3510C	
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	3510C	
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	3510C	
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	3510C	
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	3510C	
MB 480-438341/1-A	Method Blank	Total/NA	Water	3510C	
LCS 480-438341/2-A	Lab Control Sample	Total/NA	Water	3510C	

Analysis Batch: 438984

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	8270D SIM ID	438341
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	8270D SIM ID	438341
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	8270D SIM ID	438341
MB 480-438341/1-A	Method Blank	Total/NA	Water	8270D SIM ID	438341

GC/MS Semi VOA (Continued)

Analysis Batch: 438984 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-438341/2-A	Lab Control Sample	Total/NA	Water	8270D SIM ID	438341

Analysis Batch: 439689

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	8270D SIM ID	438341
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	8270D SIM ID	438341

LCMS

Prep Batch: 251626

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-14	WG-11109628-092818-DT-001	Total/NA	Water	3535	
480-142900-14 - DL	WG-11109628-092818-DT-001	Total/NA	Water	3535	
480-142900-15	WG-11109628-092818-DT-002	Total/NA	Water	3535	
480-142900-15 - DL	WG-11109628-092818-DT-002	Total/NA	Water	3535	
480-142900-16	WG-11109628-092818-DT-003	Total/NA	Water	3535	
480-142900-16 - DL	WG-11109628-092818-DT-003	Total/NA	Water	3535	
480-142900-17	WG-11109628-092818-DT-004	Total/NA	Water	3535	
480-142900-17 - DL	WG-11109628-092818-DT-004	Total/NA	Water	3535	
480-142900-18	WG-11109628-092818-DT-005	Total/NA	Water	3535	
480-142900-18 - DL	WG-11109628-092818-DT-005	Total/NA	Water	3535	
MB 320-251626/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-251626/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-251626/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 252402

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-14	WG-11109628-092818-DT-001	Total/NA	Water	537 (modified)	251626
480-142900-15	WG-11109628-092818-DT-002	Total/NA	Water	537 (modified)	251626
480-142900-16	WG-11109628-092818-DT-003	Total/NA	Water	537 (modified)	251626
480-142900-17	WG-11109628-092818-DT-004	Total/NA	Water	537 (modified)	251626
480-142900-18	WG-11109628-092818-DT-005	Total/NA	Water	537 (modified)	251626
MB 320-251626/1-A	Method Blank	Total/NA	Water	537 (modified)	251626
LCS 320-251626/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	251626
LCSD 320-251626/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	251626

Analysis Batch: 253446

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-14 - DL	WG-11109628-092818-DT-001	Total/NA	Water	537 (modified)	251626
480-142900-15 - DL	WG-11109628-092818-DT-002	Total/NA	Water	537 (modified)	251626
480-142900-16 - DL	WG-11109628-092818-DT-003	Total/NA	Water	537 (modified)	251626
480-142900-17 - DL	WG-11109628-092818-DT-004	Total/NA	Water	537 (modified)	251626
480-142900-18 - DL	WG-11109628-092818-DT-005	Total/NA	Water	537 (modified)	251626

Metals

Prep Batch: 437962

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	200.7	
480-142900-2	WG-11109628-100318-DT-007	Total/NA	Water	200.7	

Metals (Continued)

Prep Batch: 437962 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	200.7	
480-142900-4	WG-11109628-100318-DT-009	Total/NA	Water	200.7	
480-142900-5	WG-11109628-100318-DT-011	Total/NA	Water	200.7	
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	200.7	
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	200.7	
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	200.7	
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	200.7	
MB 480-437962/1-A	Method Blank	Total/NA	Water	200.7	
LCS 480-437962/2-A	Lab Control Sample	Total/NA	Water	200.7	
480-142900-5 MS	WG-11109628-100318-DT-011	Total/NA	Water	200.7	
480-142900-5 MSD	WG-11109628-100318-DT-011	Total/NA	Water	200.7	

Analysis Batch: 438330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-2	WG-11109628-100318-DT-007	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-4	WG-11109628-100318-DT-009	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-5	WG-11109628-100318-DT-011	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	200.7 Rev 4.4	437962
MB 480-437962/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	437962
LCS 480-437962/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-5 MS	WG-11109628-100318-DT-011	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-5 MSD	WG-11109628-100318-DT-011	Total/NA	Water	200.7 Rev 4.4	437962

Analysis Batch: 438561

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	200.7 Rev 4.4	437962
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	200.7 Rev 4.4	437962

General Chemistry

Prep Batch: 437939

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	Distill/Phenol	
480-142900-2	WG-11109628-100318-DT-007	Total/NA	Water	Distill/Phenol	
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	Distill/Phenol	
480-142900-4	WG-11109628-100318-DT-009	Total/NA	Water	Distill/Phenol	
480-142900-5	WG-11109628-100318-DT-011	Total/NA	Water	Distill/Phenol	
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	Distill/Phenol	
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	Distill/Phenol	
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	Distill/Phenol	
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	Distill/Phenol	
MB 480-437939/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

General Chemistry (Continued)

Prep Batch: 437939 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-437939/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
480-142900-4 MS	WG-11109628-100318-DT-009	Total/NA	Water	Distill/Phenol	
480-142900-5 MS	WG-11109628-100318-DT-011	Total/NA	Water	Distill/Phenol	
480-142900-5 MSD	WG-11109628-100318-DT-011	Total/NA	Water	Distill/Phenol	

Analysis Batch: 438468

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-142900-1	WG-11109628-100318-SG-006	Total/NA	Water	420.1	437939
480-142900-2	WG-11109628-100318-DT-007	Total/NA	Water	420.1	437939
480-142900-3	WG-11109628-100318-SG-008	Total/NA	Water	420.1	437939
480-142900-4	WG-11109628-100318-DT-009	Total/NA	Water	420.1	437939
480-142900-5	WG-11109628-100318-DT-011	Total/NA	Water	420.1	437939
480-142900-8	WG-11109628-100318-DT-015	Total/NA	Water	420.1	437939
480-142900-9	WG-11109628-100318-DT-013	Total/NA	Water	420.1	437939
480-142900-11	WG-11109628-100418-SG-014	Total/NA	Water	420.1	437939
480-142900-12	WG-11109628-100418-SG-016	Total/NA	Water	420.1	437939
MB 480-437939/1-A	Method Blank	Total/NA	Water	420.1	437939
LCS 480-437939/2-A	Lab Control Sample	Total/NA	Water	420.1	437939
480-142900-4 MS	WG-11109628-100318-DT-009	Total/NA	Water	420.1	437939
480-142900-5 MS	WG-11109628-100318-DT-011	Total/NA	Water	420.1	437939
480-142900-5 MSD	WG-11109628-100318-DT-011	Total/NA	Water	420.1	437939

Client Sample ID: WG-11109628-100318-SG-006

Lab Sample ID: 480-142900-1

Date Collected: 10/03/18 10:15

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		5	438162	10/08/18 16:56	S1V	TAL BUF
Total/NA	Prep	3510C			438341	10/09/18 07:33	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	438984	10/11/18 21:41	DMR	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:11	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:37	AED	TAL BUF

Client Sample ID: WG-11109628-100318-DT-007

Lab Sample ID: 480-142900-2

Date Collected: 10/03/18 10:00

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		40	437821	10/05/18 15:01	S1V	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:33	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:37	AED	TAL BUF

Client Sample ID: WG-11109628-100318-SG-008

Lab Sample ID: 480-142900-3

Date Collected: 10/03/18 11:55

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		2	438162	10/08/18 17:20	S1V	TAL BUF
Total/NA	Prep	3510C			438341	10/09/18 07:33	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		5	438984	10/11/18 22:04	DMR	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:37	LMH	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		10	438561	10/09/18 09:51	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:37	AED	TAL BUF

Client Sample ID: WG-11109628-100318-DT-009

Lab Sample ID: 480-142900-4

Date Collected: 10/03/18 10:00

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	437821	10/05/18 15:48	S1V	TAL BUF
Total/NA	Analysis	624.1	DL	80	438347	10/09/18 13:49	S1V	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF

Lab Chronicle

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-100318-DT-009

Lab Sample ID: 480-142900-4

Date Collected: 10/03/18 10:00
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:41	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:37	AED	TAL BUF

Client Sample ID: WG-11109628-100318-DT-011

Lab Sample ID: 480-142900-5

Date Collected: 10/03/18 11:08
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	438162	10/08/18 18:08	S1V	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:45	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:43	AED	TAL BUF

Client Sample ID: TB-11109628-100318-DT

Lab Sample ID: 480-142900-6

Date Collected: 10/03/18 00:00
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	437821	10/05/18 16:36	S1V	TAL BUF

Client Sample ID: WG-11109628-100318-SG-010

Lab Sample ID: 480-142900-7

Date Collected: 10/03/18 14:50
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	438162	10/08/18 13:09	S1V	TAL BUF

Client Sample ID: WG-11109628-100318-DT-015

Lab Sample ID: 480-142900-8

Date Collected: 10/03/18 14:40
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	437821	10/05/18 17:23	S1V	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 13:56	LMH	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		10	438561	10/09/18 09:54	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:43	AED	TAL BUF

Client Sample ID: WG-11109628-100318-DT-013

Lab Sample ID: 480-142900-9

Date Collected: 10/03/18 12:50

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	437821	10/05/18 17:47	S1V	TAL BUF
Total/NA	Analysis	624.1	DL	20	438162	10/08/18 18:32	S1V	TAL BUF
Total/NA	Prep	3510C			438341	10/09/18 07:33	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		20	439689	10/16/18 14:19	DMR	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 14:00	LMH	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		5	438561	10/09/18 09:58	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:43	AED	TAL BUF

Client Sample ID: WG-11109628-100318-SG-012

Lab Sample ID: 480-142900-10

Date Collected: 10/03/18 16:10

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		2	438162	10/08/18 18:56	S1V	TAL BUF

Client Sample ID: WG-11109628-100418-SG-014

Lab Sample ID: 480-142900-11

Date Collected: 10/04/18 10:15

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	437821	10/05/18 18:34	S1V	TAL BUF
Total/NA	Analysis	624.1	DL	40	438162	10/08/18 19:20	S1V	TAL BUF
Total/NA	Prep	3510C			438341	10/09/18 07:33	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		5	438984	10/11/18 22:51	DMR	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 14:15	LMH	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		5	438561	10/09/18 10:02	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:43	AED	TAL BUF

Client Sample ID: WG-11109628-100418-SG-016

Lab Sample ID: 480-142900-12

Date Collected: 10/04/18 11:15

Matrix: Water

Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		10	437821	10/05/18 18:58	S1V	TAL BUF
Total/NA	Analysis	624.1	DL	20	438162	10/08/18 19:44	S1V	TAL BUF
Total/NA	Prep	3510C			438341	10/09/18 07:33	JMP	TAL BUF

Client Sample ID: WG-11109628-100418-SG-016

Lab Sample ID: 480-142900-12

Date Collected: 10/04/18 11:15
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8270D SIM ID		20	439689	10/16/18 14:43	DMR	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	438330	10/08/18 14:19	LMH	TAL BUF
Total/NA	Prep	200.7			437962	10/06/18 08:53	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		5	438561	10/09/18 10:06	LMH	TAL BUF
Total/NA	Prep	Distill/Phenol			437939	10/05/18 13:56	AEF	TAL BUF
Total/NA	Analysis	420.1		1	438468	10/09/18 11:43	AED	TAL BUF

Client Sample ID: WG-11109628-100418-DT-017

Lab Sample ID: 480-142900-13

Date Collected: 10/04/18 10:05
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		2	438162	10/08/18 20:08	S1V	TAL BUF

Client Sample ID: WG-11109628-092818-DT-001

Lab Sample ID: 480-142900-14

Date Collected: 09/28/18 09:45
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)		1	252402	10/16/18 00:56	JRB	TAL SAC
Total/NA	Prep	3535	DL		251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)	DL	2	253446	10/19/18 10:51	CBW	TAL SAC

Client Sample ID: WG-11109628-092818-DT-002

Lab Sample ID: 480-142900-15

Date Collected: 09/28/18 10:10
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)		1	252402	10/16/18 01:03	JRB	TAL SAC
Total/NA	Prep	3535	DL		251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5	253446	10/19/18 10:59	CBW	TAL SAC

Client Sample ID: WG-11109628-092818-DT-003

Lab Sample ID: 480-142900-16

Date Collected: 09/28/18 10:30
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)		1	252402	10/16/18 01:11	JRB	TAL SAC
Total/NA	Prep	3535	DL		251626	10/12/18 09:47	MYV	TAL SAC

Lab Chronicle

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Client Sample ID: WG-11109628-092818-DT-003

Lab Sample ID: 480-142900-16

Date Collected: 09/28/18 10:30
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	537 (modified)	DL	20	253446	10/19/18 11:06	CBW	TAL SAC

Client Sample ID: WG-11109628-092818-DT-004

Lab Sample ID: 480-142900-17

Date Collected: 09/28/18 10:55
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)		1	252402	10/16/18 01:25	JRB	TAL SAC
Total/NA	Prep	3535	DL		251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20	253446	10/19/18 11:14	CBW	TAL SAC

Client Sample ID: WG-11109628-092818-DT-005

Lab Sample ID: 480-142900-18

Date Collected: 09/28/18 11:09
Matrix: Water
Date Received: 10/04/18 13:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)		1	252402	10/16/18 01:33	JRB	TAL SAC
Total/NA	Prep	3535	DL		251626	10/12/18 09:47	MYV	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10	253446	10/19/18 11:21	CBW	TAL SAC

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: GHD Services Inc. TestAmerica Job ID: 480-142900-1
Project/Site: 11109628, Frontier Chemical - NF POTW

Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	10026	03-31-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
624.1		Water	1,2,4-Trichlorobenzene
624.1		Water	1,2-Dichloroethene, Total
624.1		Water	2-Butanone (MEK)
624.1		Water	2-Chlorotoluene
624.1		Water	2-Hexanone
624.1		Water	3-Chlorotoluene
624.1		Water	4-Chlorotoluene
624.1		Water	4-Methyl-2-pentanone (MIBK)
624.1		Water	Carbon disulfide

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Method	Method Description	Protocol	Laboratory
624.1	Volatile Organic Compounds (GC/MS)	40CFR136A	TAL BUF
8270D SIM ID	Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)	SW846	TAL BUF
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
200.7 Rev 4.4	Metals (ICP)	EPA	TAL BUF
420.1	Phenolics, Total Recoverable	MCAWW	TAL BUF
200.7	Preparation, Total Metals	EPA	TAL BUF
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL BUF
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
Distill/Phenol	Distillation, Phenolics	None	TAL BUF

Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

None = None

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

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: GHD Services Inc.
Project/Site: 11109628, Frontier Chemical - NF POTW

TestAmerica Job ID: 480-142900-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-142900-1	WG-11109628-100318-SG-006	Water	10/03/18 10:15	10/04/18 13:05
480-142900-2	WG-11109628-100318-DT-007	Water	10/03/18 10:00	10/04/18 13:05
480-142900-3	WG-11109628-100318-SG-008	Water	10/03/18 11:55	10/04/18 13:05
480-142900-4	WG-11109628-100318-DT-009	Water	10/03/18 10:00	10/04/18 13:05
480-142900-5	WG-11109628-100318-DT-011	Water	10/03/18 11:08	10/04/18 13:05
480-142900-6	TB-11109628-100318-DT	Water	10/03/18 00:00	10/04/18 13:05
480-142900-7	WG-11109628-100318-SG-010	Water	10/03/18 14:50	10/04/18 13:05
480-142900-8	WG-11109628-100318-DT-015	Water	10/03/18 14:40	10/04/18 13:05
480-142900-9	WG-11109628-100318-DT-013	Water	10/03/18 12:50	10/04/18 13:05
480-142900-10	WG-11109628-100318-SG-012	Water	10/03/18 16:10	10/04/18 13:05
480-142900-11	WG-11109628-100418-SG-014	Water	10/04/18 10:15	10/04/18 13:05
480-142900-12	WG-11109628-100418-SG-016	Water	10/04/18 11:15	10/04/18 13:05
480-142900-13	WG-11109628-100418-DT-017	Water	10/04/18 10:05	10/04/18 13:05
480-142900-14	WG-11109628-092818-DT-001	Water	09/28/18 09:45	10/04/18 13:05
480-142900-15	WG-11109628-092818-DT-002	Water	09/28/18 10:10	10/04/18 13:05
480-142900-16	WG-11109628-092818-DT-003	Water	09/28/18 10:30	10/04/18 13:05
480-142900-17	WG-11109628-092818-DT-004	Water	09/28/18 10:55	10/04/18 13:05
480-142900-18	WG-11109628-092818-DT-005	Water	09/28/18 11:09	10/04/18 13:05

CHAIN OF CUSTODY RECORD

COC NO.:

Address: NE office PAGE 1

Phone: Fax:

Project No/ Phase/Task Code: 11109628-04	Laboratory Name: Test America Buffalo	Lab Location: Amherst NY	SSOW ID:
Project Name: Frontier Chemical Annual GW	Lab Contact: Melissa Deyo		Cooler No:
Project Location: 47th Street and Royal Ave.			Carrier: Hand Delivered
GHD Chemistry Contact: Sheri Finn			Airbill No:
Sampler(s): S. Gardner D. Tyran			Total # of Containers: 55

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd//yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	SSPL VOCs	Phenols	SSPL Metals	1,4 Dioxane	Total Containers/sample	MS/MSD Request	Comments/ Special Instructions:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)						HC	HZ	HN				
1	WG-11109628-100318-SG-006	10-3-18	1015	WG	G	N	X	X	X	X	6		
2	WG-11109628-100318-DT-007	10-3-18	1000	WG	G	N	X	X	X		5		
3	WG-11109628-100318-SG-008	10-3-18	1155	WG	G	N	X	X	X	X	6		
4	WG-11109628-100318-DT-009	10-3-18	1000	WG	G	N	X	X	X		5		
5	WG-11109628-100318-DT-011	10-3-18	1108	WG	G	N	X	X	X		15	X	
6	TB-11109628-100318-DT	10-3-18		TB	G	N	X				1		
7	WG-11109628-100318-SG-010	10-3-18	1450	WG	G	N	X				3		
8	WG-11109628-100318-DT-015	10-3-18	1440	WG	G	N	X	X	X		5		
9	WG-11109628-100318-DT-013	10-3-18	1250	WG	G	N	X	X	X	X	6		
10	WG-11109628-100318-SG-012	10-3-18	1610	WG	G	N	X				3		DST
11													
12													

480-142900 COC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

Notes/ Special Requirements: #1, 3, 4, 3, 8

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1. Dave Tyran	GHD	10-4-18	1305	1. Cwalkle	TAB	10/4/18	1305
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

GHD Form: COC-10B (20110804)

CHAIN OF CUSTODY RECORD

COC NO.: 58605

Address: NF office

PAGE 2 OF 2

Phone: Fax:

Project No/ Phase/Task Code: 11109628-04	Laboratory Name: Test America Buffalo	Lab Location: Amherst NY	SSOW ID:
Project Name: Frontier Chemical Annual GW	Lab Contact: Melissa Deyo		Cooler No:
Project Location: 47th Street and Royal Ave			Carrier: Hand Delivered
GHD Chemistry Contact: Sheri Finn			Airbill No:
Sampler(s): S. Gardner D. Tyran			Total # of Containers: 155+15=70

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd//yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	SSPL VOCs	Phenols	SSPL Metals	1,4 Dioxane	Total Containers/sample	MS/MSD Request	Comments/ Special Instructions:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)						HC	H2	HN				
1	WG-11109628-100418-SG-014	10.4.18	1015	WG	G	N	X	X	X	X	6		DUP
2	WG-11109628-100418-SG-016	10.4.18	1115	WG	G	N	X	X	X	X	6		
3	WG-11109628-100418-DT-017	10.4.18	1005	WG	G	N	X				3		
4													
5													
6													
7													
8													
9													
10													
11													
12													

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1. Dave Tyran	GHD	10/4/18	1305	1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

GHD Form: COC-10B (20110804)

CHAIN OF CUSTODY RECORD

COC NO.:

Address: NE office PAGE ___ OF ___

Phone: _____ Fax: _____

11/13/2018 (Rev. 1)

Project No/ Phase/Task Code: 11096.28.04	Laboratory Name: Test America Buffalo	Lab Location: Amherst NY	SSOW ID:
Project Name: Fuel Chemical	Lab Contact: Melissa Deyo		Cooler No:
Project Location: 72nd Street & Royal Ave	SAMPLE TYPE / ANALYSIS REQUESTED (See Back of COC for Definitions)		Carrier: Hand Delivered
GHD Chemistry Contact: Steve Simon			Airbill No:
Sampler(s):			Total # of Containers: 10

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd//yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)								
1	WS-1110928-092818-DT-001	9-28-18	0945	WS	G	N	2		
2	WS-1110928-092818-DT-002	9-28-18	1010	WS	G	N	2		
3	WS-1110928-092818-DT-003	9-28-18	1030	WS	G	N	2		
4	WS-1110928-092818-DT-004	9-28-18	0955	WS	G	N	2		
5	WS-1110928-092818-DT-005	9-28-18	1109	WS	G	N	2		
6									
7									
8									
9									
10									
11									
12									

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☑ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.	GHD	9-28-18	1134	1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

GHD Form: COC-10B (20110804)

CHA CUSTODY RECORD

COC NO

OF ___

Address: _____

Phone: _____

480-142900 Chain of Custody

Project No/ Phase/Task Code.	laboratory Name:
Name:	lab Contact:
location:	SSOW ID:
Chemistry Contact:	Cooler No:
Sampler(s):	Carrier:
	Airbill No:
	Total # of Containers:

Item	SAMPLE (Containers for each sample may be combined on one line)	DATE (mm/dd/yy)	TIME (hh:mm)	SAMPLE TYPE: Matrix Code (see back of COC)	Q: Grab (G) or Comp	Filtered (Y/N)	ANALYSIS REQUESTED See Back of COG for Definitions	Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)									
1	WA 11109628-092818-DT-001	9-28-18	0945	WG	G	N	X	2		
2	WA 11109628-092818-DT-002	9-28-18	1010	WG	G	N	X	2		
3	WA 11109628-092818-DT-003	9-28-18	1030	WG	G	N	X	2		
4	WA 11109628-092818-DT-004	9-28-18	0955	WG	G	N	X	2		
5	WA 11109628-092818-DT-005	9-28-18	1109	WG	G	N	X	2		
6										
9										
10										
11										
12										

Required business days (use separate COCs for different TATs):

D 1 Day D 2 Days D 3 Days D 1 Week D 2 Week D Other:

Notes/ Special Requirements:

1.0°C

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
				1. John Nelson	TAUSTAE	10/6/18	900
				2.			
				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

WHITE – Fully Executed Copy (CRA) YELLOW - Receiving Laboratory Copy PINK – Shipper GOLDENROD - Sampling Crew

GHD Form: COC-10B(20110804)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

San Sacramento

480-142900 Field Sheet

Job: _____

Tracking # 4113 7 2536 4562 SO (PO) / FO / 2-Day / SAT / Ground / UPS / Courier / Drop Off / GSO / OnTrac / Goldstreak / USPS / Other _____

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations. File in the job folder with the COC.

Notes: _____

Therm. ID: **AK-2 / AK-3 / AK-5 / AK-6 / HACCP** / Other _____ (+0.7°C)

Ice ~ Wet ~ Gel _____ Other _____

Cooler Custody Seal: 9978272

Sample Custody Seal: _____

Cooler ID: 1 of 2

Temp: Observed 1.0 Corrected 1.0

From: Temp Blank ☐ Sample ☐

NCM Filed: Yes ☐ No ☐

	Yes	No	NA
Perchlorate has headspace?	☐	☐	☐
Alkalinity has no headspace?	☐	☐	☐
CoC is complete w/o discrepancies?	☐	☐	☐
Samples received within holding time?	☐	☐	☐
Sample preservatives verified?	☐	☐	☐
Cooler compromised/tampered with?	☐	☐	☐
Samples compromised/tampered with?	☐	☐	☐
Samples w/o discrepancies?	☐	☐	☐
Sample containers have legible labels?	☐	☐	☐
Containers are not broken or leaking?	☐	☐	☐
Sample date/times are provided.	☐	☐	☐
Appropriate containers are used?	☐	☐	☐
Sample bottles are completely filled?	☐	☐	☐
Zero headspace?*	☐	☐	☐
Multiphasic samples are not present?	☐	☐	☐
Sample temp OK?	☐	☐	☐
Sample out of temp?	☐	☐	☐

Initials: MG Date: 10-9-18

*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

\QA-812 SAMPLE RECEIVING NOTES.DOC QA-812 TGT 08/29/2018

14C

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 480-142900-1

Login Number: 142900

List Source: TestAmerica Buffalo

List Number: 1

Creator: Wallace, Cameron

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	GHD
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 480-142900-1

Login Number: 142900
List Number: 2
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento
List Creation: 10/11/18 03:13 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	998272
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	1.0C
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?	False	Received project as a subcontract.
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.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Attachment D
Notice - Institutional and Engineering Controls Certification Form

Enclosure 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Site Management Periodic Review Report Notice

Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. **932110**

Site Name ~~**Frontier Chemical - Royal Avenue**~~ Cascades Containerboard Packaging - Royal Avenue

Site Address: 4626 Royal Avenue Zip Code: 14303
City/Town: Niagara Falls
County: Niagara
Site Acreage: 9.810

Reporting Period: November 18, 2017 to November 18, 2018

	YES	NO
1. Is the information above correct?		✓
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?		✓
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?		✓
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?		✓
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?		✓

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Industrial	✓	
7. Are all ICs/ECs in place and functioning as designed?	✓	

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 932110 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
160.09-1-6	4626 Royal Avenue Holding LLC	Ground Water Use Restriction Soil Management Plan Landuse Restriction Site Management Plan Monitoring Plan IC/EC Plan

Environmental Easement and Site Management Plan

Box 4

Description of Engineering Controls

Parcel	Engineering Control
160.09-1-6	Cover System

12" clean cover system consisting of crushed concrete or crushed stone with some asphalt

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
✓	

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
✓	

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative

Date

IC CERTIFICATIONS
SITE NO. 932110

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Michelle Hamm (print name) at Cascades 4126 Royal Ave Niagara Falls NY 14303 (print business address)

am certifying as Designated Representative (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Michelle Hamm
Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

12-6-18
Date

IC/EC CERTIFICATIONS

Box 7

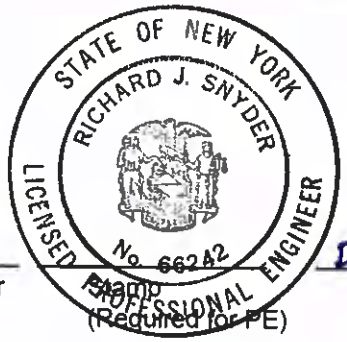
Qualified Environmental Professional Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Richard J. Snyder (print name) at GHD Services 2055 Niagara Falls Blvd Niagara Falls NY 14304 (print business address),

am certifying as a Qualified Environmental Professional for the Owner (Owner or Remedial Party)

Signature of Qualified Environmental Professional, for the Owner or Remedial Party, Rendering Certification



Stamp (Required for PE)

December 10, 2018
Date