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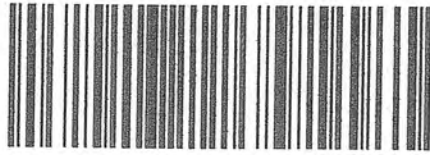
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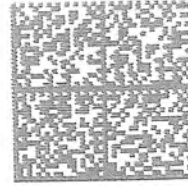
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Meer #21985

December 13, 2023

Ms. Michelle L. Nelson
City Clerk/Treasurer
City of Kenosha
625 52nd Street, Room 105
Kenosha, WI 53140

Mr. Ian C. Bagley, P.E.
Director of Engineering
Kenosha Water Utility
ibagley@kenosha.org

SUBJECT: Vapor Sampling Results - Contaminant Detected **Above** DNR Screening Level

Dear Ms. Nelson and Mr. Bagley:

Included are the findings of a recent investigation within select public rights-of-way (ROWs) by The Sigma Group, Inc. on behalf of the Wisconsin Department of Natural Resources (DNR).

This investigation was conducted because of the potential for contaminant vapors from the nearby former Werner's Cleaners/6415 28th Avenue property to migrate through soils and/or within sanitary sewer lines connected to the former building located at the former Werner's Cleaners/6451 28th Avenue property. The contaminants of concern at the former Werner's Cleaners/6415 28th Avenue property are tetrachloroethene, commonly referred to as PCE, and trichloroethene, commonly referred to as TCE.

Test Results

On November 9 and 10, 2023, The Sigma Group, Inc. installed sampling devices within select sanitary sewer manholes and installed sampling devices within the shallow subsurface at select locations within the 64th Street, 28th Avenue, and 27th Avenue ROWs. The sampler placement was completed in accordance with the multiple Street Opening/Occupancy Permits (permits 23-1220 through 23-1244) obtained by The Sigma Group, Inc. in October 2023. A map illustrating the locations of the sampled sanitary sewer manholes and shallow soil gas samples is included as *Figure 1*.

The samplers were collected on November 20, 2023 and submitted to the Beacon Environmental laboratory and Eurofins laboratory, where they underwent laboratory analysis for select volatile organic compounds (VOCs) including PCE and TCE.

The analysis detected PCE within sanitary manhole samples SSG-1 and SSG-5 at reported concentrations of 4,620 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and between 22,600 to 33,000 $\mu\text{g}/\text{m}^3$, respectively. The DNR screening level for sanitary sewer gas samples for a residential setting is 1,400 $\mu\text{g}/\text{m}^3$. In addition, TCE was reported at concentrations of 324 $\mu\text{g}/\text{m}^3$, 155 $\mu\text{g}/\text{m}^3$, and between 350 to 1,240 $\mu\text{g}/\text{m}^3$ respectively, within sanitary manhole samples SSG-1, SSG-2 and SSG-5. The DNR screening level for sanitary sewer gas samples for a residential setting is 70 $\mu\text{g}/\text{m}^3$.

The analysis also detected PCE within shallow soil gas at a concentration of 1,420 $\mu\text{g}/\text{m}^3$ within the sample collected at SG-18. The DNR screening level for shallow soil gas in a residential setting is 1,400 $\mu\text{g}/\text{m}^3$. TCE was also reported at a concentration of 157 $\mu\text{g}/\text{m}^3$ within the shallow soil gas sample collected at SG-39. The DNR screening level for shallow soil gas in a residential setting is 70 $\mu\text{g}/\text{m}^3$.

Attached are tables summarizing the results of the sanitary sewer gas and shallow soil gas samples collected within the 64th Street, 28th Avenue, and 27th Avenue ROWs. Please see the attached fact sheet, *Understanding Chemical Vapor Intrusion Test Results* or the DNR website: [Vapor Intrusion Prevention & Partnership Toolkit | A tool for local governments, neighborhood associations and property owners | Wisconsin DNR](#) for more information.

Next Steps

The DNR and Sigma are evaluating the results of the recently completed sampling efforts to determine appropriate next steps.

Please feel free to contact Joseph Martinez of the DNR at 414-218-6042 or joseph.martinez@wisconsin.gov or myself at the number below if you have any questions about these results.

Sincerely,



Stephen Meer, P.E.
Senior Engineer
The Sigma Group, Inc.
414-643-4124

cc: Mr. Joseph Martinez, DNR – Joseph.Martinez@wisconsin.gov
Ms. Jennifer Borski, DNR - Jennifer.Borski@wisconsin.gov

Enc: Table 3 and Table 4 (Sample Results)
Figure 1 – Sample Location Map
Fact Sheet: Understanding Chemical Vapor Intrusion Test Results (DNR Pub RR-977)

Table 3 and Table 4
(Sample Results)

**Table 3
Sanitary Sewer Gas Analytical Results
Werners Cleaners VIZC - 6415 28th Avenue, Kenosha, Wisconsin
Sigma Project No. 21985**

Sample Type:		Sewer Gas Samples									Residential Sanitary Sewer Gas Screening Level ² (AF=0.03)	Commercial/Industrial Sanitary Sewer Gas Screening Level ³ (AF = 0.03)	
Sample Identification:		06R_SSG_01_20231120	06R_SSG_02_20231120	06R_SSG_03_20231120	06R_SSG_03D_20231120	06R_SSG_04_20231120	06R_SSG_05_20231120	06R_SSG_05D_20231120	06R_SSG_06_20231120	06R_SSG_06D_20231120	06R_SSG_07_20231120		
Sample Date(s):		11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023 - 11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023	11/9/2023-11/20/2023		
Sampling/Analysis Method:		Beacon Passive Sampler/TO-17	Beacon Passive Sampler/TO-17	Beacon Passive Sampler/TO-17	WMS SE/TO-17	Beacon Passive Sampler/TO-17	Beacon Passive Sampler/TO-17	WMS SE/TO-17	Beacon Passive Sampler/TO-17	WMS SE/TO-17	Beacon Passive Sampler/TO-17		
Sample Duration:		15800	15771	15757	15753	15739	15596	15596	15582	15582	15548		
VOCs													
Benzene	µg/m ³	1.48 J	<1.21	1.21 J	<5.8	1.43 J	1.65 J	<5.8	17.3	<5.8	1.77 J	120	520
2-Butanone (MEK)	µg/m ³	NA	NA	NA	<4.2	NA	NA	<4.3	NA	<4.3	NA	173.333	733.333
Carbon Tetrachloride	µg/m ³	<0.743	<0.744	<0.745	<1.8	<0.746	<0.752	3.3	<0.753	<1.8	<0.755	160	680
Chlorobenzene	µg/m ³	<0.376	<0.376	<0.377	<0.88	<0.377	<0.381	<0.89	<0.381	<0.89	<0.382	1,733	7,333
Chloromethane	µg/m ³	NA	NA	NA	<10	NA	NA	<11	NA	<11	NA	3,133	13,000
Chloroform	µg/m ³	44.2	8.26	50.6	19	92.7	13	16	1.99	6.4	4.56	41	180
Cyclohexane	µg/m ³	NA	NA	NA	<1.6	NA	NA	<1.6	NA	<1.6	NA	210,000	866,666
1,2-Dibromoethane (EDB)	µg/m ³	<0.819	<0.820	<0.821	NA	<0.822	<0.830	NA	<0.830	NA	<0.832	1,567	6.7
1,2-Dichlorobenzene	µg/m ³	<0.426	<0.427	<0.427	<0.39	<0.427	<0.431	<0.39	<0.432	<0.39	<0.433	7,000	29,333
1,3-Dichlorobenzene	µg/m ³	<0.426	<0.427	<0.427	<0.43	<0.427	<0.431	<0.44	<0.432	<0.44	<0.433	NS	NS
1,4-Dichlorobenzene	µg/m ³	27.3	5.73	5.2	<0.43	17.6	1.97	2.4	<0.432	<0.43	<0.433	87	367
1,1-Dichloroethane	µg/m ³	<0.376	<0.376	<0.377	<2.0	<0.377	<0.381	<2	<0.381	<2	<0.382	590	2,600
1,2-Dichloroethane	µg/m ³	<0.570	<0.571	<0.572	<1.4	<0.572	<0.578	<1.4	<0.578	<1.4	<0.580	36	160
1,1-Dichloroethene	µg/m ³	1.76 J	<0.970	<0.970	<9.1	<0.972	14.6	<2	<0.981	<9.2	<0.983	7,000	29,000
cis-1,2-Dichloroethene	µg/m ³	402	107	90	<4	179	32	74	5.32	74	<0.612	1,400	5,800
trans-1,2-Dichloroethene	µg/m ³	109	19.5	18.2	<4	34.5	22.6	11	1.33 J	<4	<0.738	1,400	5,800
1,4-Dioxane	µg/m ³	<0.779	<0.780	4.88	NA	<0.782	<0.789	NA	201 D	NA	<0.792	187	833
Ethylbenzene	µg/m ³	1.01 J	<0.753	<0.753	<0.76	1.41 J	2.6	2.6	<0.762	2.6	<0.764	370	1,600
Heptane	µg/m ³	NA	NA	NA	1.7	NA	NA	<1.5	NA	<1.5	NA	14,000	60,000
Hexane	µg/m ³	NA	NA	NA	<8.5	NA	NA	<8.5	NA	<8.6	NA	24,333	103,333
Isopropylbenzene	µg/m ³	<0.770	<0.771	<0.772	NA	<0.773	<0.780	NA	<0.780	NA	<0.782	NS	NS
4-Methyl-2-pentanone (MIBK)	µg/m ³	NA	NA	NA	<2.5	NA	NA	<2.6	NA	<2.6	NA	103,333	433,333
Methylene Chloride	µg/m ³	9.43	3.83	5.08	NA	12.3	3.69	NA	<0.925	NA	10	21,000	88,000
2-Methylnaphthalene	µg/m ³	1.55 J	0.536 J	<0.421	NA	0.929 J	<0.426	NA	<0.426	NA	<0.427	NS	NS
Methyl-tert-butyl ether	µg/m ³	<1.28	<1.28	<1.28	<2	<1.28	<1.29	<2	<1.30	<2	<1.30	3,600	16,000
Naphthalene	µg/m ³	1.30 J	<0.400	<0.400	<0.72	0.64 J	0.481 J	<0.73	<0.405	<0.73	<0.406	28	120
Propylbenzene	µg/m ³	NA	NA	NA	<0.56	NA	NA	<0.56	NA	<0.56	NA	33,333	146,666
Styrene	µg/m ³	NA	NA	NA	0.7	NA	NA	<0.71	NA	<0.71	NA	33333	146,666
1,1,2,2-Tetrachloroethane	µg/m ³	0.986 J	<0.780	<0.781	<0.70	<0.782	<0.789	<0.71	<0.790	<0.71	<0.792	16	70
Tetrachloroethene (PCE)	µg/m ³	4,620 D	765	545	990	714	[22,600 D]	[33,000]	41.5	230	11.5	1,400	5,800
Toluene	µg/m ³	17.1	3.88 J	4.9	8.4	12	5.3	7.8	<1.62	9.9	3.18 J	170,000	730,000
1,2,3-Trichlorobenzene	µg/m ³	<0.819	<0.820	<0.821	NA	<0.822	<0.830	NA	<0.830	NA	<0.832	NS	NS
1,2,4-Trichlorobenzene	µg/m ³	<0.819	<0.820	<0.821	<0.820	<0.822	<0.830	NA	<0.830	NA	<0.832	70	293
1,1,1-Trichloroethane	µg/m ³	<0.304	<0.305	<0.305	<2.1	<0.305	0.635	3.1	<0.308	<2.1	0.465 J	170,000	730,000
1,1,2-Trichloroethane	µg/m ³	<0.968	<0.970	<0.970	<1.2	<0.972	<0.980	<1.2	<0.981	<1.2	<0.983	60	257
Trichloroethene (TCE)	µg/m ³	[324]	155	52.8	45	83.3	[1,240]	[350]	5.79	50	1.25 J	70	290
1,2,3-Trichloropropane	µg/m ³	<0.426	<0.427	<0.427	NA	<0.427	<0.431	NA	<0.432	NA	<0.433	10	43
1,1,2-Trichlorotrifluoroethane	µg/m ³	0.421 J	<0.359	<0.360	NA	0.362 J	<0.364	NA	<0.364	NA	0.402 J	173,333	733,333
1,2,4-Trimethylbenzene	µg/m ³	7.53	0.819 J	<0.772	1.5	1.32 J	10.2	10	<0.780	6.8	<0.782	2,100	8,800
1,3,5-Trimethylbenzene	µg/m ³	1.98	<0.771	<0.772	<0.5	<0.773	3.34	3.7	<0.780	2.5	<0.782	2,100	8,800
Vinyl Chloride	µg/m ³	12.2	5.78	5.26	<10	7.8	1.41	<11	<0.400	<11	<0.401	56	930
Xylenes, total	µg/m ³	4.35J	<1.454	<1.454	<1.47	0.931J	7.62	15.1	<1.472	13.6	0.992J	3,500	15,000

Notes:

- Analytical units: µg/m³ = micrograms per cubic meter
- Residential Sanitary Sewer Gas Screening Level = Risk-based concentrations based on VALs for residential air which has been adjusted with an Attenuation Factor of 0.03 for the sanitary sewer to ambient air pathway in a residential setting. VALs for residential indoor air based on WDNR publication RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for residential air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and residential air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).
- Commercial/Industrial Sanitary Sewer Gas Screening Level = Risk-based concentrations based on VALs for commercial/industrial air which has been adjusted with an Attenuation Factor of 0.03 for the sanitary sewer gas to ambient air pathway in a commercial/industrial setting. VALs for commercial/industrial setting indoor air based on WDNR publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and commercial/industrial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).
- NA = not analyzed
- Exceedances: **BOLD** = concentration greater than residential Sanitary Sewer Gas Screening Level
[] = concentration greater than commercial/industrial Sanitary Sewer Gas Screening Level
- J = Value reported below limit of quantitation (LOQ).
- D = Dilution required to report within calibration limits.

Data entered / updated by:
Data checked by:

RJA
SRM

Date: 12/12/2023
Date: 12/12/2023

Table 4
Shallow Soil Gas Analytical Results
Werners Cleaners VIZC - 6415 28th Avenue, Kenosha, Wisconsin
Sigma Project No. 21985

Sample Type:	Subslab Vapor Samples										Residential Vapor Risk Screening Level ² (AF=0.03)	Small Commercial Vapor Risk Screening Level ³ (AF = 0.03)	Large Commercial / Industrial Vapor Risk Screening Level ⁴ (AF = 0.01)	
Sample Identification:	06R_SG_01_20 231120	06R_SG_02_20 231120	06R_SG_03_20 231120	06R_SG_04_20 231120	06R_SG_05_20 231120	06R_SG_06_20 231120	06R_SG_07_20 231120	06R_SG_08_20 231120	06R_SG_09_20 231120	06R_SG_10_20 231120				
Sample Date(s):	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023	11/9/23 - 11/20/2023				
Sampling/Analysis Method:	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C				
Sample Duration:	10d 22hr 5min	10d 22hr 4min	10d 22hr	10d 21hr 43min	10d 21hr 38min	10d 21hr 34min	10d 21hr 25min	10d 21hr 18min	10d 21hr 10min	10d 20hr 53min				
VOCs														
Benzene	µg/m ³	<3.00	<3.00	<3.00	<3.00	<3.00	<3.01	<3.01	<3.01	13.9	6.65	120	520	1,600
Carbon Tetrachloride	µg/m ³	<1.48	<1.48	<1.48	<1.48	<1.48	<1.48	<1.48	<1.48	<1.48	<1.49	160	680	2,000
Chlorobenzene	µg/m ³	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	1,733	7,333	22,000
Chloroform	µg/m ³	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.83	41	180	530
1,2-Dibromoethane (EDB)	µg/m ³	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.64	<1.64	1,567	6.7	20
1,2-Dichlorobenzene	µg/m ³	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	7,000	29,333	88,000
1,3-Dichlorobenzene	µg/m ³	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	NS	NS	NS
1,4-Dichlorobenzene	µg/m ³	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	87	367	1,100
1,1-Dichloroethane	µg/m ³	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	590	2,600	7,700
1,2-Dichloroethane	µg/m ³	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	36	160	470
1,1-Dichloroethene	µg/m ³	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.94	7,000	29,000	88,000
cis-1,2-Dichloroethene	µg/m ³	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20	<1.21	1,400	5,800	18,000
trans-1,2-Dichloroethene	µg/m ³	<1.45	<1.45	<1.45	<1.45	<1.45	<1.45	<1.45	<1.45	<1.45	<1.45	1,400	5,800	18,000
1,4-Dioxane	µg/m ³	<1.55	<1.55	<1.55	<1.55	<1.55	<1.55	<1.56	<1.56	<1.56	<1.56	187	833	2,500
Ethylbenzene	µg/m ³	<1.87	<1.87	<1.87	<1.87	<1.87	<1.87	<1.88	<1.88	<1.88	<1.88	370	1,600	4,900
Isopropylbenzene	µg/m ³	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	NS	NS	NS
Methylene Chloride	µg/m ³	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.82	<1.83	21,000	88,000	260,000
2-Methylnaphthalene	µg/m ³	<2.09	<2.09	<2.09	<2.09	<2.10	<2.10	<2.10	<2.10	<2.10	<2.10	NS	NS	NS
Methyl-tert-butyl ether	µg/m ³	<3.18	<3.18	<3.18	<3.18	<3.19	<3.19	<3.19	<3.19	<3.19	<3.19	3,600	16,000	47,000
Naphthalene	µg/m ³	<1.99	<1.99	<1.99	<1.99	<1.99	<1.99	<1.99	<1.99	<1.99	<2.00	28	120	360
1,1,2,2-Tetrachloroethane	µg/m ³	<1.55	<1.55	<1.55	<1.55	<1.55	<1.55	<1.56	<1.56	<1.56	<1.56	16	70	210
Tetrachloroethene (PCE)	µg/m ³	<1.55	<1.55	<1.55	<1.55	<1.55	<1.55	<1.56	<1.56	<1.56	<1.56	1,400	5,800	18,000
Toluene	µg/m ³	<3.97	<3.97	<3.98	<3.98	<3.98	<3.98	<3.98	<3.99	<3.99	<3.99	170,000	730,000	2,200,000
1,2,3-Trichlorobenzene	µg/m ³	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.64	<1.64	<1.64	NS	NS	NS
1,2,4-Trichlorobenzene	µg/m ³	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.63	<1.64	<1.64	<1.64	70	293	880
1,1,1-Trichloroethane	µg/m ³	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	170,000	730,000	2,200,000
1,1,2-Trichloroethane	µg/m ³	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.94	60	257	770
Trichloroethene (TCE)	µg/m ³	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.93	<1.94	70	290	880
1,2,3-Trichloropropane	µg/m ³	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	10	43	129
1,1,2-Trichlorotrifluoroethane	µg/m ³	<0.71	<0.71	<0.71	<0.72	<0.72	<0.72	<0.72	<0.72	<0.72	<0.72	173,333	733,333	2,200,000
1,2,4-Trimethylbenzene	µg/m ³	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	2,100	8,800	26,000
1,3,5-Trimethylbenzene	µg/m ³	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	<1.92	2,100	8,800	26,000
Vinyl Chloride	µg/m ³	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	56	930	2,800
Xylenes, total	µg/m ³	<3.62	<3.62	<3.62	<3.62	<3.62	<3.62	8.75	<3.62	<3.62	<3.62	3,500	15,000	44,000

Notes:

1. Analytical units: µg/m³ = micrograms per cubic meter

2. Residential Vapor Risk Screening Level = Risk-based concentrations based on VALs for residential air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a residential setting. VALs for residential indoor air based on WDNR publication RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for residential air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and residential air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

3. Small Commercial Vapor Risk Screening Level = Risk-based concentrations based on VALs for small commercial air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a small commercial setting. VALs for small commercial setting indoor air based on WDNR publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and small commercial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

4. Large Commercial / Industrial Vapor Risk Screening Level = Risk-based concentrations based on VALs for large commercial/industrial air which has been adjusted with an Attenuation Factor of 0.01 for the shallow soil gas to indoor air pathway in a large commercial/industrial setting. VALs for large commercial / industrial indoor air based on WDNR publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and large commercial / industrial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

5. NA = not analyzed

6. Laboratory flags:

7. Exceedances: **BOLD** = concentration greater than residential Vapor Risk Screening Level
[] = concentration greater than small commercial Vapor Risk Screening Level
{ } = concentration greater than large commercial / industrial Vapor Risk Screening Level

Data entered / updated by: CRD
Data checked by: SRM

Date: 12/7/2023
Date: 12/7/2023

Table 4
Shallow Soil Gas Analytical Results
Werners Cleaners VIZC - 6415 28th Avenue, Kenosha, Wisconsin
Sigma Project No. 21985

Sample Type:		Shallow Soil Gas Samples											Residential Vapor Risk Screening Level ² (AF=0.03)	Small Commercial Vapor Risk Screening Level ³ (AF = 0.03)	Large Commercial / Industrial Vapor Risk Screening Level ⁴ (AF = 0.01)
Sample Identification:		06R_SG_11_20_231120	06R_SG_12_20_231120	06R_SG_13_20_231120	06R_SG_14_20_231120	06R_SG_15_20_231120	06R_SG_16_20_231120	06R_SG_17_20_231120	06R_SG_17D_20231120	06R_SG_18_20_231120	06R_SG_19_20_231120	06R_SG_20_20_231120			
Sample Date(s):		11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023			
Sampling/Analysis Method:		Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	WMS-LU/TO-17	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C			
Sample Duration:		10d 1hr 32min	10d 1hr 30min	10d 1hr 27min	10d 1hr 10min	10d 1hr 20min	10d 56min	10d 50min	10d 50min	10d 42min	10d 32min	10d 23min			
VOCs															
Benzene	µg/m ³	3.31	<3.26	<3.26	<3.26	<3.26	<3.26	<3.26	<19	5.08	<3.27	<3.27	120	520	1,600
2-Butanone (MEK)	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<14	NA	NA	NA	173,333	733,333	2,200,000
Carbon Tetrachloride	µg/m ³	<1.60	<1.60	<1.61	<1.61	<1.61	<1.61	<1.61	<5.9	<1.61	<1.61	<1.61	160	680	2,000
Chlorobenzene	µg/m ³	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<2.9	<0.81	<0.82	<0.82	1,733	7,333	22,000
Chloromethane	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<35	NA	NA	NA	3,133	13,000	39,000
Chloroform	µg/m ³	<1.97	<1.97	<1.97	<1.97	<1.97	<1.98	<1.98	<5.3	<1.98	<1.98	<1.98	41	180	530
Cyclohexane	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<5.2	NA	NA	NA	210,000	866,666	2,600,000
1,2-Dibromoethane (EDB)	µg/m ³	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	NA	<1.78	<1.78	<1.78	1,567	6.7	20
1,2-Dichlorobenzene	µg/m ³	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<1.3	<0.92	<0.92	<0.92	7,000	29,333	88,000
1,3-Dichlorobenzene	µg/m ³	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<1.4	<0.92	<0.92	<0.92	NS	NS	NS
1,4-Dichlorobenzene	µg/m ³	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<1.4	<0.92	<0.92	<0.92	87	367	1,100
1,1-Dichloroethane	µg/m ³	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<6.6	<0.81	<0.82	<0.82	590	2,600	7,700
1,2-Dichloroethane	µg/m ³	<1.23	<1.23	<1.23	<1.23	<1.23	<1.24	<1.24	<4.6	<1.24	<1.24	<1.24	36	160	470
1,1-Dichloroethene	µg/m ³	<2.09	<2.09	<2.09	<2.09	<2.09	<2.10	<2.10	<30	<2.10	<2.10	<2.10	7,000	29,000	88,000
cis-1,2-Dichloroethene	µg/m ³	<1.30	<1.30	<1.30	<1.30	<1.30	<1.31	<1.31	<5.4	3.63	<1.31	<1.31	1,400	5,800	18,000
trans-1,2-Dichloroethene	µg/m ³	<1.57	<1.57	<1.57	<1.57	<1.57	<1.57	<1.57	<13	<1.57	<1.58	<1.58	1,400	5,800	18,000
1,4-Dioxane	µg/m ³	<1.68	<1.68	<1.68	<1.69	<1.68	<1.69	<1.69	NA	<1.69	<1.69	<1.69	187	833	2,500
Ethylbenzene	µg/m ³	<2.03	<2.03	<2.03	<2.03	<2.03	<2.03	<2.04	NA	<2.04	<2.04	<2.04	370	1,600	4,900
Heptane	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<4.9	NA	NA	NA	14,000	60,000	180,000
Hexane	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<28	NA	NA	NA	24,333	103,333	310,000
Isopropylbenzene	µg/m ³	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	NA	<2.09	<2.09	<2.09	NS	NS	NS
4-Methyl-2-pentanone (MIBK)	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<8.2	NA	NA	NA	103,333	433,333	1,300,000
Methylene Chloride	µg/m ³	<1.97	<1.97	<1.97	<1.97	<1.97	<1.98	<1.98	NA	<1.98	<1.98	<1.98	21,000	88,000	260,000
2-Methylnaphthalene	µg/m ³	<2.27	<2.27	<2.27	<2.27	<2.27	<2.28	<2.28	NA	<2.28	<2.28	<2.28	NS	NS	NS
Methyl-tert-butyl ether	µg/m ³	<3.45	<3.45	<3.45	<3.46	<3.45	<3.46	<3.46	NA	<3.46	<3.46	<3.47	3,600	16,000	47,000
Naphthalene	µg/m ³	<2.16	<2.16	<2.16	<2.16	<2.16	<2.16	<2.16	<2.3	<2.16	<2.17	<2.17	28	120	360
Propylbenzene	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<1.8	NA	NA	NA	33,333	146,666	440,000
Styrene	µg/m ³	NA	NA	NA	NA	NA	NA	NA	<2.3	NA	NA	NA	33,333	146,666	440,000
1,1,1,2-Tetrachloroethane	µg/m ³	<1.68	<1.68	<1.68	<1.69	<1.68	<1.69	<1.69	<2.3	<1.69	<1.69	<1.69	16	70	210
Tetrachloroethene (PCE)	µg/m ³	<1.68	3.66	2.81	<1.69	<1.68	<1.69	8.57	26	1,420	7.54	<1.69	1,400	5,800	18,000
Toluene	µg/m ³	<4.31	<4.31	<4.31	<4.32	<4.32	<4.32	<4.33	<3.5	<4.33	<4.33	<4.33	170,000	730,000	2,200,000
1,2,3-Trichlorobenzene	µg/m ³	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	NA	<1.78	<1.78	<1.78	NS	NS	NS
1,2,4-Trichlorobenzene	µg/m ³	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	<1.77	NA	<1.78	<1.78	<1.78	70	293	880
1,1,1-Trichloroethane	µg/m ³	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<6.9	<0.66	<0.66	<0.66	170,000	730,000	2,200,000
1,1,2-Trichloroethane	µg/m ³	<2.09	<2.09	<2.09	<2.09	<2.09	<2.10	<2.10	NA	<2.10	<2.10	<2.10	60	257	770
Trichloroethene (TCE)	µg/m ³	<2.09	<2.09	<2.09	<2.09	<2.09	<2.10	<2.10	NA	207	<2.10	<2.10	70	290	880
1,2,3-Trichloropropane	µg/m ³	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	<0.92	NA	<0.92	<0.92	<0.92	10	43	129
1,1,2-Trichlorotrifluoroethane	µg/m ³	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78	NA	<0.78	<0.78	<0.78	173,333	733,333	2,200,000
1,2,4-Trimethylbenzene	µg/m ³	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	<1.5	<2.09	<2.09	<2.09	2,100	8,800	26,000
1,3,5-Trimethylbenzene	µg/m ³	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	<2.08	<1.6	<2.09	<2.09	<2.09	2,100	8,800	26,000
Vinyl Chloride	µg/m ³	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<34	<0.85	<0.86	<0.86	56	930	2,800
Xylenes, total	µg/m ³	<3.92	<3.92	<3.92	<3.92	<3.92	<3.94	<3.94	<4.8	<3.94	<3.94	<3.94	3,500	15,000	44,000

Notes:

1. Analytical units: µg/m³ = micrograms per cubic meter

2. Residential Vapor Risk Screening Level = Risk-based concentrations based on VALs for residential air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a residential setting. VALs for residential indoor air based on WDNr publication RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for residential air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and residential air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNr publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

3. Small Commercial Vapor Risk Screening Level = Risk-based concentrations based on VALs for small commercial air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a small commercial setting. VALs for small commercial indoor air based on WDNr publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and small commercial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNr publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

4. Large Commercial / Industrial Vapor Risk Screening Level = Risk-based concentrations based on VALs for large commercial/industrial air which has been adjusted with an Attenuation Factor of 0.01 for the shallow soil gas to indoor air pathway in a large commercial/industrial setting. VALs for large commercial / industrial indoor air based on WDNr publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and large commercial / industrial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNr publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

5. NA = not analyzed

6. Laboratory flags:

7. Exceedances:
- BOLD** = concentration greater than residential Vapor Risk Screening Level
 - [] = concentration greater than small commercial Vapor Risk Screening Level
 - { } = concentration greater than large commercial / industrial Vapor Risk Screening Level

Data entered / updated by: RJA Date: 12/13/2023
 Data checked by: SRM Date: 12/13/2023

Table 4
Shallow Soil Gas Analytical Results
Werners Cleaners VIZC - 6415 28th Avenue, Kenosha, Wisconsin
Sigma Project No. 21985

Sample Type:		Shallow Soil Gas Samples										Residential Vapor Risk Screening Level ² (AF=0.03)	Small Commercial Vapor Risk Screening Level ³ (AF = 0.03)	Large Commercial / Industrial Vapor Risk Screening Level ⁴ (AF = 0.01)	
Sample Identification:	06R_SG_21_20 231120	06R_SG_22_20 231120	06R_SG_23_20 231120	06R_SG_24_20 231120	06R_SG_25_20 231120	06R_SG_26_20 231120	06R_SG_27_20 231120	06R_SG_28_20 231120	06R_SG_29_20 231120	06R_SG_30_20 231120					
Sample Date(s):	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023	11/10/23-11/20/2023					
Sampling/Analysis Method:	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C	Beacon PS6/EPA 8260C					
Sample Duration:	9d 23hr 50min	9d 23hr 42min	9d 23hr 25min	9d 23hr 18min	9d 23hr 5min	9d 22hr 33min	9d 22hr 23min	9d 22hr 6min	9d 21hr 40min	9d 21hr 25min					
VOCs															
Benzene	µg/m ³	4.82	<3.28	<3.28	<3.29	<3.29	<3.30	<3.30	<3.30	<3.31	<3.31	120	520	1,600	
Carbon Tetrachloride	µg/m ³	<1.62	<1.62	<1.62	<1.62	<1.62	<1.62	<1.63	<1.63	<1.63	<1.63	160	680	2,000	
Chlorobenzene	µg/m ³	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.83	<0.83	1,733	7,333	22,000	
Chloroform	µg/m ³	<1.99	<1.99	<1.99	<1.99	<1.99	<2.00	<2.00	<2.00	<2.00	<2.01	41	180	530	
1,2-Dibromoethane (EDB)	µg/m ³	<1.78	<1.78	<1.78	<1.79	<1.79	<1.79	<1.79	<1.79	<1.80	<1.80	1,567	6.7	20	
1,2-Dichlorobenzene	µg/m ³	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.94	<0.94	7,000	29,333	88,000	
1,3-Dichlorobenzene	µg/m ³	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.94	<0.94	NS	NS	NS	
1,4-Dichlorobenzene	µg/m ³	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.94	<0.94	87	367	1,100	
1,1-Dichloroethane	µg/m ³	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.83	<0.83	590	2,600	7,700	
1,2-Dichloroethane	µg/m ³	<1.24	<1.24	<1.24	<1.24	<1.24	<1.25	<1.25	<1.25	<1.25	<1.25	36	160	470	
1,1-Dichloroethene	µg/m ³	<2.11	<2.11	<2.11	<2.11	<2.11	<2.12	<2.12	<2.12	<2.13	<2.13	7,000	29,000	88,000	
cis-1,2-Dichloroethene	µg/m ³	<1.31	<1.31	<1.31	<1.31	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	1,400	5,800	18,000	
trans-1,2-Dichloroethene	µg/m ³	<1.58	<1.58	<1.58	<1.58	<1.58	<1.59	<1.59	<1.59	<1.59	<1.60	1,400	5,800	18,000	
1,4-Dioxane	µg/m ³	<1.69	<1.70	<1.70	<1.70	<1.70	<1.70	<1.71	<1.71	<1.71	<1.71	187	833	2,500	
Ethylbenzene	µg/m ³	<2.04	<2.05	<2.05	<2.05	<2.05	<2.05	<2.06	<2.06	<2.06	<2.06	370	1,600	4,900	
Isopropylbenzene	µg/m ³	<2.09	<2.09	<2.10	<2.10	<2.10	<2.10	<2.11	<2.11	<2.11	<2.11	NS	NS	NS	
Methylene Chloride	µg/m ³	<1.99	<1.99	<1.99	<1.99	<1.99	<2.00	<2.00	<2.00	<2.00	<2.01	21,000	88,000	260,000	
2-Methylnaphthalene	µg/m ³	<2.29	<2.29	<2.29	<2.29	<2.29	<2.30	<2.30	<2.30	<2.31	<2.31	NS	NS	NS	
Methyl-tert-butyl ether	µg/m ³	<3.47	<3.48	<3.48	<3.48	<3.49	<3.49	<3.50	<3.50	<3.51	<3.51	3,600	16,000	47,000	
Naphthalene	µg/m ³	<2.17	<2.17	<2.18	<2.18	<2.18	<2.18	<2.18	<2.19	<2.19	<2.19	28	120	360	
1,1,2,2-Tetrachloroethane	µg/m ³	<1.69	<1.70	<1.70	<1.70	<1.70	<1.70	<1.71	<1.71	<1.71	<1.71	16	70	210	
Tetrachloroethene (PCE)	µg/m ³	<1.69	<1.70	<1.70	<1.70	<1.70	<1.70	<1.71	<1.71	<1.71	<1.71	1,400	5,800	18,000	
Toluene	µg/m ³	<4.34	<4.35	<4.35	<4.35	<4.36	<4.37	<4.37	<4.37	<4.38	<4.39	170,000	730,000	2,200,000	
1,2,3-Trichlorobenzene	µg/m ³	<1.78	<1.78	<1.78	<1.79	<1.79	<1.79	<1.79	<1.79	<1.80	<1.80	NS	NS	NS	
1,2,4-Trichlorobenzene	µg/m ³	<1.78	<1.78	<1.78	<1.79	<1.79	<1.79	<1.79	<1.79	<1.80	<1.80	70	293	880	
1,1,1-Trichloroethane	µg/m ³	<0.66	<0.66	<0.66	<0.66	<0.66	<0.67	<0.67	<0.67	<0.67	<0.67	170,000	730,000	2,200,000	
1,1,2-Trichloroethane	µg/m ³	<2.11	<2.11	<2.11	<2.11	<2.11	<2.12	<2.12	<2.12	<2.13	<2.13	60	257	770	
Trichloroethene (TCE)	µg/m ³	<2.11	<2.11	<2.11	<2.11	<2.11	<2.12	<2.12	<2.12	<2.13	<2.13	70	290	880	
1,2,3-Trichloropropane	µg/m ³	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.94	<0.94	10	43	129	
1,1,2-Trichlorotrifluoroethane	µg/m ³	<0.78	<0.78	<0.78	<0.78	<0.78	<0.79	<0.79	<0.79	<0.79	<0.79	173,333	733,333	2,200,000	
1,2,4-Trimethylbenzene	µg/m ³	<2.09	<2.09	<2.10	<2.10	<2.10	<2.10	<2.11	<2.11	<2.11	<2.11	2,100	8,800	26,000	
1,3,5-Trimethylbenzene	µg/m ³	<2.09	<2.09	<2.10	<2.10	<2.10	<2.10	<2.11	<2.11	<2.11	<2.11	2,100	8,800	26,000	
Vinyl Chloride	µg/m ³	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.87	<0.87	56	930	2,800	
Xylenes, total	µg/m ³	<3.94	<3.96	<3.96	<3.96	<3.96	<3.96	<3.98	<3.98	<3.98	<3.98	3,500	15,000	44,000	

Notes:

1. Analytical units: µg/m³ = micrograms per cubic meter

2. Residential Vapor Risk Screening Level = Risk-based concentrations based on VALs for residential air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a residential setting. VALs for residential indoor air based on WDNR publication RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for residential air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and residential air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

3. Small Commercial Vapor Risk Screening Level = Risk-based concentrations based on VALs for small commercial air which has been adjusted with an Attenuation Factor of 0.03 for the shallow soil gas to indoor air pathway in a small commercial setting. VALs for small commercial indoor air based on WDNR publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and small commercial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

4. Large Commercial / Industrial Vapor Risk Screening Level = Risk-based concentrations based on VALs for large commercial/industrial air which has been adjusted with an Attenuation Factor of 0.01 for the shallow soil gas to indoor air pathway in a large commercial/industrial setting. VALs for large commercial / industrial indoor air based on WDNR publication PUB-RR-800 "Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin" (dated January 2018) which in turn references EPA Region 3 Risk-Based Concentrations for industrial air [Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) May 2023] and large commercial / industrial air in August 2023 "Wisconsin Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels And Vapor Risk Screening Levels" publication RR-0136. VAL adjusted to 1-in-100,000 increase in lifetime cancer risk for carcinogens per WDNR publication RR-800; VAL is not adjusted for non-carcinogens (i.e., hazard index = 1).

5. NA = not analyzed

6. Laboratory flags:

7. Exceedances: **BOLD** = concentration greater than residential Vapor Risk Screening Level
[] = concentration greater than small commercial Vapor Risk Screening Level
{ } = concentration greater than large commercial / industrial Vapor Risk Screening Level

Data entered / updated by: CRD Date: 12/7/2023
 Data checked by: SRM Date: 12/7/2023

Figure 1

Sample Location Map



City of Kenosha

28TH ST

26TH AVE

64TH ST

FORMER WERNERS CLEANERS SITE

6501 28th Ave.

27TH AVE

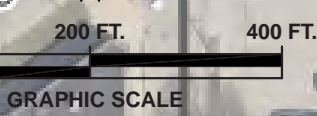
27TH AVE

27TH AVE

LEGEND	
	APPROXIMATE SITE BOUNDARY
	WATER
	SANITARY SEWER
	NATURAL GAS
	UNDERGROUND ELECTRIC
	OVERHEAD ELECTRIC
	COMMUNICATION
	STORM SEWER
	SOIL GAS SAMPLE LOCATION
	SANITARY SEWER GAS SAMPLE LOCATION

NOTE: AERIAL IMAGERY (2022) AND PARCEL BOUNDARY TAKEN FROM KENOSHA COUNTY INTERACTIVE MAPPING

PROJECT: 21985 | DIRECTORY: CAD | FILENAME: 21985_Master Map_vertical 11x17.ai | CREATED BY: CLE | DATE: 09/27/2023



SAMPLE LOCATION MAP

WERNERS CLEANERS
6415 28TH AVENUE
KENOSHA, WISCONSIN

FIGURE

1

Fact Sheet: Understanding Chemical Vapor Intrusion Test Results

(DNR Pub RR-977)



Understanding Chemical Vapor Intrusion Testing Results

RR-977

October 2014

From the Lab to You

Chemical vapor samples were taken from underneath your house or building and possibly indoors as well. These samples have been tested by a certified laboratory and a report was issued. The Wisconsin Department of Natural Resources (DNR) uses these test results to determine if people in the building are being exposed to chemical vapors coming from nearby contaminated soil or groundwater, and to decide what, if any, action is needed to prevent this exposure.

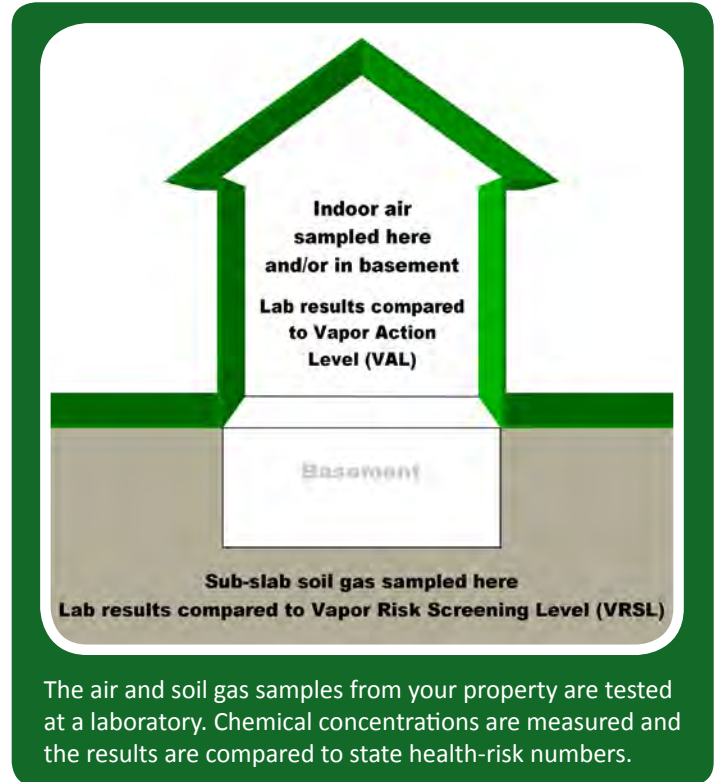
Indoor Air Testing Results

If indoor air samples were collected in your house or building, test results from the lab will be compared to the state Vapor Action Level (VAL) for chemicals of concern. The VAL is a chemical compound's numerical value that represents a health hazard risk to no more than 1 in 100,000 people during a lifetime of exposure. If test results show chemical concentrations in your air below the VAL then adverse health effects are extremely rare, even if you were to breathe the chemical at this concentration for your entire life.

Test results showing chemical concentrations in the air at or above the VAL prompt DNR to recommend that exposure to these chemical vapors be reduced. If test results show concentrations significantly above the VAL, or more than one type of chemical vapor is identified in your indoor air, the risk from exposure increases. If the concentration of any indoor chemical vapor greatly exceeds the VAL, DNR is concerned about even short-term exposure and will typically require immediate action to address the problem.

The VAL for each chemical is set by scientific research. It is protective of all people, including those who are most susceptible to adverse health effects.

If test results identify chemicals in your air that are not present in nearby soil or groundwater contamination, it is likely that these vapors are coming from some product or activity in or near your house or building. Many everyday consumer products (e.g., cleaners, solvents, polish, adhesives, lubricants, aerosols, insect repellants, etc.); combustion processes (e.g., smoking, home heating); fuels in attached garages; dry cleaned clothing or draperies; and occupant activities (e.g., craft hobbies), also release chemical vapors into the air.



The air and soil gas samples from your property are tested at a laboratory. Chemical concentrations are measured and the results are compared to state health-risk numbers.

Sub-slab Soil Gas Testing Results

Soil gas samples were collected from the ground beneath the concrete slab of your building foundation or basement. The lab measured the concentrations of various chemicals in these samples. DNR compares these measurements to the state Vapor Risk Screening Level (VRSL), which identifies the concentration of a chemical in soil gas that scientific research suggests can be a health risk if vapor enters a building. If soil gas measurements exceed the VRSL for a chemical of concern, action to reduce exposure is strongly recommended.

The VRSL is a higher number (higher chemical concentration) than the VAL because it is presumed that concrete building foundations and basement walls will prevent most soil gas from entering a building. Further, any soil gas that does enter a building through cracks, holes, sump pumps, drains, etc., will be diluted to some extent by the indoor air. So, people inside will not be breathing air that includes the full concentration of chemical vapors that exist in the ground.



DNR generally relies on the test results of the sub-slab soil gas samples when determining what, if any, action should be taken related to chemical vapors coming from nearby soil or groundwater contamination. Indoor air quality is highly variable, and it is difficult to make a definitive decision about vapor intrusion based on indoor air sampling alone.

Follow-Up Actions

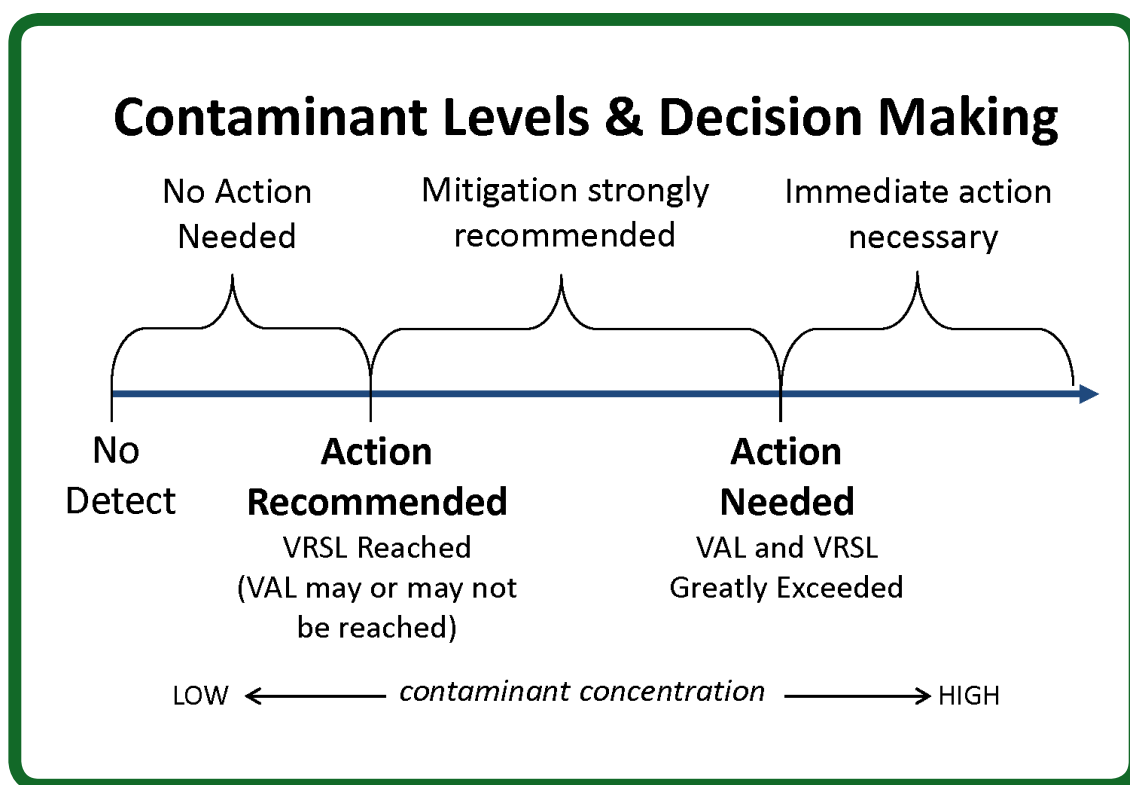
If your test results are less than a VAL for indoor air, or a VRSL for sub-slab soil gas, then the air in the house or building should not present a health concern. Follow-up sampling and testing may be necessary to confirm the results, but no other action is typically suggested.

When test results show soil gas chemical concentrations above a VRSL, both DNR and the Wisconsin Department of

Health Services recommend that owners take action to reduce potential exposure. This typically involves installing a vapor mitigation system that vents chemical vapors from beneath your home or building to the outdoors, similar to a radon mitigation system.

If indoor air concentrations exceed a VAL, but sub-slab concentrations are less than a VRSL, then the chemical vapors are most likely coming from indoor sources. Steps should be taken by the house or building owner to identify the products and practices causing the problem and implement appropriate remedies.

If soil gas mitigation is recommended, a representative of the party who is responsible for the soil or groundwater contamination will contact you to discuss your options.



A Note about Measurement Units: The lab report may include some unfamiliar technical language. The most important point to note is whether or not the test result for a specific chemical exceeds a VAL or VRSL, which are also sometimes referred to, generically, as “screening levels.”

The concentration of gaseous pollutants in air is typically described in two different ways: 1) as units of mass per volume, where $\mu\text{g}/\text{m}^3$ represents micrograms of gaseous pollutant per cubic meter of ambient air; and 2) as parts per billion by volume (ppbv), where the volume of a gaseous pollutant is compared to a set volume of ambient air. These are the numbers that are compared to the VAL and VRSL.

For more information, visit dnr.wi.gov/topic/Brownfields/Vapor.html