

MAY 2021

GROUNDWATER MONITORING REPORT

FOR

MAIN STREET RIGHT-OF-WAY

NYSDEC SPILL #9500234

CITY OF BUFFALO, ERIE COUNTY, NEW YORK

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ACRONYM LIST

C&S	C&S ENGINEERS, INC.
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
LUST	LEAKING UNDERGROUND STORAGE TANK
BCP	BROWNFIELD CLEANUP PROGRAM
SPH	SEPARATE PHASE HYDROCARBONS
RI/IRM	REMEDIAL INVESTIGATION / INTERIM REMEDIAL MEASURES
BTEX	BENZENE, TOLUENE, ETHYLBENZENE AND TOTAL XYLENE
LNAPL	LIGHT NON AQUEOUS PHASE LIQUID
VOC	VOLATILE ORGANIC COMPOUNDS
SCO	SOIL CLEANUP OBJECTIVES
PID	PHOTO-IONIZATION DETECTOR

As part of the 2013 Stipulation Agreement between the New York State Department of Environmental Conservation (NYSDEC) and the Kaleida Health, C&S Engineers, Inc. (C&S) is providing this report detailing ongoing groundwater monitoring and remedial work that addresses the presence of residual petroleum contamination within the Main Street and Goodrich Street Right-of-Way (ROW). This report describes the methods and results of the May 2021 sampling event.

1. INTRODUCTION

For over 30 years, leaking underground storage tanks (LUSTs) formerly located at a Mobil Service Station at the corner of Main and High Streets released petroleum products into the subsurface soils and groundwater. The source area surrounded the former LUSTs, where contaminated soils were observed from 10 feet below ground surface (bgs), with the bulk of the contamination in the range of 20 feet bgs to approximately to 40 feet bgs. From the main release area, historic migration of petroleum product entered into a semi-confined coarse sand and gravel lens observed approximately 32 to 35 feet bgs. Petroleum product within this lens generally moved horizontally with groundwater flow.

While much of the contamination was located on the Conventus Site (Brownfield Site No. C915260), an off-site investigation was conducted as part of the Brownfield Cleanup Program (BCP) remedial activities in December 2012. The intent of the off-site investigation was to assess the presence of petroleum contamination that may have migrated from the Conventus Site to the adjacent Main Street Right-of-Way (ROW). That work indicated that the groundwater contaminant plume had indeed migrated to the Main Street ROW and the results were provided to the NYSDEC in August 2013.

While the BCP program does not require the remediation of off-site contamination, Kaleida Health voluntarily entered into the stipulation with the NYSDEC to address off-site contamination concerns. The stipulation requires Kaleida Health to remediate contamination resulting from the former Mobil Service Station release in the area identified as the Main Street Right-of-Way. Because of the depth of contamination and documented low soil contamination levels (Restricted Residential Use SCOs or below), off-site concerns were limited to the presence of dissolved phase petroleum hydrocarbons above NYSDEC groundwater standards. The concentration and extent of the off-site contaminant plume has been well documented to extend off-site to west under the Main Street ROW.

Throughout this report the term “Conventus Site” will refer to the BCP Site No. C915260 located at 1001 Main Street. The term “ROW Site” will refer to the areas outside of the BCP area along Main Street.

Known contaminants include petroleum compounds, primarily gasoline and associated BTEX compounds¹. Separate Phase Hydrocarbons (SPH) have been observed in several wells on-site, including former MW-24, which is located less than 30 feet from the Main Street ROW. Based on the presence of SPH in former MW-24, contaminated soil and groundwater may extend to the west under the Main Street ROW.

This report presents results of ongoing remediation work for the contamination within the Main Street Right-of -Way.

¹ Benzene, Toluene, Ethylbenzene and total Xylene (“BTEX”)

2. SUBSURFACE CONDITIONS

2.1. Geology

Geologic information is based on observations made during site excavations for the Conventus Site remedial efforts, as well as numerous previous studies such as the Supplemental Subsurface Investigation and Quarterly Groundwater Monitoring Report, (December 9, 2008, Groundwater & Environmental Service, Inc.) and the Geotechnical Engineering Report, 1001 Main Street Medical Office Building, Buffalo New York; (November 2010; McMahon and Mann Consulting Engineers).

The Conventus Site contained urban fill of varying depths. Fill depths ranged from 3 feet of parking lot subgrade and mixed stone to more urban fill ranging from 6 -12 feet of bricks concrete and miscellaneous building rubble, which at times was contained within old building basements.

Underlying the fill were native deposits of fine dense sand with silt with discrete clay lenses. Within this formation is a discrete, discontinuous water bearing zone comprised of coarse sand and fine to medium gravel. This zone is generally found between 32 and 35 feet bgs and ranging in thickness between 6-inches to several feet (GES, 2008).

Below this zone is the dry to moist fine sand and silt formation extends to nearly 70 feet bgs. Below this massive sand and silt formation is a coarse sand and gravel layer that grades to a sand, gravel; and clay till formation. Underlying the overburden is a grey cherty limestone formation at approximately 90 feet bgs (M&M, 2010).

2.2. Hydrogeology

The principal groundwater bearing zone beneath the Conventus Site is located within the coarse sand and gravel layer that is generally present between 32 and 35 feet bgs. This layer is of variable thickness (generally six inches to three feet) but is horizontally discontinuous. The layer is located within the central and northeastern portions of the Conventus Site, but does not extend completely to the southern, northwestern or southeastern areas of the Conventus Site (GES, 2008) and is confined by the dense fine sands and silt above and below the groundwater bearing zone.

Groundwater beneath the Conventus Site flows from the west to the northeast, following the depositional area of the confined groundwater bearing zone. The preferential flow of groundwater within this confined zone serves as the transport media for the petroleum release that occurred on the ROWs.

2.3. Contaminant Transport

For over 40 years, light non-aqueous phase liquid (LNAPL) has filtered downward from the base of the former underground storage tanks to a depth of approximately 40 feet bgs. LNAPL intercepted the groundwater at approximately 32 feet bgs. The water table is present within a semi-confined coarse sand and gravel lens. This lens varies in thickness (1/2 to 3 feet) and extends to the northeast, confined laterally to the east and west. Because of low carbon in the fine sand silt and gravel formations, the breakdown of the BTEX compounds was slow. This resulted in high concentrations of volatile organic compound (VOC) soil gas in the unsaturated zone below the release area and the continual loading of BTEX into the groundwater from the LNAPL. Soil contamination (at concentrations exceeding the Residential Use SCOs), below the LNAPL layer was noted to extend to a depth

of 35 to 40 feet bgs. This area has been identified as the Source Area for groundwater contamination.

The Source Area was removed during field activities conducted under the NYSDEC's BCP. Groundwater flows to the northeast, and has extended slightly west on the Main Street sidewalk from the former source (1001 Main Street) to the north Side of Goodrich Street.

In addition, recent investigations confirmed that the contaminated groundwater plume extends under the Main Street sidewalk (generally opposite of the documented groundwater flow direction in the area). The majority of Main Street is underlain by the Niagara Frontier Transportation Authority (NFTA) Light Rail Tunnel. The presence of contamination beneath the Main Street sidewalk may be due to its close proximity to the original source within 1001 Main Street property, or it may be a result of local influence from rail tunnel present under Main Street. The underground rail tunnel and associated drain system acts as a sink for groundwater along the Main Street ROW. Over time, contaminated groundwater on the western BCP boundary has slowly migrated underneath the Main Street sidewalk. The presence of contamination further west of the rail tunnel has not been determined.

The NFTA rail system has three sections:

- The surface tracks that run from the Inner Harbor to West Tupper Street;
- The shallow tunnels (constructed by digging through the overburden) which run from West Tupper Street to W/E Ferry Streets; and
- The deep bored tunnels (bored through the bedrock) which runs from Ferry Street to the end of the line at the University at Buffalo Station.

The project area along Main Street is located in the shallow tunnel section. Per the NFTA, the groundwater seepage into the rail tunnel is directed along the bottom of the tunnel between and along the track base. The water drains into sumps located at the transition to the deep bored tunnels near Ferry Street. These sumps pump the water into the nearby city sanitary sewer system. Therefore, the water collected in the tunnel drainage system in the area of 1001 Main Street runs along the base of the tunnel until it discharges into a sump near Ferry Street, providing no discrete access to the water collection along that length.

3. ISCO TREATMENT

The remedial method selected for ROW Site was in-situ chemical oxidation (ISCO) using RegenOX manufactured by Regenesis. RegenOX is sodium percarbonate formulated to degrade petroleum hydrocarbons through direct oxidation and through the generation of free radical compounds which will also oxidize contaminants. RegenOx produces minimal heat and pressure and is non-corrosive, making it a relatively safe chemical oxidant that is compatible for use in direct contact with underground infrastructure such as utilities, tanks, piping, and communication lines. This was an important characteristic when selecting the ISCO product due to the close proximity of the monitoring wells to the earth retention sheeting for the Conventus Building.

The amount of RegenOX used was calculated based on ROW Site specific data and professional experience of C&S and Regenesis. RegenOX was mixed with tap water in 55 gallon drums at a concentration of 100 pounds of RegenOX with 110 gallons of water for each location.

In-situ treatment consisted of gravity-feeding a chemical oxidizer mixed with water directly into monitoring wells MSMW-2, MSMW-3, and MSMW-4. Groundwater samples were collected approximately three months after treatment. The first ISCO treatment was conducted on January 29, 2017.

At the same time of the first ISCO event, C&S placed five oxygen release compound (ORC) socks linked in series in three of the four groundwater monitoring wells. ORC was used to provide long term controlled-release oxygen for aerobic microbes to flourish and accelerate aerobic biodegradation.

The third ISCO event was conducted on November 20-21, 2017. Rather than gravity feeding the treatment solution into each monitoring well, the PVC riser was modified to allow for a hose to be connected and treatment solution injected under pressure. Nature's Way Environmental performed the injections using a truck mounted mixer and pump.

As the surrounding formation became saturated with treatment solution, the injection rate decreased. Monitoring wells were then given approximately 25 gallon increments of treatment solution and left to allow the treatment solution time to infiltrate into the water-bearing zone. This process was repeated until the targeted 100 pounds of RegenOX per monitoring well was achieved.

For this reporting period, the last in-situ treatment was completed on June 1 to June 4, 2021.

GROUNDWATER MONITORING

3.1. Groundwater Sampling Events

Previously, groundwater samples were collected from the wells on following dates:

- | | |
|---------------------|----------------------|
| • December 21, 2012 | • September 11, 2017 |
| • July 23, 2014 | • January 10, 2018 |
| • August 21, 2015 | • August 17, 2018 |
| • December 16, 2015 | • November 30, 2018 |
| • April 28, 2016 | • July 29, 2019 |
| • December 9, 2016 | • May 13, 2020 |
| • April 20, 2017 | • November 24, 2020 |
| • July 6, 2017 | • May 7, 2021 |

For this reporting period, the groundwater sampling was completed on May 7, 2021.

3.2. Groundwater Sampling Methods

Before purging the wells, water levels were measured using an electric water level sounder capable of measuring to the 0.01-foot accuracy. Peristaltic or bladder pumps using manufacturer-specified tubing was used for purging and sampling groundwater.

Calibration, purging and sampling procedures was performed as specified by the USEPA² for low-flow sampling. Decontamination was conducted after each well is sampled to reduce the likelihood of cross contamination. Groundwater sampling equipment including the in-well pump, flow cell and water level meter was cleaned with Alconox, a phosphate free cleaner.

Samples were collected for VOCs in three 40 ml glass vials. Groundwater filled each vial until it formed a meniscus and no air bubbles were inside the vial. The cap was placed on the vial and turned over to check if any air bubbles were in the sample. Groundwater samples were kept at 4°C until the laboratory took custody of the samples.

3.3. Groundwater Levels

Groundwater levels were measured from the top of the monitoring well casing an electric water level sounder capable of measuring to the 0.01-foot accuracy. Lidar data, downloaded from the New York State GIS Clearinghouse, was used to obtain ground elevations for each monitoring well. The Lidar dataset, developed in 2008, covers Erie County and achieves a vertical accuracy of 18.5 cm on open bare terrain and 37.0 cm for obscured areas. Ground elevations for each monitoring well are provided in **Table 4-1** below.

Table 4-1: Monitoring Well Ground Elevations

<i>MONITORING WELL ID</i>	<i>GROUND ELEVATION (FT.)</i>	<i>WATER LEVEL (FT.)</i>	<i>GROUNDWATER ELEVATION (FT.)</i>
MSMW-1	639.665	23.73	615.935
MSMW-2	632.265	29.0	603.265
MSMW-3	632.495	31.63	600.865
MSMW-4	632.985	31.15	601.835

Note: Ground elevations from Lidar Dataset.

Figure 1 presents groundwater elevation contours.

3.4. BTEX Monitoring

Table 4-2 attached to the end of this report presents detected VOC concentrations from December 2012 to May 2021. **Figure 2** presents total BTEX concentrations from each monitoring well.

MSMW-1

² U.S. EPA Region 1 Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

VOC concentrations in this well have remained below NYSDEC groundwater standards since May 2015.

MSMW-2

MSMW-2 initially (2012) contained no detectable concentrations of contaminants, then in July 2014 results indicate a significant number of VOCs at elevated concentrations. This significant change in VOC concentrations maybe due to multiple factors, including the disturbance of natural groundwater flow by the shoring of the Conventus Building, and/or the excavation and removal of contaminated soil and groundwater from the Conventus Site.

The May 2021 sampling event showed an increase in overall VOCs as well as total BTEX concentrations. Total VOC concentrations were 11,241 ug/l, and total BTEX concentration was 8,280 ug/l which is an increase to levels detected in 2018.

MSMW-3

Initial analytical results (2012) from MSMW-3 showed total BTEX concentrations at 19,863 ug/L. Groundwater results indicate this well has shown a significant decrease in BTEX concentrations from the initial sampling event to the 2018 event. Total BTEX concentrations from the August 2018 sampling event are 13 ug/L, which is a 99.9% decrease in BTEX concentrations since December 2012.

Water level readings indicated a minimal amount of water in this well. A bailer was used in an attempt to purge out enough water to collect a VOC sample; however, no enough water could be collected. This well was not sampled for the May 2021 event.

MSMW-4

In December 2012, MSMW-4 contained the highest BTEX concentrations at 27,169 ug/L, while BTEX concentrations from August 2018 are 94.2 ug/L, a 99.7% reduction in petroleum contaminant concentrations.

The May 2021 sampling event showed a concentration of 16.1 ug/l for total VOCs and 2.3 ug/l for total BTEX concentrations; these concentrations are consistent with the last sample event on November 2020.

4. CONCLUSION AND RECOMMENDATIONS

To address the presence of residual petroleum contamination within the Main Street ROW, C&S has conducted groundwater monitoring and multiple quarterly chemical oxidant treatments. Groundwater sampling results indicate that groundwater contamination in the Main Street ROW is limited to the southwest corner of the Conventus Building. Likely due to the removal of the source material on the Conventus Site as well as the effects of natural attenuation, contaminant concentrations have significantly decreased over time in three out of the four monitoring wells.

The residual groundwater contaminant plume has been continually treated and monitored. Contaminant concentrations have shown mixed results from in-situ treatments. Multiple factors complicate the treatment of the remaining groundwater contamination. Some of these factors include:

1. Limited Treatment Options

- In Situ or Enhanced In-Situ Bioremediation – Previous work at the Site demonstrated that the groundwater contains very little carbon due to the nature of the surrounding soils. This has resulted in a dearth of microbes available to treat the groundwater in situ. This lack of microbes eliminates the viability of this approach for the Site.
 - Pump and Treat – Pump and Treat Pilot Studies conducted on the Conventus site has not resulted in reduced contaminants in the wells, suggesting that long-term pumping will not likely have a significant impact on the groundwater quality at the Site.
 - Chemical Oxidant Injections – Three rounds of gravity fed chemical oxidation injections have already occurred at the Site, as reported to the NYSDEC in periodic reports. The injections were not effective in significantly reducing contaminant concentrations in groundwater. The fourth and fifth rounds of chemical oxidation injections in borings under pressure have shown limited effectiveness.
2. The installation of the steel shoring system has benefited the Site by reducing groundwater migration; however, this prevents the installation of additional monitoring wells to the east.
3. A major utility corridor and NFTA subway lies immediately west of the monitoring wells, preventing the installation of any additional wells in this direction.

At this time, pressurized in-situ injections are the most efficient method to apply chemical oxidants into the subsurface, but the effectiveness of using chemical oxidants to reduce contaminant concentrations is limited by the factors described above.

Based on the accumulated data collected to date and the conversation with the NYSDEC on October 1, 2021, C&S recommends the remediation (chemical injections) be halted and the groundwater monitoring schedule be reduced to annual sampling on MS-MW02 only. The sampling program will be terminated after 5-years unless contaminant levels significantly increase.

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TABLES

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID		MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01
Sample Matrix	NYSDEC T.O.G.S.	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG
Date Sampled	GROUNDWATER	12/21/2012	7/23/2014	5/4/2015	8/21/2015	12/16/2015	4/28/2016	12/9/2016	4/20/2017	7/6/2017	9/11/2017	1/10/2018	8/17/2018
Units	STANDARDS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Volatile Organic Compound													
Acetone	50										1.5		
Benzene	1												
Bromodichloromethane	50												
Dibromochloromethane	50												
Ethylbenzene	5		1.1										
p-Isopropyltoluene	5												
Toluene	5												
Xylene, Total	5		7.2										
n-Butylbenzene	5												
sec-Butylbenzene	5												
1,2,4,5-Tetramethylbenzene	5												
1,2,4-Trimethylbenzene	5												
1,3,5-Trimethylbenzene	5												
Trichloroethylene (TCE)	5												
Naphthalene	10												
2-Hexanone	50												
2-Butanone (MEK)	N/S												
Carbon disulfide	N/S												
Chloroform	N/S		0.4	J									
Cyclohexane	N/S		0.4	J									
Isopropylbenzene	N/S												
Methylcyclohexane	N/S		0.2	J									
Methylene Chloride	N/S												
n-Propylbenzene	N/S												
4-Methyl-2-pentanone	N/S												
1,4-Diethylbenzene	N/S												
Total VOC			9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
Total BTEX			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID		MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01	MSMW-01
Sample Matrix	NYSDEC T.O.G.S.	WG	WG	WG	WG	WG	WG
Date Sampled	GROUNDWATER	11/30/2018	7/29/2019	12/12/2019	5/13/2020	11/24/2020	5/7/2021
Units	STANDARDS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Volatile Organic Compound							
Acetone	50		3.6	J	1.5	J	
Benzene	1						
Bromodichloromethane	50						
Dibromochloromethane	50						
Ethylbenzene	5						
p-Isopropyltoluene	5						
Toluene	5						
Xylene, Total	5						
n-Butylbenzene	5						
sec-Butylbenzene	5						
1,2,4,5-Tetramethylbenzene	5						
1,2,4-Trimethylbenzene	5						
1,3,5-Trimethylbenzene	5						
Trichloroethylene (TCE)	5		0.24	J			
Naphthalene	10						1.3
2-Hexanone	50						J
2-Butanone (MEK)	N/S						
Carbon disulfide	N/S						
Chloroform	N/S						
Cyclohexane	N/S						
Isopropylbenzene	N/S						
Methylcyclohexane	N/S						
Methylene Chloride	N/S						
n-Propylbenzene	N/S						
4-Methyl-2-pentanone	N/S						
1,4-Diethylbenzene	N/S						
Total VOC		0.0	3.84	1.5	0.0	0.0	1.3
Total BTEX		0.0	0.0	0.0	0.0	0.0	0.0

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

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WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID Sample Matrix Date Sampled Units	NYSDEC T.O.G.S. GROUNDWATER STANDARDS	MSMW-02 WG 12/21/2012 ug/L	MSMW-02 WG 7/23/2014 ug/L	MSMW-02 WG 8/21/2015 ug/L	MSMW-02 WG 12/16/2015 ug/L	MSMW-02 WG 4/28/2016 ug/L	MSMW-02 WG 12/9/2016 ug/L	MSMW-02 WG 4/20/2017 ug/L	MSMW-02 WG 7/6/2017 ug/L	MSMW-02 WG 9/11/2017 ug/L	MSMW-02 WG 1/10/2018 ug/L	MSMW-02 WG 8/17/2018 ug/L	MSMW-02 WG 11/30/2018 ug/L
Volatile Organic Compound													
Acetone	50								60.7				77.0
Benzene	1		400	350	310	160	551	563	64.2	470.0	740.0	280.0	180.0
Bromodichloromethane	50												
Dibromochloromethane	50												
Ethylbenzene	5		2,900	1,200	1,500	1,400	1,410	782	478	460	1,100	1,000	700.0
p-Isopropyltoluene	5								5.0				
Toluene	5		2,400	1,500	1,900	2,700	386	939	1,320	590	550	300	490.0
Xylene, Total	5		13,000	DL	13,000	10,000	15,000	9,060	11,570	10,200	11,600	4,700	4,700
n-Butylbenzene	5								39.1				8.1
sec-Butylbenzene	5												
1,2,4,5-Tetramethylbenzene	5												
1,2,4-Trimethylbenzene	5								12,600			1,700	960.0
1,3,5-Trimethylbenzene	5								713			630	700.0
Trichloroethylene (TCE)	5												
Naphthalene	10								376			380	490.0
2-Hexanone	50		92	J		130	J		111				
2-Butanone (MEK)	N/S								22.5				
Carbon disulfide	N/S								1.1				
Chloroform	N/S												
Cyclohexane	N/S		660	450		440	430	430		370	310	210	140.0
Isopropylbenzene	N/S		58						13.4		32.0	24.0	J 20.0 J
Methylcyclohexane	N/S		250	170	J	150	J	220	163	163	260	130	120 J 78.0 J
Methylene Chloride	N/S		160	240	B	210							
n-Propylbenzene	N/S								37.6			130.0	70.0
4-Methyl-2-pentanone	N/S								34.7				28.0 J
1,4-Diethylbenzene	N/S								282				
Total VOC		0.0	19,920	16,910	14,070	20,050	12,000	14,447	26,358	13,750	7,662	9,474	8,641.1
Total BTEX		0.0	18,700	16,050	13,710	19,260	11,407	13,854	12,062	13,120	7,190	6,280	6,070.0

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID		MSMW-02	MSMW-02	MSMW-02	MSMW-02	MSMW-02
Sample Matrix	NYSDEC T.O.G.S.	WG	WG	WG	WG	WG
Date Sampled	GROUNDWATER	7/29/2019	12/12/2019	5/13/2020	11/24/2020	5/7/2021
Units	STANDARDS	ug/L	ug/L	ug/L	ug/L	ug/L
Volatile Organic Compound						
Acetone	50	170.0	53.0		26.0	
Benzene	1	230.0	79.0	510.0	62.0	310.0
Bromodichloromethane	50					
Dibromochloromethane	50					
Ethylbenzene	5	94.0	23.0	400.0	100.0	610.0
p-Isopropyltoluene	5		3.7	J		
Toluene	5	550.0	390.0	610.0	490.0	960.0
Xylene, Total	5	4,800.0	3,100.0	3,400.0	2,500.0	6,400.0
n-Butylbenzene	5			8.0	J	
sec-Butylbenzene	5					
1,2,4,5-Tetramethylbenzene	5					
1,2,4-Trimethylbenzene	5		620.0	610.0	320.0	1,400.0
1,3,5-Trimethylbenzene	5		560.0	760.0	350.0	620.0
Trichloroethylene (TCE)	5					
Naphthalene	10		380.0	350.0	140.0	580.0
2-Hexanone	50	10.0	J	15.0	J	
2-Butanone (MEK)	N/S					
Carbon disulfide	N/S					
Chloroform	N/S					
Cyclohexane	N/S	150.0	120.0	170.0	71.0	160.0
Isopropylbenzene	N/S		9.8	J	15.0	J
Methylcyclohexane	N/S		83.0	130.0	51.0	110.0
Methylene Chloride	N/S					
n-Propylbenzene	N/S		11.0	J	42.0	6.3
4-Methyl-2-pentanone	N/S	26.0	J	22.0	J	23.0
1,4-Diethylbenzene	N/S					
Total VOC		6,030.0	5,454.5	7,043.0	4,119.9	11,241.0
Total BTEX		5,810.0	3,592.0	4,920.0	3,152.0	8,280.0

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS														
Location ID Sample Matrix Date Sampled Units	NYSDEC T.O.G.S. GROUNDWATER STANDARDS	MSMW-03 WG 12/21/2012 ug/L	MSMW-03 WG 7/23/2014 ug/L	MSMW-03 WG 4/28/2016 ug/L	MSMW-03 WG 12/9/2016 ug/L	MSMW-03 WG 4/20/2017 ug/L	MSMW-03 WG 7/6/2017 ug/L	MSMW-03 WG 9/11/2017 ug/L	MSMW-03 WG 1/10/2018 ug/L	MSMW-03 WG 8/17/2018 ug/L	MSMW-03 WG 11/30/2018 ug/L	MSMW-03 WG 7/29/2019 ug/L	MSMW-03 WG 12/12/2019 ug/L	MSMW-03 WG 5/13/2020 ug/L
Volatile Organic Compound														
Acetone	50	3,000	B 22 J			206	83.2	51.0	28.0 J	J	62.0		24.0	41.0
Benzene	1	123	80	78	184	184	140	72	67	3.6	2.0	0.18		1.9
Bromodichloromethane	50											1.1	0.3 J	0.9
Dibromochloromethane	50											0.76 J	0.4 J	0.5
Ethylbenzene	5	2,370	190	990	982	679	66.4	200.0	150.0		7.7	6.8	2.8	4.3
p-Isopropyltoluene	5						1.1							
Toluene	5	2,920	34.0	60.0	42.7	50.2	15.7	57.0	14.0 J	2.0 J	1.6 J			2.0
Xylene, Total	5	14,450	360	570	127	145.5	129.0	415.0	45.0 J	7.0 J	10.2 J	7.03 J	8.8	11.1
n-Butylbenzene	5						5.2							
sec-Butylbenzene	5						2.2							
1,2,4,5-Tetramethylbenzene	5						41.0							
1,2,4-Trimethylbenzene	5	4,710					5.2							
1,3,5-Trimethylbenzene	5	1,430					63.7			0.9	14.0		6.1	6.1
Trichloroethylene (TCE)	5											0.28 J		
Naphthalene	10	1,180					67.8			0.8 J			4.0	0.8
2-Hexanone	50	447	J	8.3		29.6	29.6	22.0						
2-Butanone (MEK)	N/S		12.0 J	11.0		115.0						3.6 J		
Carbon disulfide	N/S						1.7							1.3
Chloroform	N/S										0.9 J	2.1 J	1.1 J	1.5
Cyclohexane	N/S	1,130	52	260	284	219		130	150	56	9.2 J	8.3 J	3.0 J	2.1
Isopropylbenzene	N/S		6.6	27.0	22.2	11.4	12.9		8.0 J	J				
Methylcyclohexane	N/S	678	25.0	78.0	108	108	108		47 J	9 J	2.3 J	1.3 J	0.8 J	0.6
Methylene Chloride	N/S		9.8											
n-Propylbenzene	N/S	467					3.6				0.9 J			
4-Methyl-2-pentanone	N/S							16.0						1.2
1,4-Diethylbenzene	N/S						37.9							
Total VOC		32,905	791.4	2,082.3	1,749.9	1,747.7	814.2	963	509	78	111.6	31.5	51.3	75.3
Total BTEX		19,863	664	1,698	1,335.7	1,058.7	351.1	744	276	13	21.5	14.0	11.6	19.3

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID	NYSDEC T.O.G.S. GROUNDWATER STANDARDS		MSMW-03 WG 11/24/2020 ug/L	MSMW-03 WG 5/7/2021 ug/L
Sample Matrix				
Date Sampled				
Units				
Volatile Organic Compound				
Acetone	50		19.0	J
Benzene	1			
Bromodichloromethane	50			
Dibromochloromethane	50	J		
Ethylbenzene	5			
p-Isopropyltoluene	5			
Toluene	5			
Xylene, Total	5			
n-Butylbenzene	5			
sec-Butylbenzene	5			
1,2,4,5-Tetramethylbenzene	5			
1,2,4-Trimethylbenzene	5			
1,3,5-Trimethylbenzene	5			
Trichloroethylene (TCE)	5			
Naphthalene	10	J	28.0	
2-Hexanone	50			
2-Butanone (MEK)	N/S			
Carbon disulfide	N/S	J		
Chloroform	N/S	J		
Cyclohexane	N/S	J		
Isopropylbenzene	N/S			
Methylcyclohexane	N/S	J		
Methylene Chloride	N/S			
n-Propylbenzene	N/S			
4-Methyl-2-pentanone	N/S	J		
1,4-Diethylbenzene	N/S			
Total VOC			47.0	
Total BTEX			0.0	

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID		MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04				
Sample Matrix	NYSDEC T.O.G.S.	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG	WG				
Date Sampled	GROUNDWATER	12/28/2012	7/23/2014	8/21/2015	12/16/2015	4/28/2016	12/9/2016	4/20/2017	7/6/2017	9/11/2017	1/10/2018	8/17/2018	11/30/2018				
Units	STANDARDS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L				
Volatile Organic Compound																	
Acetone	50	< 1000	22.0	26.0					25.7		9.1	J	9.1	J	6.7		
Benzene	1	59.9	J	150.0	140	180	71.0	119	80.4	121	69	27	2		1.3		
Bromodichloromethane	50																
Dibromochloromethane	50																
Ethylbenzene	5	2,370	180	140	420	510	496	395	175	260	94	14			3.7		
p-Isopropyltoluene	5																
Toluene	5	9,890	39.0	5.8	48.0	46.0	23.9	7.5	2.5						3.4		
Xylene, Total	5	14,850	160	64.0	190	210	68.9	75.4	23.2		19.5	J	75.0	J	1.5	J	
n-Butylbenzene	5								2.6								
sec-Butylbenzene	5								1.0								
1,2,4,5-Tetramethylbenzene	5								29.2								
1,2,4-Trimethylbenzene	5	2,300							3.7				29.0		1.4	J	
1,3,5-Trimethylbenzene	5	668							1.6				8.5		0.7	J	
Trichloroethylene (TCE)	5																
Naphthalene	10	686							38.0				7.4				
2-Hexanone	50	< 500															
2-Butanone (MEK)	N/S		7.2	J													
Carbon disulfide	N/S																
Chloroform	N/S																
Cyclohexane	N/S	< 1000	52.0	100	170	190	245	215	215	77	43		5.7		4.6	J	
Isopropylbenzene	N/S		8.1	5.9	14.0	13.0	17.4	8.3	5.7		3.6	J		J			
Methylcyclohexane	N/S	165	J	33.0	43.0	70.0	58.0	96.6	67.3	67.3	29.0	11.0	J	2.3	J	1.0	J
Methylene Chloride	N/S		6.6	23.0	B												
n-Propylbenzene	N/S	205							18.6				1.6		0.7	J	
4-Methyl-2-pentanone	N/S																
1,4-Diethylbenzene	N/S								7.5								
Total VOC		31,194	657.9	547.7	1,092	1,098	1,066.8	848.8	737.6	435	207.2		157.8		21.6		
Total BTEX		27,170	529	349.8	838	837	707.8	558.2	321.7	329	140.5		94.2		6.5		

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

TABLE 4-2: GROUNDWATER ANALYTICAL RESULTS

Location ID		MSMW-04	MSMW-04	MSMW-04	MSMW-04	MSMW-04
Sample Matrix	NYSDEC T.O.G.S.	WG	WG	WG	WG	WG
Date Sampled	GROUNDWATER	7/29/2019	12/12/2019	5/13/2020	11/24/2020	5/7/2021
Units	STANDARDS	ug/L	ug/L	ug/L	ug/L	ug/L
Volatile Organic Compound						
Acetone	50		3.7 J	6.0	3.3 J	
Benzene	1	2.5	0.5 J	2.6	0.4 J	1.0
Bromodichloromethane	50	0.66	0.29 J	0.78	0.21 J	
Dibromochloromethane	50	0.48 J	0.2 J	0.39 J	0.18 J	
Ethylbenzene	5	2.5	1.2 J	4.0		1.2 J
p-Isopropyltoluene	5					
Toluene	5					
Xylene, Total	5	1.1 J	0.9 J	2.4 J	1.9 J	
n-Butylbenzene	5					
sec-Butylbenzene	5					
1,2,4,5-Tetramethylbenzene	5					
1,2,4-Trimethylbenzene	5					
1,3,5-Trimethylbenzene	5			0.8 J		
Trichloroethylene (TCE)	5	0.45 J				
Naphthalene	10		1.4 J	0.8 J	1.9 J	
2-Hexanone	50					
2-Butanone (MEK)	N/S					
Carbon disulfide	N/S					
Chloroform	N/S	0.96 J		1.2 J		
Cyclohexane	N/S	1.6 J	3.6 J	0.5 J	2.9 J	13.0
Isopropylbenzene	N/S					
Methylcyclohexane	N/S		0.6 J		0.4 J	0.9 J
Methylene Chloride	N/S					
n-Propylbenzene	N/S			0.8 J		
4-Methyl-2-pentanone	N/S					
1,4-Diethylbenzene	N/S					
Total VOC		10.3	12.4	20.3	11.2	16.1
Total BTEX		2.5	2.6	9.0	2.3	2.2

Notes:

NYSDEC T.O.G.S. Groundwater Standards in ug/L.

Only analytes detected in one or more samples shown.

Blank space indicates compound not detected.

J - Estimated value due to either the compound was detected below the reporting limit or estimated concentration for Tentatively Identified Compound.

B - Compound was also detected in associated Method Blank.

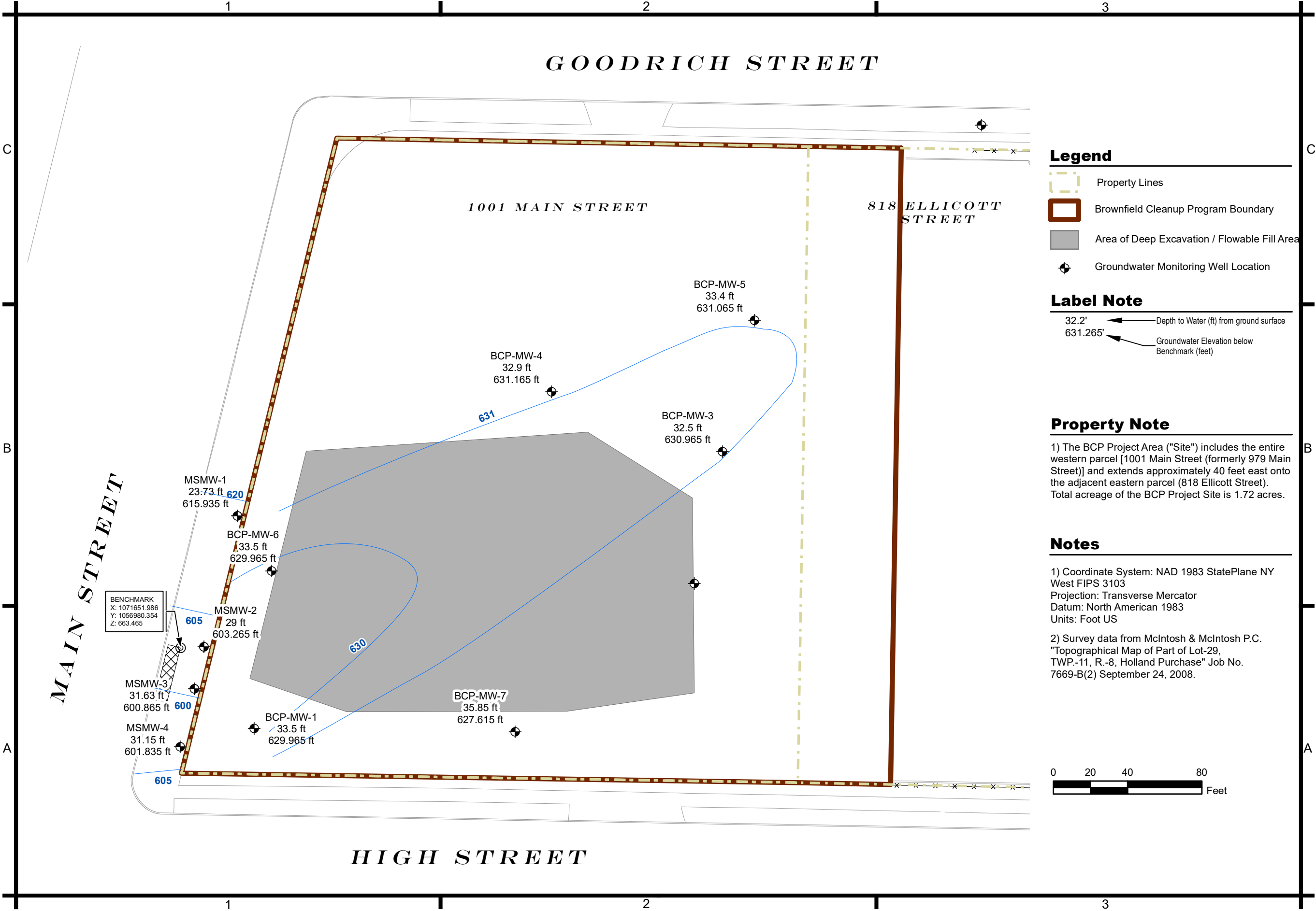
P- Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns the lower of the two results is reported.

WG - groundwater

N/S - no standard

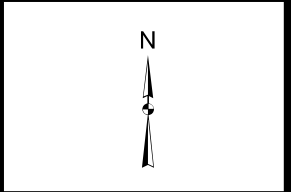
FIGURES

Path: F:\Project\K11 - Kaleida Health\K11.005.004 - General Environmental Cleanup Services 2018-2021\Planning-Study\Reports\2021-Groundwater Monitoring Reports\May 2021\Figures\2021 ISCO_GW_CONTOURS.mxd





C&S Engineers, Inc.
141 Elm Street
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com



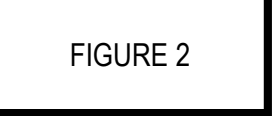
**FORMER MOBIL STATION 99-MST
979 MAIN ST (1001 MAIN ST)
BROWNFIELD CLEANUP PROGRAM**

BUFFALO, NEW YORK

MARK	DATE	DESCRIPTION
REVISIONS		
PROJECT NO: K11.002.001		
DATE: December 2020		
DRAWN BY: R. BACKERT		
DESIGNED BY: C. MARTIN		
CHECKED BY: D. RIKER		
NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW		

GROUNDWATER
CONTOUR

FIGURE 1



APPENDICES

APPENDIX A
LABORATORY ANALYTICAL RESULTS



ANALYTICAL REPORT

Lab Number:	L2123976
Client:	C&S Companies 141 Elm Street, Suite 100 Buffalo, NY 14203
ATTN:	Cody Martin
Phone:	(716) 847-1630
Project Name:	MAIN STREET/CONVENTUS
Project Number:	Not Specified
Report Date:	05/19/21

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Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Project Name: MAIN STREET/CONVENTUS
Project Number: Not Specified

Lab Number: L2123976
Report Date: 05/19/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2123976-01	MSMW-01-050721	WATER	BUFFALO, NY	05/07/21 10:45	05/07/21
L2123976-02	MSMW-02-050721	WATER	BUFFALO, NY	05/07/21 12:00	05/07/21
L2123976-03	MSMW-04-050721	WATER	BUFFALO, NY	05/07/21 11:30	05/07/21

Project Name: MAIN STREET/CONVENTUS
Project Number: Not Specified

Lab Number: L2123976
Report Date: 05/19/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: MAIN STREET/CONVENTUS
Project Number: Not Specified

Lab Number: L2123976
Report Date: 05/19/21

Case Narrative (continued)

Report Submission

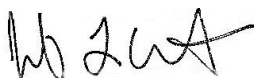
All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

L2123976-02D and -03 were received in the proper acid-preserved containers; however, upon analysis, the pH was determined to be greater than 2, and thus the method required holding time was exceeded.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:



Jennifer L Clements

Title: Technical Director/Representative

Date: 05/19/21

ORGANICS

VOLATILES

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-01
 Client ID: MSMW-01-050721
 Sample Location: BUFFALO, NY

Date Collected: 05/07/21 10:45
 Date Received: 05/07/21
 Field Prep: Not Specified

Sample Depth:

Matrix: Water
 Analytical Method: 1,8260C
 Analytical Date: 05/15/21 15:31
 Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-01
 Client ID: MSMW-01-050721
 Sample Location: BUFFALO, NY

Date Collected: 05/07/21 10:45
 Date Received: 05/07/21
 Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	1.3	J	ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
Methyl Acetate	ND		ug/l	2.0	0.23	1
Cyclohexane	ND		ug/l	10	0.27	1
Freon-113	ND		ug/l	2.5	0.70	1
Methyl cyclohexane	ND		ug/l	10	0.40	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	100		70-130
Dibromofluoromethane	108		70-130

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-02 D

Date Collected: 05/07/21 12:00

Client ID: MSMW-02-050721

Date Received: 05/07/21

Sample Location: BUFFALO, NY

Field Prep: Not Specified

Sample Depth:

Matrix: Water

Analytical Method: 1,8260C

Analytical Date: 05/15/21 15:08

Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	50	14.	20
1,1-Dichloroethane	ND		ug/l	50	14.	20
Chloroform	ND		ug/l	50	14.	20
Carbon tetrachloride	ND		ug/l	10	2.7	20
1,2-Dichloropropane	ND		ug/l	20	2.7	20
Dibromochloromethane	ND		ug/l	10	3.0	20
1,1,2-Trichloroethane	ND		ug/l	30	10.	20
Tetrachloroethene	ND		ug/l	10	3.6	20
Chlorobenzene	ND		ug/l	50	14.	20
Trichlorofluoromethane	ND		ug/l	50	14.	20
1,2-Dichloroethane	ND		ug/l	10	2.6	20
1,1,1-Trichloroethane	ND		ug/l	50	14.	20
Bromodichloromethane	ND		ug/l	10	3.8	20
trans-1,3-Dichloropropene	ND		ug/l	10	3.3	20
cis-1,3-Dichloropropene	ND		ug/l	10	2.9	20
Bromoform	ND		ug/l	40	13.	20
1,1,2,2-Tetrachloroethane	ND		ug/l	10	3.3	20
Benzene	310		ug/l	10	3.2	20
Toluene	960		ug/l	50	14.	20
Ethylbenzene	610		ug/l	50	14.	20
Chloromethane	ND		ug/l	50	14.	20
Bromomethane	ND		ug/l	50	14.	20
Vinyl chloride	ND		ug/l	20	1.4	20
Chloroethane	ND		ug/l	50	14.	20
1,1-Dichloroethene	ND		ug/l	10	3.4	20
trans-1,2-Dichloroethene	ND		ug/l	50	14.	20
Trichloroethene	ND		ug/l	10	3.5	20
1,2-Dichlorobenzene	ND		ug/l	50	14.	20

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-02 D

Date Collected: 05/07/21 12:00

Client ID: MSMW-02-050721

Date Received: 05/07/21

Sample Location: BUFFALO, NY

Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	50	14.	20
1,4-Dichlorobenzene	ND		ug/l	50	14.	20
Methyl tert butyl ether	ND		ug/l	50	14.	20
p/m-Xylene	4100		ug/l	50	14.	20
o-Xylene	2300		ug/l	50	14.	20
cis-1,2-Dichloroethene	ND		ug/l	50	14.	20
Styrene	ND		ug/l	50	14.	20
Dichlorodifluoromethane	ND		ug/l	100	20.	20
Acetone	ND		ug/l	100	29.	20
Carbon disulfide	ND		ug/l	100	20.	20
2-Butanone	ND		ug/l	100	39.	20
4-Methyl-2-pentanone	ND		ug/l	100	20.	20
2-Hexanone	ND		ug/l	100	20.	20
1,2-Dibromoethane	ND		ug/l	40	13.	20
n-Butylbenzene	ND		ug/l	50	14.	20
sec-Butylbenzene	ND		ug/l	50	14.	20
tert-Butylbenzene	ND		ug/l	50	14.	20
1,2-Dibromo-3-chloropropane	ND		ug/l	50	14.	20
Isopropylbenzene	20	J	ug/l	50	14.	20
p-Isopropyltoluene	ND		ug/l	50	14.	20
Naphthalene	580		ug/l	50	14.	20
n-Propylbenzene	71		ug/l	50	14.	20
1,2,4-Trichlorobenzene	ND		ug/l	50	14.	20
1,3,5-Trimethylbenzene	620		ug/l	50	14.	20
1,2,4-Trimethylbenzene	1400		ug/l	50	14.	20
Methyl Acetate	ND		ug/l	40	4.7	20
Cyclohexane	160	J	ug/l	200	5.4	20
Freon-113	ND		ug/l	50	14.	20
Methyl cyclohexane	110	J	ug/l	200	7.9	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	97		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	95		70-130

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-03
 Client ID: MSMW-04-050721
 Sample Location: BUFFALO, NY

Date Collected: 05/07/21 11:30
 Date Received: 05/07/21
 Field Prep: Not Specified

Sample Depth:

Matrix: Water
 Analytical Method: 1,8260C
 Analytical Date: 05/15/21 15:54
 Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	1.0		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	1.2	J	ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**SAMPLE RESULTS**

Lab ID: L2123976-03
 Client ID: MSMW-04-050721
 Sample Location: BUFFALO, NY

Date Collected: 05/07/21 11:30
 Date Received: 05/07/21
 Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
Methyl Acetate	ND		ug/l	2.0	0.23	1
Cyclohexane	13		ug/l	10	0.27	1
Freon-113	ND		ug/l	2.5	0.70	1
Methyl cyclohexane	0.89	J	ug/l	10	0.40	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	100		70-130

Project Name: MAIN STREET/CONVENTUS

Lab Number: L2123976

Project Number: Not Specified

Report Date: 05/19/21

Method Blank Analysis Batch Quality Control

Analytical Method: 1,8260C
 Analytical Date: 05/15/21 10:50
 Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1499983-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
Bromoform	ND		ug/l	2.0	0.65
1,1,1,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70

Project Name: MAIN STREET/CONVENTUS

Lab Number: L2123976

Project Number: Not Specified

Report Date: 05/19/21

Method Blank Analysis Batch Quality Control

Analytical Method: 1,8260C
 Analytical Date: 05/15/21 10:50
 Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1499983-5					
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
1,2-Dibromoethane	ND		ug/l	2.0	0.65
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
Methyl Acetate	ND		ug/l	2.0	0.23
Cyclohexane	ND		ug/l	10	0.27
Freon-113	ND		ug/l	2.5	0.70
Methyl cyclohexane	ND		ug/l	10	0.40

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**Method Blank Analysis**
Batch Quality Control

Analytical Method: 1,8260C

Analytical Date: 05/15/21 10:50

Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG1499983-5					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	95		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	105		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: MAIN STREET/CONVENTUS

Project Number: Not Specified

Lab Number: L2123976

Report Date: 05/19/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1499983-3 WG1499983-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	110		100		70-130	10		20
Chloroform	96		92		70-130	4		20
Carbon tetrachloride	98		93		63-132	5		20
1,2-Dichloropropane	110		100		70-130	10		20
Dibromochloromethane	96		93		63-130	3		20
1,1,2-Trichloroethane	98		95		70-130	3		20
Tetrachloroethene	98		94		70-130	4		20
Chlorobenzene	100		97		75-130	3		20
Trichlorofluoromethane	100		95		62-150	5		20
1,2-Dichloroethane	92		90		70-130	2		20
1,1,1-Trichloroethane	98		93		67-130	5		20
Bromodichloromethane	94		91		67-130	3		20
trans-1,3-Dichloropropene	82		80		70-130	2		20
cis-1,3-Dichloropropene	93		90		70-130	3		20
Bromoform	88		87		54-136	1		20
1,1,2,2-Tetrachloroethane	100		100		67-130	0		20
Benzene	97		92		70-130	5		20
Toluene	100		96		70-130	4		20
Ethylbenzene	99		93		70-130	6		20
Chloromethane	120		110		64-130	9		20
Bromomethane	94		85		39-139	10		20
Vinyl chloride	130		120		55-140	8		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: MAIN STREET/CONVENTUS

Project Number: Not Specified

Lab Number: L2123976

Report Date: 05/19/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1499983-3 WG1499983-4								
Chloroethane	120		110		55-138	9		20
1,1-Dichloroethene	120		100		61-145	18		20
trans-1,2-Dichloroethene	110		100		70-130	10		20
Trichloroethene	93		90		70-130	3		20
1,2-Dichlorobenzene	100		97		70-130	3		20
1,3-Dichlorobenzene	100		96		70-130	4		20
1,4-Dichlorobenzene	100		97		70-130	3		20
Methyl tert butyl ether	87		85		63-130	2		20
p/m-Xylene	100		95		70-130	5		20
o-Xylene	100		95		70-130	5		20
cis-1,2-Dichloroethene	110		100		70-130	10		20
Styrene	100		95		70-130	5		20
Dichlorodifluoromethane	110		100		36-147	10		20
Acetone	86		84		58-148	2		20
Carbon disulfide	110		95		51-130	15		20
2-Butanone	95		100		63-138	5		20
4-Methyl-2-pentanone	100		100		59-130	0		20
2-Hexanone	120		120		57-130	0		20
1,2-Dibromoethane	96		94		70-130	2		20
n-Butylbenzene	100		98		53-136	2		20
sec-Butylbenzene	100		96		70-130	4		20
tert-Butylbenzene	100		100		70-130	0		20
1,2-Dibromo-3-chloropropane	100		97		41-144	3		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: MAIN STREET/CONVENTUS

Lab Number: L2123976

Project Number: Not Specified

Report Date: 05/19/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG1499983-3 WG1499983-4								
Isopropylbenzene	100		97		70-130	3		20
p-Isopropyltoluene	110		100		70-130	10		20
Naphthalene	110		110		70-130	0		20
n-Propylbenzene	100		97		69-130	3		20
1,2,4-Trichlorobenzene	92		90		70-130	2		20
1,3,5-Trimethylbenzene	97		94		64-130	3		20
1,2,4-Trimethylbenzene	97		94		70-130	3		20
Methyl Acetate	110		100		70-130	10		20
Cyclohexane	120		120		70-130	0		20
Freon-113	110		96		70-130	14		20
Methyl cyclohexane	100		98		70-130	2		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	93		93		70-130
Toluene-d8	102		102		70-130
4-Bromofluorobenzene	103		103		70-130
Dibromofluoromethane	96		95		70-130

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information**Cooler** **Custody Seal**

A Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2123976-01A	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-01B	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-01C	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-02A	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-02B	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-02C	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-03A	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-03B	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)
L2123976-03C	Vial HCl preserved	A	NA		3.0	Y	Absent		NYTCL-8260-R2(14)

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
	Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**Footnotes**

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers



Project Name: MAIN STREET/CONVENTUS**Lab Number:** L2123976**Project Number:** Not Specified**Report Date:** 05/19/21**Data Qualifiers**

- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Report Format: DU Report with 'J' Qualifiers



Project Name: MAIN STREET/CONVENTUS
Project Number: Not Specified

Lab Number: L2123976
Report Date: 05/19/21

REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300:** Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1 Hg.**

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

 NEW YORK CHAIN OF CUSTODY Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		Service Centers Mahwah, NJ 07430: 35 Whitney Rd, Suite 5 Albany, NY 12205: 14 Walker Way Tonawanda, NY 14150: 275 Cooper Ave, Suite 105		Page 1 of 1		Date Rec'd in Lab 5/8/21		ALPHA Job # L2123976			
Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288		Project Information Project Name: <u>Main Street / Conventus</u> Project Location: Project # (Use Project name as Project #) ☐				Deliverables ☐ ASP-A ☒ ASP-B ☒ EQUIS (1 File) ☐ EQUIS (4 File) ☐ Other				Billing Information ☒ Same as Client Info PO #	
Client Information Client: <u>CES Engineers, Inc.</u> Address: <u>141 Elm St.</u> Phone: Fax: Email: <u>cmartino@cscos.com</u>		Project Manager: ALPHAQuote #: Turn-Around Time Standard ☒ Rush (only if pre approved) ☐ Due Date: # of Days:				Regulatory Requirement ☒ NY TOGS ☐ NY Part 375 ☐ AWQ Standards ☐ NY CP-51 ☐ NY Restricted Use ☐ Other ☐ NY Unrestricted Use ☐ NYC Sewer Discharge				Disposal Site Information Please identify below location of applicable disposal facilities. Disposal Facility: ☐ NJ ☒ NY ☐ Other:	
These samples have been previously analyzed by Alpha ☐						ANALYSIS				Sample Filtration ☐ Done ☐ Lab to do ☐ Preservation ☐ Lab to do (Please Specify below)	
Other project specific requirements/comments:						TOL VOC				Total Bottles	
Please specify Metals or TAL.											
ALPHA Lab ID (Lab Use Only)		Sample ID		Collection Date Time		Sample Matrix		Sampler's Initials			
23976-01		MSMW-01-050721		5/7/21 10:45		GW		CM			
02		MSMW-02-050721		12:00							
03		MSMW-03-050721									
		MSMW-04-050721		11:30							
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃ K/E = Zn Ac/NaOH O = Other		Container Code P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type Preservative		V B			
				Relinquished By: <u>[Signature]</u>		Date/Time: <u>5/7/21 2:45</u>		Received By: <u>[Signature]</u>		Date/Time: <u>5/7/21 14:45</u>	
				<u>[Signature]</u>		<u>5/7/21 14:45</u>		<u>[Signature]</u>		<u>5/8/21 01:50</u>	
Form No: 01-25 HC (rev. 30-Sept-2013)											

APPENDIX B GROUNDWATER MONITORING CONSTRUCTION & SAMPLING LOGS
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C&S Engineers, Inc.
141 Elm Street
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454

Well Sampling Field Data Sheet

Well Casing Unit Volume

(gal/l.f.)

1 1/4" = 0.08 2" = 0.17 3" = 0.38
4" = 0.66 6" = 1.5 8" = 2.6

Client Name:

Site Name:

Project No.:

Field Staff:

Kaliela Health

Main Street Right of Way

11-005-004

C. Martin

WELL DATA

Date	5/7								
Well Number	MSMW-01	MSMW-02	MSMW-03	MSMW-04					
Diameter (inches)	2"	2"	2"	2"					
Total Sounded Depth (feet)	35.75	35.5	32.95	35.00					
Static Water Level (feet)	23.73	29	31.63	31.15					
H ₂ O Column (feet)									
Pump Intake (feet)									
Well Volume (gallons)									
Amount to Evacuate (gallons)	2	1	0.25	0.7					
Amount Evacuated (gallons)	2	1	X	2					

FIELD READINGS

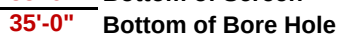
Date	5/7								
Time	10:44	10:47	10:51		11:09				
Volume Extracted	0	1	2		0				
Static Water Level (feet)	NA								
pH (Std. Units)	+/-0.1	6.72	6.54	6.47	8.49				
Conductivity (mS/cm)	3%	5.71	5.79	6.06	12.1				
Turbidity (NTU)	10%	331	50	0	100				
D.O. (mg/L)	10%	8.09	7.78	7.44	11.41				
Temperature (°C)(°F)	3%	11.75	11.83	11.80	10.74				
ORP ³ (mV)	+/-10 mv	272	228	131	175				
Appearance		C	C	C	251				
Free Product (Yes/No)		N	N	N	N				
Odor		N	N	N	N				
Comments	MW-3 dry no sample collected MW-2 not enough volume for the pump + pump issues MW-2 and MW-4 collected with trailer.								

C = Clear T = Turbid ST = Semi Turbid VT = Very Turbid

36'-0" Bottom of Bore Hole

[illegible]

[illegible]



[illegible]

		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MSMW-01	
		Sheet 1 of: 2					
		Project No.: K11.002.001					
Project Name: 1001 Main Street Brownfield Cleanup - Main Street Well Installation				Surface Elev.: 664.14			
Location: Main Street Right-of-Way				Datum: NAVD 88			
Client: Kalieda Health				Start Date: 3/6/14			
Drilling Firm: SJB, Inc				Finish Date: 3/6/14			
Groundwater		Depth	Date & Time	Drill Rig: Track Mounted CME	Inspector: C. Martin		
While Drilling:				Casing: 2.25"	Rock Core:		
Before Casing Removal:				Sampler: 2" Split Spoon	Other:		
After Casing Removal:				Hammer: Auto			
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)							
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	MATERIAL DESCRIPTION c - coarse a - and - 35-50% m - medium s - some - 20-35% f - fine l - little - 10-20% t - trace - 0-10% S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey		COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)	
1							
2				BORING INSTALLED APPROXIMATELY 20 INCHES FROM THE			
3				CONSTRUCTION EDGE OF SIDEWALK. BORING WAS INSTALLED			
4				INSIDE TRENCH BETWEEN EDGE OF SIDEWALK AND BUILDING. TRENCH			
5				WAS BACKFILLED WITH CRUSHED STONE TO PROVIDE A PLACE FOR			
6				DRILLERS TO STAND.			
7				AUGERED TO 5 FEET BELOW GROUND SURFACE.			
8							
9				AUGERED 5 FEET			
10							
11			4	18 in- <u>SILT -brown - moist</u>		0 ppm	
12			12				
13			20				
14			25				
15				AUGERED 5 FEET			
16			13	15 in- <u>SILT -brown - moist</u>		0 ppm	
17			17				
18			16				
19			19				
20				AUGERED 5 FEET			
21			15	18 in- <u>SILT -brown - moist</u>		0 ppm	
22			22	18 in- <u>Sandy SILT -brown - trace fine Sand - saturated</u>			
23			26				
			30				
				AUGERED 5 FEET			

			C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MSMW-01	
		Sheet 2 of: 2						
		Project No.: K11.002.001						
Project Name: 1001 Main Street Brownfield Cleanup - Main Street Well Installation			Start Date: 3/6/14					
Location: Main Street Right-of-Way			Finish Date: 3/6/14					
Client: Kalieda Health			Inspector: C.Martin					
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, moisture, core run, RQD, % recovered)	
24								
25								
26		10						
27		14		<u>No Recovery</u>				
28		19						
29		21						
30		12		<u>10 in- Silty SAND-brown - fine Sand trace Silt - saturated</u>			0 ppm	
31		14		<u>3 in- SILT -brown - saturated</u>				
32		15						
33		21						
34		3		<u>15 in- SILT -brown - saturated</u>			0 ppm	
35		11						
36		17						
37		23						
38		25		<u>15 in- Sandy SILT -brown - trace fine Sand - saturated</u>			0 ppm	
39		33						
40		50/3						
41								
42		17		<u>19 in- Clay SILT -brown - some Clay - wet</u>			0 ppm	
43		13						
44		12						
45		15						
46								
47				<u>END OF BORING AT 35 FEET BELOW GROUND SURFACE</u>				
48								
49								

		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No.		MSMW-02	
		Sheet 1 of:				2			
		Project No.:				K11.002.001			
Project Name:		1001 Main Street Brownfield Cleanup - Main Street Well Installation				Surface Elev.:		663.47	
Location:		Main Street Right-of-Way				Datum:		NAVD 88	
Client:		Kalieda Health				Start Date:		3/4/14	
Drilling Firm:		SJB, Inc				Finish Date:		3/4/14	
Groundwater		Depth	Date & Time	Drill Rig:	Track Mounted CME		Inspector:		C. Martin
While Drilling:				Casing:	2.25"	Rock Core:		Undist:	
Before Casing Removal:				Sampler:	2" Split Spoon	Other:			
After Casing Removal:				Hammer:	Auto				
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)									
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)		
1									
2				BORING INSTALLED APPROXIMATELY 20 INCHES FROM THE					
3				CONSTRUCTION EDGE OF SIDEWALK. BORING WAS INSTALLED					
4				INSIDE TRENCH BETWEEN EDGE OF SIDEWALK AND BUILDING. TRENCH					
5				WAS BACKFILLED WITH CRUSHED STONE TO PROVIDE A PLACE FOR					
6				DRILLERS TO STAND.					
7				AUGERED TO 5 FEET BELOW GROUND SURFACE.					
8									
9									
10									
11				12					
12				20 6 in - Silty CLAY - red brown			0 ppm		
13				8					
14				7					
15									
16									
17				AUGERED 5 FEET					
18									
19									
20									
21				5 17 in- Silty SAND - brown - dry - fine Sand - trace Silt			0 ppm		
22				19					
23				22					
24				24					
25									
26									
27				AUGERED 5 FEET					
28									
29									
30									
31				9 17 in- Silty SAND - brown - dry - fine Sand - trace Silt			0 ppm		
32				10					
33				15					
34				17					
35									
36									
37				AUGERED 5 FEET					
38									
39									
40									
41				8 17 in- Silty SAND - brown - dry - fine Sand - trace Silt			117 ppm		
42				11					
43				11					
44				10					
45				AUGERED 5 FEET					
46									

			C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No.		MSMW-02	
		Sheet 2 of:		2						
		Project No.:		K11.002.001						
Project Name:			1001 Main Street Brownfield Cleanup - Main Street Well Installation				Start Date:		3/4/14	
Location:			Main Street Right-of-Way				Finish Date:		3/4/14	
Client:			Kalieda Health				Inspector:		C.Martin	
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey			a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%		COMMENTS (e.g., N-value, recovery, moisture, core run, RQD, % recovered)	
24										
25										
26			5	17 in- Silty SAND - brown - moist - fine Sand - trace Silt			132 ppm			
27			7							
28			9							
29			12							
30			5	13 in- Silty SAND - brown - moist - fine Sand - trace Silt			242 ppm			
31			7	6 in- Silty SAND - brown - moist - med Sand - trace Silt						
32			9	2 in- SILT - brown - moist						
33			12							
34			3	16 in- Silty CLAY - red brown - moist			0 ppm			
35			4	3 in- Sandy SILT- trace fine Sand - moist						
36			9							
37			13							
38			12	13 in- Sand & Gravel - grey - coarse sand and .25 in rounded gravel grey -			300 ppm			
39			14	saturated						
40			18							
41			17							
42			11	6 in- Sand & Gravel- black - coarse sand and .25 in rounded gravel grey -			150 ppm			
43			4	saturated						
44			8							
45			12							
46			1	8 in- Sand & Gravel- black - coarse sand and .25 in rounded gravel grey -			80 ppm			
47			1	saturated						
48			8							
49			8							
50			12	24 in- Sand & Gravel- black - coarse sand and .25 in rounded gravel grey -			400 ppm			
51			12	saturated						
52			11							
53			11							
54										
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		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MSMW-03			
		Sheet 1 of: 2							
		Project No.: K11.002.001							
Project Name:		1001 Main Street Brownfield Cleanup - Main Street Well Installation				Surface Elev.:		663.28	
Location:		Main Street Right-of-Way				Datum:		NAVD 88	
Client:		Kalieda Health				Start Date:		3/5/14	
Drilling Firm:		SJB, Inc				Finish Date:		3/5/14	
Groundwater		Depth	Date & Time	Drill Rig:	Track Mounted CME		Inspector:		C. Martin
While Drilling:				Casing:	2.25"	Rock Core:		Undist:	
Before Casing Removal:				Sampler:	2" Split Spoon	Other:			
After Casing Removal:				Hammer:	Auto				
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)									
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)		
1									
2				BORING INSTALLED APPROXIMATELY 20 INCHES FROM THE CONSTRUCTION EDGE OF SIDEWALK. BORING WAS INSTALLED					
3				INSIDE TRENCH BETWEEN EDGE OF SIDEWALK AND BUILDING. TRENCH					
4				WAS BACKFILLED WITH CRUSHED STONE TO PROVIDE A PLACE FOR					
5				DRILLERS TO STAND.					
6				AUGERED TO 5 FEET BELOW GROUND SURFACE.					
7				23					
8				24 <u>16 in- Silty SAND -lt brown - fine sand some silt - moist</u>			0 ppm		
9				21 <u>7 in- Silty CLAY -dark grey - dense 40% Silt - moist</u>					
10				26					
11									
12				AUGERED 5 FEET					
13									
14									
15				6 <u>24 in- Silty CLAY -red brown - dense massive high pl - moist</u>			0 ppm		
16				12					
17				13					
18				19					
19									
20				AUGERED 5 FEET					
21									
22									
23				4 <u>24 in- Clay SILT -red brown - silt with some clay - low pl - trace fine Sand - moist</u>			0 ppm		
				4					
				8					
				8					
				AUGERED 5 FEET					
				13 <u>24 in- Silty SAND -brown - fine Sand 20-30% Silt - moist</u>			0 ppm		
				22					
				22					
				19					
				AUGERED 5 FEET					

 C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com			BORING LOG		Boring No. MSMW-03	
					Sheet 2 of: 2	
					Project No.: K11.002.001	
Project Name: 1001 Main Street Brownfield Cleanup - Main Street Well Installation			Start Date: 3/5/14		Finish Date: 3/5/14	
Location: Main Street Right-of-Way			Inspector: C.Martin			
Client: Kalieda Health						

Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine	MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey	a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%	COMMENTS (e.g., N-value, recovery, moisture, core run, RQD, % recovered)
24							
25							
26			6		<u>24 in- Silty SAND -brown - fine Sand 20-30% Silt - wet</u>		1.7 ppm
27			10				
28			10				
29			10				
30			12		<u>7 in- SAND -lt grey - med Sand - wet</u>		18 ppm
31			13		<u>14 in- Sandy SILT-brown - trace fine Sand - saturated</u>		
32			16				
33			18				
34			6		<u>24 in- Sandy SILT -brown - trace fine Sand some staining last 4" - saturated</u>		470 ppm
35			14				
36			17				
37			22				
38			12		<u>17 in- Coarse Sand & Gravel -dk grey to black - coarse rounded and angular Sand with 1" smller gravek subrounded - saturated</u>		130 ppm
39			14				
40			18				
41			17				
42			10		<u>24 in- Coarse Sand & Gravel -dk grey to black - coarse rounded and angular Sand with 1" smller gravek subrounded - saturated</u>		370 ppm
43			12				
44			12				
45			16				
46							
47							
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		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MSMW-04			
		Sheet 1 of: 2							
		Project No.: K11.002.001							
Project Name:		1001 Main Street Brownfield Cleanup - Main Street Well Installation				Surface Elev.:		662.97	
Location:		Main Street Right-of-Way				Datum:		NAVD 88	
Client:		Kalieda Health				Start Date:		3/5/14	
Drilling Firm:		SJB, Inc				Finish Date:		3/5/14	
Groundwater		Depth	Date & Time	Drill Rig:	Track Mounted CME		Inspector:		C. Martin
While Drilling:				Casing:	2.25"	Rock Core:		Undist:	
Before Casing Removal:				Sampler:	2" Split Spoon	Other:			
After Casing Removal:				Hammer:	Auto				
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)									
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)		
1									
2				BORING INSTALLED APPROXIMATELY 20 INCHES FROM THE CONSTRUCTION EDGE OF SIDEWALK. BORING WAS INSTALLED					
3				INSIDE TRENCH BETWEEN EDGE OF SIDEWALK AND BUILDING. TRENCH					
4				WAS BACKFILLED WITH CRUSHED STONE TO PROVIDE A PLACE FOR					
5				DRILLERS TO STAND.					
6				AUGERED TO 5 FEET BELOW GROUND SURFACE.					
7				11					
8				10 <u>14 in- SILT -brown - wet</u>			0 ppm		
9				10					
10				9					
11									
12				AUGERED 5 FEET					
13									
14									
15									
16				13 <u>18 in- Silty SAND -brown - fine Sand 30-40% Silt - moist</u>			0 ppm		
17				25					
18				35					
19				31					
20									
21				AUGERED 5 FEET					
22									
23									
24				29 <u>10 in- Silty SAND -brown - fine Sand 30-40% Silt - moist</u>			2.7 ppm		
25				50/4					
26									
27									
28									
29				AUGERED 5 FEET					
30									
31									
32									
33				24 <u>16 in- Silty SAND -brown - fine Sand 20-30% Silt - moist</u>			1.7 ppm		
34				44					
35				50/4					
36									
37									
38				AUGERED 5 FEET					
39									

		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MW-02R			
		Sheet 1 of: 2							
		Project No.: K11.002.001							
Project Name:		1001 Main Street Brownfield Cleanup - Main Street Well Installation				Surface Elev.:		661.38	
Location:		Main Street Right-of-Way				Datum:		NAVD 88	
Client:		Kalieda Health				Start Date:		3/6/14	
Drilling Firm:		SJB, Inc				Finish Date:		3/6/14	
Groundwater		Depth	Date & Time	Drill Rig:	Track Mounted CME		Inspector:		C. Martin
While Drilling:				Casing:	2.25"	Rock Core:		Undist:	
Before Casing Removal:				Sampler:	2" Split Spoon	Other:			
After Casing Removal:				Hammer:	Auto				
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)									
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)		
1									
2				BORING INSTALLED APPROXIMATELY 20 INCHES FROM THE CONSTRUCTION EDGE OF SIDEWALK. BORING WAS INSTALLED					
3				INSIDE TRENCH BETWEEN EDGE OF SIDEWALK AND BUILDING. TRENCH					
4				WAS BACKFILLED WITH CRUSHED STONE TO PROVIDE A PLACE FOR					
5				DRILLERS TO STAND.					
6				AUGERED TO 5 FEET BELOW GROUND SURFACE.					
7				7					
8				7 12 in- silty SAND - brown - fine to med Sand trace Silt - moist			0 ppm		
9				8					
10				18					
11									
12				AUGERED 5 FEET					
13									
14									
15				3 No Recovery					
16				5					
17				12					
18				18					
19									
20				AUGERED 5 FEET					
21									
22									
23				12 16 in- silty SAND - brown - fine to med Sand trace Silt - moist			0 ppm		
				25					
				33					
				38					
				AUGERED 5 FEET					
				8 9 in- SAND - lt brown - med with trace Silt - moist			0 ppm		
				20 5 in- SILT - red brown - moist					
				23					
				20					
				AUGERED 5 FEET					

			C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No.		MW-02R	
		Sheet 2 of:		2						
		Project No.:		K11.002.001						
Project Name:			1001 Main Street Brownfield Cleanup - Main Street Well Installation				Start Date:		3/6/14	
Location:			Main Street Right-of-Way				Finish Date:		3/6/14	
Client:			Kalieda Health				Inspector:		C.Martin	
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey			a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%		COMMENTS (e.g., N-value, recovery, moisture, core run, RQD, % recovered)	
24										
25										
26			11	<u>8 in- SILT - red brown - wet</u>			0 ppm			
27			18							
			37							
			42							
28			38	<u>20 in- Silty SAND - brown - fine to med Sand 10-20% Silt - saturated</u>			0 ppm			
29			21							
			24							
			33							
30			15	<u>16 in- sandy SILT - brown - trace fine Sand - saturated</u>			0 ppm			
			17							
			17							
31			28							
32			21	<u>8 in- sandy SILT - brown - trace fine Sand - saturated</u>						
			34	<u>2 in- sandy SILT - black - trace fine Sand - saturated</u>			14 ppm			
33			48	<u>8 in- Coarse Sand & Gravel - black - coarse rounded and angular Sand with</u>			120 ppm			
			40	<u>1" smaller gravel subrounded - saturated</u>						
34			7	<u>18 in- silty CLAY - red brown - some Silt med pL trace embedded gravel</u>			34 ppm			
			10	<u>.35 " smaller subrounded - wet</u>						
			11							
35			14							
36				<u>END OF BORING AT 35 FEET BELOW GROUND SURFACE</u>						
37										
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47										
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49										

		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No. MW-02R-1			
		Sheet 1 of: 2							
		Project No.: K11.005.001							
Project Name:		Goodrich Street Well Replacement				Surface Elev.:		665.54	
Location:		818 Ellicott Street				Datum:		NAVD 88	
Client:		Kalieda Health				Start Date:		2/5/16	
Drilling Firm:		Nature's Way Environmental				Finish Date:		2/5/16	
Groundwater		Depth	Date & Time	Drill Rig:	Mobile B-57		Inspector:		C. Martin
While Drilling:				Casing:	2.25"	Rock Core:		Undist:	
Before Casing Removal:				Sampler:	2" Split Spoon	Other:			
After Casing Removal:				Hammer:	Auto				
(N -- No. of blows to drive sampler 12" w/140 lb. hammer falling 30" ASTM D-1586, Standard Penetration Test)									
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	c - coarse m - medium f - fine MATERIAL DESCRIPTION S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, relative moisture, core run, RQD, % recovered)		
1				<u>Asphalt & Gravel Sub-base</u>					
2			<u>Augered to 24 Feet below ground surface</u>						
3			<u>Drill Cuttings: Silty SAND - brown dry</u>						
4									
5									
6									
7			<u>Drill Cuttings: Silty SAND - brown moist</u>						
8									
9									
10									
11			<u>Drill Cuttings: Silty SAND - brown moist</u>						
12									
13									
14									
15									
16			<u>Drill Cuttings: Silty SAND - brown moist</u>						
17									
18									
19									
20									
21			<u>Drill Cuttings: Silty SAND - brown moist</u>						
22									
23									

		C&S Engineers, Inc. 141 Elm Street Buffalo, New York 14203 Phone: 716-847-1630 Fax: 716-847-1454 www.cscos.com		BORING LOG		Boring No.	MW-02R-1
						Sheet 2 of:	2
						Project No.:	K11.005.001
Project Name:		Goodrich Street Well Replacement				Start Date:	2/5/16
Location:		818 Ellicott Street				Finish Date:	2/5/16
Client:		Kalieda Health				Inspector:	C.Martin
Depth (ft)	Sample No.	Symbol	Blows on Sampler per 6"	MATERIAL DESCRIPTION c - coarse m - medium f - fine S - Sand, \$ - Silt, G - Gravel, C - Clay, cly - clayey a - and - 35-50% s - some - 20-35% l - little - 10-20% t - trace - 0-10%			COMMENTS (e.g., N-value, recovery, moisture, core run, RQD, % recovered)
24							
25			21	12"	<u>Silty SAND - brown; fine 10-20% Silt; moist</u>		0 ppm
			43				
26			65				
			60				
27			8	12"	<u>Silty SAND - brown; fine 20-35% Silt; moist</u>		0 ppm
			36				
			100/5				
28							
29			6	14"	<u>Silty SAND - brown; fine 20-35% Silt; wet</u>		0 ppm
			42				
			60				
30			72				
31			10	18"	<u>Silty SAND - brown; fine 20-35% Silt; wet to saturated</u>		0 ppm
			25				
			42				
32			37				
33			9	0-4"	<u>Silty SAND - brown; fine 20-35% Silt; loose; saturated</u>		
			19	4-10"	<u>Black medium SAND; no fines; some 0.5 inch round Gravel</u>		10 ppm
34			24	10-19"	<u>CLAY - brown - wet</u>		
			23				
35			8	0-5"	<u>SAND - medium; no fines; grey; saturated; loose</u>		0 ppm
			16	5-18"	<u>Clay SILT - low plasticity; brown; wet</u>		
			33				
36			26				
37			15	18"	<u>Silty CLAY - brown; soft</u>		0 ppm
			29				
			16				
38			20				
39			31		<u>NO RECOVERY</u>		
			23				
			42				
40			34				
41			24	10"	<u>Silty CLAY - brown; wet; soft; trace embedded Gravel</u>		0 ppm
			33				
			19				
42			21				
43			6	20"	<u>Silty CLAY - brown; wet; soft; trace embedded Gravel</u>		0 ppm
			11				
			16				
44			20				
45					<u>END OF BORING AT 44 FEET</u>		
46					<u>BOTTOM OF MONITORING WELL SET AT 43 FEET</u>		
47							
48							
49							

APPENDIX C
IN SITU PRODUCT INFORMATION



CHEMICAL OXIDATION REDEFINED...

RegenOx™ is an advanced in situ chemical oxidation technology designed to treat organic contaminants including high concentration source areas in the saturated and vadose zones*

PRODUCT FEATURES:

- Rapid and sustained oxidation of target compounds
- Easily applied with readily available equipment
- Destroys a broad range of contaminants
- More efficient than other solid oxidants
- Enhances subsequent bioremediation
- Avoids detrimental impacts to groundwater aquifers



RegenOx product application

HOW IT WORKS:

RegenOx maximizes in situ performance using a solid alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. The product is delivered as two parts that are combined and injected into the subsurface using common drilling or direct-push equipment. Once in the subsurface, the combined product produces an effective oxidation reaction comparable to that of Fenton's Reagent without a violent exothermic reaction. RegenOx safely, effectively and rapidly destroys a wide range of contaminants in both soil and groundwater (Table 1).

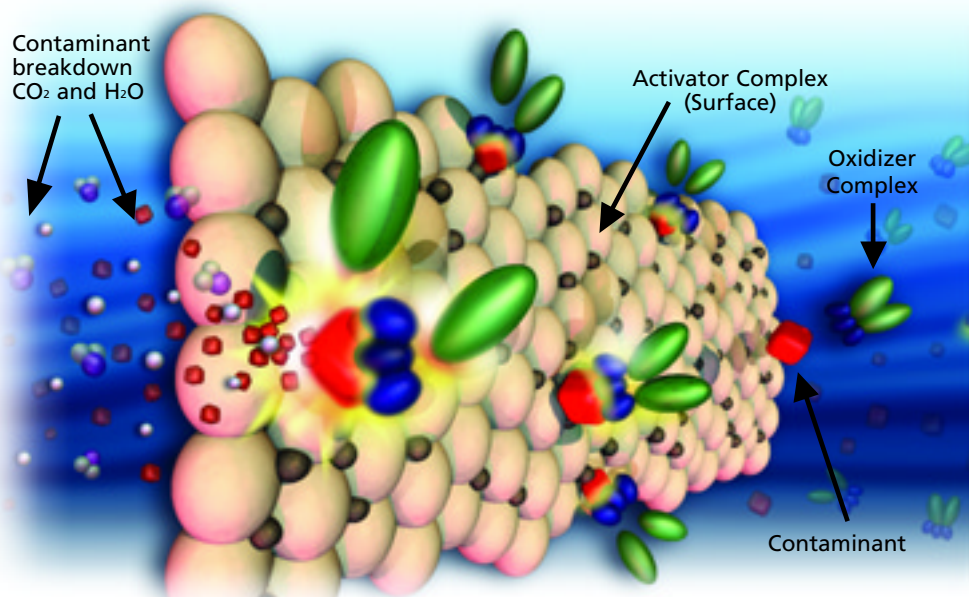
ACHIEVES RAPID OXIDATION VIA A NUMBER OF MECHANISMS

RegenOx directly oxidizes contaminants while its unique catalytic complex generates a suite of highly charged, oxidative free radicals that are responsible for the rapid destruction of contaminants. The mechanisms by which RegenOx operates are:

- **Surface- Mediated Oxidation:** (see Figure 1 and description below)
- **Direct Oxidation:** $\text{C}_2\text{Cl}_4 + 2 \text{Na}_2\text{CO}_3 + 3 \text{H}_2\text{O}_2 + 2 \text{H}_2\text{O} \leftrightarrow 2\text{CO}_2 + 4 \text{NaCl} + 4 \text{H}_2\text{O} + 2 \text{H}_2\text{CO}_3$
- **Free Radical Oxidation:**
 - Peroxyhydroxyl Radical ($\text{HO}_2\bullet$)
 - Hydroxyl Radical ($\text{OH}\bullet$)
 - Superoxide Radical ($\text{O}_2\bullet$)

Figure 1. Surface-Mediated Oxidation is responsible for the majority of RegenOx contaminant destruction. This process takes place in two stages. First, the RegenOx activator complex coats the subsurface. Second, the oxidizer complex and contaminant react with the activator complex surface destroying the contaminant.

Figure 1. RegenOx™ Surface-Mediated Oxidation



* Patent applied for



From Mass Reduction to Bioremediation:

RegenOx™ is an effective and rapid contaminant mass reduction technology. A single injection will remove significant amounts of target contaminants from the subsurface. Strategies employing multiple Regenox injections coupled with follow-on accelerated bioremediation can be used to treat highly contaminated sites to regulatory closure. In fact, RegenOx was designed specifically to allow for a seamless transition to low-cost accelerated bioremediation using any of Regenesys controlled release compounds.

Significant Longevity:

RegenOx has been shown to destroy contaminants for periods of up to one month.

Product Application Made Safe and Easy:

RegenOx produces minimal heat and as with all oxidants proper health and safety procedures must be followed. The necessary safety guidance accompanies all shipments of RegenOx and additional resources are available on request. Through the use of readily available, highly mobile, direct-push equipment and an array of pumps, RegenOx has been designed to be as easy to install as other Regenesys products like ORC® and HRC®.

Effective on a Wide Range of Contaminants:

RegenOx has been rigorously tested in both the laboratory and the field on petroleum hydrocarbons (aliphatics and aromatics), gasoline oxygenates (e.g., MTBE and TAME), polyaromatic hydrocarbons (e.g., naphthalene and phenanthrene) and chlorinated hydrocarbons (e.g., PCE, TCE, TCA).

Oxidant Effectiveness vs. Contaminant Type:

Table 1						
Contaminant	RegenOx™	Fenton's Reagent	Permanganate	Persulfate	Activated Persulfate	Ozone
Petroleum Hydrocarbons	A	A	B	B	B	A
Benzene	A	A	D	B	B	A
MTBE	A	B	B	C	B	B
Phenols	A	A	B	C	B	A
Chlorinated Ethenes (PCE, TCE, DCE, VC)	A	A	A	B	A	A
Chlorinated Ethanes (TCA, DCA)	A	B	C	D	C	B
Polycyclic Aromatic Hydrocarbons (PAHs)	A	A	B	B	A	A
Polychlorinated Biphenyls (PCBs)	B	C	D	D	D	B
Explosives (RDX, HMX)	A	A	A	A	A	A

Based on laboratory kinetic data, thermodynamic calculations, and literature reports.

Oxidant Effectiveness Key:

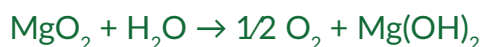
- A = Short half life, low free energy (most energetically favored), most complete
- B = Intermediate half life, low free energy, intermediate degree of completion
- C = Intermediate half life, intermediate free energy, low degree of completion
- D = Long half life, high free energy (least favored), very low degree of completion



Advanced Technologies for Groundwater Resources

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The original Oxygen Release Compound (ORC®) is a fine, powdery material comprised of a patented formulation of phosphate-intercalated magnesium peroxide. The intercalation or embedding of phosphates within the magnesium peroxide is Regenesi's patented, controlled-release mechanism. Upon hydration, ORC is designed to produce a controlled-release of oxygen (10% by weight) into the subsurface in accordance with the following reaction:



This process can proceed for periods of up to one year depending on site conditions. In the presence of this long-lasting oxygen source, aerobic microbes flourish - accelerating the naturally slow rates of aerobic biodegradation.

Product Benefits

By enhancing bioremediation using ORC, in-situ treatment of contaminants can result in an efficient, simple and cost-effective alternative to traditional technologies. With low capital costs, no operations and maintenance, minimal site disturbance and proven effectiveness, ORC can restore water quality and property values at a reasonable cost.

Subsurface Emplacement

- Direct – Push Injection
- Hollow Stem Augers
- Replaceable Filter Socks (existing wells)
- Excavations
- Trenches
- *Ex Situ* biophiles

Treatable Contaminants

ORC can treat a wide range of contaminants and most any aerobically degradable compound including: gasoline and fuel additives (BTEX and MTBE), diesel, kerosene, jet fuel, gas condensates, fuel oils, lubricants, bunker oil, PAHs, certain pesticides/herbicides and certain industrial solvents (alcohols and ketones).

Material Application

Most contaminated sites are treated using ORC slurry which is a prescribed and easily injectable water and ORC mixture (Figure 2). The direct-push injection of ORC slurry maximizes ORC and oxygen distribution in the subsurface increasing the range of enhanced biodegradation. ORC is dosed in pounds per vertical foot of material treated. The amount of ORC recommended depends greatly on various factors such as contaminant concentrations, oxygen sinks, groundwater flow rates and subsurface geology. It is recommended that a Regenesi Technical Services Representative be contacted for detailed design information. ORC treatment approaches or designs may consist of one, or combinations of the following: Source Area Grids, Plume Area Grids or Barriers, Excavations and Biopiles.