

September 18, 2018

SER Wastewater Program
Wisconsin Department of Natural Resources
2300 North Dr. Martin Luther King, Jr. Drive
Milwaukee, Wisconsin 53212-3128

RE: NR 140 Exemption Post-Injection Report
BRRTS #: 02-41-576336 & 02-41-579429
FID #: 241828620
Sunrise Shopping Center
2410-2424 10th Avenue & 1009 Marquette Avenue
South Milwaukee, Wisconsin 53172

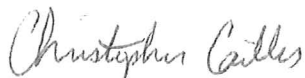
Compliance Officer:

Please find enclosed an *NR 140 Exemption Post-Injection Report* (Post-Injection Report) that is being submitted by DAI Environmental, Inc., (DAI) on behalf of Carol Investment Corporation in compliance with monitoring condition 12 of the June 27th and July 9th NR 140 Temporary Injection Exemption letters issued by Wisconsin Department of Natural Resources (WDNR) for the above-referenced site located in South Milwaukee, Wisconsin. As required, this Post-Injection Report is submitted within 60-days of the completion of the pilot-scale chemical injection activities that were performed on July 20, 2018.

Included in this Post-Injection Report are details of the pilot-scale injection activities and the post-injection confirmation sampling. Additionally, tables included in the report summarize all the information required to be cataloged during injection activities, as specified in the NR 140 Temporary Injection Exemption monitoring conditions.

If you have any questions or require additional information in regards to this submission, please contact me at 847-573-8900 extension 580. Thank you for your time.

Sincerely,
DAI Environmental, Inc.



Christopher Cailles, P.E.
Project Engineer

Attachment

cc: Steven Dukatt – Carol Investment Corporation (w/enclosure electronically)
Riley Neuman – WDNR RR Program (w/enclosure electronically)

**NR 140 EXEMPTION POST-INJECTION REPORT
SUNRISE SHOPPING CENTER
2410-2424 10TH AVENUE & 1009 MARQUETTE AVENUE
SOUTH MILWAUKEE, WISCONSIN 53172
WDNR BRRTS ACTIVITY #02-41-576336 & 02-41-579429
WDNR FID #241828620**

September 18, 2018

DAI Project Number: 6255

Prepared For:
Carol Investment Corporation
1410 South Clinton Street
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Polo Park Business Center
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1.0 INTRODUCTION

DAI Environmental, Inc., (DAI) has been engaged by the Carol Investment Corporation to obtain a Case Close Out Letter from the Wisconsin Department of Natural Resources (WDNR) for the Sunrise Shopping Center Property located at 2410-2424 10th Avenue and 1009 Marquette Avenue in South Milwaukee, Wisconsin (Site). An Aerial View of Site and Surrounding Property is provided in Figure B.1.b.1.

Following the completion of Site Investigation activities, a *Remedial Actions Options Report/Design Report* (RAOR/Design Report) dated April 2, 2018, was submitted to the Wisconsin Department of Natural Resources (WDNR). The RAOR/Design Report proposed a combination of active remediation and the implementation of institutional controls to address subsurface contamination at the Site, including using chemical injection to reduce contaminant concentrations in the soil and groundwater. The chemical injections were to be performed in two (2) phases; first a pilot-scale study needed to acquire certain information as needed for a full-scale design, then the full-scale design and implementation.

Per a telephone discussion of May 10, 2018, WDNR provided preliminary approval for the proposed remedial actions based upon two (2) conditions:

- The chemical injection activities currently proposed are intended to be conducted as a pilot test to evaluate feasibility and effectiveness, with a more detailed “Remedial Action Plan” to be submitted after the pilot test; and
- A request to perform the intended pilot-scale chemical injection must be submitted and approved prior to performing the proposed testing.

Therefore, a *Request for Approval of NR 140.28 Exemption and NR 812.05 Variance* dated May 23, 2018, was submitted to WDNR with all required information. Included with the request were an *Inventory of Injection Wells* Form (3300-253) and a copy of the Wisconsin Pollutant Discharge Elimination System (WPDES) permit application that was submitted concurrently (injection activities conducted as part of Remedial Actions must be performed under WPDES permit WI-0046566).

Approval for coverage under a WPDES permit was granted in a letter from the WDNR dated June 6, 2018 (with coverage under the reissued WPDES permit subsequently granted in a subsequent letter dated June 29, 2018). The NR 140 Temporary Injection Exemption was granted in a letter from the WDNR dated June 27, 2018, allowing the injection of RemOx® (Potassium permanganate) into the subsurface. An amended exemption was later granted in a letter dated July 9, 2018, allowing the injection of PersulfOx® (Sodium persulfate) in addition to RemOx®.

The pilot-scale testing was performed in July 2018. This *NR 140 Exemption Post-Injection Report* (Post-Injection Report) is submitted in compliance with monitoring condition 12 that was included in the June 27th and July 9th letters from WDNR granting the NR 140 Temporary Injection Exemption. In addition to this Post-Injection Report, Discharge Monitoring Reports (DMRs) have been submitted to the WDNR in August and September 2018 to document total daily injection volumes in compliance with the requirements of the WPDES permit. DMRs will continue to be submitted to WDNR, even if no injection activities are conducted during the prior month, until such time as Remedial Actions are completed and termination of the WPDES permit is approved.

2.0 PILOT-SCALE INJECTION

2.1 INJECTION POINT LOCATIONS

The pilot-scale testing was performed on July 19 and July 20, 2018. In total, 13 injection points were installed (IP-1 to IP-13), seven (7) points outside the building and six (6) points within the building. On July 19, 2018, injection points IP-1 to IP-3 were installed outside the western (rear) wall of the 2414B tenant space for the purpose of addressing previously observed Polynuclear Aromatic Hydrocarbons (PAHs) soil and groundwater contamination. See Figure C.6.a for the locations of the injection points.

Injection points IP-4 to IP-7, located outside the rear of the 2410-2412 tenant spaces, were also installed on July 19th. These four (4) injection points were primarily intended to reduce the Tetrachloroethene (Perc) groundwater contamination in monitoring well MW-5, which was observed at concentrations exceeding the Enforcement Standard. The six (6) indoor injection points (IP-8 to IP-13) were installed within the front portion of the 2410-2412 tenant spaces for the purpose of decreasing the Perc contaminant mass in the soil. (The 2410 tenant space was the location of historical drycleaner operations.) Figure C.6.b provides the locations of the Perc injection points in relation to the soil contaminant plume.

All injection activities were conducted through the direct-push drive rods; no injection wells were installed. Following the completion of injection activities, all injection locations were abandoned by filling the borehole with bentonite and patching the surface with asphalt or concrete.

2.2 CHEMICAL INJECTION INFORMATION

Two (2) different, though similarly acting, chemical oxidants were used during the pilot test; RemOx® (Potassium permanganate) and PersulfOx® (Sodium persulfate). Only RemOx® was injected into IP-1 to IP-7 (July 19th). Both chemicals were injected on July 20th, RemOx® into IP-8 to IP-10 (2410 tenant space) and PersulfOx® into IP-11 to IP-13 (2412 tenant space).

During the injection activities, all monitoring conditions outlined in the NR 140 Temporary Injection Exemption were recorded. Tables 2.2A and 2.2B below summarize the field monitoring parameters.

Table 2.2A. Summary of Injection Activity Field Monitoring Parameters

Injection Point (Date Installed)	Injection Interval (See NOTE)	Location	Chemical Injected	Batch Mixture Ratio*	Injection Period (Start/Stop)	Volume Injected (gal)	Injection Pressure (psi)
IP-1 (7/19/18)	3-ft to 9-ft	Rear of 2414B, south point	RemOx®	55-lb chemical/55-gal water	09:23-10:12	55	20
IP-2 (7/19/18)	3-ft to 9-ft	Rear of 2414B, middle point			10:39-11:00	55	20
IP-3 (7/19/18)	3-ft to 9-ft	Rear of 2414B, north point			11:07-11:45	55	20
IP-4 (7/19/18)	3-ft to 12-ft	Rear of 2410-2412, south point	RemOx®	110-lb chemical/125-gal water	12:03-13:05	65	20
IP-5 (7/19/18)	3-ft to 12-ft	Rear of 2410-2412, west point			13:08-13:20 & 13:30-13:40	65	20
IP-6 (7/19/18)	3-ft to 12-ft	Rear of 2410-2412, north point			15:12-15:35	65	20
IP-7 (7/19/18)	3-ft to 12-ft	Rear of 2410-2412, east point			15:38-16:05	65	20
IP-8 (7/20/18)	3-ft to 9-ft	Inside 2410, east point	RemOx®	110-lb chemical/150-gal water	09:30-10:156	75	25
IP-9 (7/20/18)	3-ft to 9-ft	Inside 2410, north point			10:20-10:50	75	30
IP-10 (7/20/18)	3-ft to 9-ft	Inside 2410, west point			08:58-09:26	75	25
IP-11 (7/20/18)	3-ft to 9-ft	Inside 2412, east point	PersulfOx®	55-lb chemical/75-gal water	12:00-12:35	75	30
IP-12 (7/20/18)	3-ft to 9-ft	Inside 2412, south point			13:20-14:00	75	30
IP-13 (7/20/18)	3-ft to 9-ft	Inside 2412, west point			12:45-13:20	75	45

NOTE: Chemical injection in the upper 3-ft was discontinued due to rapid back up or “daylighting” of the injectate through the borehole.
 *: Vita-D-Chlor was added to the tap water to meet monitoring requirement 2 of the NR 140 Temporary Injection Exemption approval.

Table 2.2B. Summary of VOC/LEL Readings During Injection Activities

Injection Point (Date Installed)	Injection Period (Start/Stop)	Pre-Injection VOC/LEL readings at IP (ppm/%)	Ambient Air VOC readings at IP (ppm)	Injection Area Monitoring Point	Monitoring Point VOC/LEL readings (ppm/%)
IP-1 (7/19/18)	09:23-10:12	5/0	15: 0 30: 0 45: 0 60: 0 Post: 0	MW-4	15: 43/0 30: 25/0 45: 1/0 60: 1/0 Post: 0/0
IP-2 (7/19/18)	10:39-11:00	10/0	15: 1 30: 0 45: 0 60: 0	MW-4	15: 36/0.0 30: NM 45: NM 60: NM
IP-3 (7/19/18)	11:07-11:45	12/0	15: 0 30: 0 45: 0 60: 0	MW-4	15: NM 30: 25/0 45: 1/0 60: 1/0
IP-4 (7/19/18)	12:03-13:05	0/0	15: 0 30: 0 45: 0 60: 0	MW-5	15: 0/0 30: 0/0 45: 0/0 60: 0/0
IP-5 (7/19/18)	13:08-13:20 & 13:30- 13:40	0/0	15: 0 30: 0 45: 0 60: 0	MW-5	15: 1/0 30: 1/0 45: 1/0 60: 1/0
IP-6 (7/19/18)	15:12-15:35	0/0	15: 0 30: 0 45: 0 60: 0	MW-5	15: 1/0 30: 1/0 45: 1/0 60: 1/0
IP-7 (7/19/18)	15:38-16:05	0/0	15: 0 30: 0 45: 0 60: 0	MW-5	15: 0/0 30: 0/0 45: 0/0 60: 0/0
IP-8 (7/20/18)	09:30-10:156	0/0	15: 0 30: 0 45: 0 60: 0	IP-8	15: 0 30: 0 45: 0 60: 0

Injection Point (Date Installed)	Injection Period (Start/Stop)	Pre-Injection VOC/LEL readings at IP (ppm/%)	Ambient Air VOC readings at IP (ppm)	Injection Area Monitoring Point	Monitoring Point VOC/LEL readings (ppm/%)
IP-9 (7/20/18)	10:20-10:50	0/0	15:0 30:0 45:0 60:0	IP-9	15:0 30:0 45:0 60:0
IP-10 (7/20/18)	08:58-09:26	0/0	15:0 30:0 45:0 60:0	IP-10	15:0 30:0 45:0 60:0
IP-11 (7/20/18)	12:00-12:35	0/0	15:0 30:0 45:0 60:0	IP-11	15:0 30:0 45:0 60:0
IP-12 (7/20/18)	13:20-14:00	0/0	15:0 30:0 45:0 60:0	IP-12	15:0 30:0 45:0 60:0
IP-13 (7/20/18)	12:45-13:20	0/0	15:0 30:0 45:0 60:0	IP-13	15:0 30:0 45:0 60:0

NM – No measurement collected; monitoring well filled with injectate (i.e., no vapor space from which to collect readings)

2.3 CONFIRMATION SAMPLING

2.3.1 Soil Sampling

Following the completion of injection activities, confirmation soil samples were collected within each of the three (3) treatment areas to assess the amount contaminant reduction. Three (3) soil borings were installed within the injection area behind the 2414B tenant space, four (4) within the injection area outside the 2410-2412 tenant spaces, and six (6) inside the 2410-2412 tenant spaces. Most of the confirmatory boring locations were selected to directly compare pre-remediation contaminant concentrations with post injection concentrations. The confirmation soil sampling results will be used to design the full-scale Remedial Action system. These results will be provided to the WDNR Remediation and Redevelopment (RR) Program in the Design Report Addendum/Remedial Action Plan (RAP) that will be submitted along with the full-scale remedial design. The RAP will include an updated NR 140 temporary injection exemption request to cover the full-scale chemical injection.

2.3.2 Groundwater Sampling

Post-injection groundwater samples were collected from monitoring wells MW-4 and MW-5 on July 30, 2018. Monitoring well MW-4 is located in the PAH treatment area behind the 2414B tenant space and Monitoring well MW-5 is located behind the 2410-2412 tenant spaces. (No monitoring well is available for sampling within the 2410-2412 tenant space.) Results of the groundwater sampling were submitted to the WDNR RR Program in the *Quarterly Groundwater Sampling Report* dated August 17, 2018. A copy of the summary tables from the quarterly report are submitted as Appendix A. In general, the post-injection groundwater concentrations in MW-4 and MW-5 declined from pre-injection concentrations observed during the second quarter 2018 groundwater sampling event.

3.0 SUMMARY

Pilot-scale chemical injections were performed between July 19 and July 20, 2018, after receiving a June 27, 2018, dated NR 140 Temporary Injection Exemption letter from WDNR. The pilot-scale injection activities were performed within three (3) treatment areas at the Sunrise Shopping Center Site using the chemical injectates RemOx[®] (Potassium permanganate) and PersulfOx[®] (Sodium persulfate). A total of 13 injection points were installed to assess the effectiveness of chemical oxidation on chlorinated ethenes (e.g., Perc) and PAHs in the subsurface. The results of the pilot-scale testing will be used to develop a full-scale Remedial Action design that will be proposed to WDNR RR Program in a Remedial Action Plan report prior to implementation. An updated NR 140 Temporary Injection Exemption will be obtained for the full-scale system.

FIGURES



FIGURE B.1.b.1
 DETAILED SITE MAP WITH AERIAL VIEW
 OF SITE AND SURROUNDING PROPERTY
 (2015 AERIAL TAKEN FROM GOOGLE EARTH)

SUNRISE SHOPPING CENTER
 2410-2424 10TH AVENUE
 1009 MARQUETTE AVENUE
 SOUTH MILWAUKEE, WISCONSIN

ENVIRONMENTAL

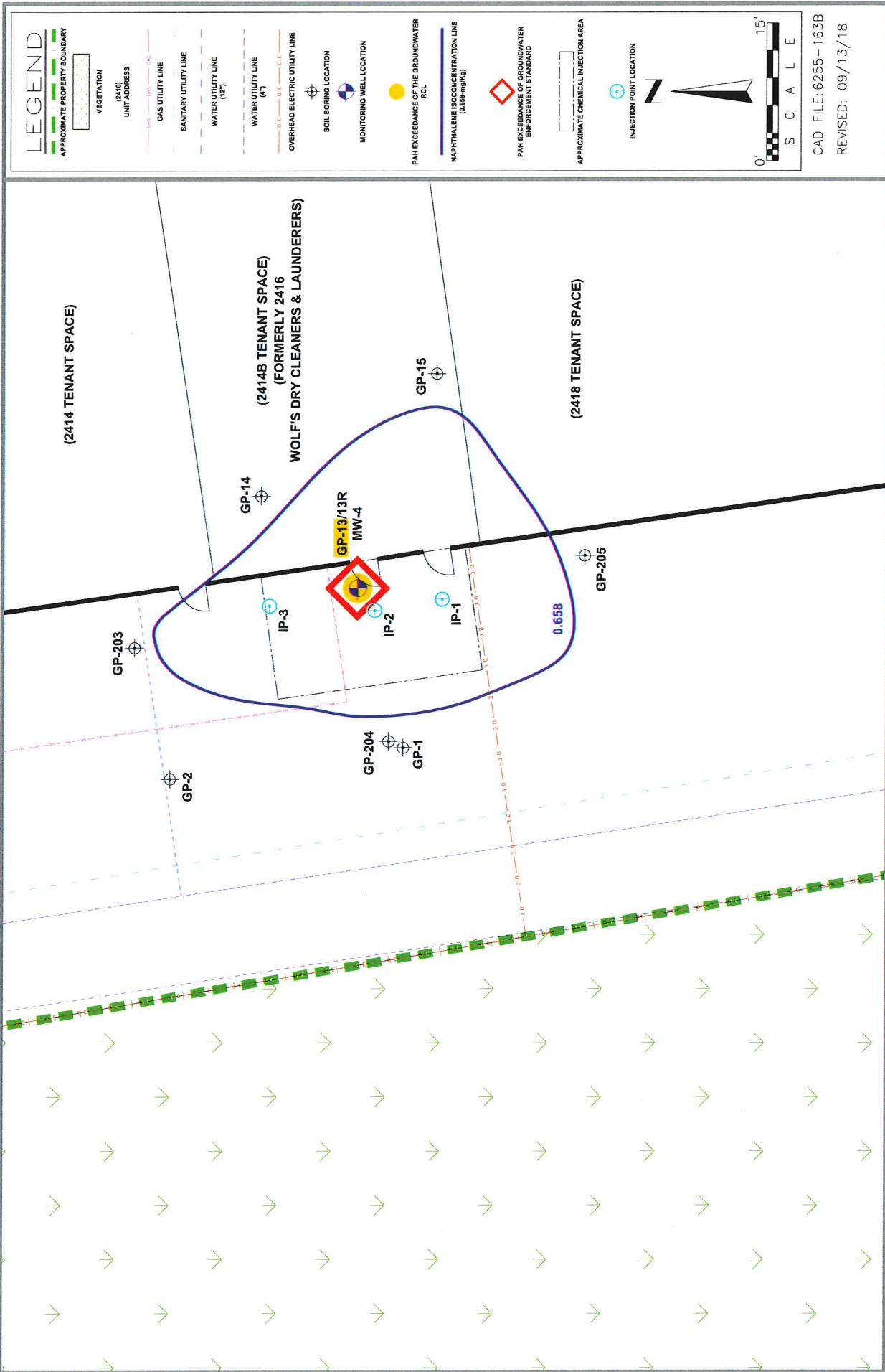


FIGURE C.6.a
PILOT TEST CHEMICAL INJECTION
(FORMER HEATING OIL UST)

SUNRISE SHOPPING CENTER
 2410-2424 10TH AVENUE
 1009 MARQUETTE AVENUE
 SOUTH MILWAUKEE, WISCONSIN

ENVIRONMENTAL

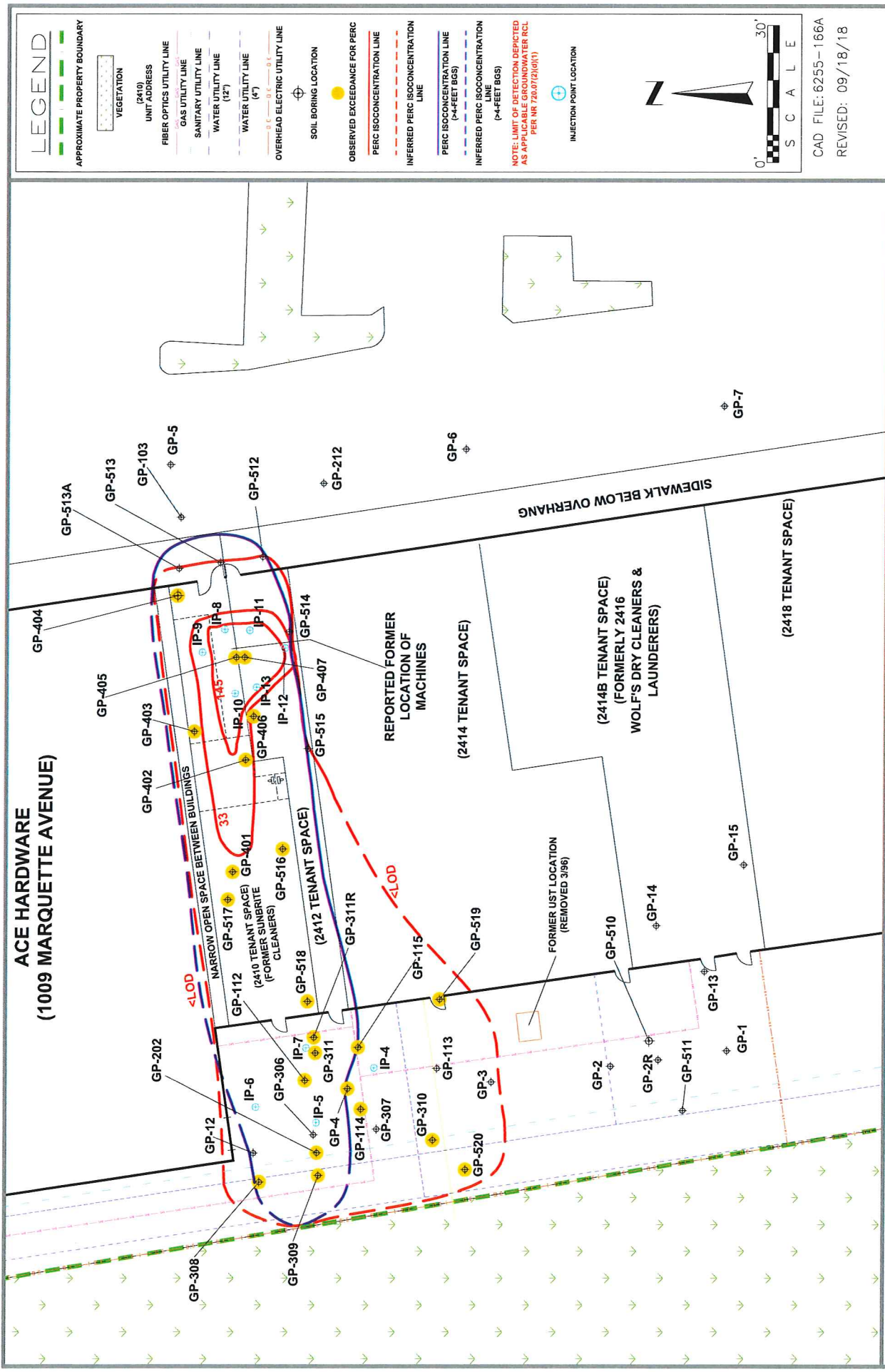


FIGURE C.6.b
PILOT TEST CHEMICAL INJECTION
(FORMER DRY CLEANER)

SUNRISE SHOPPING CENTER
 2410-2424 10TH AVENUE
 1009 MARQUETTE AVENUE
 SOUTH MILWAUKEE, WISCONSIN

ENVIRONMENTAL

APPENDIX A
THIRD QUARTER 2018 GROUNDWATER SUMMARY TABLE

**Table A.1.A. Groundwater Analytical Table for Volatile Organic Compounds (mg/L)
(Quarterly Groundwater Sampling Wells)**

Volatile Organic Compound	Sample Location (Sample Date)										PAL ¹	ES ²	
	TW-2 (11/12/14)	MW-5 (01/27/15)	MW-5 (02/23/16)	MW-5 (05/30/17)	MW-5 (01/05/18)	MW-5 (04/07/18)	MW-5 (07/30/18)						
Benzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	0.005
Bromobenzene	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00024	NL	NL
Bromochloromethane	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00036	NL	NL
Bromodichloromethane	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.00036*	0.00006	0.0006
Bromoform	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0005*	<0.0004*	0.00044	0.0044
Bromomethane	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.0024*	<0.00097	0.001	0.01
n-Butylbenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00071	NL	NL
sec-Butylbenzene	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.00085	NL	NL
tert-Butylbenzene	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.0003	NL	NL
Carbon tetrachloride	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00017	0.0005	0.005
Chlorobenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00071	NL	NL
Chloroethane	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.00037	<0.0013	0.08	0.4
Chloroform	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0025*	<0.0013*	0.0006	0.006
Chloromethane	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0022	0.003	0.03
2-Chlorotoluene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00093	NL	NL
4-Chlorotoluene	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00021	<0.00076	NL	NL
Dibromochloromethane	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0026	0.006	0.006
1,2-Dibromo-3-chloropropane	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0022*	<0.0018*	0.00002	0.0002
1,2-Dibromoethane (EDB)	<0.00016*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00018*	<0.00083*	0.000005	0.00005
Dibromomethane	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00094	NL	NL
1,2-Dichlorobenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00071	0.06	0.6
1,3-Dichlorobenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00063	0.12	0.6
1,4-Dichlorobenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00094	0.015	0.075
Dichlorodifluoromethane	<0.0002	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.0005	0.2	1
1,1-Dichloroethane	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00024	<0.00027	0.085	0.85
1,2-Dichloroethane	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00028	0.0005	0.005
1,1-Dichloroethene	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00041	<0.00024	0.0007	0.007
cis-1,2-Dichloroethene	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00027	0.007	0.07
trans-1,2-Dichloroethene	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.0011	0.02	0.1
1,2-Dichloropropane	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00028	0.0005	0.005
1,3-Dichloropropane	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00083	NL	NL
2,2-Dichloropropane	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.00048	<0.0023	NL	NL
1,1-Dichloropropene	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00054	NL	NL
1,3-Dichloropropene (c & t)	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.00073*	<0.008*	0.00004	0.0004
Diisopropyl ether	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0019	NL	NL
Ethylbenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00022	0.14	0.7
Hexachloro-1,3-butadiene	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0012	NL	NL

**Table A.1.A (Continued). Groundwater Analytical Table
for Volatile Organic Compounds (mg/L)
(Quarterly Groundwater Sampling Wells)**

Volatile Organic Compound	Sample Location (Sample Date)								PAL ¹	ES ²
	TW-2 (11/12/14)	MW-5 (01/27/15)	MW-5 (02/23/16)	MW-5 (05/30/17)	MW-5 (01/05/18)	MW-5 (04/07/18)	MW-5 (07/30/18)			
Isopropyl benzene	<0.00014	<0.00014	<0.00014	<0.00014	<0.00014	<0.00014	<0.00039	NL	NL	
p-Isopropyltoluene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0008	NL	NL	
Methylene chloride	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00058*	0.0005	0.005	
Methyl tertiary-butyl ether	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.0012	0.012	0.06	
Naphthalene	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0012	0.01	0.1	
n-Propylbenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00081	NL	NL	
Styrene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00047	0.01	0.1	
1,1,1,2-Tetrachloroethane	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00027	0.007	0.07	
1,1,2,2-Tetrachloroethane	<0.00025*	<0.00025*	<0.00025*	<0.00025*	<0.00025*	<0.00025*	<0.00028*	0.00002	0.0002	
Tetrachloroethene	0.0026	0.0026	0.0083	0.0124	0.0181	0.0203	0.0086	0.0005	0.005	
Toluene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00017	0.16	0.8	
1,2,3-Trichlorobenzene	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.00063	NL	NL	
1,2,4-Trichlorobenzene	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.00095	0.014	0.07	
1,1,1-Trichloroethane	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00057	0.00088	0.04	0.2	
1,1,2-Trichloroethane	<0.0016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00055*	0.0005	0.005	
Trichloroethene	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.00026	0.0005	0.005	
Trichlorofluoromethane	<0.0017	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00021	0.7	3.5	
1,2,3-Trichloropropane	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00059	0.012	0.06	
1,2,4-Trimethylbenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00084	0.096	0.48	
1,3,5-Trimethylbenzene	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00087	0.4	2	
Vinyl chloride	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00018	<0.00017	0.4	2	
Xylenes (total)	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.00073	3.96	260	

¹ – Preventive Action Limits (PALs) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1
² – Enforcement Standards (ES) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1

Bold – Concentration exceeds the PAL

Underlined – Concentration exceeds the PAL and the ES

* – Limit of detection reported greater than most stringent applicable standard; “non-detect” concentration not taken as exceedance per NR140.14(3)(a)
(J) – Concentration reported by the laboratory above the Limit of Detection, but below the Limit of Quantification
NL – Not Listed in NR 140

VOCs via USEPA Method SW8260

NOTE – MW-5 generally duplicated TW-2

**Table A.1.B. Groundwater Analytical Table for Polynuclear Aromatics (mg/L)
(Quarterly Groundwater Sampling Wells)**

Polynuclear Aromatic	Sample Location (Sample Date)								PAL ¹	ES ²
	TW-5 (11/13/14)	MW-3 (01/27/15)	MW-3 (05/30/17)	MW-3 (01/05/18)	MW-3 (04/07/18)	MW-3 (07/30/18)				
Acenaphthene	0.00076	0.0000043 (J)	0.000026 (J)	0.0000077 (J)	0.000029	0.000014 (J)		NL	NL	
Acenaphthylene	0.00013	0.0000036 (J)	0.000016 (J)	<0.0000045	0.000053	0.000023		NL	NL	
Anthracene	0.00056	<0.0000023	0.00013	0.0000031 (J)	0.00015	0.000073		0.6	3	
Benzo(a)anthracene	0.00069	<0.0000031	0.00073	0.0000069 (J)	0.001	0.00043		NL	NL	
Benzo(a)pyrene	0.0006	0.000011 (J)	0.001	<0.0000096	0.0019	0.00068		0.00002	0.0002	
Benzo(b)fluoranthene	0.00077	0.00002 (J)	0.002	0.000037	0.0039	0.0013		0.00002	0.0002	
Benzo(g,h,i)perylene	0.0004	0.000016 (J)	0.0011	0.00018 (J)	0.0025	0.00082		NL	NL	
Benzo(k)fluoranthene	0.00029	0.00001 (J)	0.00068	0.000014 (J)	0.0014	0.00041		NL	NL	
Chrysene	0.00084	0.000028 (J)	0.0015	0.000047 (J)	0.003	0.00095		0.00002	0.0002	
Dibenzo(a,h)anthracene	0.000091	<0.0000032	0.00022	<0.0000091	0.00034	0.00015		NL	NL	
Fluoranthene	0.0024	0.000041 (J)	0.0031	0.00021	0.0052	0.0019		0.08	0.4	
Fluorene	0.0011	0.0000035 (J)	0.000052	0.000022 (J)	0.000048	0.00004		0.08	0.4	
Indeno(1,2,3-cd)pyrene	0.0003	0.0000081 (J)	0.00086	<0.000016	0.0021	0.00089		NL	NL	
1-Methylnaphthalene	0.002	0.0000091 (J)	0.00018	0.00016	0.000033	0.000033		NL	NL	
2-Methylnaphthalene	0.00017	0.0000084 (J)	0.00013	0.00016	0.000024	0.000031		NL	NL	
Naphthalene	0.00016	<0.0000056	0.00012	0.00046	0.000051	0.000053 (J)		0.017	0.1	
Phenanthrene	0.0021	0.0000043 (J)	0.00071	0.000085	0.0013	0.00047		NL	NL	
Pyrene	0.0025	0.0000059	0.002	0.00011	0.0037	0.0012		0.05	0.25	

¹ – Preventive Action Limits (PALs) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1

² – Enforcement Standards (ES) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1

Bold – Concentration exceeds the PAL

Underlined – Concentration exceeds the PAL and the ES

(J) – Concentration reported by the laboratory above the Limit of Detection, but below the Limit of Quantification

NL – Not Listed in Wisconsin Administrative Code

PNAs via USEPA Method SW8270SIM

NOTE – MW-3 installed to duplicate TW-5

**Table A.1.B (Continued). Groundwater Analytical Table for Polynuclear Aromatics (mg/L)
(Quarterly Groundwater Sampling Wells)**

Polynuclear Aromatic	Sample Location (Sample Date)								PAL ¹	ES ²
	TW-6 (11/13/14)	MW-4 (01/27/15)	MW-4 (02/23/16)	MW-4 (05/30/17)	MW-4 (01/05/18)	MW-4 (04/07/18)	MW-4 (07/30/18)			
Acenaphthene	0.00049	0.0000039 (J)	0.00056	0.0386	0.0246	0.0031	0.0021	NL	NL	
Acenaphthylene	0.00012	0.000084	0.000073	0.0166	0.0083	0.00073	0.00064	NL	NL	
Anthracene	0.00006	0.00006	0.00011	0.0018 (J)	0.0019	0.00051	0.00024	0.6	3	
Benzo(a)anthracene	0.000013 (J)	<0.0000032	0.000082 (J)	0.00044 (J)	<0.00014	0.00012 (J)	<0.000035	NL	NL	
Benzo(a)pyrene	0.000053 (J)	0.000017 (J)	0.000006 (J)	<0.00049	<0.0002	<0.000095	<0.000048	0.00002	0.0002	
Benzo(b)fluoranthene	0.000093 (J)	0.000043 (J)	0.000014 (J)	<0.00027	0.00022 (J)	0.000096 (J)	<0.000026	0.00002	0.0002	
Benzo(g,h,i)perylene	0.000071 (J)	0.000025 (J)	0.000081 (J)	<0.00031	<0.00013	<0.000061	<0.000031	NL	NL	
Benzo(k)fluoranthene	<0.000005	0.000021 (J)	<0.0000051	<0.00035	<0.00014	<0.000068	<0.000035	NL	NL	
Chrysene	0.000021 (J)	0.000042 (J)	0.000017 (J)	0.0018 (J)	0.001 (J)	0.000031 (J)	<0.00006	0.00002	0.0002	
Dibenzo(a,h)anthracene	<0.0000035	<0.0000033	<0.0000051	<0.00046	<0.00019	<0.000009	<0.000046	NL	NL	
Fluoranthene	0.00004 (J)	0.000049	0.00003 (J)	0.0037	0.0046	0.0001	0.000061 (J)	0.08	0.4	
Fluorene	0.00061	0.000031 (J)	0.00051	0.0759	0.0504	0.0053	0.0035	0.08	0.4	
Indeno(1,2,3-cd)pyrene	0.000044 (J)	0.000017 (J)	0.000056 (J)	<0.00082	<0.00033	<0.000016	<0.000081	NL	NL	
1-Methylnaphthalene	0.0087	0.000076	0.0041	0.357	0.183	0.0109	0.0395	NL	NL	
2-Methylnaphthalene	0.0065	0.000066	0.000037 (J)	0.0747	0.0126	0.00026	0.00051	NL	NL	
Naphthalene	0.0022	0.00027	0.00017	0.0243	0.0151	0.0022	0.0015	0.01	0.1	
Phenanthrene	0.00062	0.000033 (J)	0.00029	0.165	0.102	0.0033	0.0031	NL	NL	
Pyrene	0.00006	0.0001	0.000081	0.0165	0.0102	0.00032	0.00017 (J)	0.05	0.25	

¹ – Preventive Action Limits (PALs) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1
² – Enforcement Standards (ES) taken from Wisconsin Administrative Code, Chapter NR 140, Table 1

Bold – Concentration exceeds the PAL
Underlined – Concentration exceeds the PAL and the ES

(J) – Concentration reported by the laboratory above the Limit of Detection, but below the Limit of Quantification

NL – Not Listed in Wisconsin Administrative Code

PNAs via USEPA Method SW8270SIM

NOTE – MW-4 installed to duplicate TW-6