8976 Wellington Road
Manassas, VA 20109

Sent via email

January 29, 2021

Daniel Lanners
Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C
625 Broadway, 11th Floor
Albany, New York 12233-7014

Re: IBM Corporation - Former IBM Kingston Site (TechCity)
Inactive Hazardous Waste Disposal Site 356002
Emerging Contaminants Poly- and Perfluoroalkyl Substances and 1,4-Dioxane Sampling Report

Dear Mr. Lanners:

Enclosed is the *Emerging Contaminant Poly- and Perfluoroalkyl Substances and 1,4-Dioxane Sampling Report* for the former IBM Kingston site (TechCity). The work was conducted in accordance with the project workplan which was approved by NYSDEC on September 4, 2020.

If you have any questions regarding the report or require additional information, please contact me at 703-257-2583 or chartd@us.ibm.com.

Sincerely yours,
International Business Machines Corporation

Dean W Chartrand
Program Manager
Corporate Environmental Affairs

Enclosure

cc: Amen Omorogbe (w/ enclosure)
Kristen Kulow (w/ enclosure)
Alan Ginsberg (w/ enclosure)

FORMER IBM KINGSTON SITE (TECHCITY)

EMERGING CONTAMINANTS
POLY- AND PERFLUOROALKYL SUBSTANCES AND 1,4-DIOXANE
SAMPLING REPORT

SITE ID: 356002
ORDER ON CONSENT, INDEX #D3-10023-6-11

Prepared for:

IBM Corporate Environmental Affairs
8976 Wellington Road
Manassas, VA 20109

January 29, 2021

Prepared by:
Groundwater Sciences, P.C.
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Professional Geologist Certification
Former IBM Kingston Site (TechCity)
Town of Ulster
Ulster County, New York

Emerging Contaminants
Poly- and Perfluoroalkyl Substances and 1,4-Dioxane
Sampling Report

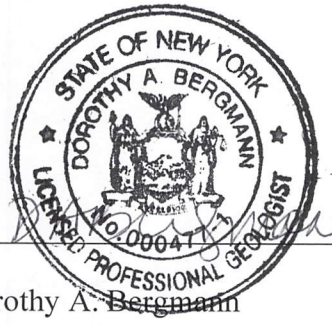
Site ID: 356002
Order on Consent, Index #D3-10023-6-11

January 29, 2021

As the person with primary responsibility for the performance of the geological services and activities associated with the captioned Sampling Report, I certify that I have reviewed the document titled *"Former IBM Kingston Site (TechCity) Emerging Contaminants, Poly- and Perfluoroalkyl Substances and 1,4-Dioxane Sampling Report, Site ID: 356002, Order on Consent, Index #D3-10023-6-11"*. This report is dated January 29, 2021 and was prepared by Groundwater Sciences, P.C. (GSPC) and Groundwater Sciences Corporation (GSC) for IBM Corporation.

I certify that the associated geological services and this report have been prepared under my direct supervision. To the best of my knowledge, all such information contained in this report is complete and accurate.

This report bears the seal of a professional geologist; no alterations may be made to the information contained in this plan unless made in accordance with Title 8, Article 145, Section 7209 of New York State Education Law.



Signature: _____ Date: January 29, 2021

Name: Dorothy A. Bergmann

License No: 00477

State: New York

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Table 1: Summary of Abbreviations Used in this Report	
GMP	Groundwater Monitoring Plan
GSC	Groundwater Sciences Corporation
GSPC	Groundwater Sciences, P.C.
GTF	Groundwater Treatment Facility
GWCS	Groundwater Collection System
IBM	International Business Machines Corporation
IWSL	Industrial Waste Sludge Lagoon
IWTP	Industrial Waste Treatment Plant
NPLA	North Parking Lot Area
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PFAS	Poly- and Perfluoroalkyl Substances
QA/QC	Quality Assurance/Quality Control
SPDES	State Pollutant Discharge Elimination System
VOCs	Volatile Organic Compounds
Monitoring Parameters	
111-TCA	1,1,1-Trichlorethane
112-TCA	1,1,2-Trichloroethane
11-DCA	1,1-Dichloroethane
11-DCE	1,1-Dichloroethene
12-DCA	1,2-Dichloroethane
12-DCBZ	1,2-Dichlorobenzene
12-DCE	1,2-Dichloroethene (total)
13-DCBZ	1,3-Dichlorobenzene
14-DCBZ	1,4-Dichlorobenzene
CBZ	Chlorobenzene
CEA	Chloroethane
CIS13-DCPRE	Cis-1,2-Dichloropropene
DCDFM	Dichlorodifluoromethane
DCM	Methylene Chloride (Dicholoromethane)
Freon® 113	1,1,2-Trichloro-1,2,2-Trifluoroethane
Freon® 123a	1,2-Dichloro-1,2,2-Trifluoroethane
PCE	Tetrachloroethene
TCE	Trichloroethylene
TCM	Chloroform (Trichloromethane)
VC	Vinyl Chloride

1.0 INTRODUCTION

The Former IBM Kingston Site (TechCity) is located north of the City of Kingston in the Town of Ulster, Ulster County, New York and is bounded by John M. Clarke Drive and Route 9W to the east, Old Neighborhood Road and Route 209 to the north, Esopus Creek to the west, and Boices Lane to the south (see Figure 1-1).

On June 5, 2018[1], the International Business Machines Corporation (IBM) received a request from the New York State Department of Environmental Conservation (NYSDEC) to complete sampling at the Site for emerging contaminants, including specific Poly- and Perfluoroalkyl Substances (PFAS) and 1,4-Dioxane.

PFAS are a group of compounds that NYSDEC has recently identified as emerging contaminants due to their potential health effects and persistence in the environment.

In response to the NYSDEC request, an Emerging Contaminant, PFAS and 1,4-Dioxane, Sampling Work Plan (EC Sampling Work Plan)[2] was prepared by Groundwater Sciences, P.C. (GSPC) and Groundwater Sciences Corporation (GSC) and submitted to NYSDEC on July 31, 2018. NYSDEC approved the EC Sampling Work Plan on in a letter dated September 4, 2020[3].

This report details the results of groundwater sampling and analysis for PFAS and 1,4-Dioxane conducted in October 2020 under the approved EC Sampling Work Plan.

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[1] NYSDEC, June 5, 2018, *Request for Sampling of Emerging Contaminants, IBM Kingston, NYSDEC Site No. 356002.*

[2] Groundwater Sciences Corporation and Groundwater Sciences, P.C., July 31, 2018, *Former IBM Kingston Facility (TechCity) Emerging Contaminants Poly- and Perfluoroalkyl Substances and 1,4-Dioxane Sampling Work Plan, Site No. 356002, Order on Consent, Index #D3-10023-6-11.*

[3] NYSDEC., September 4, 2020, *Emerging Contaminants Sampling Work Plan, Former IBM Kingston Site, NYSDEC Site No. 356002, Kingston, Ulster County, NY.*

Section 2.0 of this report presents a Site overview. Section 3.0 includes a discussion on the emerging contaminants sampling program. Section 4.0 presents the results of the groundwater sampling for emerging contaminants. Section 5.0 includes a discussion of the findings.

2.0 SITE OVERVIEW

The following sections provide details on the Site, including current Site conditions and the Site chronology.

2.1 Site Background

The approximately 258-acre property was first developed by IBM from farmland during the 1950s. The primary activities at the Site included the manufacturing of electric typewriters and the development, manufacture and testing of computer systems and related components and technologies. IBM ceased operations during the early-1990s, and the property was subsequently subdivided into multiple parcels. The portion of the Site located east of Enterprise Drive is referred to as the East Campus and includes the majority of the buildings at the Site, many of which are vacant and some demolished with just the slab remaining. The portion located west of Enterprise Drive is referred to as the West Campus and includes Buildings 201 (B201), Building 202 (B202) and Building 203 (B203); a large parking area south and west of this building complex; and generally undeveloped land further to the southwest and north of this building complex.

In 1996, the Town of Ulster approved IBM's subdivision of the Site into twenty-seven (27) parcels as shown on Figure 2-1. In 1998, IBM sold the Site to AG Properties of Kingston, LLC (Parcels 2 through 19; Parcels 22 through 29 and Parcel 30) and, Ulster Business Complex, LLC (Parcel 1 (Building 201-203 Complex); Parcel 20 (Building 042) and; Parcel 21 (Building 043)). Since that time, multiple property transfers have occurred from AG Properties of Kingston, LLC, and Ulster Business Complex, LLC to other business entities. On March 13, 2017 three parcels were transferred to Ulster County due to tax foreclosure and include: Building B001 and the 5.84 acres on which it stands (Parcel 1); the 1-acre site where building B002 used to stand (Parcel 12); and the 0.38-acre site where Building B034 used to stand (Parcel 034). On November 1, 2019, two additional parcels were transferred to Ulster County due to tax foreclosure and include: Buildings B201, B202 and B203 and associated 24.7 acres of land (Parcel 1) and B070 (Salt Barn) and the 57.5 acres of vacant land to the south and southwest along Boices Lane (Parcel 2).

The site was listed in the New York State Inactive Hazardous Waste Disposal Sites Registry as a Class 4 Site (Site #356002) and was managed in compliance with the October 4, 1996 6NYCRR Part

373 Hazardous Waste Management Permit[4] (RCRA Permit) until the Order on Consent[5] (Order) was signed with New York State Department of Environmental Conservation (NYSDEC) by IBM and A.G. Properties of Kingston, LLC and Ulster Business Complex LLC ("TechCity") on July 8, 2011. Corrective Action activities at the Site were conducted with oversight of NYSDEC under the RCRA Permit and from July 2011 to present under the Order.

Prior to and under the RCRA Permit, IBM completed extensive RCRA Facility Assessments (RFAs) and RCRA Facility Investigations (RFIs) and beginning in the early 1990s through 2002 to delineate the occurrence and extent of volatile organic compounds (VOCs) in groundwater, soil and soil vapor beneath the Site. These investigations were conducted at all identified and accessible Solid Waste Management Units (SWMUs). Since 2008, IBM has completed additional investigations of SWMUs as those areas that became accessible as the result of TechCity's redevelopment activities.

Corrective Measures implemented by IBM include the operation and maintenance of a perimeter control system that intercepts the groundwater plume. The perimeter control system consists of two storm water sewer systems, an unsaturated portion of the surficial sand unit that underlies the site, a utility trench barrier wall, and a groundwater collection system.

The Order, which supersedes and replaces the former RCRA Permit, divided the Site into ten Operable Units (OUs). The locations of the OUs are depicted in Figure 2-2. Table 2-1 presents a list of the OUs, including TechCity's proposed use for each OU based on the TechCity Comprehensive Design Plan and Redevelopment Overlay District[6], and which OUs remain listed as a Class 4 Inactive Hazardous Waste Disposal Site (Site #356002).

[4] NYSDEC, October 4, 1996, *6NYCRR Part 373 RCRA Permit,* #3-5154-00067/00090.

[5] NYSDEC, July 8, 2011, *Order on Consent (Order), Index # D3-10023-6-11, Site Number 356002.*

[6] Divney Tung Schwalbe, February 2, 2009, *TechCity Comprehensive Development Plan*

Table 2-1: Listing of Operable Units, Proposed Use and Status		
Operable Unit	**Proposed Use**	**Status**
OU 1	Commercial	
OU 2	Commercial	
OU 3	Commercial	Included as part of the Class 4 Inactive Hazardous Waste Disposal Site # 356002
OU 3a	Commercial	Included as part of the Class 4 Inactive Hazardous Waste Disposal Site # 356002
OU 4	Restricted Residential	
OU 4a	Commercial	
OU 5	Commercial	Included as part of the Class 4 Inactive Hazardous Waste Disposal Site # 356002
OU 6	Commercial	
OU 7	Commercial	
OU 8	Commercial	

The Statement of Basis (February 2013) provides an update on the Corrective Action activities at the Site and describes the closure conditions identified by various site investigations from the late 1970s to 2012.

2.2 Generalized Geology

The Site is located within the Hudson-Mohawk Lowland Physiographic Province. The bedrock underlying the western portion of the Site consists of siltstone and shale of the Middle Devonian Age Lower Hamilton Group. The eastern portion of the Site is underlain by both the Lower Hamilton Group and the Lower Devonian Age Onondaga Limestone. The exact location and nature of the contact between these units is not known. The Lower Hamilton Group forms a north-northwest trending bedrock high approximately coincident with Enterprise Drive and is described as a calcareous shale in boring logs completed during previous Site investigations.

Literature on regional geologic conditions indicate that a glacially-derived sand and gravel unit directly overlies the bedrock west of Enterprise Drive and a glacial till unit overlies the bedrock east of Enterprise Drive. These unconsolidated units are overlain by a varved silt and clay unit that is interpreted to be of lacustrine origin, with a thickness of zero feet in an area where it is absent

proximate to the bedrock high, to over 180-feet in the central portion of East Campus as determined by previous Site borings. The clay portion of the varved silt and clay unit serves as an aquitard throughout most the Site, except in the localized area in the vicinity of the bedrock high where it is absent.

A well sorted, fine to coarse-grained sand of lacustrine origin, with intermittent, thin, silty-clay zones, overlies the varved silt and clay (or bedrock where the varved silt and clay is absent in the vicinity of the bedrock high). This surficial sand unit ranges in thickness across the Site from approximately 6-feet in the area of the bedrock ridge to greater than 30-feet in the central portion of the East Campus. A discontinuous transition zone of relatively fine-grained materials is present at the base of the surficial sand unit in some areas of the Site (GSC, 1997).

Generalized descriptions of the near-surface lithologic units encountered at the Site are as follows:

- **Surficial SAND Unit:** Consists of a light brown, fine to medium grained sand containing variable amounts of finer-grained silt and clay. This unit is typically saturated below a depth of approximately 6 to 7-feet below ground surface (ft bgs).
- **SILTY-SAND and CLAY Transition Unit:** Consists of variable amounts of reddish-brown to gray silt, sand, and clay. Typical appearance in a soil core is a silty-sand matrix containing thin lenses of silt and sandy clay. This unit, if present, is generally encountered between 15 to 20-ft bgs in the vicinity of B001.
- **Varved CLAY Unit:** Consists of red-brown and gray, plastic, cohesive, wet clay with intermittent silt zones. Typical appearance in a soil core is clay with laminae of silt and sometimes very fine-grained sand. This unit is typically encountered at approximately 20 to 25-ft bgs in the B001 area, with greater or lesser depths of first occurrence in localized areas.

The thickness of the sand unit increases and the thickness of the transition unit decreases coinciding with a shallowing of the depth to top-of-clay along the western edge of a clay unit "valley" identified in the *RCRA Facility Investigation on Groundwater Plumes* report (GSC, 1997b). This valley is deepest below B001 and B003 (i.e., approximately 30 ft bgs to the top of the clay unit) and extends southward towards Boices Lane.

2.3 Generalized Hydrogeology

The varved clay unit serves as an aquitard throughout most the Site; therefore, groundwater in the bedrock and in the deep sand and gravel and glacial till units that underlie the varved silt and clay is

under confined conditions. Groundwater within the surficial sand unit that overlies the varved silt and clay unit is unconfined. The surficial sand unit is typically unsaturated in the area of the bedrock high along Enterprise Drive.

The estimated horizontal hydraulic conductivity of the surficial sand unit ranges from approximately 65 feet per day (ft/day) to 270 ft/day (i.e., 2.3×10^{-2} centimeters per second [cm/sec] to 9.5×10^{-2} cm/sec), with an average hydraulic conductivity of approximately 100 ft/day [2.3×10^{-2} cm/sec]. The horizontal hydraulic conductivity of the varved silt and clay unit has been estimated at approximately one (1) foot per day [3.5×10^{-4} cm/sec]. The vertical hydraulic conductivity of this unit is likely significantly lower than its horizontal hydraulic conductivity due to the horizontal bedding structure. The low vertical hydraulic conductivity and thickness of the unit support the designation of the varved silt and clay as an aquitard.

2.4 Groundwater Flow

Groundwater elevation measurements were used to generate a groundwater elevation contour map for the shallow water table aquifer underlying most of the developed portion of the site, included as Figure 2-3 for the fourth quarter 2019. An enlargement of the northern portion of the Site, including the Groundwater Collection System (GWCS) and the installed trench extension, is included on this figure. Also shown on this figure are the locations of the storm sewer systems on the Site, the location of the GWCS trench (including the trench extension) and the utility trench barrier wall.

An east-west trending groundwater divide has been identified at the Site underlying B001, Building 002 (B002), B003 and Building 005 (B005) (see Figure 2-3). Groundwater to the north of the divide flows west and northwest. Groundwater to the south of the divide flows west and southwest.

Groundwater flow is influenced by the presence of the perimeter control system (see Figure 2-3), which is composed of:

- A 42-inch diameter storm sewer pipe that extends from east to west along a line south of B001 through B005 and passes under Enterprise Drive to the south of B201.
- A naturally occurring unsaturated portion of the surficial sand unit that intersects the 42-inch storm sewer south of B201, and extends east-northeast back across Enterprise Drive, and then continues toward the north portion of the Site.

- The GWCS extends along the western and northern perimeter of the North Parking Lot Area. The GWCS is comprised of a set of groundwater cut-off trenches. Water collected in the trenches is treated via air stripping.
- A 60-inch diameter storm sewer pipe that runs parallel to the north property line intersects the GWCS and extends along the western portion of the North Parking Lot Area.
- A utility trench barrier wall, consisting of an approximately 250-foot long trench backfilled with clay with the base keyed into the Varved Clay Unit and the top of the barrier wall completed a minimum of two feet above the recorded high water table. This barrier wall was installed to mitigate the potential for westward groundwater migration along the underground utility pipes which ultimately terminate at the former Industrial Waste Treatment Facility (IWTF).

2.5 Chemical Constituents in Groundwater

Identified constituents of concern in the surficial sand aquifer include the following chlorinated VOCs: 1,1,1-trichloroethance [111-TCA], trichloroethene [TCE] and tetrachloroethene [PCE], and related degradation products (i.e., 1,1-dichloroethene [1,1-DCE], 1,1-dichloroethane [1,1-DCA], 1,2-cis-dichloroethene [1,2-DCE] and 1,2-dichloroethane [1,2-DCA]). Other VOCs have been detected in groundwater, including carbon tetrachloride, Freon®, and petroleum hydrocarbons; however, concentrations of these VOCs are generally lower and less extensive than the chlorinated compounds.

Four groundwater plumes have been identified at the Site, including:

- The North Parking Lot Area (NPLA) Plume: Located to the north of B001 and B003, the NPLA Plume is primarily composed of TCE and 111-TCA, and to a lesser degree PCE. Based on historic groundwater quality sampling and soil vapor screening investigations, the source areas for this plume are likely associated with historic manufacturing activities in B001, B002, B003, B004 and B005S, including industrial waste sewer lines located beneath these buildings (as noted below) and north of B001 and B003. PCE, TCE, and 111-TCA in the NPLA Plume appear to originate in the central and western portions of the eastern campus and is moving north-northwest toward the GWCS.
- The B005 Plume Area: Located beneath B001, B002, B003, B004 and B005, the B005 Plume Area is primarily composed of TCE and 111-TCA. Based on historic groundwater quality sampling and soil vapor screening investigations, this plume is believed to have originated from activities in B001, B003, B004 and B005S.
- An isolated PCE plume, extending from the southern portion of B005 to the 42-inch sewer and originating from a release(s) at a PCE tank located in the southeastern corner of B005.
- The B036 Area Plume: Located on the West Campus near Building 036 (B036), the B036 Area Plume, is primarily composed of TCE and 111-TCA. The plume in this area is not likely to have originated from the former IWSL or from activities associated with the IWTF, but is believed to have migrated from the eastern campus plume along the underground utility pipes prior to the installation of the utility trench barrier wall.

Figure 2-4 and Figure 2-5 present a generalized depiction of areas where groundwater is impacted by VOCs that has been inferred based on historical monitoring data and corresponds to the following compounds: PCE; TCE; 12-DCE; VC; 111-TCA; 11-DCE; 11-DCA; Freon® 113; 12-DCA; TCM and 112-TCA. Compounds less frequently detected include: 12-dichlorobenzene (DCBZ), 13-DCBZ, 14-DCBZ, chlorobenzene (CBZ), and chloroethane (CEA).

Figure 2-4 and Figure 2-5 include postings of the results from the fourth quarter 2019 sampling event for each of the major constituent(s) and their associated degradation products. The maximum concentrations for the constituents present in these plumes were observed during the 1980s and the concentrations observed on the Site have declined since that time.

Lastly, Figure 2-4 and Figure 2-5 show the delineation of the limits of hydraulic control shown as the site control perimeter. In general, groundwater plumes in the shallow sand aquifer are contained within this boundary with the exception of the B036 Area plume which is believed to have migrated from the eastern campus plume along the underground utility pipes prior to the installation of the utility trench barrier wall.

3.0 EMERGING CONTAMINANTS SAMPLING PROGRAM

This section provides details on the scope of sampling for emerging contaminants at the Site in accordance with the NYSDEC-approved EC Sampling Work Plan. This section also includes a brief discussion relating to the sampling, analytical and validation procedures.

3.1 Sampling Locations

Twelve (12) groundwater monitoring locations and the two influent flows to the on-Site groundwater treatment facility (Groundwater Collection System (GWCS) and the North Parking Lot Area (NPLA) pump stations) were selected for EC monitoring. Table 3-1 provides a summary of the sampling plan and the selected sample locations are highlighted on Plate 1.

In general, groundwater monitoring locations were selected based on near or in downgradient positions from former tanks, former use and storage areas or SWMUs thought to be potential source for these emerging compounds. Seven (7) of the groundwater monitoring locations selected for emerging contaminant monitoring are part of the current, NYSDEC-approved Groundwater Monitoring Plan (GMP). Six of the twelve monitoring wells had not required sampling within the past year including one well that is a Hydraulic Effectiveness location under the GMP.

Given the ubiquity of PFAS in the environment, monitoring well MW-124S was selected to represent upgradient, background conditions on Site. Lastly, as an added QC check, IBM sampled the municipal water at the Site for PFAS and 1,4-Dioxane.

Table 3-1 Emerging Contaminants Sampling Locations

Sampling Area	Well	Apparent Position	PFAS	1,4-Dioxane	Depth to Bottom (ft)	Well Diameter (in)	Screen Location	Top Screen Elevation (ft amsl)	Bottom Screen Elevation (ft amsl)
Groundwater Monitoring Locations									
OU1	**MW-173S**	Triangle Plume Area	X	X	20.79	2	surficial SAND unit	159.03	174.03
OU2	**none**								
OU3	**MW-255S**	near, SWMU R, Former Waste TCA Tank (B005S)		X	11.0	2	surficial SAND unit	167.50	175.20
	MW-267S	downgradient SWMU R, Former Waste TCA Tank (B005S)	X		26.7	2	surficial SAND unit	151.10	171.10
	MW-275S	downgradient SWMU S + AB, Former Waste TCA Tank B001 and Former TCA Recovery Unit (B001)		X	18.4	2	surficial SAND unit	162.26	172.26
	MW-503S	AOC V, B005 Plume	X	X	16.4	3	surficial SAND unit	164.73	173.73
	MW-505S	near B004 historical activities, including "photo resist"	X		13.4	3	surficial SAND unit	165.67	171.67
OU3a	**MW-204S**	downgradient SWMU S + AB, Former Waste TCA Tank B001 and Former TCA Recovery Unit (B001)	X	X	15.8	3	surficial SAND unit	157.27	163.77
OU4	**MW-162S**	near Former B058, chem storage / chem waste	X	X	12.5	2	surficial SAND unit	171.64	179.89
OU4a	**MW-124S**	upgradient, background	X	X	27.1	3	surficial SAND unit	151.43	166.93
OU5	**MW-802**	SWMU L, Former IWSL compliance monitoring well	X	X	21.8	3	SILTY-SAND unit	130.70	140.70
OU6	**MW-106S**	near, side-gradient of Former Fire Training Area, SWMU AD	X		15.2	3	surficial SAND unit	144.73	136.73
	MW-125S	adjacent to former utility-line related source that is no longer discharging to this area due to the installation of the Utility Trench Barrier Wall on the East Campus	X	X	14.0	3	SILTY-SAND unit	159.82	166.82
OU7	**MW-313S**	near SWMU W, Former B004 Separator Tank	X	X	18.1	2	surficial SAND unit	161.60	171.60
OU8	**none**								
Groundwater Treatment Facility Influent									
Groundwater Collection System (GWCS)			X	X					
North Parking Lot Area (NPLA)			X	X					
Municipal Water Supply			X	X					

3.2 Sampling Procedures

Sampling programs for PFAS require the development and implementation of detailed operating procedures to reduce the potential for cross contamination and false positive sample results due to extremely low method detection limit concentrations associated with PFAS analysis (nanogram per liter or parts per trillion) and the numerous potential background sources of detectable concentrations of PFAS.

In consideration and to minimize these concerns, Standard Operating Procedures (SOPs) were developed for general field practices, monitoring well purging methods groundwater sampling protocols, surface water sampling protocol, soil sampling protocols and Quality Assurance Quality Control Protocols. The SOPs detailed in the approved EC Sampling Work Plan were followed during the EC sampling program.

Prior to initiating groundwater sampling activities, dedicated purging and sampling equipment was removed and monitoring wells were redeveloped by purging 10 well volumes from the well or evacuating the well three times for low-yield wells using Teflon® free equipment. In addition, due to the potential for PFAS cross-contamination from the 1,4-Dioxane sample containers, where required under the plan, sampling for 1,4-Dioxane occurred after samples were collected for PFAS.

All samples were submitted to Eurofins Lancaster Laboratories of Lancaster, Pennsylvania (New York Lab ID Number 10670) for analysis of the Full PFAS Target Analyte List as described in the approved EC Sampling Work Plan using USEPA Method 537 Rev 1.1 mod and 1,4-Dioxane analysis via 8270 SIM methodology. Eurofins Lancaster Laboratories currently holds New York State Department of Health (NYSDOH) certification for the analysis of Perfluorooctanoic acid (PFOA) and Perfluorooctanessulfonic acid (PFOS) in drinking water.

Of the twenty-one PFAS on the Full PFAS Target Analyte List, six (6) are identified in the United States Environmental Protection Agency (USEPA) Third Unregulated Contaminant Monitoring Rule (UCMR3) and are shown in bold text in Table 3-2.

Table 3-2: Full PFAS Target Analyte List				
Group	**CAS Number**	**Length of Fluorinated Carbon Chain (# Atoms)**	**Parameter Name**	**Abbreviation**
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	**Perfluorobutanesulfonic acid**	**PFBS**
	355-46-4	**C-6**	**Perfluorohexanesulfonic acid**	**PFHxS**
	375-92-8	C-7	Perfluoroheptanesulfonic acid	PFHpS
	1763-23-1	**C-8**	**Perfluorooctanesulfonic acid**	**PFOS**
	335-77-3	C-10	Perfluorodecanesulfonic acid	PFDS
Perfluoroalkyl carboxylates	375-22-4	C-4	Perfluorobutanoic acid	PFBA
	2706-90-3	C-5	Perfluoropentanoic acid	PFPeA
	307-24-4	C-6	Perfluorohexanoic acid	PFHxA
	375-85-9	**C-7**	**Perfluoroheptanoic acid**	**PFHpA**
	335-67-1	**C-8**	**Perfluorooctanoic acid**	**PFOA**
	375-95-1	**C-9**	**Perfluorononanoic acid**	**PFNA**
	335-76-2	C-10	Perfluorodecanoic acid	PFDA
	2058-94-8	C-11	Perfluoroundecanoic acid	PFUA/PFUdA
	307-55-1	C-12	Perfluorododecanoic acid	PFDoA
	72629-94-8	C-13	Perfluorotridecanoic acid	PFTriA/PFTrDA
	376-06-7	C-14	Perfluorotetradecanoic acid	PFTA/PFTeDA
Fluorinated Telomer Sulfonates	27619-97-2	C-8	6:2 Fluorotelomer sulfonic acid	6:2 FTS
	39108-34-4	C-10	8:2 Fluorotelomer sulfonic acid	8:2 FTS
Perfluorooctanesulfonamides	754-91-6	C-8	Perfluorooctanesulfonamide	FOSA
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	NMeFOSAA	N-MeFOSAA
	2991-50-6	C-8	NEtFOSAA	N-EtFOSAA
SVOC	123-91-1		1,4-Dioxane	14-Dioxane
Note: **Bold** entries depict the 6 PFAS identified in the United States Environmental Protection Agency (USEPA) Third Unregulated Contaminant Monitoring Rule (UCMR3).				

3.3 Quality Assurance / Quality Control Samples

Field samplers collected equipment rinse blanks, field duplicates, field blanks, and trip blanks for Quality Assurance (QA)/Quality Control (QC) purposes to serve as a check on the validity of the sample, sampling technique and laboratory precision. QA/QC samples were collected in accordance with the frequencies and types specified in the NYSDEC-approved EC Sampling Work Plan. Table 3-3 summarizes the field quality assurance / quality control samples for each of the sampling requests.

Table 3-3: Field Quality Assurance / Quality Control Sample Summary		
Parameter / Group*	**QA/QC Type**	**Sampling Location**
PFAS	Field Duplicate	GWCS Influent
	Field Blank	MW-204S
		MW-204S
		MW-802S
	Equipment Rinse Blank	NPLA Influent
		MW-125S
		MW-162S
	Trip Blank	10/14/2020 to 10/15/2020
		10/15/2020 to 10/16/2020
		10/16/2020 to 10/17/2020
1,4-Dioxane	Field Duplicate	GWCS Influent
	Field Blank	MW-204S
		MW-802S
		NPLA Influent
	Equipment Rinse Blank	MW-124S
		MW-125S
		MW-162S
	Trip Blank	10/14/2020 to 10/15/2020
		10/15/2020 to 10/16/2020
		10/16/2020 to 10/17/2020
* **Parameter List Notes**: Full PFAS Target Analyte List, USEPA Method 537 Rev 1.1 mod 1,4-Dioxane analysis via 8270 SIM methodology		

3.4 Municipal Water Sampling

As specified in the NYSDEC-approved EC Sampling Work Plan, a sample of the municipal water at the Site was sampled for PFAS and 1,4-Dioxane. If present, trace concentrations of PFAS and / or 1,4-Dioxane in the municipal water could serve as a background source in groundwater and/or surface water due to historical water line breaks, hydrant flushing, and other exterior Site operations that include the use of municipal water.

3.5 Data Validation

The data were examined to determine the usability of the analytical results and the compliance relative to requirements specified in the analytical methods and guidelines provided. Validation of the data included a review of the sample condition upon receipt; analytical holding times; blank analyses; laboratory control sample analyses; matrix spike / matrix spike duplicate analyses; extraction standard recoveries (surrogates); initial calibrations and initial calibration verification measurements; internal standards and field duplicate results. Qualifier codes have been placed next to the results so the data

user can quickly assess the qualitative and/or quantitative reliability of any result. The data qualifications allow the data end user to best understand the usability of the analytical results and data that have not been qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

4.0 SAMPLING RESULTS

This section provides a summary of the results of the analytical laboratory analyses for the presence of PFAS and 1,4-Dioxane in groundwater and QA/QC samples.

Groundwater samples were collected between October 14 and October 16, 2020. Samples collected from the Groundwater Treatment System influent locations were collected on October 16, 2020. A sample of the municipal water was collected on October 16, 2020. Field QA/QC samples were collected daily between October 14 and October 16 at the locations and frequencies provided in Table 3-3.

For ease of review of data PFAS and 1,4-Dioxane sampling results for groundwater, the two influents to the groundwater treatment facility and municipal water are shown on Plate 1 and presented in Tables A-1 through A-10 of Appendix A. Tables A-1 through A-10 correspond to the sampling areas noted on Table 3-1. Field QA/QC sampling results are presented in Table A-11 of Appendix A.

As noted previously, these results have been validated as per the approved EC Sampling Work Plan. Results of this review indicated the following:

- Each laboratory report was determined to be complete.
- Laboratory documentation logs confirmed that the samples were received at the proper temperature.
- Samples were analyzed within appropriate holding times.
- Reporting limits were raised for two sampling locations, MW-204S (OU3a, Table A-3 of Appendix A) and MW-125S (OU6, Table A-7 of Appendix A) due to interference from the sample matrix.
- Qualifications are noted in the attached Tables A-1 through A-11 and on Plate 1.

5.0 DISCUSSION OF FINDINGS

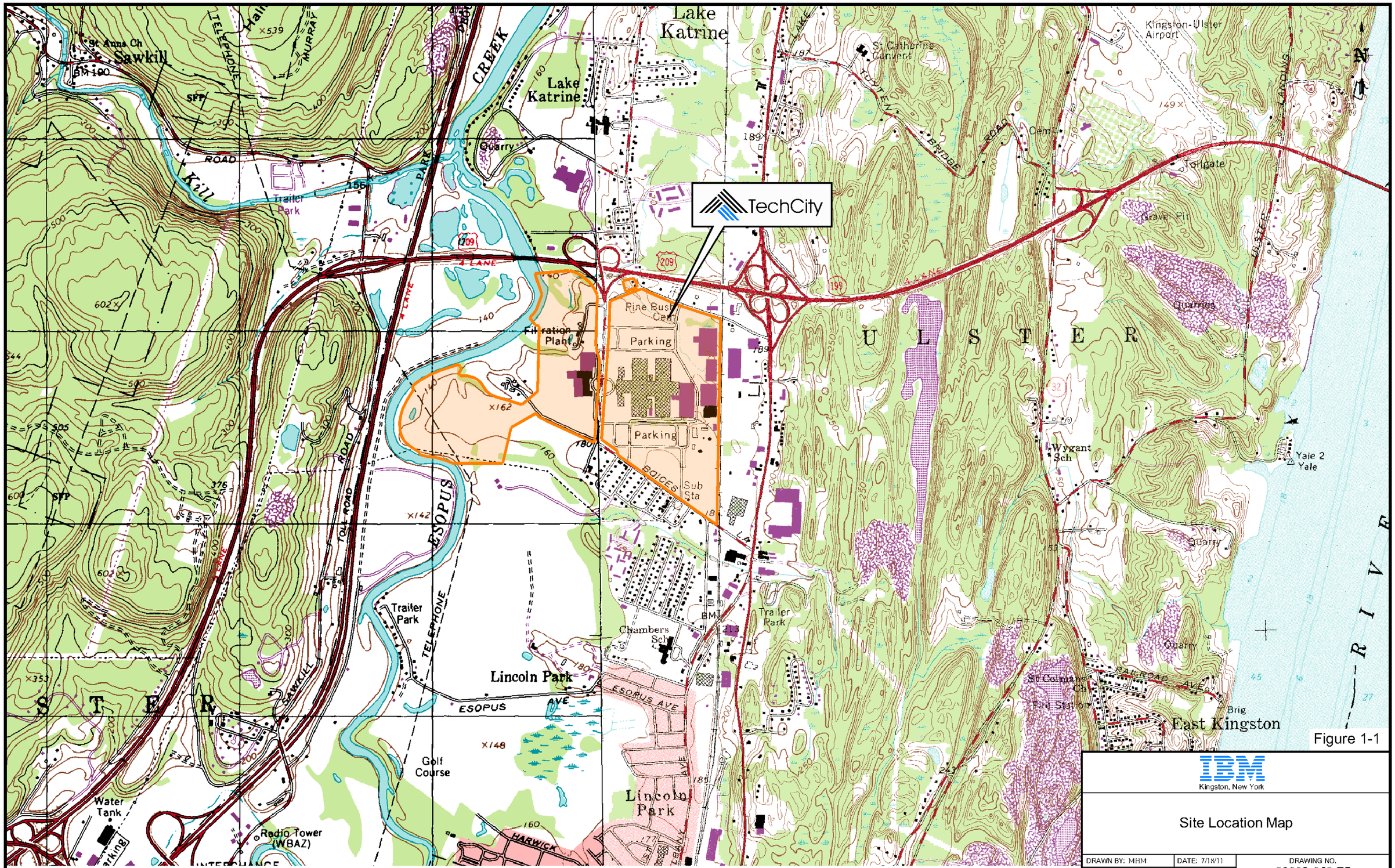
Results of the sampling program indicate the presence of PFAS in groundwater as shown on Plate 1 and also presented in Tables A-1 through A-11 of Appendix A. PFAS identified in the United States Environmental Protection Agency (USEPA) Third Unregulated Contaminant Monitoring Rule (UCMR3) are highlighted in **bold** text in Tables A-1 through A-11 of Appendix A, on Plate 1 and in the discussion of findings below.

The highest detected concentration for PFAS in groundwater was at monitoring well MW-313S where **PFOS** was detected at a concentration of 4,000 ng/L with **PFOA** detected at this same location at a concentration of 51 ng/L. Other PFAS detected in groundwater include: **PFBS, PFHxS**, PFHpS, PFDS, PFBA, PFPeA, PFHxA, **PFHpA**, **PFNA** and PFDA. All other PFAS on the Full PFAS Target Analyte List as described in this report, were not detected at concentrations above 2 ng/L.

The maximum concentration of 1,4-Dioxane detected in groundwater was from the sample collected at MW-173S at a concentration of 21 ug/L.

As note previously, groundwater monitoring well MW-124S was selected to represent upgradient, background conditions on Site. The highest detected concentration for PFAS in MW-124S was PFBA at a concentration of 2.6 ng/L. Other PFAS detected at this location, all at concentrations less than 2.3 ng/L, include **PFHxS,** PFPeA, PFHxA**, PFOS, PFOA and PFBS.** 1,4-Dioxane was not detected at MW-124S at the method detection limit of 0.10 ug/L.

PFOS was detected in the municipal water at a concentration of 0.97 ng/L and 1,4-Dioxane was not detected at the method detection limit of 0.10 ug/L.



Portions of the Kingston East (1963, photorevised 1980) and Kingston West (1997) 7.5 Minute USGS Quadrangles

Scale
0 750' 1500'

Figure 1-1

IBM
Kingston, New York

Site Location Map

DRAWN BY: MHM	DATE: 7/18/11	DRAWING NO. 93002-059-E7
CHECKED & APPROVED BY: DAB		

GROUNDWATER SCIENCES CORPORATION

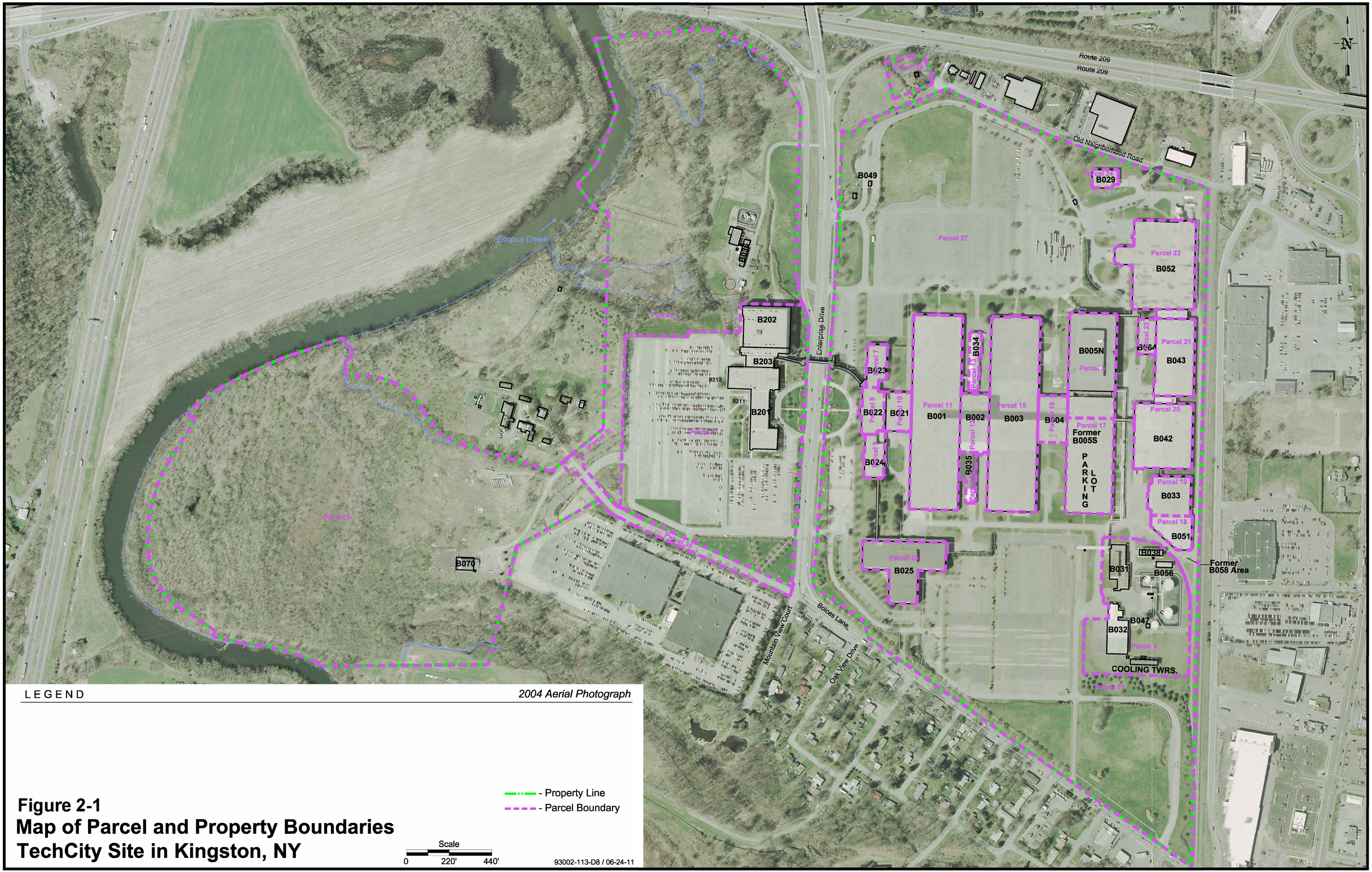


Figure 2-1
Map of Parcel and Property Boundaries
TechCity Site in Kingston, NY

SOLID WASTE MANAGEMENT UNITS (SWMUs)

A: B029 Chemical Distribution Center
B: B036 Container Storage Area
C: Former B058
D: Former Waste Acetone Storage Tank
E: Former Waste IPA Storage Tank
F: Former East Side Waste Tanks
G: Former Waste PCE Tank
H: Former East SRP Tank
I: Former West SRP
J: Wastewater Treatment Tanks
K: Emergency Wastewater Holding Tanks
L: Former Industrial Waste Sludge Lagoon
M: Industrial Waste Sewer Lines
N: Inactive B036 Construction and Debris Landfill
O: Salt Barn Parking Lot Sand Fill Area
P: Former B035 Dry Well
Q: Former B031 Lagoon
R: Former Waste TCA Tank (B005(S))
S: Former Waste TCA Tank (B001)
T: Former Waste Oil Tank
U: North Parking Lot Area Plume
V: B005 Plume
W: Former B004 Separator Tank
X: B031 Separator
Y: Former Fluoride Wastewater Ejector Tank
Z: Inactive B033 Septic System
AA: Inactive B031 Septic System
AB: Former B001 TCA Recovery Unit
AC: Former B005(S) Solvent Recovery Process Unit
AD: Former Fire Training Area
AE: B202 Elevator No. 2
AF: Inactive West Demolition Debris Fill Area

Groundwater Collection System
60" Storm
North Parking Lot Area (NPLA) System
Utility Trench Barrier Wall
42" Storm
Former B058 Area
COOLING TWRS.
Former B005S
Former B005N
Esopus Creek
Route 209
Old Neighborhood Road
Route 9W
John M. Clark Road
Enterprise Drive
Mountain View Court
Boices Lane
Oak View Drive
PS1
PS2
B029
B049 GWCS Treatment Bldg.
B052
B064
B043
B042
B033
B051
B056
B038
B031
B032
B047
B034
B035
B070
B202
B203
B201
B023
B022
B021
B001
B002
B003
B004
B024
B025

Figure 2-2

IBM
Kingston, New York

Site Layout and Area Map

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GROUNDWATER SCIENCES CORPORATION

LEGEND

- Storm Sewer Line
- North Parking Lot Area (NPLA) System
- Area of 1,1,1-Trichloroethane/Tricholoroethene >5 µg/l (5/08)
- Groundwater Collection System (GWCS)
- GWCS Trench Extension
- Subsurface Utility Trench Barrier Wall
- Solid Waste Management Unit
- # - Operable Unit
- Property Line

N

Scale
0 220' 440'

IWSL Detail, 2X

GWCS Detail, 2X

Esopus Creek

Route 209

Old Neighborhood Rd.

Enterprise Drive

Mtn. View Ct.

Boices Lane

Supplemental Groundwater Elevation Contour See 93002-118-Z1

Landing Area

Former B058 Area

60" STORM

36" STORM

42" STORM

27" STORM

(see IWSL detail)

(see GWCS detail)

B001 B002 B003 B004 B005 B005N B021 B022 B023 B024 B025 B029 B031 B032 B033 B034 B035 B036 B038 B042 B043 B051 B052 B056 B064 B201 B202 B203

LEGEND

- ▲ - Monitoring Well Location (installed in soil)
- △ - Temporary Monitoring Point
- ✪ - North Parking Lot Area Pump Station
- Property Line
- Site Control Perimeter
- 178 - Groundwater Elevation Contour
- Supplemental Groundwater Elevation Contour
- 177.55 - Groundwater Elevation
- NA - Not Accessible
- Groundwater Divide
- Inferred Direction of Groundwater Flow
- Groundwater Collection System (GWCS)
- GWCS Trench Extension
- 162.64 - GWCS Invert Elevation
- Subsurface Utility Trench Barrier Wall
- Unsaturated Surficial Sand Unit (Perennially Saturated Shallow Sand Absent)

Scale 0 300' 400'

Figure 2-3

IBM Kingston, New York

Surficial Sand Aquifer Groundwater Elevation Contour Map October 4, 2019 (Fourth Quarter 2019)

DRAWN BY: KA	DATE: 3/18/20	DRAWING NO. 93002-129-G2
CHECKED & APPROVED BY: CES/DAB		

GROUNDWATER SCIENCES CORPORATION

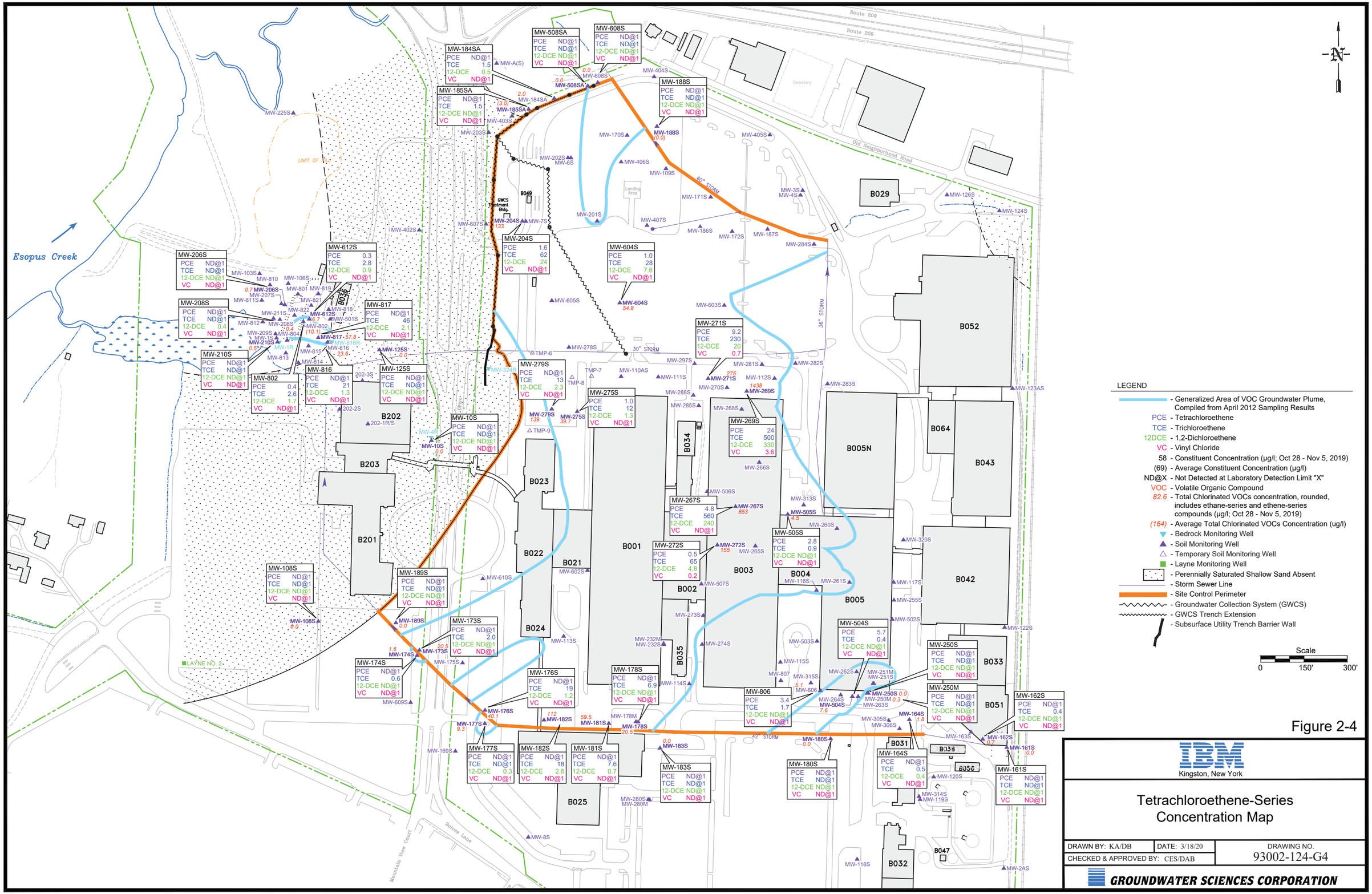


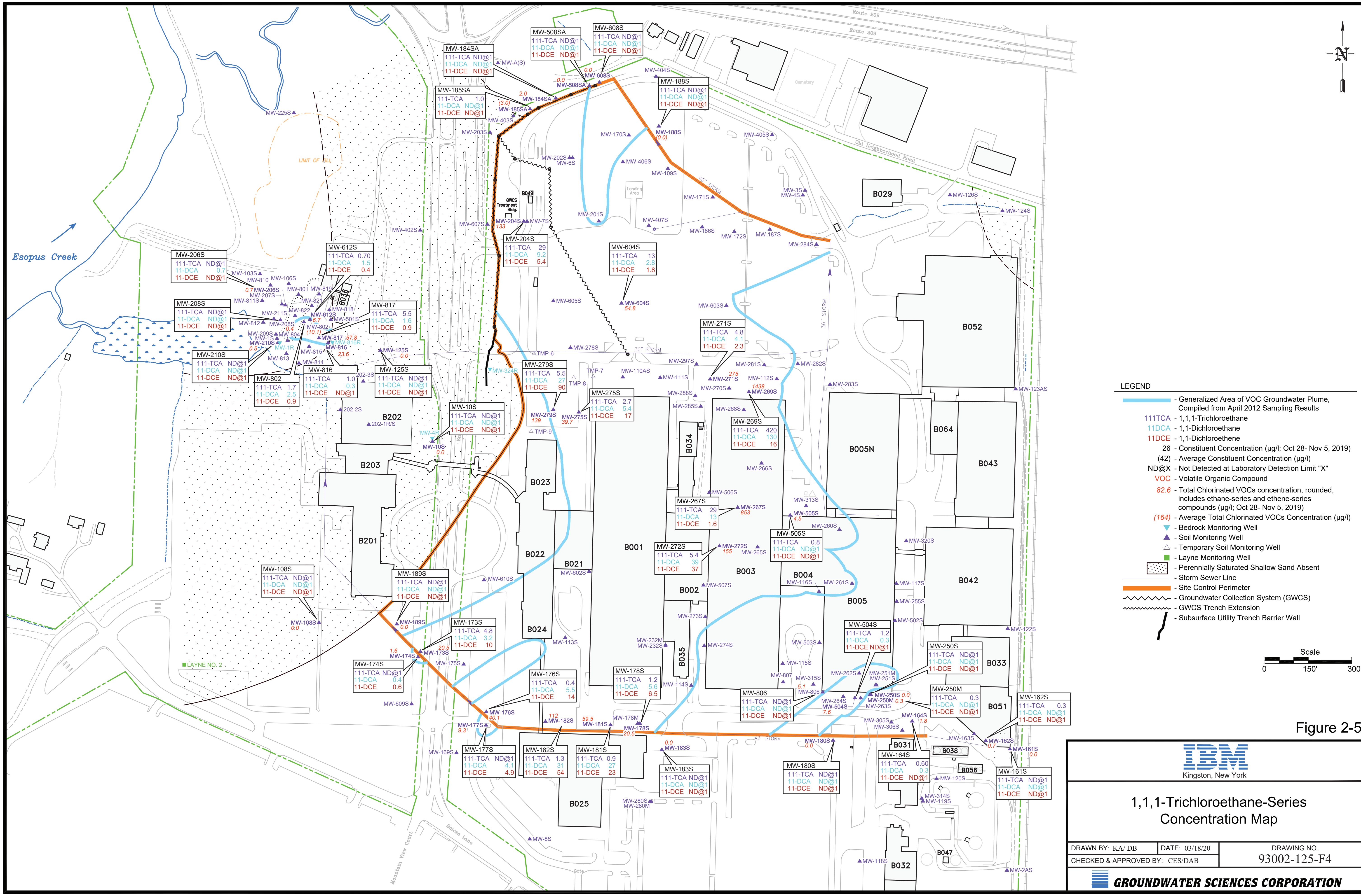
Figure 2-4

IBM
Kingston, New York

Tetrachloroethene-Series Concentration Map

DRAWN BY: KA/DB	DATE: 3/18/20	DRAWING NO. 93002-124-G4
CHECKED & APPROVED BY: CES/DAB		

GROUNDWATER SCIENCES CORPORATION


Esopus Creek
Route 209
Old Neighborhood Road
Cemetery
LIMIT OF FILL
GWCS Treatment Bldg.
Landing Area
60" STORM
36" STORM
30" STORM
42" STORM
Mountain View Court
Boices Lane
LAYNE NO. 2
MW-184SA 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-185SA 111-TCA 1.0 11-DCA ND@1 11-DCE ND@1
MW-508SA 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-608S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-188S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-204S 111-TCA 29 11-DCA 9.2 11-DCE 5.4
MW-604S 111-TCA 13 11-DCA 2.8 11-DCE 1.8
MW-612S 111-TCA 0.70 11-DCA 1.5 11-DCE 0.4
MW-206S 111-TCA ND@1 11-DCA 0.7 11-DCE ND@1
MW-208S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-817 111-TCA 5.5 11-DCA 1.6 11-DCE 0.9
MW-210S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-802 111-TCA 1.7 11-DCA 2.5 11-DCE 0.9
MW-816 111-TCA 1.0 11-DCA 0.3 11-DCE ND@1
MW-125S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-271S 111-TCA 4.8 11-DCA 4.1 11-DCE 2.3
MW-279S 111-TCA 5.5 11-DCA 27 11-DCE 90
MW-275S 111-TCA 2.7 11-DCA 5.4 11-DCE 17
MW-10S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-269S 111-TCA 420 11-DCA 130 11-DCE 16
MW-267S 111-TCA 29 11-DCA 13 11-DCE 1.6
MW-505S 111-TCA 0.8 11-DCA ND@1 11-DCE ND@1
MW-272S 111-TCA 5.4 11-DCA 39 11-DCE 37
MW-108S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-189S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-173S 111-TCA 4.8 11-DCA 3.2 11-DCE 10
MW-174S 111-TCA ND@1 11-DCA 0.4 11-DCE 0.6
MW-176S 111-TCA 0.4 11-DCA 5.5 11-DCE 14
MW-178S 111-TCA 1.2 11-DCA 5.6 11-DCE 6.5
MW-504S 111-TCA 1.2 11-DCA 0.3 11-DCE ND@1
MW-250S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-250M 111-TCA 0.3 11-DCA ND@1 11-DCE ND@1
MW-806 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-162S 111-TCA 0.3 11-DCA ND@1 11-DCE ND@1
MW-177S 111-TCA ND@1 11-DCA 4.1 11-DCE 4.9
MW-182S 111-TCA 1.3 11-DCA 31 11-DCE 54
MW-181S 111-TCA 0.9 11-DCA 27 11-DCE 23
MW-183S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-180S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
MW-164S 111-TCA 0.60 11-DCA 0.3 11-DCE ND@1
MW-161S 111-TCA ND@1 11-DCA ND@1 11-DCE ND@1
B001 B002 B003 B004 B005 B005N B021 B022 B023 B024 B025 B029 B031 B032 B033 B034 B035 B036 B038 B042 B043 B047 B049 B051 B052 B056 B064 B201 B202 B203
LEGEND
- Generalized Area of VOC Groundwater Plume, Compiled from April 2012 Sampling Results
111TCA - 1,1,1-Trichloroethane
11DCA - 1,1-Dichloroethane
11DCE - 1,1-Dichloroethene
26 - Constituent Concentration (µg/l; Oct 28- Nov 5, 2019)
(42) - Average Constituent Concentration (µg/l)
ND@X - Not Detected at Laboratory Detection Limit "X"
VOC - Volatile Organic Compound
82.6 - Total Chlorinated VOCs concentration, rounded, includes ethane-series and ethene-series compounds (µg/l; Oct 28- Nov 5, 2019)
(164) - Average Total Chlorinated VOCs Concentration (µg/l)
- Bedrock Monitoring Well
- Soil Monitoring Well
- Temporary Soil Monitoring Well
- Layne Monitoring Well
- Perennially Saturated Shallow Sand Absent
- Storm Sewer Line
- Site Control Perimeter
- Groundwater Collection System (GWCS)
- GWCS Trench Extension
- Subsurface Utility Trench Barrier Wall
Scale
0 150' 300'
Figure 2-5
IBM
Kingston, New York
1,1,1-Trichloroethane-Series Concentration Map
DRAWN BY: KA/ DB
DATE: 03/18/20
DRAWING NO. 93002-125-F4
CHECKED & APPROVED BY: CES/DAB
GROUNDWATER SCIENCES CORPORATION

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-204S 10/14/2020 410-17301-7 & 410-17270-6	
		Operable Unit		OU3a	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		ND	5.0
C-6	**PFHxS**	ng/L		ND	5.0
C-7	PFHpS	ng/L		ND	5.0
C-8	**PFOS**	ng/L		9.9	5.0
C-10	PFDS	ng/L		ND	5.0
C-4	PFBA	ng/L		ND	5.0
C-5	PFPeA	ng/L		ND	5.0
C-6	PFHxA	ng/L		ND	5.0
C-7	**PFHpA**	ng/L		ND	5.0
C-8	**PFOA**	ng/L		ND	5.0
C-9	**PFNA**	ng/L		ND	5.0
C-10	PFDA	ng/L		ND	5.0
C-11	PFUA/PFUdA	ng/L		ND	5.0
C-12	PFDoA	ng/L		ND	5.0
C-13	PFTriA/PFTrDA	ng/L		ND	5.0
C-14	PFTA/PFTeDA	ng/L		ND	5.0
C-8	6:2 FTS	ng/L		ND	20
C-10	8:2 FTS	ng/L		ND	10
C-8	FOSA	ng/L		ND	5.0
C-8	N-MeFOSAA	ng/L		ND	6.0
C-8	N-EtFOSAA	ng/L		ND	5.0
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		GWCS Influent 10/16/2020 410-17605-4 & 410-17604-4		GWCS Influent Duplicate 10/16/2020 410-17605-5 & 410-17604-5	
				GTF		GTF	
	Abbreviation	units		Result	MDL	Result	MDL
C-4	**PFBS**	ng/L		2.2	0.40	2.3	0.40
C-6	**PFHxS**	ng/L		10	0.40	11	0.40
C-7	PFHpS	ng/L		1.7	0.40	1.8	0.40
C-8	**PFOS**	ng/L		47	0.40	55	0.40
C-10	PFDS	ng/L		ND	0.40	ND	0.40
C-4	PFBA	ng/L		4.9	1.6	4.6	1.6
C-5	PFPeA	ng/L		6.5	0.40	5.5	0.40
C-6	PFHxA	ng/L		7.6	0.40	6.2	0.40
C-7	**PFHpA**	ng/L		2.3	0.40	2.2	0.40
C-8	**PFOA**	ng/L		7	0.40	6.4	0.40
C-9	**PFNA**	ng/L		0.58	0.40	0.58	0.40
C-10	PFDA	ng/L		ND	0.40	ND	0.40
C-11	PFUA/PFUdA	ng/L		ND	0.40	ND	0.40
C-12	PFDoA	ng/L		ND	0.40	ND	0.40
C-13	PFTriA/PFTrDA	ng/L		ND	0.40	ND	0.40
C-14	PFTA/PFTeDA	ng/L		ND	0.40	ND	0.40
C-8	6:2 FTS	ng/L		ND	1.6	ND	1.6
C-10	8:2 FTS	ng/L		ND	0.81	ND	0.81
C-8	FOSA	ng/L		ND	0.40	ND	0.40
C-8	N-MeFOSAA	ng/L		ND	0.48	ND	0.48
C-8	N-EtFOSAA	ng/L		ND	0.40	ND	0.40
	14-Dioxane	ug/L		1	0.10	7.1	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		NPLA Influent 10/16/2020 410-17605-2 & 410-17604-2	
				GTF	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		4.7	0.40
C-6	**PFHxS**	ng/L		17	0.40
C-7	PFHpS	ng/L		7.2	0.40
C-8	**PFOS**	ng/L		470	4.0
C-10	PFDS	ng/L		ND	0.40
C-4	PFBA	ng/L		8.5	1.6
C-5	PFPeA	ng/L		7.9	0.40
C-6	PFHxA	ng/L		9.3	0.40
C-7	**PFHpA**	ng/L		6.2	0.40
C-8	**PFOA**	ng/L		19	0.40
C-9	**PFNA**	ng/L		1.3	0.40
C-10	PFDA	ng/L		0.53	0.40
C-11	PFUA/PFUdA	ng/L		ND	0.40
C-12	PFDoA	ng/L		ND	0.40
C-13	PFTriA/PFTrDA	ng/L		ND	0.40
C-14	PFTA/PFTeDA	ng/L		ND	0.40
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.80
C-8	FOSA	ng/L		ND	0.40
C-8	N-MeFOSAA	ng/L		ND	0.48
C-8	N-EtFOSAA	ng/L		ND	0.40
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		Municipal Water 10/16/2020 410-17605-6 & 410-17604-6	
				QAQC	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		ND	0.41
C-6	**PFHxS**	ng/L		ND	0.41
C-7	PFHpS	ng/L		ND	0.41
C-8	**PFOS**	ng/L		0.97	0.41
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		ND	1.6
C-5	PFPeA	ng/L		ND	0.41
C-6	PFHxA	ng/L		ND	0.41
C-7	**PFHpA**	ng/L		ND	0.41
C-8	**PFOA**	ng/L		ND	0.41
C-9	**PFNA**	ng/L		ND	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.82
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample ID		MW-106S 10/15/2020 410-17464-6	
		Operable Unit		OU6	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		3.3	0.41
C-6	**PFHxS**	ng/L		16	0.41
C-7	PFHpS	ng/L		7.2	0.41
C-8	**PFOS**	ng/L		470	4.1
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		8.3	1.6
C-5	PFPeA	ng/L		9.3	0.41
C-6	PFHxA	ng/L		11	0.41
C-7	**PFHpA**	ng/L		5	0.41
C-8	**PFOA**	ng/L		14	0.41
C-9	**PFNA**	ng/L		0.69	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.81
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L			

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample ID		MW-275S 10/14/2020 410-17270-5	
		Operable Unit		OU3	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L			
C-6	**PFHxS**	ng/L			
C-7	PFHpS	ng/L			
C-8	**PFOS**	ng/L			
C-10	PFDS	ng/L			
C-4	PFBA	ng/L			
C-5	PFPeA	ng/L			
C-6	PFHxA	ng/L			
C-7	**PFHpA**	ng/L			
C-8	**PFOA**	ng/L			
C-9	**PFNA**	ng/L			
C-10	PFDA	ng/L			
C-11	PFUA/PFUdA	ng/L			
C-12	PFDoA	ng/L			
C-13	PFTriA/PFTrDA	ng/L			
C-14	PFTA/PFTeDA	ng/L			
C-8	6:2 FTS	ng/L			
C-10	8:2 FTS	ng/L			
C-8	FOSA	ng/L			
C-8	N-MeFOSAA	ng/L			
C-8	N-EtFOSAA	ng/L			
	14-Dioxane	ug/L		1	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-124S 10/14/2020 410-17301-3 & 410-17270-3	
		Operable Unit		OU4a	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		0.46	0.41
C-6	**PFHxS**	ng/L		2.3	0.41
C-7	PFHpS	ng/L		ND	0.41
C-8	**PFOS**	ng/L		1.1	0.41
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		2.6	1.6
C-5	PFPeA	ng/L		1.5	0.41
C-6	PFHxA	ng/L		1.3	0.41
C-7	**PFHpA**	ng/L		ND	0.41
C-8	**PFOA**	ng/L		0.52	0.41
C-9	**PFNA**	ng/L		ND	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.82
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-313S 10/14/2020 410-17301-5 & 410-17270-4	
		Operable Unit		OU7	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		10	0.41
C-6	**PFHxS**	ng/L		37	0.41
C-7	PFHpS	ng/L		20	0.41
C-8	**PFOS**	ng/L		4000	41
C-10	PFDS	ng/L		2	0.41
C-4	PFBA	ng/L		18	1.6
C-5	PFPeA	ng/L		19	0.41
C-6	PFHxA	ng/L		30	0.41
C-7	**PFHpA**	ng/L		20	0.41
C-8	**PFOA**	ng/L		51	0.41
C-9	**PFNA**	ng/L		1.7	0.41
C-10	PFDA	ng/L		0.49	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.82
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample ID		MW-802 10/15/2020 410-17464-5 & 410-17467-5	
		Operable Unit		OU5	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		4	0.41
C-6	**PFHxS**	ng/L		18	0.41
C-7	PFHpS	ng/L		8.4	0.41
C-8	**PFOS**	ng/L		580	4.1
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		9.8	1.7
C-5	PFPeA	ng/L		12	0.41
C-6	PFHxA	ng/L		13	0.41
C-7	**PFHpA**	ng/L		6.8	0.41
C-8	**PFOA**	ng/L		19	0.41
C-9	**PFNA**	ng/L		1.8	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.7
C-10	8:2 FTS	ng/L		ND	0.83
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.50
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		4.3	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-255S 10/15/2020 410-17467-8	
		Operable Unit		OU3	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L			
C-6	**PFHxS**	ng/L			
C-7	PFHpS	ng/L			
C-8	**PFOS**	ng/L			
C-10	PFDS	ng/L			
C-4	PFBA	ng/L			
C-5	PFPeA	ng/L			
C-6	PFHxA	ng/L			
C-7	**PFHpA**	ng/L			
C-8	**PFOA**	ng/L			
C-9	**PFNA**	ng/L			
C-10	PFDA	ng/L			
C-11	PFUA/PFUdA	ng/L			
C-12	PFDoA	ng/L			
C-13	PFTriA/PFTrDA	ng/L			
C-14	PFTA/PFTeDA	ng/L			
C-8	6:2 FTS	ng/L			
C-10	8:2 FTS	ng/L			
C-8	FOSA	ng/L			
C-8	N-MeFOSAA	ng/L			
C-8	N-EtFOSAA	ng/L			
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-173S 10/15/2020 410-17464-7 & 410-17467-6	
		Operable Unit		OU1	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		1.9	0.40
C-6	**PFHxS**	ng/L		2.1	0.40
C-7	PFHpS	ng/L		ND	0.40
C-8	**PFOS**	ng/L		14	0.40
C-10	PFDS	ng/L		ND	0.40
C-4	PFBA	ng/L		6.9	1.6
C-5	PFPeA	ng/L		10	0.40
C-6	PFHxA	ng/L		16	0.40
C-7	**PFHpA**	ng/L		19	0.40
C-8	**PFOA**	ng/L		41	0.40
C-9	**PFNA**	ng/L		0.87	0.40
C-10	PFDA	ng/L		ND	0.40
C-11	PFUA/PFUdA	ng/L		ND	0.40
C-12	PFDoA	ng/L		ND	0.40
C-13	PFTriA/PFTrDA	ng/L		ND	0.40
C-14	PFTA/PFTeDA	ng/L		ND	0.40
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.81
C-8	FOSA	ng/L		ND	0.40
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.40
	14-Dioxane	ug/L		21	1.0

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-125S 10/15/2020 410-17464-3 & 410-17467-3	
		Operable Unit		OU6	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		ND	4.9
C-6	**PFHxS**	ng/L		ND	4.9
C-7	PFHpS	ng/L		ND	4.9
C-8	**PFOS**	ng/L		ND	4.9
C-10	PFDS	ng/L		ND	4.9
C-4	PFBA	ng/L		ND	20
C-5	PFPeA	ng/L		ND	4.9
C-6	PFHxA	ng/L		ND	4.9
C-7	**PFHpA**	ng/L		ND	4.9
C-8	**PFOA**	ng/L		ND	4.9
C-9	**PFNA**	ng/L		ND	4.9
C-10	PFDA	ng/L		ND	4.9
C-11	PFUA/PFUdA	ng/L		ND	4.9
C-12	PFDoA	ng/L		ND	4.9
C-13	PFTriA/PFTrDA	ng/L		ND	4.9
C-14	PFTA/PFTeDA	ng/L		ND	4.9
C-8	6:2 FTS	ng/L		ND	20
C-10	8:2 FTS	ng/L		ND	9.9
C-8	FOSA	ng/L		ND	4.9
C-8	N-MeFOSAA	ng/L		ND	5.9
C-8	N-EtFOSAA	ng/L		ND	4.9
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample ID		MW-267S 10/14/2020 410-17301-6	
		Operable Unit		OU3	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		0.97	0.40
C-6	**PFHxS**	ng/L		4	0.40
C-7	PFHpS	ng/L		2	0.40
C-8	**PFOS**	ng/L		83	0.40
C-10	PFDS	ng/L		ND	0.40
C-4	PFBA	ng/L		3.9	1.6
C-5	PFPeA	ng/L		1.9	0.40
C-6	PFHxA	ng/L		2.3	0.40
C-7	**PFHpA**	ng/L		2.8	0.40
C-8	**PFOA**	ng/L		17	0.40
C-9	**PFNA**	ng/L		0.59	0.40
C-10	PFDA	ng/L		ND	0.40
C-11	PFUA/PFUdA	ng/L		ND	0.40
C-12	PFDoA	ng/L		ND	0.40
C-13	PFTriA/PFTrDA	ng/L		ND	0.40
C-14	PFTA/PFTeDA	ng/L		ND	0.40
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.81
C-8	FOSA	ng/L		ND	0.40
C-8	N-MeFOSAA	ng/L		ND	0.48
C-8	N-EtFOSAA	ng/L		ND	0.40
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-503S 10/15/2020 410-17464-8 & 410-17467-7	
		Operable Unit		OU3	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		2.6	0.40
C-6	**PFHxS**	ng/L		3.1	0.40
C-7	PFHpS	ng/L		0.46	0.40
C-8	**PFOS**	ng/L		22	0.40
C-10	PFDS	ng/L		ND	0.40
C-4	PFBA	ng/L		4.5	1.6
C-5	PFPeA	ng/L		1.3	0.40
C-6	PFHxA	ng/L		2.7	0.40
C-7	**PFHpA**	ng/L		2.3	0.40
C-8	**PFOA**	ng/L		11	0.40
C-9	**PFNA**	ng/L		0.55	0.40
C-10	PFDA	ng/L		ND	0.40
C-11	PFUA/PFUdA	ng/L		ND	0.40
C-12	PFDoA	ng/L		ND	0.40
C-13	PFTriA/PFTrDA	ng/L		ND	0.40
C-14	PFTA/PFTeDA	ng/L		ND	0.40
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.80
C-8	FOSA	ng/L		ND	0.40
C-8	N-MeFOSAA	ng/L		ND	0.48
C-8	N-EtFOSAA	ng/L		ND	0.40
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample ID		MW-505S 10/14/2020 410-17301-4	
		Operable Unit		OU3	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		1.5	0.41
C-6	**PFHxS**	ng/L		2.5	0.41
C-7	PFHpS	ng/L		1.1	0.41
C-8	**PFOS**	ng/L		86	0.41
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		6.2	1.6
C-5	PFPeA	ng/L		2.1	0.41
C-6	PFHxA	ng/L		2.8	0.41
C-7	**PFHpA**	ng/L		3.1	0.41
C-8	**PFOA**	ng/L		16	0.41
C-9	**PFNA**	ng/L		1.7	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.82
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		ND	0.10

Length of Fluorinated Carbon Chain (# Atoms)		Sample Location / Sample Date / Laboratory Sample IDs		MW-162S 10/16/2020 410-17605-7 & 410-17604-7	
		Operable Unit		OU4	
	Abbreviation	units		Result	MDL
C-4	**PFBS**	ng/L		1.9	0.41
C-6	**PFHxS**	ng/L		1	0.41
C-7	PFHpS	ng/L		ND	0.41
C-8	**PFOS**	ng/L		8.6	0.41
C-10	PFDS	ng/L		ND	0.41
C-4	PFBA	ng/L		3.8	1.6
C-5	PFPeA	ng/L		7.8	0.41
C-6	PFHxA	ng/L		6.6	0.41
C-7	**PFHpA**	ng/L		2.8	0.41
C-8	**PFOA**	ng/L		7.8	0.41
C-9	**PFNA**	ng/L		2.3	0.41
C-10	PFDA	ng/L		ND	0.41
C-11	PFUA/PFUdA	ng/L		ND	0.41
C-12	PFDoA	ng/L		ND	0.41
C-13	PFTriA/PFTrDA	ng/L		ND	0.41
C-14	PFTA/PFTeDA	ng/L		ND	0.41
C-8	6:2 FTS	ng/L		ND	1.6
C-10	8:2 FTS	ng/L		ND	0.82
C-8	FOSA	ng/L		ND	0.41
C-8	N-MeFOSAA	ng/L		ND	0.49
C-8	N-EtFOSAA	ng/L		ND	0.41
	14-Dioxane	ug/L		ND	0.10

SOLID WASTE MANAGEMENT UNITS (SWMUs):

- A: B029 Chemical Distribution Center
- B: B036 Container Storage Area
- C: Former B058
- D: Former Waste Acetone Storage Tank
- E: Former Waste IPA Storage Tank
- F: Former East Side Waste Tanks
- G: Former Waste PCE Tank
- H: Former East SRP Tank
- I: Former West SRP
- J: Wastewater Treatment Tanks
- K: Emergency Wastewater Holding Tanks
- L: Former Industrial Waste Sludge Lagoon
- M: Industrial Waste Sewer Lines
- N: Inactive B036 Construction and Debris Landfill
- O: Salt Barn Parking Lot Sand Fill Area
- P: Former B035 Dry Well
- Q: Former B031 Lagoon
- R: Former Waste TCA Tank (B005(S))
- S: Former Waste TCA Tank (B001)
- T: Former Waste Oil Tank
- U: North Parking Lot Area Plume
- V: B005 Plume
- W: Former B004 Separator Tank
- X: B031 Separator
- Y: Former Fluoride Wastewater Ejector Tank
- Z: Inactive B033 Septic System
- AA: Inactive B031 Septic System
- AB: Former B001 TCA Recovery Unit
- AC: Former B005(S) Solvent Recovery Process Unit
- AD: Former Fire Training Area
- AE: B202 Elevator No. 2
- AF: Inactive West Demolition Debris Fill Area

	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Parameter Name	ParamCode
Perfluoroalkyl sulfonates	375-73-5	C-4	**Perfluorobutanesulfonic acid**	**PFBS**
	355-46-4	C-6	**Perfluorohexanesulfonic acid**	**PFHxS**
	375-92-8	C-7	Perfluoroheptanesulfonic acid	PFHpS
	1763-23-1	C-8	**Perfluorooctanesulfonic acid**	**PFOS**
	335-77-3	C-10	Perfluorodecanesulfonic acid	PFDS
Perfluoroalkyl carboxylates	375-22-4	C-4	Perfluorobutanoic acid	PFBA
	2706-90-3	C-5	Perfluoropentanoic acid	PFPeA
	307-24-4	C-6	Perfluorohexanoic acid	PFHxA
	375-85-9	C-7	**Perfluoroheptanoic acid**	**PFHpA**
	335-67-1	C-8	**Perfluorooctanoic acid**	**PFOA**
	375-95-1	C-9	**Perfluorononanoic acid**	**PFNA**
	335-76-2	C-10	Perfluorodecanoic acid	PFDA
	2058-94-8	C-11	Perfluoroundecanoic acid	PFUA/PFUdA
	307-55-1	C-12	Perfluorododecanoic acid	PFDoA
	72629-94-8	C-13	Perfluorotridecanoic acid	PFTriA/PFTrDA
	376-06-7	C-14	Perfluorotetradecanoic acid	PFTA/PFTeDA
Fluorinated Telomer Sulfonates	27619-97-2	C-6	6:2 Fluorotelomer sulfonic acid	6:2 FTS
	39108-34-4	C-10	8:2 Fluorotelomer sulfonic acid	8:2 FTS
Perfluorooctanesulfonamides	754-91-6	C-8	Perfluorooctanesulfonamide	FOSA
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	NMeFOSAA	N-MeFOSAA
	2991-50-6	C-8	NEtFOSAA	N-EtFOSAA
SVOC	123-91-1		1,4-Dioxane	14-Dioxane

LEGEND

- PFAS Sampling Location
- PFAS and 1,4-Dioxane Sampling Location
- 1,4-Dioxane Sampling Location
- GMP Water Quality Monitoring Location
- GMP Hydraulic Effectiveness Monitoring Location (only)
- Other Monitoring Location (not part of site GMP)
- Groundwater Collection System (GWCS)
- Subsurface Utility Trench Barrier Wall
- Railroad
- Active or Inactive Subsurface Industrial Waste Lines
- Overhead Active Industrial Waste Sewer Lines (approx.)
- Sanitary Sewer Lines
- Storm Sewer Lines
- Solid Waste Management Unit
- Operable Unit

Note: Utilities are represented as solid lines inside buildings, dashed lines outside buildings.

Scale: 0, 150', 300'

Plate 1

IBM Kingston, New York

Emerging Contaminants Sampling Results
Poly- and Perfluoroalkyl Substances (PFAS)
and 1,4-Dioxane

DRAWN BY: KA | DATE: 12/12/20 | DRAWING NO. 93002-130-B1

CHECKED & APPROVED BY: DAB

GROUNDWATER SCIENCES CORPORATION

APPENDIX A:
EMERGING CONTAMINANTS SAMPLING RESULTS

Table A-1: Emerging Contaminants Summary of Sampling Results: Operable Unit 1

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		MW-173S 10/15/2020 410-17464-7 & 410-17467-6	
					Operable Unit		OU1	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	1.9	0.40
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	2.1	0.40
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.40
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	14	0.40
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.40
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	6.9	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	10	0.40
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	16	0.40
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	19	0.40
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	41	0.40
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	0.87	0.40
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.40
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.40
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.40
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.40
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.40
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.81
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.40
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.40
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	21	1.0

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-2: Emerging Contaminants Summary of Sampling Results: Operable Unit 3

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample ID		MW-255S 10/15/2020 410-17467-8		MW-267S 10/14/2020 410-17301-6		MW-275S 10/14/2020 410-17270-5		MW-503S 10/15/2020 410-17464-8 & 410-17467-7		MW-505S 10/14/2020 410-17301-4	
					Operable Unit		OU3		OU3		OU3		OU3		OU3	
					Abbreviation	units	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L			0.97	0.40			2.6	0.40	1.5	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L			4	0.40			3.1	0.40	2.5	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L			2	0.40			0.46	0.40	1.1	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L			83	0.40			22	0.40	86	0.41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L			ND	0.40			ND	0.40	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L			3.9	1.6			4.5	1.6	6.2	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L			1.9	0.40			1.3	0.40	2.1	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L			2.3	0.40			2.7	0.40	2.8	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L			2.8	0.40			2.3	0.40	3.1	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L			17	0.40			11	0.40	16	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L			0.59	0.40			0.55	0.40	1.7	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L			ND	0.40			ND	0.40	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L			ND	0.40			ND	0.40	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L			ND	0.40			ND	0.40	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L			ND	0.40			ND	0.40	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L			ND	0.40			ND	0.40	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L			ND	1.6			ND	1.6	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L			ND	0.81			ND	0.80	ND	0.81
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L			ND	0.40			ND	0.40	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L			ND	0.49			ND	0.48	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L			ND	0.40			ND	0.40	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10			1	0.10	ND	0.10		

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-3: Emerging Contaminants Summary of Sampling Results: Operable Unit 3a

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		MW-204S 10/14/2020 410-17301-7 & 410-17270-6	
					Operable Unit		OU3a	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	ND	5.0
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	ND	5.0
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	5.0
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	9.9 J	5.0
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	5.0
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	ND	20
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	ND	5.0
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	ND	5.0
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	5.0
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	ND	5.0
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	5.0
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	5.0
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	5.0
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	5.0
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	5.0
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	5.0
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	20
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	10
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	5.0
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	6.0
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	5.0
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-4: Emerging Contaminants Summary of Sampling Results: Operable Unit 4

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		MW-162S 10/16/2020 410-17605-7 & 410-17604-7	
					Operable Unit		OU4	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	1.9	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	1	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	8.6	0.41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	3.8	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	7.8	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	6.6	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	2.8	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	7.8	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	2.3	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.82
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-5: Emerging Contaminants Summary of Sampling Results: Operable Unit 4a

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		MW-124S 10/14/2020 410-17301-3 & 410-17270-3	
					Operable Unit		OU4a	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	0.46	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	2.3	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	1.1	0.41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	2.6	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	1.5	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	1.3	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	0.52	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.82
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-6: Emerging Contaminants Summary of Sampling Results: Operable Unit 5

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		MW-802 10/15/2020 410-17464-5 & 410-17467-5	
					Operable Unit		OU5	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	4	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	18	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	8.4	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	580	4.1
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	9.8	1.7
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	12	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	13	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	6.8	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	19	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	1.8	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.7
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.83
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.50
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	4.3	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-7: Emerging Contaminants Summary of Sampling Results: Operable Unit 6

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		MW-106S 10/15/2020 410-17464-6		MW-125S 10/15/2020 410-17464-3 & 410-17467-3	
					Operable Unit		OU6		OU6	
					Abbreviation	units	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	3.3	0.41	ND	4.9
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	16	0.41	ND	4.9
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	7.2	0.41	ND	4.9
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	470	4.1	ND	4.9
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.41	ND	4.9
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	8.3	1.6	ND	20
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	9.3	0.41	ND	4.9
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	11	0.41	ND	4.9
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	5	0.41	ND	4.9
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	14	0.41	ND	4.9
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	0.69	0.41	ND	4.9
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.41	ND	4.9
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41	ND	4.9
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41	ND	4.9
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41	ND	4.9
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41	ND	4.9
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6	ND	20
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.81	ND	9.9
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41	ND	4.9
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49	ND	5.9
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41	ND	4.9
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L			ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-8: Emerging Contaminants Summary of Sampling Results: Operable Unit 7

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		MW-313S 10/14/2020 410-17301-5 & 410-17270-4	
					Operable Unit		OU7	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	10	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	37	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	20	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	4000	41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	2	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	18	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	19	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	30	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	20	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	51	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	1.7	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	0.49	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.82
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-9: Emerging Contaminants Summary of Sampling Results: Groundwater Treatment Facility

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location / Sample Date / Laboratory Sample IDs		GWCS Influent 10/16/2020 410-17605-4 & 410-17604-4		GWCS Influent Duplicate 10/16/2020 410-17605-5 & 410-17604-5		NPLA Influent 10/16/2020 410-17605-2 & 410-17604-2	
					Location		GTF		GTF		GTF	
					Abbreviation	units	Result	MDL	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	2.2	0.40	2.3	0.40	4.7	0.40
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	10	0.40	11	0.40	17	0.40
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	1.7	0.40	1.8	0.40	7.2	0.40
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	47	0.40	55	0.40	470	4.0
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.40	ND	0.40	ND	0.40
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	4.9	1.6	4.6	1.6	8.5	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	6.5	0.40	5.5	0.40	7.9	0.40
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	7.6	0.40	6.2	0.40	9.3	0.40
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	2.3	0.40	2.2	0.40	6.2	0.40
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	7	0.40	6.4	0.40	19	0.40
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	0.58	0.40	0.58	0.40	1.3	0.40
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.40	ND	0.40	0.53	0.40
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.40	ND	0.40	ND	0.40
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.40	ND	0.40	ND	0.40
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.40	ND	0.40	ND	0.40
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.40	ND	0.40	ND	0.40
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6	ND	1.6	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.81	ND	0.81	ND	0.80
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.40	ND	0.40	ND	0.40
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.48	ND	0.48	ND	0.48
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.40	ND	0.40	ND	0.40
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	1	0.10	7.1	0.10	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L)

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-10: Emerging Contaminants Summary of Sampling Results: Municipal Water

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		Municipal Water 10/16/2020 410-17605-6 & 410-17604-6	
					Operable Unit		QAQC	
					Abbreviation	units	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	ND	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	ND	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	0.97	0.41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	ND	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	ND	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	ND	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	ND	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.82
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.49
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-11: Emerging Contaminants Summary of Sampling Results: Field Quality Assurance / Quality Control

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		Trip Blank 10/14/2020 to 10/15/2020		Trip Blank 10/15/2020 to 10/16/2020		Trip Blank 10/16/2020 to 10/17/2020	
					Sample Type		QAQC		QAQC		QAQC	
					Abbreviation	units	Result	MDL	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	ND	1.9	ND	ND@1.8	ND	1.7
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.9	ND	ND@1.8	ND	1.7
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.94	ND	ND@0.91	ND	0.85
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.56	ND	ND@0.54	ND	0.51
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.47	ND	ND@0.45	ND	0.42
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.11	ND	ND@0.10	ND	0.1

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-11: Emerging Contaminants Summary of Sampling Results: Field Quality Assurance / Quality Control (continued)

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		EQ Rinse Blk Pump MW-124S 10/14/2020		EQ Rinse Blk Pump MW-125S 10/15/2020		EQ Rinse Blk Pump MW-162S 10/16/2020	
					Sample Type		QAQC		QAQC		QAQC	
					Abbreviation	units	Result	MDL	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	ND	1.6	ND	ND@1.6	ND	1.7
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6	ND	ND@1.6	ND	1.7
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.8	ND	ND@0.81	ND	0.83
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.48	ND	ND@0.49	ND	0.5
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.40	ND	ND@0.41	ND	0.41
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.1	ND	ND@0.10	ND	0.1

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit

Table A-11: Emerging Contaminants Summary of Sampling Results: Field Quality Assurance / Quality Control (continued)

Group	CAS	Length of Fluorinated Carbon Chain (# Atoms)	Molecular Weight (g/mol)	Parameter Name	Sample Location Sample Date Laboratory Sample IDs		Field Blank MW-204S 10/14/2020		Field Blank MW-802 10/15/2020		Field Blank NPLA 10/16/2020	
					Sample Type		QAQC		QAQC		QAQC	
					Abbreviation	units	Result	MDL	Result	MDL	Result	MDL
Perfluoroalkyl sulfonates	**375-73-5**	**C-4**	299.09	**Perfluorobutanesulfonic acid**	**PFBS**	ng/L	ND	0.40	ND	0.40	ND	0.40
	355-46-4	**C-6**	399.11	**Perfluorohexanesulfonic acid**	**PFHxS**	ng/L	ND	0.40	ND	0.40	ND	0.40
	375-92-8	C-7	449.12	Perfluoroheptanesulfonic acid	PFHpS	ng/L	ND	0.40	ND	0.40	ND	0.40
	1763-23-1	**C-8**	499.12	**Perfluorooctanesulfonic acid**	**PFOS**	ng/L	0.58	0.40	ND	0.40	ND	0.40
	335-77-3	C-10	599.14	Perfluorodecanesulfonic acid	PFDS	ng/L	ND	0.40	ND	0.40	ND	0.40
Perfluoroalkyl carboxylates	375-22-4	C-4	214.04	Perfluorobutanoic acid	PFBA	ng/L	ND	1.6	ND	1.6	ND	1.6
	2706-90-3	C-5	264.05	Perfluoropentanoic acid	PFPeA	ng/L	ND	0.40	ND	0.40	ND	0.40
	307-24-4	C-6	314.05	Perfluorohexanoic acid	PFHxA	ng/L	ND	0.40	ND	0.40	ND	0.40
	375-85-9	**C-7**	364.06	**Perfluoroheptanoic acid**	**PFHpA**	ng/L	ND	0.40	ND	0.40	ND	0.40
	335-67-1	**C-8**	414.07	**Perfluorooctanoic acid**	**PFOA**	ng/L	ND	0.40	ND	0.40	ND	0.40
	375-95-1	**C-9**	464.08	**Perfluorononanoic acid**	**PFNA**	ng/L	ND	0.40	ND	0.40	ND	0.40
	335-76-2	C-10	514.08	Perfluorodecanoic acid	PFDA	ng/L	ND	0.40	ND	0.40	ND	0.40
	2058-94-8	C-11	564.09	Perfluoroundecanoic acid	PFUA/PFUdA	ng/L	ND	0.40	ND	0.40	ND	0.40
	307-55-1	C-12	614.10	Perfluorododecanoic acid	PFDoA	ng/L	ND	0.40	ND	0.40	ND	0.40
	72629-94-8	C-13	664.10	Perfluorotridecanoic acid	PFTriA/PFTrDA	ng/L	ND	0.40	ND	0.40	ND	0.40
	376-06-7	C-14	714.11	Perfluorotetradecanoic acid	PFTA/PFTeDA	ng/L	ND	0.40	ND	0.40	ND	0.40
Fluorinated Telomer Sulfonates	27619-97-2	C-8	428.17	6:2 Fluorotelomer sulfonic acid	6:2 FTS	ng/L	ND	1.6	ND	1.6	ND	1.6
	39108-34-4	C-10	528.18	8:2 Fluorotelomer sulfonic acid	8:2 FTS	ng/L	ND	0.80	ND	0.80	ND	0.80
Perfluorooctanesulfonamides	754-91-6	C-8	499.15	Perfluorooctanesulfonamide	FOSA	ng/L	ND	0.40	ND	0.40	ND	0.40
Perfluorooctane-sulfonamidoacetic acids	2355-31-9	C-8	428.17	NMeFOSAA	N-MeFOSAA	ng/L	ND	0.48	ND	0.48	ND	0.48
	2991-50-6	C-8	528.18	NEtFOSAA	N-EtFOSAA	ng/L	ND	0.40	ND	0.40	ND	0.40
SVOC	123-91-1		88.11	1,4-Dioxane	14-Dioxane	ug/L	ND	0.10	ND	0.10	ND	0.10

Notes:

Bold entries depict the 6 PFAS identified in the United States Environmental Protection Agency Third Unregulated Contaminant Monitoring Rule (UCMR3)

PFAS compounds reported in nanograms per liter (ng/L) and 1,4-Dioxane reported in micrograms per liter (ug/L

Result Laboratory reported result

MDL Method Detection Limit

NS Not Sampled

Result qualifiers:

ND The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit

J signifies estimated concentration below Limit of Quantitation but above the Method Detection Limit