

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Tuesday, June 16, 2020 5:47 PM
To: Adam Tegen; Nicholas Mueller; Paul Braun
Cc: Kathleen McDaniel; Beggs, Tauren R - DNR; Van Der Kloot, James
Subject: Supplemental Assessment at 1512 Washington Street
Attachments: 47 - Supplemental Investigation.pdf

Adam:

As a continuance of the Stantec (2019) Site-Specific Sampling and Analysis Plan for a Chapter NR 716 Wisconsin Administrative Code (WAC) Site Investigation (SSSAP), and on behalf of the Community Development Authority of the City of Manitowoc (CDA), Stantec Consulting Services (Stantec) has completed a supplemental assessment of light non-aqueous phase liquid (LNAPL) recovered from monitoring well MW-12 at the brownfield property located at 1512 Washington Street in Manitowoc, Wisconsin.

This work was completed using funds provided through a site-specific brownfield assessment grant awarded to the CDA by the United States Environmental Protection Agency (USEPA) in 2018 under cooperative agreement number BF-00E02380. The USEPA Assessment, Cleanup and Redevelopment Exchange System (ACRES) number for the Property is 169132. The Wisconsin Department of Natural Resources (WDNR) Bureau for Remediation and Redevelopment Tracking System (BRRTS) open case number is 02-36-545108.

Please call with questions.

Sincerely,

Harris Byers, Ph.D.

Sr. Brownfields Project Manager

Direct: 414 581-6476
Harris.Byers@stantec.com

Stantec
12075 Corporate Parkway Suite 200
Mequon WI 53092-2649



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Stantec Consulting Services Inc.
12075 Corporate Parkway Suite 200, Mequon WI 53092-2649

June 16, 2020
File: 193706270p

Attention: Mr. Adam Tegen
Community Development Director
City of Manitowoc
900 Quay Street
Manitowoc, Wisconsin 54220

Dear Mr. Tegen,

**Reference: Further Characterization of Light Non-Aqueous Phase Liquid in MW-12
1512 Washington Street
Manitowoc, Wisconsin
WDNR BRRTS No.: 02-36-545108 (Open)
USEPA Cooperative Agreement No.: BF-00E02380
ACRES Property No.: 169132**

As a continuance of the Stantec (2019) Site-Specific Sampling and Analysis Plan for a Chapter NR 716 Wisconsin Administrative Code (WAC) Site Investigation (SSSAP), and on behalf of the Community Development Authority of the City of Manitowoc (CDA), Stantec Consulting Services (Stantec) has completed a supplemental assessment of light non-aqueous phase liquid (LNAPL) recovered from monitoring well MW-12 at the brownfield property located at 1512 Washington Street in Manitowoc, Wisconsin (herein referred to as the "Site" or "Property"). The location of the Site is illustrated on Figure 1. The location of MW-12 is illustrated on Figure 2, which is adapted from the Stantec (2020) Phase II Environmental Site Assessment (ESA).

This work was completed using funds provided through a site-specific brownfield assessment grant awarded to the CDA by the United States Environmental Protection Agency (USEPA) in 2018 under cooperative agreement number BF-00E02380. The USEPA Assessment, Cleanup and Redevelopment Exchange System (ACRES) number for the Property is 169132. The Wisconsin Department of Natural Resources (WDNR) Bureau for Remediation and Redevelopment Tracking System (BRRTS) open case number is 02-36-545108.

BACKGROUND

As described in the Stantec (2020) Phase II ESA and illustrated on Figure 2, LNAPL recovered as an immiscible layer in several monitoring wells installed in Building K. Initial characterization of the LNAPL confirmed the absence of polychlorinated biphenyls (PCBs) in the fluid and suggested the LNAPL was not petroleum-based. Further evaluation by a specialized Eurofins laboratory suggested the LNAPL was polymer-based and contained water, acetone, and polyvinyl fluoride. However, Eurofins was unwilling to provide further characterization of the LNAPL due to the potential for significant costly damage to laboratory analytical equipment.

Reference: Further Characterization of Light Non-Aqueous Phase Liquid in MW-12; 1512 Washington Street, Manitowoc, Wisconsin
WDNR BRRTS No.: 02-36-545108 (Open); USEPA Cooperative Agreement No.: BF-00E02380; ACRES No.: 169132

As illustrated on Figure 2, the concentrations of polyfluorinated alkyl substances (PFAS) in shallow groundwater [almost entirely Perfluorooctanoic acid (PFOA)] were several orders of magnitude greater than proposed groundwater quality standards. Therefore, the Stantec (2020) Phase II ESA recommended further characterization of the LNAPL to determine if the fluid could be a continuing source of groundwater impacts.

METHODS

A sample of LNAPL was collected from MW-12 with a bailer on May 13, 2020. The sample was poured directly into laboratory-supplied containers, placed on ice, and shipped to GEL Laboratories, LLC (GEL) under chain of custody procedures. Photographic documentation is provided in Attachment A. The LNAPL sample was analyzed by GEL using proprietary procedures developed by GEL as a custom modification to method 537 for quantification of PFAS in free-phase product. The laboratory report is provided in Attachment B.

RESULTS

As summarized in the table below, two PFAS compounds [Perfluorobutanoic acid (PFBA) and PFOA] were detected in the LNAPL sample by GEL at concentrations greater than laboratory limits of detection. PFBA and PFOA were also detected in groundwater at the Site, and the concentrations of these compounds in groundwater from monitoring well MW-12 and from nearby monitoring wells outside of the LNAPL area presented in the Stantec (2020) Phase II ESA are added to the table below for reference.

Compound	PFAS Concentration (ng/L)		
	LNAPL from MW-12	Groundwater from MW-12 (Stantec, 2020)	Groundwater near MW-12 (Stantec, 2020) ¹
Perfluorobutanoic acid	1,620	2,300	<77
Perfluorooctanoic acid	10,100	4,100	Mean ± SD: 3,410 ± 2,263 Range: 680-6,700

Note: ¹ Data is from monitoring wells MW-5, MW-15, MW-16, MW-31, MW-37, MW-48, and MW-121. SD = standard deviation.

CONCLUSIONS

Fingerprinting PFAS for forensics purposes remains an emerging analytical field, and although the source of the LNAPL is unlikely to be definitively established, as discussed in the Stantec (2020) Phase II ESA, historic records suggest PFOA was the primary fluorinated alkyl associated with application of protective and non-stick coatings. Additionally, records described in previous Stantec reports (e.g. Stantec 2016, 2019, and 2020) indicate that protective and non-stick coating paints were formerly located at the Property. Therefore, the absence of sulfonated PFAS compounds (e.g. perfluorooctanesulfonic acid) in the LNAPL sample was not surprising.

The presence and concentrations of PFBA and PFOA in the LNAPL suggest the liquid could be an ongoing source of PFAS impacts to groundwater at the Property. As recommended in the Stantec (2020) Phase II ESA, continued delineation of PFAS impacts to groundwater at the Property should continue. The investigation will likely require installation of monitoring wells offsite for delineation purposes. Due to the location of the LNAPL, the fluid could have impacted portions of the concrete utility tunnel network resulting in a PFAS release to building materials.

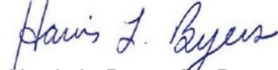
Reference: Further Characterization of Light Non-Aqueous Phase Liquid in MW-12; 1512 Washington Street, Manitowoc, Wisconsin
WDNR BRRTS No.: 02-36-545108 (Open); USEPA Cooperative Agreement No.: BF-00E02380; ACRES No.: 169132

Section NR 708.13 WAC, which is based on the requirements in the Code of Federal Regulations (40 CFR 280.64), states: "Responsible parties shall conduct free product removal whenever it is necessary to halt or contain the discharge of a hazardous substance or to minimize the harmful effects of the discharge to the air, lands or waters of the state." As such, recovery of accessible LNAPL may be appropriate as an interim action pending completion of the NR 716 WAC Site Investigation.

We trust this information meets your needs and we look forward to working with you on this project.

Regards,

STANTEC CONSULTING SERVICES INC.



Harris L. Byers, Ph.D.
Sr. Brownfields Project Manager
Tel: 414 – 581 – 6476
Email: Harris.Byers@Stantec.com

STANTEC CONSULTING SERVICES INC.



Richard J. Binder, P.G., CPG
QA/QC Manager
Rick.Binder@stantec.com

Enclosures: Figures
Attachment A – Photographic Documentation
Attachment B – Laboratory Report

REFERENCES

Stantec, 2016, Phase I ESA for 1512 Washington Street, Manitowoc, Wisconsin, June 28, 2016.

Stantec, 2019, Site-Specific Sampling and Analysis Plan for a Chapter NR 716 WAC Site Investigation, 1512 Washington Street, Manitowoc, Wisconsin, January 9, 2019.

Stantec, 2020, Phase II Environmental Site Assessment, Investigation of PCB Impacts to Soil Beneath the Loading Dock and Area 8 and Continued Assessment of Site-Wide Impacts to Soil and Groundwater, 1512 Washington Street, Manitowoc, Wisconsin, March 19, 2020.

LIMITATIONS

The sampling and characterization of LNAPL at the Property was performed in accordance with generally accepted practices of the profession for performing similar studies at the same time and in the same geographical area. Stantec observed that degree of care and skill generally exercised by the profession under similar circumstances and conditions. No other warranty is expressed or implied.

Stantec observations, findings, and opinions must not be considered as scientific certainties, but only an opinion based on our professional judgment concerning the significance of the data gathered during the course of the investigation. Specifically, Stantec does not and cannot represent that the Site contains no hazardous or toxic materials or other latent condition beyond that observed by Stantec.

Stantec does not warrant that this submittal represents an exhaustive study of all possible environmental concerns at the project area. The items investigated as part of this study represent likely sources of environmental concerns at the project area and are consequently believed to adequately address the public at risk at the present time.

FIGURES

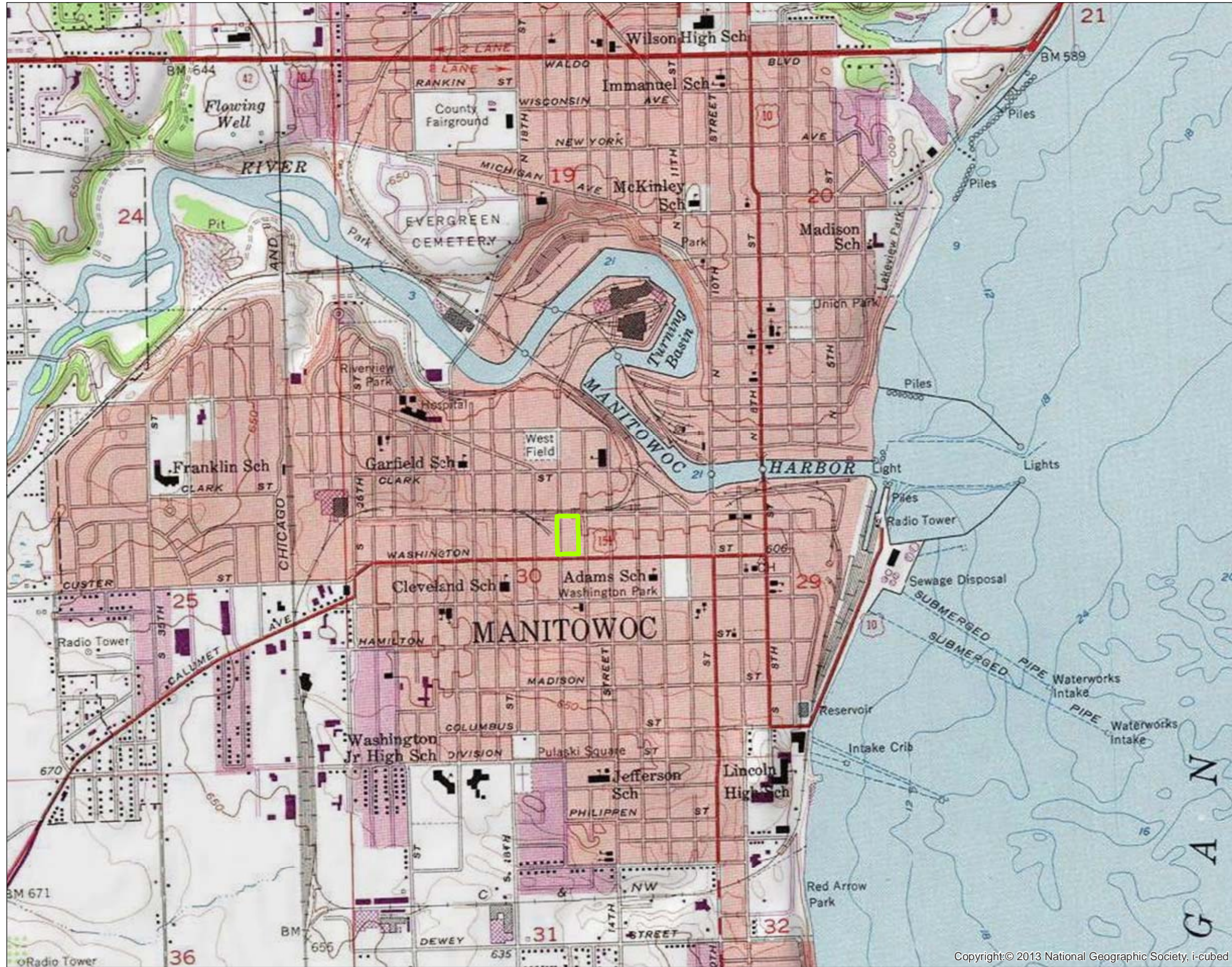
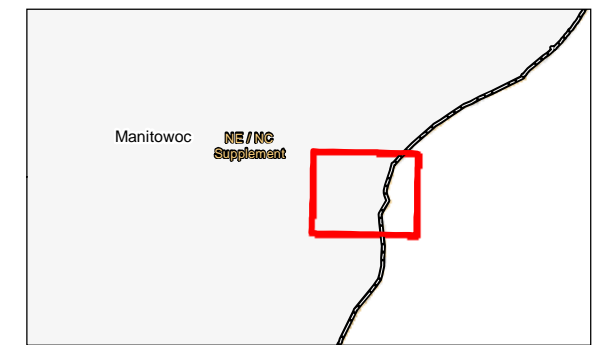


Figure No. 1
 Title **Site Location and Local Topography**
 Client/Project
 City of Manitowoc
 USEPA Brownfield Assessment Grant
 Hazardous Substances
 0 1,050 2,100 Feet
 193703931
 Prepared by HLB on 5-24-16

Legend
 Target Site



Notes
 1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
 2. Data Sources Include:
 Topo Map: USGS/National Geographic Society

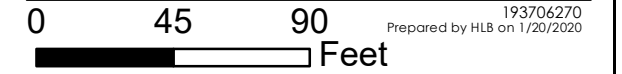


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G:\Data\Manitowoc\MapX1512\Washregion\01.mxd - Revised: 2016-05-25 By: bzy

Figure No. **2**
 Title
Groundwater Sample Locations and PFOA+PFOS Concentrations

Client/Project
 City of Manitowoc
 USEPA Brownfield Assessment Grant
 Hazardous Substances



Legend

Phase II ESA Sample Locations

- Soil Boring / Monitoring Well (21)
- Prior Monitoring Wells (7)

- Potential Source Areas (4)
- Historic USTs (7)
- Paint/Paint Waste Storage (Yanko, 1989)

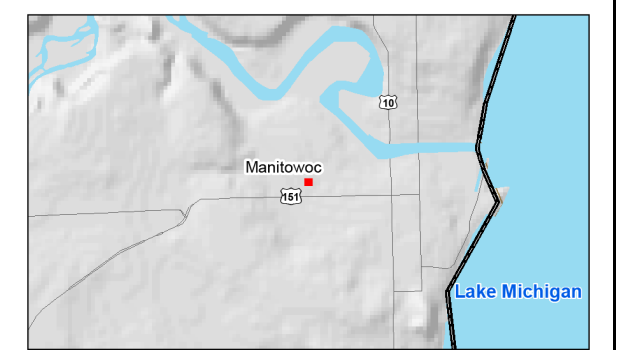
Paint Related Features (ca. 1959)

- "Paint Mixing" - 6th Floor
- Pipe Run to Spray Booth - 3rd Floor
- Pipe Run to Spray Booth - 5th Floor
- Pipe Run to Spray Booth - 6th Floor

PFOA+PFOS Concentration (ng /L)

- 100
- 500
- 1000

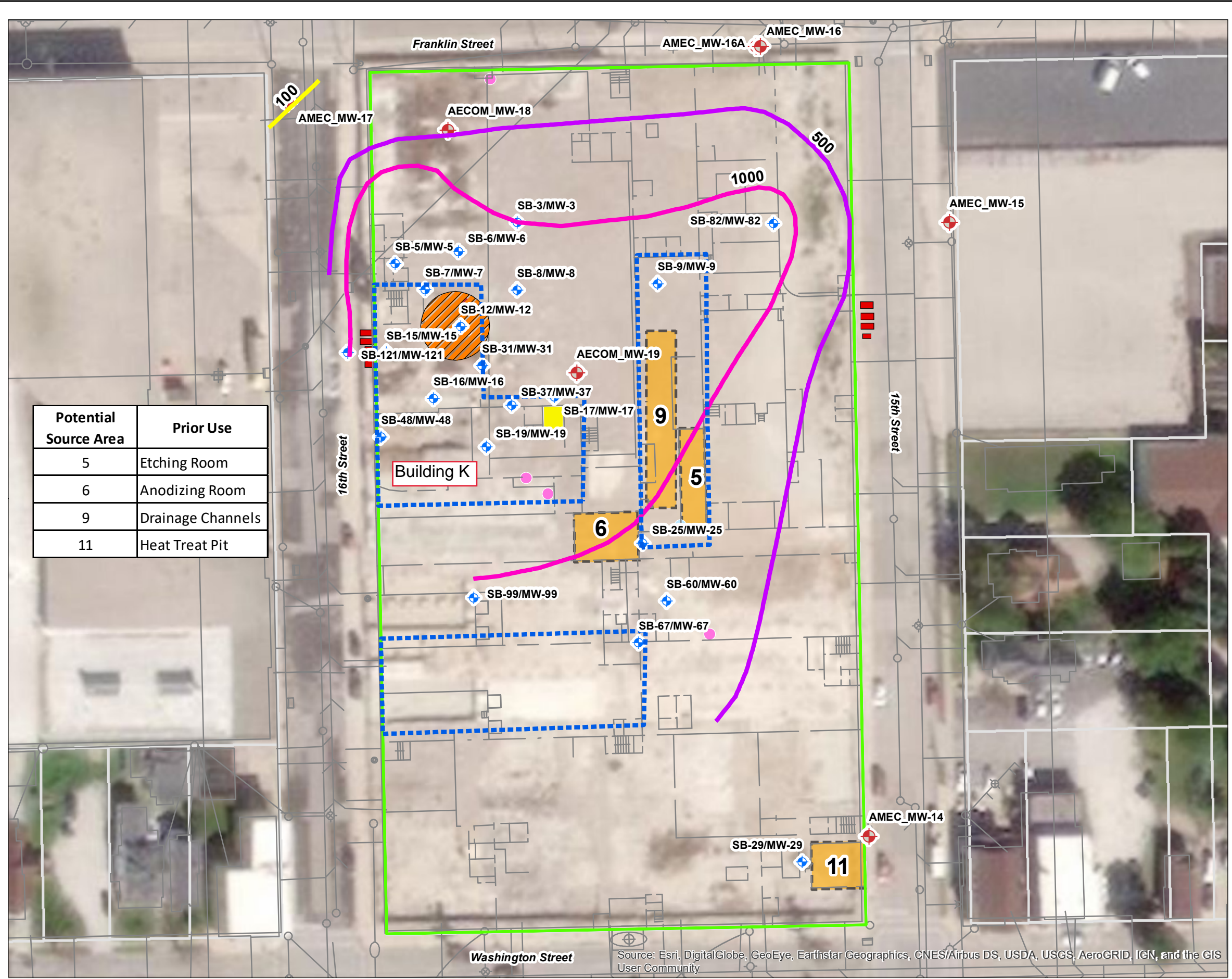
- LNAPL
- Target Parcel
- Former Building Walls
- Parcels



Notes

- Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
- Select Groundwater Data Adapted From: AECOM (2018)

Potential Source Area	Prior Use
5	Etching Room
6	Anodizing Room
9	Drainage Channels
11	Heat Treat Pit



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





C:\GIS_Manitowoc\Phase II ESA\Figure 12 - PFOA+PFOS.mxd, Revised: 2020-02-02 8:42:15 AM

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

ATTACHMENT A

Photographic Documentation

Client:	Community Development Authority of the City of Manitowoc	Project:	193706270
Site Name:	Mirro	Site Location:	1512 Washington Street
Photograph ID: 1			
Photo Location: MW-12			
Direction:			
Survey Date: 5/13/2020			
Comments: View of LNAPL removed in bailer			
Photograph ID: 2			
Photo Location: MW-12			
Direction:			
Survey Date: 5/13/2020			
Comments: LNAPL samples submitted to GEL Labs			

APPENDIX B

Laboratory Report



June 02, 2020

Harris Byers
Stantec
12075 Corporate Parkway Suite 200
Thiensville, Wisconsin 53092

Re: PFAS
Work Order: 511226

Dear Harris Byers:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 14, 2020. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4487.

Sincerely,

Brielle Luthman
Project Manager

Purchase Order: TBD
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 – (843) 556-8171 – www.gel.com

Certificate of Analysis Report for

STNT001 Stantec

Client SDG: 511226 GEL Work Order: 511226

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- ** Analyte is a surrogate compound
- J See case narrative for an explanation
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Brielle Luthman.

Reviewed by _____

B. Luthman

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 2, 2020

Company : Stantec
Address : 12075 Corporate Parkway Suite 200

Thiensville, Wisconsin 53092

Contact: Harris Byers
Project: PFAS

Client Sample ID: MW-12	Project: STNT00120
Sample ID: 511226001	Client ID: STNT001
Matrix: Misc Liquid	
Collect Date: 13-MAY-20 09:00	
Receive Date: 14-MAY-20	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
LCMSMS PFCs												
EPA 537Mod PFCs by LC-MS/MS "As Received"												
Perfluorododecanoic acid (PFDOA)	U	ND	6.60	20.0	ng/L	0.200	1	JLS	05/20/20	1730	1998229	1
Perfluorooctane sulfonic acid (PFOS)	U	ND	8.00	20.0	ng/L	0.200	1					
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	U	ND	66.0	200	ng/L	0.200	5	JLS	05/20/20	2106	1998229	2
Perfluorobutane sulfonic acid (PFBS)	U	ND	33.0	89.0	ng/L	0.200	5					
Perfluorodecanoic acid (PFDA)	U	ND	39.0	100	ng/L	0.200	5					
Perfluorohexane sulfonic acid (PFHxS)	U	ND	33.0	91.0	ng/L	0.200	5					
Perfluoropentane sulfonic acid (PFPeS)	U	ND	33.0	94.0	ng/L	0.200	5					
Perfluorotetradecanoic acid (PFTDA)	U	ND	40.0	100	ng/L	0.200	5					
Perfluoroundecanoic acid (PFUnDA)	U	ND	33.0	100	ng/L	0.200	5					
Perfluorobutanoic acid (PFBA)	J	1620	800	2000	ng/L	0.200	100	JLS	05/20/20	2117	1998229	3
Perfluoroheptanoic acid (PFHpA)	U	ND	660	2000	ng/L	0.200	100					
Perfluorohexanoic acid (PFHxA)	U	ND	800	2000	ng/L	0.200	100					
Perfluorononanoic acid (PFNA)	U	ND	660	2000	ng/L	0.200	100					
Perfluorooctanoic acid (PFOA)		10100	800	2000	ng/L	0.200	100					
Perfluoropentanoic acid (PFPeA)	U	ND	660	2000	ng/L	0.200	100					
Perfluorotridecanoic acid (PFTrDA)	U	ND	660	2000	ng/L	0.200	100					
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	U	ND	132000	380000	ng/L	0.200	10000	JLS	05/21/20	1007	1998229	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 537.1 Mod, PFAS, Compl	PFCs Extraction in Liquid	LM1	05/20/20	0731	1998228

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 537.1 Mod, PFAS, Compliant with QSM Table B-15	
2	EPA 537.1 Mod, PFAS, Compliant with QSM Table B-15	
3	EPA 537.1 Mod, PFAS, Compliant with QSM Table B-15	
4	EPA 537.1 Mod, PFAS, Compliant with QSM Table B-15	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: June 2, 2020

Company : Stantec
Address : 12075 Corporate Parkway Suite 200

Thiensville, Wisconsin 53092
Contact: Harris Byers
Project: PFAS

Client Sample ID:	MW-12	Project:	STNT00120
Sample ID:	511226001	Client ID:	STNT001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	----	---------	------	------	-------	--------

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: June 2, 2020

Page 1 of 5

Stantec
12075 Corporate Parkway Suite 200
Thiensville, Wisconsin

Contact: Harris Byers

Workorder: 511226

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Perfluorinated Compounds											
Batch	1998229										
QC1204563926 LCS											
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	18.3			16.9	ng/L		92	(56%-143%)	JLS	05/20/20	19:55
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	19.3			20.0	ng/L		104	(63%-142%)			
Perfluorobutane sulfonic acid (PFBS)	17.1			19.6	ng/L		115	(68%-136%)			
Perfluorobutanoic acid (PFBA)	19.3			18.7	ng/L		97	(70%-133%)			
Perfluorodecanoic acid (PFDA)	19.3			19.2	ng/L		100	(62%-135%)			
Perfluorododecanoic acid (PFDOA)	19.3			20.7	ng/L		107	(66%-131%)			
Perfluoroheptanoic acid (PFHpA)	19.3			20.0	ng/L		104	(67%-135%)			
Perfluorohexane sulfonic acid (PFHxS)	17.6			16.6	ng/L		94	(64%-137%)			
Perfluorohexanoic acid (PFHxA)	19.3			18.7	ng/L		97	(67%-133%)			
Perfluorononanoic acid (PFNA)	19.3			20.5	ng/L		106	(66%-134%)			
Perfluorooctane sulfonic acid (PFOS)	19.3			18.2	ng/L		94	(61%-131%)			
Perfluorooctanoic acid (PFOA)	19.3			19.4	ng/L		100	(63%-145%)			
Perfluoropentane sulfonic acid (PFPeS)	18.1			17.9	ng/L		99	(62%-139%)			
Perfluoropentanoic acid (PFPeA)	19.3			18.8	ng/L		97	(69%-132%)			

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QC Summary

Workorder: 511226

Page 2 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Perfluorinated Compounds											
Batch	1998229										
Perfluorotetradecanoic acid (PFTDA)	19.3			22.3	ng/L		116	(65%-143%)	JLS	05/20/20	19:55
Perfluorotridecanoic acid (PFTTrDA)	19.3			16.1	ng/L		83	(57%-149%)			
Perfluoroundecanoic acid (PFUnDA)	19.3			19.7	ng/L		102	(65%-134%)			
QC1204563927 LCSD											
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	18.2			18.2	ng/L	7	100	(0%-36%)		05/20/20	20:05
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	19.2			17.9	ng/L	11	94	(0%-25%)			
Perfluorobutane sulfonic acid (PFBS)	17.0			15.6	ng/L	23	92	(0%-30%)			
Perfluorobutanoic acid (PFBA)	19.2			17.9	ng/L	5	93	(0%-30%)			
Perfluorodecanoic acid (PFDA)	19.2			18.2	ng/L	6	95	(0%-29%)			
Perfluorododecanoic acid (PFDOA)	19.2			19.9	ng/L	4	104	(0%-30%)			
Perfluoroheptanoic acid (PFHpA)	19.2			18.7	ng/L	7	98	(0%-30%)			
Perfluorohexane sulfonic acid (PFHxS)	17.5			18.6	ng/L	11	106	(0%-30%)			
Perfluorohexanoic acid (PFHxA)	19.2			17.9	ng/L	5	93	(0%-30%)			
Perfluorononanoic acid (PFNA)	19.2			18.3	ng/L	11	95	(0%-27%)			
Perfluorooctane sulfonic acid (PFOS)	19.2			18.0	ng/L	1	94	(0%-27%)			
Perfluorooctanoic acid (PFOA)	19.2			18.1	ng/L	7	94	(0%-30%)			

GEL LABORATORIES LLC

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QC Summary

Workorder: 511226

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Perfluorinated Compounds											
Batch	1998229										
Perfluoropentane sulfonic acid (PFPeS)	18.0			19.2	ng/L	7	107	(0%-29%)	JLS	05/20/20	20:05
Perfluoropentanoic acid (PFPeA)	19.2			18.3	ng/L	3	95	(0%-30%)			
Perfluorotetradecanoic acid (PFTDA)	19.2			20.4	ng/L	9	106	(0%-30%)			
Perfluorotridecanoic acid (PFTrDA)	19.2			15.2	ng/L	6	79	(0%-35%)			
Perfluoroundecanoic acid (PFUnDA)	19.2			20.1	ng/L	2	105	(0%-28%)			
QC1204563925 MB											
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)			U	ND	ng/L					05/20/20	19:45
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)			U	ND	ng/L						
Perfluorobutane sulfonic acid (PFBS)			U	ND	ng/L						
Perfluorobutanoic acid (PFBA)			U	ND	ng/L						
Perfluorodecanoic acid (PFDA)			U	ND	ng/L						
Perfluorododecanoic acid (PFDOA)			U	ND	ng/L						
Perfluoroheptanoic acid (PFHpA)			U	ND	ng/L						
Perfluorohexane sulfonic acid (PFHxS)			U	ND	ng/L						
Perfluorohexanoic acid (PFHxA)			U	ND	ng/L						
Perfluorononanoic acid (PFNA)			U	ND	ng/L						

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 511226

Page 4 of 5

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Perfluorinated Compounds											
Batch	1998229										
Perfluorooctane sulfonic acid (PFOS)			U	ND	ng/L				JLS	05/20/20	19:45
Perfluorooctanoic acid (PFOA)			U	ND	ng/L						
Perfluoropentane sulfonic acid (PFPeS)			U	ND	ng/L						
Perfluoropentanoic acid (PFPeA)			U	ND	ng/L						
Perfluorotetradecanoic acid (PFTDA)			U	ND	ng/L						
Perfluorotridecanoic acid (PFTTrDA)			U	ND	ng/L						
Perfluoroundecanoic acid (PFUnDA)			U	ND	ng/L						

Notes:

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B The target analyte was detected in the associated blank.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- E Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J See case narrative for an explanation
- J Value is estimated
- JNX Non Calibrated Compound
- N Organics--Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
- N Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 511226

Page 5 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
ND	Analyte concentration is not detected above the detection limit										
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
P	Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, the difference is >70%.										
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.										
R	Sample results are rejected										
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.										
UJ	Compound cannot be extracted										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	QC Samples were not spiked with this compound										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
h	Preparation or preservation holding time was exceeded										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Page: 1 of 1
 Project # 193706269
 GEL Quote #:
 QC Number (1):
 PO Number:



Laboratories LLC
 Chemistry | Radiochemistry | Radiobiology | Specialty Analytics
Chain of Custody and Analytical Request

GEL Laboratories, LLC
 2040 Savage Road
 Charleston, SC 29407 **511226**
 Phone: (843) 556-8171
 Fax: (843) 766-1178

Client Name: STANTEC Phone # (414) 581-0776

Project/Site Name: FORMER MICRO PROPERTY Fax # -

Address: 12075 CORPORATE PKWY, #200, MEQUON, WI 53092

Collected By: Whitney Cull Send Results To: HARRIS BYERS, HARRIS BYERS@STANTEC.COM

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID <small>* For composites - indicate start and stop date/time</small>	*Date Collected <small>(mm-dd-yy)</small>	*Time Collected <small>(Military) (hhmm) (hhmm)</small>	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Radioactive <small>Please supply isotope info</small>	Should this sample be considered:	Total number of containers	Sample Analysis Requested (5)										Preservative Type (6)	Comments <small>Note: extra sample is required for sample specific QC</small>					
									(7) Known or possible hazards																
<u>MW-1Z</u>	<u>5/13/20</u>	<u>0900</u>	<u>N</u>	<u>N</u>	<u>ML</u>	<u>-</u>	<u>-</u>	<u>3</u>	<u>PFAS</u>															<u>FREE PRODUCT IN A MONITORING WELL</u>	

Chain of Custody Signatures TAT Requested: Normal: Rush: Specify: (Subject to Surcharge)

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time	Fax Results: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Select Deliverable: <input type="checkbox"/> C of A <input type="checkbox"/> QC Summary <input type="checkbox"/> Level 1 <input type="checkbox"/> Level 2 <input type="checkbox"/> Level 3 <input type="checkbox"/> Level 4
<u>W S Cull</u>	<u>5/13/2020</u>	<u>1600</u>	<u>Impresso Datum</u>	<u>5/14/20</u>	<u>900</u>	<u>EMAIL (PROVIDED ABOVE)</u>	
2			2				
3			3				

For sample shipping and delivery details, see Sample Receipt & Review form (SRR.) Sample Collection Time Zone: Eastern Pacific Central Mountain Other:

- 1.) Chain of Custody Number = Client Determined
- 2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
- 3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
- 4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
- 5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
- 6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) Are there any known or possible hazards associated with these samples?

RCRA Metals As = Arsenic Hg = Mercury Ba = Barium Se = Selenium Cd = Cadmium Ag = Silver Cr = Chromium MR = Miscellaneous Pb = Lead RCRA metals	Characteristic Hazards FL = Flammable/Ignitable CO = Corrosive RE = Reactive	Listed Waste LW = Listed Waste (F, K, P and U-listed wastes.) Waste code(s):	Other OT = Other / Unknown (i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.) Description:	Please provide any additional details below regarding handling and/or disposal concerns. (i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.) <u>SEE COMMENT; PFAS POSSIBLE</u>
TSCA Regulated PCB = Polychlorinated biphenyls				

SAMPLE RECEIPT & REVIEW FORM

Client: <u>STANT</u>	SDG/AR/COC/Work Order: <u>511226</u>	<u>B.L</u>
Received By: <u>Dye</u>	Date Received: <u>5/13/20</u>	
Carrier and Tracking Number	Circle Applicable: <u>FedEx Express</u> FedEx Ground UPS Field Services Courier Other <u>1314 7222 2815</u>	

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCBs Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: _____ *all temperatures are recorded in Celsius TEMP: <u>1°C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Temperature Device Serial #: <u>113-19</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?		<input checked="" type="checkbox"/>		If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
		<input checked="" type="checkbox"/>		Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
		<input checked="" type="checkbox"/>		Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

List of current GEL Certifications as of 02 June 2020

State	Certification
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122020-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2019-165
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-20-17
Utah NELAP	SC000122020-32
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

**LCMSMS-Misc
 Technical Case Narrative
 Stantec
 SDG #: 511226**

Product: The Extraction and Analysis of Per and Polyfluoroalkyl Substances Using LCMSMS

Analytical Method: EPA 537.1 Mod, PFAS, Compliant with QSM Table B-15

Analytical Procedure: GL-OA-E-076 REV# 9

Analytical Batches: 1998229 and 1998228

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
511226001	MW-12
1204563925	Method Blank (MB)
1204563926	Laboratory Control Sample (LCS)
1204563927	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Sample Dilutions

The following samples were diluted due to matrix interference and/or diluted to bring the over range concentration within the calibration range. 511226001 (MW-12).

Analyte	511226
	001
Fluorotelomer sulfonate 6:2 (6:2 FTS)	10000X
N-ethylperfluoro-1-octanesulfonamidoacetic acid	5X
Perfluorobutanesulfonate (PFBS)	5X
Perfluorobutyric acid (PFBA)	100X
Perfluorodecanoic acid (PFDA)	5X
Perfluoroheptanoic acid (PFHpA)	100X
Perfluorohexanesulfonate (PFHxS)	5X
Perfluorohexanoic acid (PFHxA)	100X
Perfluorononanoic acid (PFNA)	100X
Perfluorooctanoic acid (PFOA)	100X
Perfluoropentanesulfonate (PFPeS)	5X
Perfluoropentanoic acid (PFPeA)	100X
Perfluorotetradecanoic acid (PFTeDA)	5X
Perfluorotridecanoic acid (PFTrDA)	100X
Perfluoroundecanoic acid (PFUdA)	5X

Miscellaneous Information

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may require manual integrations due to software limitations. 511226001 (MW-12).

Additional Comments

Additional sample was not provided for matrix QC. 511226001 (MW-12).

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.