



May 7, 2018

Phil Richard
Department of Natural Resources
875 S. 4th Ave
Park Falls, WI 54552

Re: Summary Letter Report and Work Plan, Letsos Property - Belknap Street
902-904 Belknap Street, Superior, WI 54880
BRRTS# 02-16-560359

Dear Mr. Richard:

This letter report presents a summary of the site history and recent activities performed as part of the investigation of contaminated soil at the 902-904 Belknap Street property including contaminated soil removal, indoor air sampling and remedial actions that have occurred since the last letter report submittal in January 2017. The report also provides an interpretation of the results as well as recommendations for additional work necessary to complete the plume delineation and continue to monitor contaminant concentrations on the site.

Site History

Soil contamination was first identified at the site when soil samples collected from borings advanced on and directly adjacent to the site by TRC Environmental Corporation as part of a Phase 2.5 Environmental Site Investigation completed prior to the Belknap Street reconstruction detected tetrachloroethene (PCE) and trichloroethene (TCE).

A Phase II Environmental Site Assessment completed by Environmental Troubleshooters identified soil contamination within a room in the southwest corner of the basement and immediately south of the outside basement door. Analytical results detected the presence of chlorinated solvents that appeared to be related to dry cleaning at concentrations that required further assessment. On February 24, 2016, the Douglas County Department of Health and Human Services (DCDHHS) collected two indoor air samples at the property, one in the basement and one in the 2nd floor apartment. The building tenants were notified of the concentrations of PCE, TCE, and vinyl chloride exceeding indoor air vapor action levels (VALs).

MSA was contracted in March 2016 to address the identified soil contamination on the Property. MSA collected a soil sample from the exposed basement soils in the southwest room of the basement and a water sample from the basement sump to determine existing concentrations and provide preliminary evaluation for planned treatment and disposal options. MSA also obtained Sanborn maps of the site and the immediate vicinity from Historical Information Gatherers (HIG) on March 17, 2016 and identified a building on the existing site since at least 1914. The site appears to have been used as a creamery from at least 1949 through 1955 and as a dry cleaner from at least 1967 through 1972. Based on this information, MSA advanced five soil borings on April 18, 2016 and ten soil samples and three groundwater samples were collected to determine the magnitude and extent of contamination on the site. Sampling results indicated that chlorinated solvent soil concentrations that exceeded Wisconsin Department of Natural Resources (WDNR) direct contact residual contaminant levels (RCLs) were present within four feet of the ground surface beneath the footprint of the building and petroleum contaminated soil and groundwater were identified on the north side of the building. MSA recommended the excavation of contaminated soils within the earthen section of the basement in order to mitigate the soil direct contact and vapor intrusion threats to the building. A letter report was submitted to the WDNR on January 10, 2017 outlining the investigative work completed and describing the commencement of site excavation work. The location

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of the soil borings is shown on **Figure 2** and the soil and groundwater analytical results are presented in **Table 1** and **Table 2**.

Contaminated Soil Removal and Indoor Air Sampling

Excavation activities in the basement were initiated on December 2, 2016. After the removal of several yards of contaminated material, it was determined that the soil/debris in the basement was actually on top of a poured concrete floor with a raised concrete slab which existed several feet lower than the rest of the basement. The contaminated soil was fully excavated on December 22, 2016, with a total of approximately 20 cubic yards of soil/debris were excavated and transferred into a lined on-site roll off container and transported to the Vonco V Landfill located in Duluth, Minnesota for disposal. As a means of evaluating conditions below the slab, two cores were drilled by Twin Ports Testing and two soil samples, HA-1 and HA-2, were collected under the slab using a hand auger by MSA. Based on the concentration of contaminants detected in the soil samples collected under the slab, it was determined that it would be more effective to leave the concrete in place as a barrier to the contamination than to remove it. Clean sand backfill and a drain tile system were installed in the areas of lower elevation and a new concrete floor was installed over the entire floor of the basement room. A sealed sump was also installed, which is currently connected to the City of Superior sanitary sewer. Manifests for soil disposal are included in **Attachment A** and two cross sections of the basement floor showing pre and post excavation arrangement are shown on **Figure 3**.

On May 17, 2017, four 24-hour indoor air samples, IA-1 through IA-4, were collected at the site using summa canisters with a 24-hour sampling valve. The canisters were placed based on guidance provided in the WDNR publication RR-800 "Addressing Vapor Intrusion at Remediation and Redevelopment Sites in Wisconsin" in the 902 Belknap Street (902 Building) main building office space, upstairs apartment, basement and in the 904 Belknap Street (904 building). A second indoor air sample, BASEMENT ROOM, was collected from the basement location on June 8, 2017 to confirm analytical results from the first sampling event. Based on concentrations detected in the prior sampling events, it was determined that remedial action was necessary in order to decrease contaminant concentration in the indoor air. An indoor air sample, Indoor Air 9/7/17, was collected in the main office space on September 7, 2017 to confirm concentrations in the occupied section of the building prior to the installation of an indoor air mitigation system. In late September 2017, an indoor air mitigation system was installed in the room in the southwest corner of the basement and all pipes, holes and sumps were sealed. Additional indoor air samples, IA-5 through IA-8, were collected at all four previous sampling locations on October 25, 2017 to determine the effectiveness of the remediation measures. The sampling locations are shown on **Figure 2**.

Indoor Air Sampling Results

Based on building use, small commercial Vapor Action Limits (VALs) were used to evaluate indoor air contaminant concentrations in the 902-904 Belknap Street buildings. The 902 and 904 Belknap Street buildings are both used as office space, with a limited-use residential rental unit located on the 2nd floor of the 902 Belknap Street building. This unit is not occupied full time, and is rented out on a nightly basis. For this reason, the small-commercial VALs were used to evaluate this space as well.

Analytical results from the May 17, 2017 indoor air sampling event detected twenty-nine compounds above their respective method detection limits in the four indoor air samples collected. PCE was detected at 199 µg/m³ and TCE was detected at 20 µg/m³ in the 902 Belknap main office sample exceeding their respective VALs. TCE was detected at 13.2 µg/m³ in the 902 building upstairs apartment sample exceeding its VAL. Naphthalene was detected at 24.2 µg/m³, 1,2,4-trimethylbenzene was detected at 3,340 µg/m³, 1,3,5-trimethylbenzene was detected at 1,210 µg/m³ and total xylenes were detected at 8,050 µg/m³ in the 904 building sample, all exceeding their respective VALs. PCE was detected at 945 µg/m³ and TCE was detected at 70.7 µg/m³ in the 902 building basement sample exceeding their respective VALs. No

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other detected concentrations exceeded their respective VALs. A confirmation sample from the basement collected on June 8, 2017 detected PCE at 260 $\mu\text{g}/\text{m}^3$ and TCE was detected at 54.4 $\mu\text{g}/\text{m}^3$ in the 902 Belknap main office sample exceeding their respective VALs.

Analytical results from the September 7, 2017 indoor air sample collection prior to the installation of the indoor air mitigation system detected twenty-four compounds above their respective method detection limits but no concentrations exceeded their respective VALs.

Analytical results from the October 25, 2017 indoor air sampling event detected twenty-five compounds above their respective method detection limits in the four air samples collected. PCE was detected at 214 $\mu\text{g}/\text{m}^3$ and TCE was detected at 35.7 $\mu\text{g}/\text{m}^3$ in the 902 building basement sample exceeding their respective VALs. No other detected concentrations exceeded their respective VALs. The indoor air sampling results are shown on **Table 3** and the laboratory analytical reports for the indoor air sampling events are provided in **Attachment B**.

Remedial Actions

In addition to the indoor air mitigation system installed in late September 2017, a radon mitigation system was installed by Shubitz Plumbing of Duluth, Minnesota by the property owner as a preemptive remedial action to ventilate volatile organic compounds from the basement room in April 2018. The radon system is tied into the sump and drain tile installed after the basement room was excavated. A Homeaire model RN104 fan was connected to system to provide a vacuum and the exhaust was piped out of the basement to an exhaust port on the roof. An operation and maintenance manual including information about system parts and inspection items will be prepared for the system prior to pursuing closure for the site. The manual may be used by the current and future building owners to ensure that regular system inspection and proper maintenance takes place. A photographic log of the installed system and components and the specifications of the installed fan are provided in **Attachment C**.

A pressure field extension (PFE) test will be performed on the system in Spring 2018 to ensure that the system meets depressurization guidelines for the building. Indoor air samples will be collected concurrent with the PFE test at previous indoor air sampling locations (basement, main floor, upstairs apartment, and 904 Belknap Street building) to verify that the system is effectively reducing indoor air contaminant concentrations.

Conclusions and Recommendations

Soil samples collected and analyzed from the previously advanced five soil borings advanced at the site detected chlorinated solvents in five of the six soil samples collected from borings GP-2, GP-3 and GP-4 but at concentrations below their respective residual contaminant levels (RCLs). Additional soil samples collected from the hand auger borings in the basement of the building also indicated the presence of chlorinated solvents exceeding their respective RCLs. Based on sampling results, it appears that the extent of chlorinated contaminated soils that exceed their RCLs has been delineated and is limited to soils under the building in the vicinity of the basement room. Benzene was also detected above its RCL in the soil sample collected from the 7.5-10 foot interval collected from boring GP-1 but it appears to be associated with the BRRS site #03-16-560358 at the intersection of Belknap Street and Clough Avenue and will be excavated concurrently with the road construction activities on Belknap Street in 2018.

Groundwater samples were collected and analyzed from the previously advanced soil borings GP-1, GP-4, GP-5 and from the sump in the basement room. Samples were not able to be collected from soil borings GP-2 and GP-3 due to limited volume of groundwater in the borings. Laboratory analytical results detected concentrations of chlorinated solvents exceeding their respective Enforcement Standards (ES) in the samples collected from borings GP-4, GP-5 and the sump in the basement room. Benzene was also detected above its ES in the sample collected from boring GP-1. It appears the

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contamination related to chlorinated solvents is concentrated in the vicinity of the basement room but the full extent is currently not fully delineated. The benzene detected in the groundwater sample from GP-1 appears to be associated with the BRRTS site #03-16-560358 at the intersection of Belknap Street and Clough Avenue.

Based on the indoor air sampling results, it appears that the remediation measures including excavation of the contaminated material, installation of the indoor air mitigation system and sealing of possible intrusion pathways has effectively reduced the levels of indoor air contamination at the site. Sampling following the excavation detected contaminant concentrations exceeding VALs in each sampling location. The detection of petroleum compounds and a lack of chlorinated solvents in indoor air sample IA-4 collected in the 904 building during the May 17, 2017 sampling event does not appear to be related to the contamination identified during this investigation and may be related to construction events taking place on Belknap Street during the sampling interval. Concentrations of PCE and TCE have shown a substantial decrease in concentration in each consecutive sampling event to the level that only basement concentrations currently exceed small commercial VALs. Concentrations of other contaminants of concern have also shown a general decrease in all sampling locations indicating that the remediation measures have been effective.

Based on the results of the indoor air sampling, MSA recommends additional quarterly indoor vapor sampling for one year in order to continue to monitor and determine trends of the contaminant concentrations in the indoor air. Based on the results of the sampling, adjustments may be made to the indoor air mitigation system to increase effectiveness if necessary. MSA also recommends additional groundwater sampling in the vicinity of GP-4 in order to determine the magnitude and extent of groundwater contamination.

Please contact me with any questions. I can be reached by phone at (218) 499-3184 or by email at mdavidson@msa-ps.com.

Sincerely,

MSA Professional Services, Inc.



Mark Davidson, P.G.
Project Hydrogeologist



Reviewed by: Jeffrey K. Anderson, P.E.
Senior Project Manager

Cc: Maria Letsos, Owner

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|--------------|--------------|---|
| Attachments: | Table 1 | Soil Sampling Analytical Results |
| | Table 2 | Groundwater Sampling Analytical Results |
| | Table 3 | Indoor Air Sampling Analytical Results |
| | Figure 1 | Site Location |
| | Figure 2 | Site Map |
| | Figure 3 | Basement Cross Section |
| | Attachment A | Soil Disposal Manifests |
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TABLES

Table 1
Soil Sampling Analytical Results
902/904 Belknap
Superior, WI
1771000
BRRTS Site #02-16-560359

SAMPLE/BORING #	HA-1 ¹	HA-2 ¹	Basement Soil	GP-1 ²		GP-2 ²		GP-3 ²		GP-4 ²		GP-5 ²		Soil RCLs (mg/kg)		
DEPTH to Water Table (ft BGS)				7.55	7.55					11.41	11.41	4.63	4.63			
Date Collected	6/18/2013	6/18/2013	3/14/2016	4/12/2016		4/12/2016		4/12/2016		4/12/2016		4/12/2016				
DEPTH (ft BGS)	2-3	1		7.5-10	12.5-15	7.5-10	12.5-15	7.5-10	12.5-15	5-7.5	7.5-10	5-7.5	7.5-10			
SATURATED OR UNSATURATED				sat	sat					unsat	unsat	sat	sat			
SOIL TYPE																
	Soil Concentrations in mg/kg (or ppm)													July 2015 DNR Table	Background	
														Non-Industrial Direct Contact	Soil to GW	Surficial BTV
VOC ANALYTES																
Benzene	<0.0289	<0.135	<0.0932	7.83	0.418	0.359	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	1.49	0.0051	
n-Butylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	108	NS	
sec-Butylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	145	NS	
1,2-Dichlorobenzene	<0.0723	<0.338	0.788	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	376	1.168	
1,4-Dichlorobenzene	<0.0723	<0.338	0.105	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	3.48	0.144	
1,1-Dichloroethene	<0.0723	<0.338	0.168	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	4.72	0.005	
cis-1,2-Dichloroethene	0.587	35.7	301	<0.0654	<0.0693	<0.0616	0.141	<0.0655	<0.0748	0.468	0.184	<0.0767	<0.0666	156	0.0412	
trans-1,2-Dichloroethene	<0.0723	1.76	2.5	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	1,560	0.0626	
Ethylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	7.47	1.57	
p-Isopropylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	NS	NS	
Methyl tert butyl ether	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	59.4	0.027	
Naphthalene	<0.289	<1.350	<0.466	<0.327	<0.347	<0.308	<0.530	<0.327	<0.374	<0.345	<0.331	<0.384	<0.333	0.854	0.6587	
n-Propylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	264	NS	
Tetrachloroethene	11.6	1.96	2620	<0.0654	<0.0693	2.01	<0.106	0.176	<0.0748	0.749	0.0803	<0.0767	<0.0666	30.7	0.0045	
Toluene	<0.0723	<0.338	<0.466	<0.327	<0.347	<0.308	<0.530	<0.327	<0.374	<0.345	<0.331	<0.384	<0.333	818	1.1072	
1,2,3-Trichlorobenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	48.9	NS	
Trichloroethene	0.832	0.845	259	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	0.292	<0.0663	<0.0767	<0.0666	1.26	0.0036	
1,2,4-Trimethylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	89.8	1.3793*	
1,3,5-Trimethylbenzene	<0.0723	<0.338	<0.0932	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	182	1.3793*	
Vinyl chloride	0.123	7.36	2.65	<0.0654	<0.0693	<0.0616	<0.106	<0.0655	<0.0748	<0.0690	<0.0663	<0.0767	<0.0666	0.067	0.0001	
Xylene (Total)	<0.217	<1.01	<0.280	<0.196	<0.208	<0.185	<0.318	<0.196	<0.224	<0.207	<0.199	<0.230	<0.200	258*	3.94*	
No. of Individual Exceedances (DC)	1	1		0	0	0	0	0	0	0	0	0	0			
Cumulative Hazard Index (DC)	0.2435	0.4656		0	0	0	0	0	0	0	0	0	0			
Cumulative Cancer Risk (DC)	2.90E-06	1.10E-04		0	0	0	0	0	0.0	0	0	0	0			

Exceedance Highlights:

BOLD font indicates DC RCL exceedance, and BTV exceedance for metals.

Italic font indicates GW RCL Exceedance. Groundwater quality (> NR 140 ES) may be affected when GW RCLs are exceeded.

Blanks indicate parameter was not analyzed.

NS: No published standard.

Table Notes:

J: Indicates the analyte was detected between the Laboratory Limit of Detection and Laboratory Limit of Quantitation.

<: Indicates the analyte was not detected above the Laboratory Limit of Quantitation.

*: Indicates total xylenes (m-,o-,p- combined) and total trimethylbenzenes (1,2,4- and 1,3,5- combined).

1: Hand auger borings completed by Environmental Troubleshooters

2: Soil boring advanced by MSA Professional Services, Inc.

Table 2
Groundwater Sampling Analytical Results
902/904 Belknap
Superior, WI
17711000
BRRTS Site #02-16-560359

	Acetone	Benzene	2-Butanone (MEK)	Chloroform	Chloroethane	1,1,1-Trichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethene	1,1,2,2-Tetrachloroethane	Naphthalene	1,2,4-Trichlorobenzene	Toluene	Trichloroethene	Vinyl Chloride	Groundwater Elevation (feet bgs)
NR 140 ES	9000	5	4000	6	30	1000	5	850	70	100	100	5	800	5	0.2	
NR 140 PAL	1800	0.5	800	0.6	3	200	0.5	85	7	20	10	0.5	160	0.5	0.02	
Groundwater Concentrations in ug/l (or ppb)																
GP-1																
4/12/2016	<50.0	986	<10.0	<5.00	<2.50	<5.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<5.00	<1.00	<1.00	7.55
GP-4																
4/12/2016	<50.0	<100	<10.0	<5.00	<2.50	<5.00	<1.00	26.3	4330	16.3	<5.00	1600	<5.00	1730	874	11.41
GP-5																
4/12/2016	<50.0	<1.00	<10.0	<5.00	<2.50	<5.00	<1.00	<1.00	5.62	<1.00	<5.00	<1.00	<5.00	<1.00	15.6	4.63
Basement Sump																
3/14/2016	<1250	<25.0	<250	<125	<62.5	<125	<25.0	61.8	87300	288	<125	51600	<125	22600	11500	

Exceedance Highlights:

BOLD font indicates NR 140 Enforcement Standard (ES) exceedance.

Italic font indicates NR 140 Preventative Action Limit (PAL) exceedance.

BTEX and other VOC compounds detected in at least one sample are included in table. See laboratory report for all results.

NS: No published standard.

Table Notes:

<: Indicates the analyte was not detected above the Laboratory Limit of Quantitation.

*: Indicates total xylenes (m-,o-,p- combined) and total trimethylbenzenes (1,2,4- and 1,3,5- combined).

NA: Indicates constituent was not analyzed.

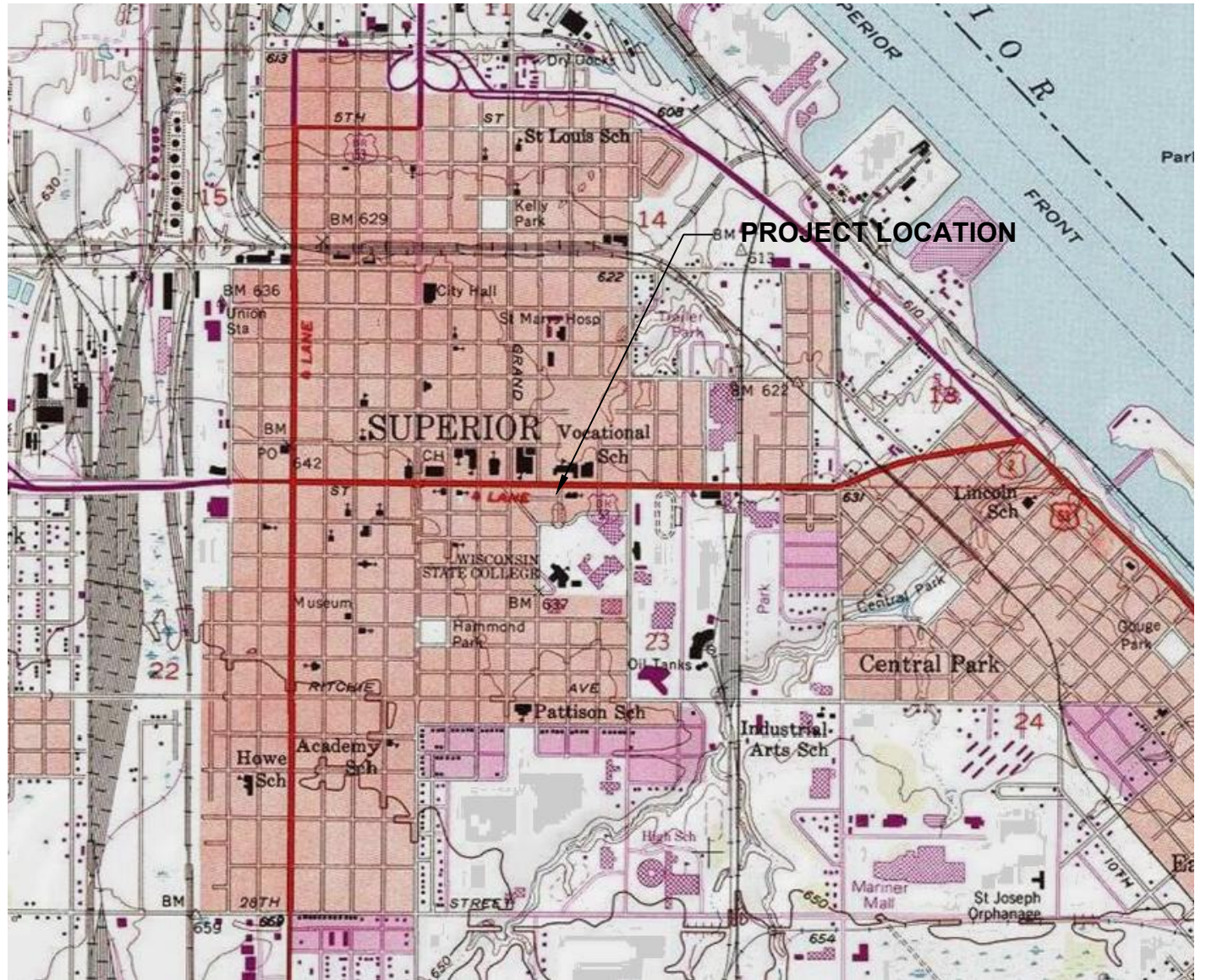
J: Laboratory qualifier indicating the estimated concentration at or above the Limit of Detection and below the Limit of Quantitation.

Table 3
Indoor Air Sampling Analytical Results
902/904 Belknap
Superior, WI
17711000
BRRTS Site #02-16-560359

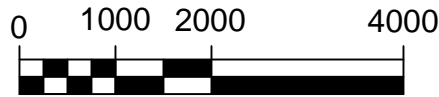
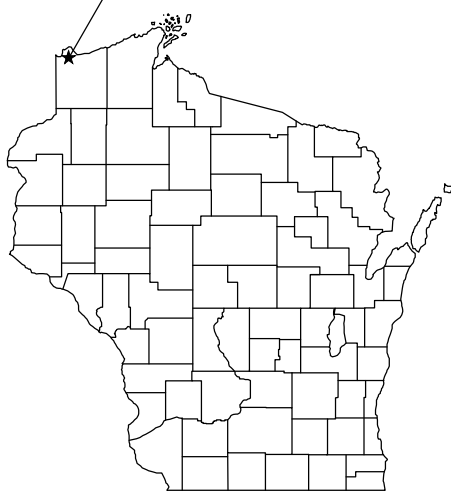
Compound/Parameter	CAS No.	Small Commercial		Sample Identifier and Date Collected									
		Wisconsin Indoor Air VAL	Wisconsin Subslab VRSL	Building - Main Office Space			Upstairs Apartment		904 Belknap		Basement		
				IA-1	INDOOR AIR-9/7/17	IA-7	IA-3	IA-5	IA-4	IA-6	IA-2	BASEMENT ROOM	IA-8
				05/17/17	09/07/17	10/25/17	05/17/17	10/25/17	05/17/17	10/25/17	05/17/17	06/08/17	10/25/17
Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result			
Wisconsin Quick Look Up Compounds													
Volatile Organic Compounds (VOCs) reported in ug/m3 -Detected Compounds Only													
Benzene	71-43-2	16	530	0.772	0.732	<0.489	0.708	<0.489	2.32	<0.489	0.830	<0.639	<0.489
Carbon tetrachloride	56-23-5	20	670	<1.26	<1.26	<1.23	<1.26	<1.23	<1.26	<1.23	<1.26	<1.26	<1.23
Chloroform	67-66-3	5.3	180	<0.973	<0.973	<0.93	<0.973	<0.93	<0.973	<0.93	<0.973	<0.973	1.04
Chloromethane	74-87-3	390	13,000	1.2	1.33	1.15	1.260	1.01	2.450	1.12	0.965	1.13	0.902
Dichlorofluoromethane	75-71-8	440	15,000	1.73	3.2	1.33	1.83	1.24	1.86	1.3	1.73	1.49	1.44
1,1-Dichloroethane (1,1 DCA)	75-34-3	77	2,600	<0.802	<0.802	<0.685	<0.802	<0.685	<0.802	<0.685	<0.802	<0.802	<0.685
1,2-Dichloroethane (1,2 DCA)	107-06-2	4.7	160.0	<0.81	<0.81	<0.83	<0.81	<0.83	<0.81	<0.83	<0.81	<0.81	<0.83
1,1-Dichloroethene (1,1 DCE)	75-35-4	880	29,000	<0.793	<0.793	<0.646	<0.793	<0.646	<0.793	<0.646	<0.793	<0.793	<0.646
cis-1,2-Dichloroethene	156-59-2	NA	NA	34.2	7.51	2.82	21.5	1.97	11.3	1.54	130.0	76.1	66.9
trans-1,2-Dichloroethene	156-60-5	NA	NA	<0.793	<0.793	<0.614	<0.793	<0.614	<0.793	<0.614	0.835	<0.793	0.68
Ethylbenzene	100-41-4	49.0	1,600	<0.867	10.6	<0.733	1.04	<0.733	675	<0.733	1.66	4.3	1.56
Methylene chloride (Dichloromethane)	75-09-2	2,600	87,000	4.15	3.04	0.582	2.65	<0.538	1.98	0.952	17.6	19.9	6.97
Methyl-tert-butyl ether (Isopropyl ether or MTBE)	1634-04-4	470	16,000	<0.721	<0.721	<0.605	<0.721	<0.605	<0.721	<0.605	<0.721	<0.721	<0.605
Naphthalene	91-20-3	3.6	120	<3.3	<3.3	<2.69	<3.3	<2.69	24.2	<2.69	<3.3	<3.3	<2.69
Tetrachloroethene (PCE)	127-18-4	180	6,000	199	27.7	10.7	141	6.55	67.2	6.19	945	260	214
Toluene	108-88-3	22,000	730,000	12.9	15.7	5.15	13.4	4.38	325	7.44	15.3	51.7	16.4
1,1,1-Trichloroethane (1,1,1 TCA)	71-55-6	22,000	730,000	<1.09	<1.09	<1.21	<1.09	<1.21	<1.09	<1.21	<1.09	<1.09	<1.21
Trichloroethene (TCE)	79-01-6	8.8	290	20	4.53	3.15	13.2	1.08	6.86	<0.975	70.7	54.4	35.7
Trichlorofluoromethane	75-69-4	NA	NA	1.38	1.29	<1.26	1.23	<1.26	1.44	<1.26	1.36	1.28	1.57
1,2,4-Trimethylbenzene	95-63-6	260	8,700	1.42	1.42	<0.79	<0.982	<0.79	3,340	<0.79	2.98	2.56	5.06
1,3,5-Trimethylbenzene	108-67-8	260	8,700	<0.982	<0.982	<1.03	<0.982	<1.03	1,210	<1.03	<0.982	<0.982	<1.03
Vinyl chloride	75-01-4	28	930	3.29	0.519	0.759	1.27	<0.389	0.96	<0.389	8.97	4.49	7.49
Total Xylenes	179601-23-1	440	15,000	4.26	49.6	1.85	3.88	1.69	8,050	<2.285	9.27	21.97	10.58
Detected Compounds													
Volatile Organic Compounds (VOCs) reported in ug/m3 -Detected Compounds Only													
1,1-Difluoroethane	75-36-7	42,000		79.7	--	13.8	66.1	8.58	47.6		265	136	332
1,2,3-Trimethylbenzene	526-73-8	63		<0.982	--	<0.531	<0.982	<0.531	491 ^a	<0.531	1.1	<0.982	<0.531
2,2,4-Trimethylpentane	540-84-1	NE		2.09	10.8	1.25	<0.934	1.62	498	1.02	<0.934	6.73	4.87
2-Butanone (MEK)	78-93-3	5,200		<3.69	4.68	3.16	<3.69	1.01	55.4	<0.484	6.35	6.26	<0.484
2-Propanol	67-63-0	NE		4.92	33.8	3	9.37	2.38	30.5	2.64	<3.07	41	1.54
4-Ethyltoluene	622-96-8	NE		1	<0.982	<1.09	<0.982	<1.09	3,750	<1.09	2.21	2.05	4.36
Acetone	67-64-1	32,000		30.3	61	28.1	38.3	19.3	209	16.7	28	54.2	35.8
Carbon Disulfide	75-15-0	730		<0.622	<0.622	<0.563	0.771	<0.563	<0.622	<0.563	0.746	<0.622	<0.563
Chlorodifluoromethane	75-45-6	52,000		5.16	--	2.01	5.66	<0.382	10.8	1.5	6.93	16.5	5.35
Chloroethane	75-00-3	10,000		<0.528	<0.528	<0.43	<0.528	<0.43	1.06	<0.43	<0.528	<0.528	<0.43
Cyclohexane	110-82-7	1,000		9.36	1.06	0.769	2.83	<0.613	9.19	<0.613	<0.689	1.11	<0.613
Dichlorodifluoromethane	75-71-8	100		1.73	3.2	1.33	1.83	1.24	1.86	1.3	1.73	1.49	1.44
Ethanol	64-17-5	NE		294	289	137	654	197	1,060	611	12	48	11.7
Ethyl Acetate	141-78-6	73		<0.72	--	<0.389	1.15	<0.389	<0.72	<0.389	<0.72	4.8	<0.389
Heptane	142-82-5	420		2.43	1.46	1.31	0.926	1.07	66.2	<0.855	<0.818	1.73	4.44
Isopropylbenzene (Cumene)	98-82-8	420		<0.983	<0.983	<0.924	<0.983	<0.924	168	<0.924	<0.983	<0.983	<0.924
Methyl Cyclohexane (Methyl Methacrylate)	80-62-6	730		1.4	--	<0.434	<0.803	<0.434	48.6	<0.434	<0.803	4	<0.434
N-Hexane	110-54-3	730		4.69	1.78	0.627	<0.705	<0.536	12.7	<0.536	<0.705	2.07	0.544
Styrene	100-42-5	1,000		<0.851	2.09	<0.659	<0.851	<0.659	<0.851	<0.659	<0.851	3.79	<0.659
Tetrahydrofuran	109-99-9	2,100		<0.59	1.02	<0.498	1.33	<0.498	107	<0.498	2.98	2.84	2.74
GRO (TPH (GC/MS) Low Fraction)		NE		486	--	191	350	306	31,500	279	1,070	887	943

Notes:
Wisconsin Quick Look UP and Detected Compounds Only
Based on June 2017 US EPA Regional Screening Levels
Bold = Detected Concentration
Exceedance
EPA = Environmental Protection Agency
VAL = Vapor Action Level
VRSL = Vapor Risk Screening Level
NE = Vapor Action Level determined by 2017 EPA Vapor Risk Calculator Spreadsheet
<0.02 = Not Detected above laboratory reporting limits
-- = Not Analyzed
^a = Exceedance calculated using 2017 EPA Vapor Risk Calculator Spreadsheet

FIGURES



PROJECT LOCATION



Superior Quadrangle
 Wisconsin - Douglass County
 7.5 Minute Series (Topographic)

Contour Interval 10 Feet
 1954
 Revised 1993

File Name: P:\1770\1770\1771\1771\1500CAD\1771\000 Belknap Street.dwg

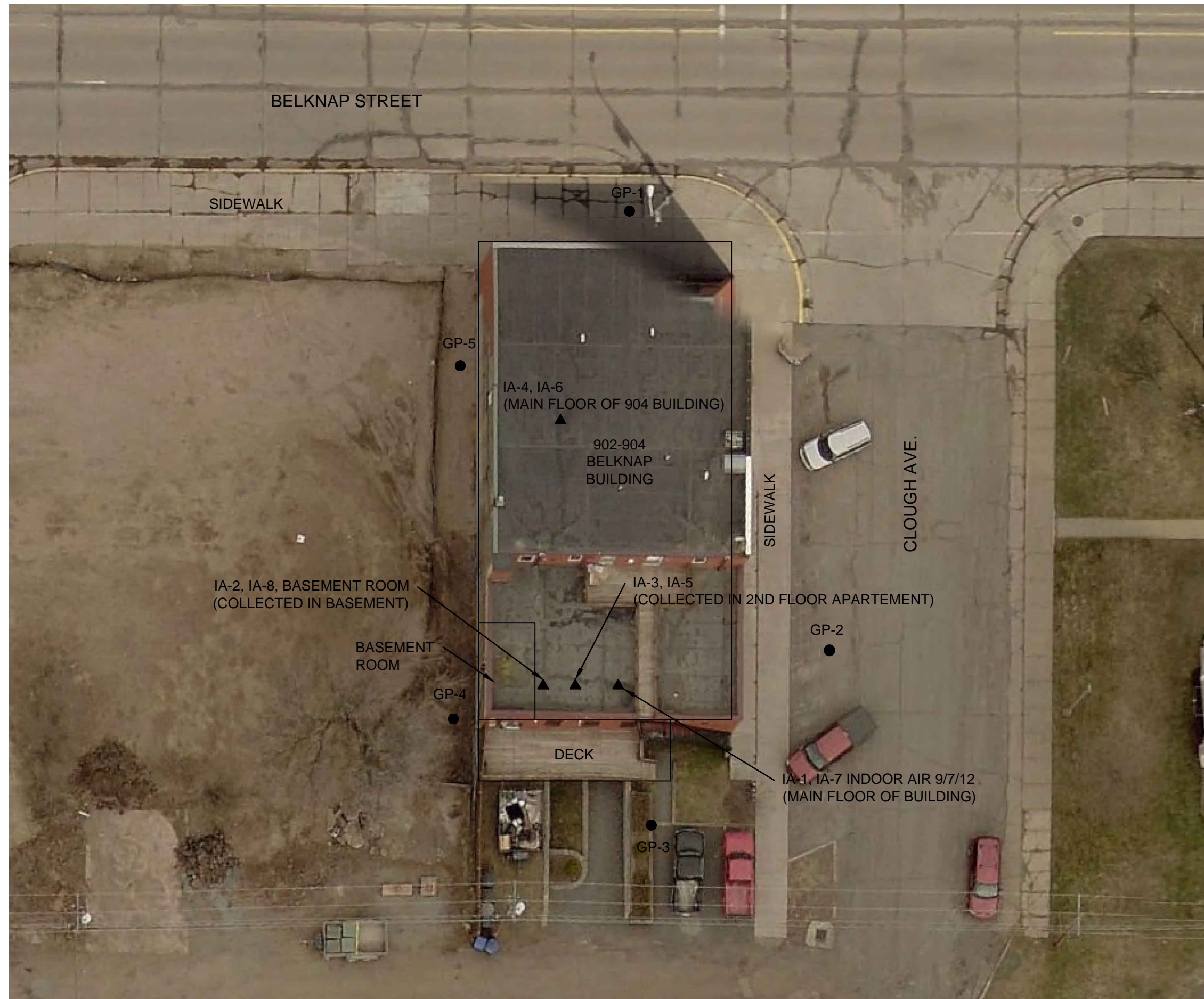


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 Web Address: www.msa-ps.com
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Figure 1

SITE LOCATION MAP
 902-904 BELKNAP STREET
 SUPERIOR, WI

FILE NO.
 00639091
 SHEET
 1



LEGEND

GP-1 ● GEOPROBE BORING LOCATION
(ADVANCED UNDER DIRECTION OF MSA)

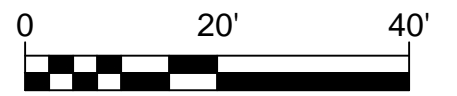
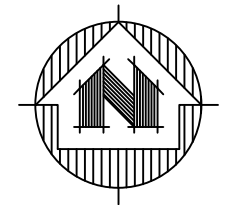


FIGURE 2

SITE LAYOUT MAP

902-904 BELKNAP STREET
SUPERIOR, WI

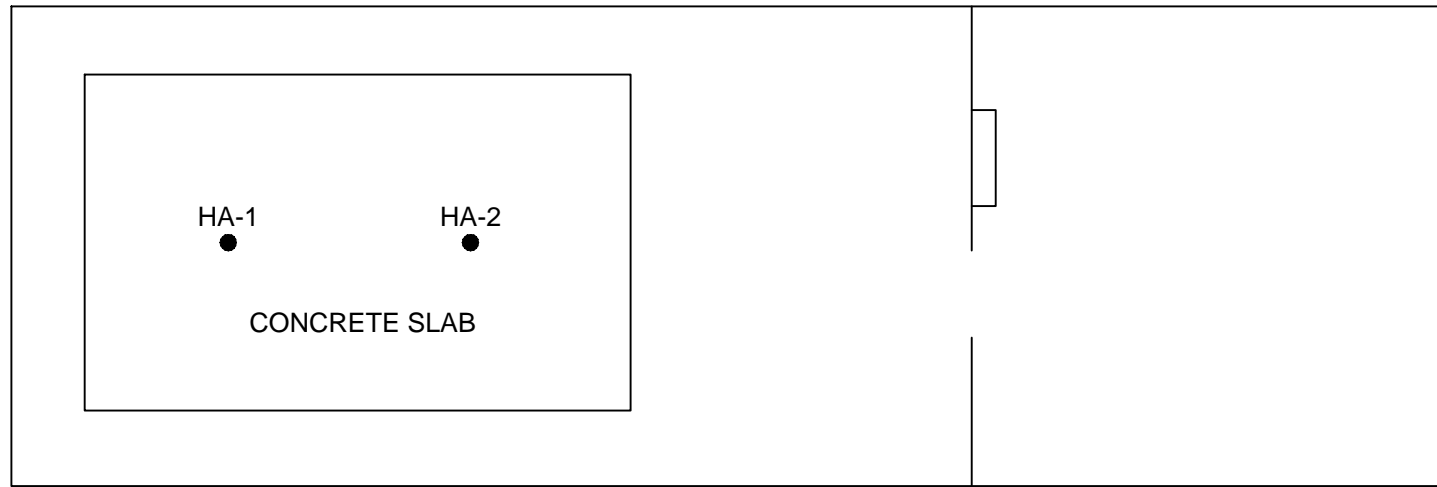
MSA TRANSPORTATION • MUNICIPAL DEVELOPMENT • ENVIRONMENTAL

332 W. Superior Street Duluth, MN 55802
218-722-3915 1-800-777-7380 Fax: 218-722-4548
Web Address: www.msa-ps.com
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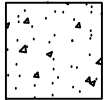
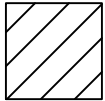
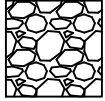
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CHECKED BY CAR	SCALE AS SHOWN	FILE NO. 1771000

File: 1771000\1771000_01\1771000_SiteLayout.dwg 15 Mar 2016 4:40pm P2 Site Layout

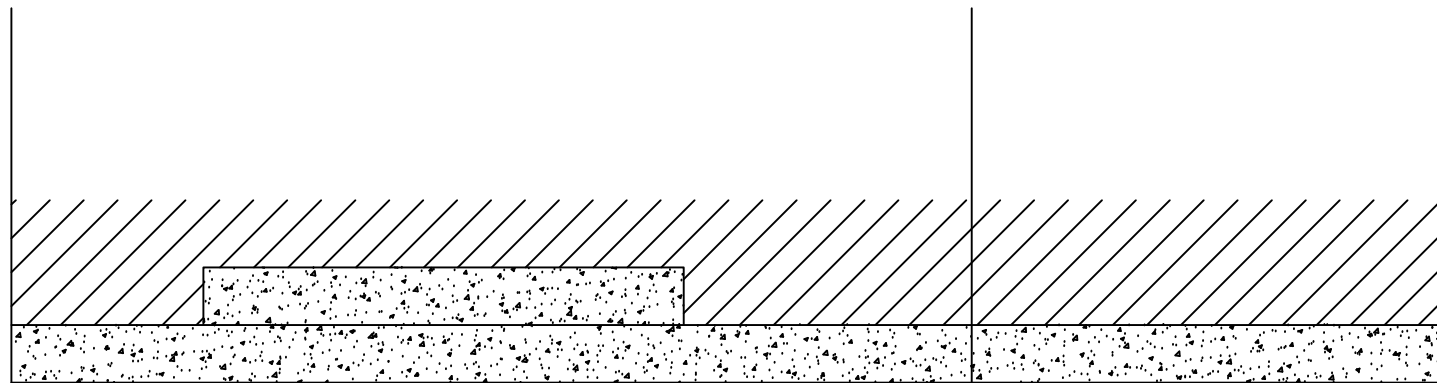
PLAN VIEW



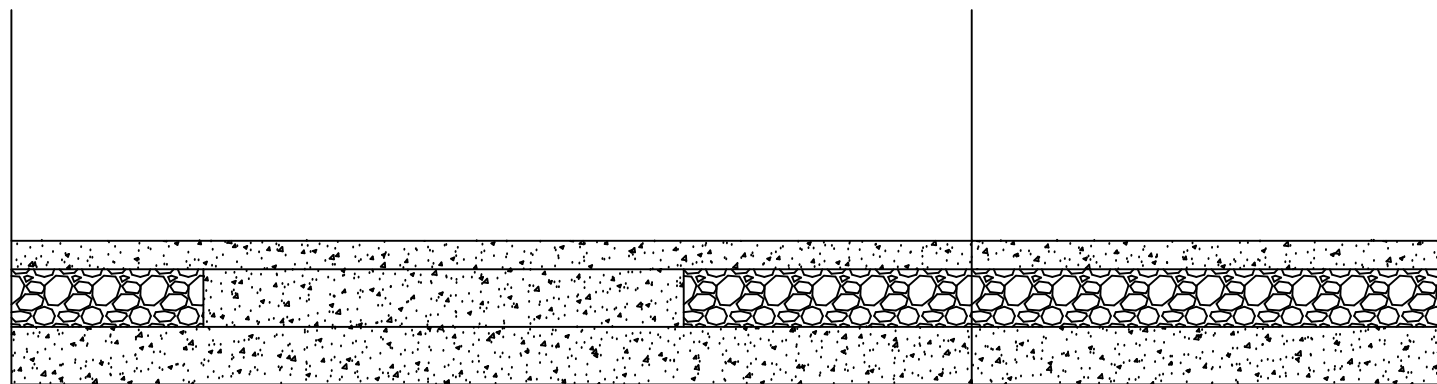
LEGEND

- HA-1 ● GEOPROBE BORING LOCATION
(ADVANCED UNDER DIRECTION OF MSA)
-  CONCRETE
-  CONTAMINATED MATERIAL
-  BACKFILL


PRE EXCAVATION CROSS SECTION VIEW



POST EXCAVATION CROSS SECTION VIEW



NOT TO SCALE

FIGURE 3			
BASEMENT ROOM EXCAVATION CROSS SECTION 902-904 BELKNAP STREET SUPERIOR, WI			
		TRANSPORTATION • MUNICIPAL DEVELOPMENT • ENVIRONMENTAL 332 W. Superior Street Duluth, MN 55802 218-722-3915 1-800-777-7380 Fax: 218-722-4548 Web Address: www.msa-ps.com <small>© MSA Professional Services, Inc.</small>	
DRAWN BY	KSM	DATE	9/19/16
CHECKED BY	CAR	SCALE	AS SHOWN
SHEET NO.		2	
FILE NO.		1771000	

P:\1771000\1771000.dwg 11/17/2016 10:05:45 AM 1771000.dwg 18-Apr-2016 10:05:45 AM 1771000.dwg

ATTACHMENT A

SOIL DISPOSAL MANIFESTS

VONCO V, LLC.

PHONE: 218-626-3830 FAX: 218-626-1009

INDUSTRIAL/NON-HAZARDOUS MATERIAL TRANSPORT AND DISPOSAL MANIFEST

G E N E R A T O R	1. Work Site Name <u>Northland Rental Resource</u> Address <u>902 Bulknop Street, Suite C</u> City, St., Zip <u>Superior, WI 54880</u> Owner's Name <u>Maria Letso</u> Owner's Phone No. <u>(715) 718-2261</u>	PROFILE #: 17-025-1		
	2. Consultant/Contractor <u>MSA Professional Services</u> Address <u>332 W. Superior Street, Suite 600</u> City, St., Zip <u>Duluth, MN 55802</u> Operator's Phone <u>(218) 499-3175</u>	3. Waste Disposal Site VONCO V, LLC. Mailing Address 1100 West Gary Street City, St., Zip Duluth, MN 55808	4. Responsible Agency MN Pollution Control Agency Address 520 Lafayette Road City, St., Zip St. Paul, MN 55155-3898	
	5. Description of Materials <u>contact: Jeff Anderson</u> <u>Contaminated soil from excavation</u> <u>at former dry cleaner</u>	6. Containers (No.-Type) <u>1 roll-off</u>	7. Total Quantity (m³ or yd³) <u>10 CY</u>	
	8. Special Handling Instructions and Additional Information <u>Contaminated soil w/ lower concentration chlorinated solvents</u>			
9. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and governmental regulations. The above listed material(s) is (are) not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law.				
Name & Title (Printed or Typed) <u>Jeffrey K Anderson - MSA Professional Services</u> <u>Environmental Consultant on behalf of Generator</u> Signature <u>Jeff Anderson</u> Date <u>4-20-17</u>				
T R A N S P O R T E R	10. Transporter 1 (Acknowledgement of receipt of materials) <u>Generator</u>			
	Name/Title _____ Signature _____ Date _____ Address _____ City, St., Zip _____ Phone No. _____			
11. Transporter 2 (Acknowledgement of receipt of materials)				
Name/Title _____ Signature _____ Date _____ Address _____ City, St., Zip _____ Phone No. _____				
DISPOSAL SITE		13. Waste Disposal Site Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest except as noted in item 12.		
12. Discrepancy Indication Space		Name/Title (Printed or Typed) _____		
Ticket # _____ Tons _____ Yards _____ E _____ N _____ Elev. _____		Signature _____ Date _____		

CONTRACTOR - WHITE

TRANSPORTER - CANARY

WASTE DISPOSAL SITE - PINK

GENERATOR/OPERATOR - GOLD

VONCO V, LLC.

PHONE: 218-626-3830 FAX: 218-626-1009

INDUSTRIAL/NON-HAZARDOUS MATERIAL TRANSPORT AND DISPOSAL MANIFEST

GENERATOR	1. Work Site Name <u>Northland Rental Resources</u> Address <u>902 Belknap Street, Suite C</u> City, St., Zip <u>Superior, WI 54880</u> Owner's Name <u>Marica Letsos</u> Owner's Phone No. <u>(715) 718-2261</u>		PROFILE #: 17-025-1		
	2. Consultant/Contractor <u>MSA Professional Services</u> Address <u>332 West Superior Street, Suite 600</u> City, St., Zip <u>Duluth, MN 55802</u> Operator's Phone <u>(218) 499-3175</u>		3. Waste Disposal Site VONCO V, LLC. Mailing Address 1100 West Gary Street City, St., Zip Duluth, MN 55808 4. Responsible Agency MN Pollution Control Agency Address 520 Lafayette Road City, St., Zip St. Paul, MN 55155-3898		
	5. Description of Materials <u>Contact: Jeff Anderson</u> <u>Contaminated soil from</u> <u>excavation at former dry cleaner</u>		6. Containers (No.-Type) <u>1 roll-off</u>		7. Total Quantity (m³ or yd³) <u>10 CY</u>
	8. Special Handling Instructions and Additional Information <u>Contaminated soil w/ lower concentration chlorinated solvents</u>				
9. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and governmental regulations. The above listed material(s) is (are) not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law. Name & Title (Printed or Typed) <u>Jeffrey K. Anderson - MSA Professional Services Environmental Consultant</u> Signature <u>[Signature]</u> Date <u>4-20-17</u> <u>on behalf of Generator</u>					
TRANSPORTER	10. Transporter 1 (Acknowledgement of receipt of materials) Name/Title _____ Signature _____ Date _____ Address _____ City, St., Zip _____ Phone No. _____				
	11. Transporter 2 (Acknowledgement of receipt of materials) Name/Title _____ Signature _____ Date _____ Address _____ City, St., Zip _____ Phone No. _____				
DISPOSAL SITE		13. Waste Disposal Site Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest except as noted in item 12. Name/Title (Printed or Typed) _____ Signature _____ Date _____			
12. Discrepancy Indication Space Ticket # _____ Tons _____ Yards _____ E _____ N _____ Elev. _____					

CONTRACTOR - WHITE

TRANSPORTER - CANARY

WASTE DISPOSAL SITE - PINK

GENERATOR/OPERATOR - GOLD

ATTACHMENT B

LABORATORY ANALYTICAL REPORTS

MSA Professional Services

Sample Delivery Group: L910291
Samples Received: 05/18/2017
Project Number: 17711000
Description: 902-904 Belknap Street
Site: SUPERIOR, WI
Report To: Jeff Anderson
332 W. Superior Street, Suite 600
Duluth, MN 55802

Entire Report Reviewed By:



John Hawkins

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1	¹Cp
Tc: Table of Contents	2	²Tc
Ss: Sample Summary	3	³Ss
Cn: Case Narrative	4	⁴Cn
Sr: Sample Results	5	⁵Sr
IA-1 L910291-01	5	
IA-2 L910291-02	7	
IA-3 L910291-03	9	
IA-4 L910291-04	11	
Qc: Quality Control Summary	13	⁶Qc
Volatile Organic Compounds (MS) by Method TO-15	13	
Gl: Glossary of Terms	19	⁷Gl
Al: Accreditations & Locations	20	⁸Al
Sc: Chain of Custody	21	⁹Sc

SAMPLE SUMMARY



IA-1 L910291-01 Air

			Collected by Erica Klingfus	Collected date/time 05/17/17 09:00	Received date/time 05/18/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG982086	1	05/22/17 18:09	05/22/17 18:09	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG982597	10	05/24/17 16:25	05/24/17 16:25	MBF

1 Cp

2 Tc

3 Ss

IA-2 L910291-02 Air

			Collected by Erica Klingfus	Collected date/time 05/17/17 09:10	Received date/time 05/18/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG982086	1	05/22/17 18:52	05/22/17 18:52	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG982597	10	05/24/17 17:07	05/24/17 17:07	MBF

4 Cn

5 Sr

6 Qc

IA-3 L910291-03 Air

			Collected by Erica Klingfus	Collected date/time 05/17/17 09:05	Received date/time 05/18/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG982086	1	05/22/17 19:35	05/22/17 19:35	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG982597	20	05/24/17 17:50	05/24/17 17:50	MBF

7 Gl

8 Al

9 Sc

IA-4 L910291-04 Air

			Collected by Erica Klingfus	Collected date/time 05/17/17 09:20	Received date/time 05/18/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG982086	1	05/22/17 20:17	05/22/17 20:17	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG982597	25	05/24/17 18:33	05/24/17 18:33	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG983150	25	05/25/17 18:24	05/25/17 18:24	MBF



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John Hawkins
Technical Service Representative

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Collected date/time: 05/17/17 09:00

L910291

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	1.25	2.97	12.7	30.3		1	WG982086
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG982086
Benzene	71-43-2	78.10	0.200	0.639	0.242	0.772		1	WG982086
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG982086
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG982086
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG982086
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG982086
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG982086
Carbon disulfide	75-15-0	76.10	0.200	0.622	ND	ND		1	WG982086
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG982086
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG982086
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG982086
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG982086
Chloromethane	74-87-3	50.50	0.200	0.413	0.579	1.20		1	WG982086
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG982086
Cyclohexane	110-82-7	84.20	0.200	0.689	2.72	9.36		1	WG982086
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG982086
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG982086
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG982086
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG982086
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG982086
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG982086
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG982086
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG982086
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	8.64	34.2		1	WG982086
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG982086
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG982086
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG982086
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG982086
1,4-Dioxane	123-91-1	88.10	0.200	0.721	ND	ND		1	WG982086
Ethanol	64-17-5	46.10	6.30	11.9	156	294		10	WG982597
Ethylbenzene	100-41-4	106	0.200	0.867	ND	ND		1	WG982086
4-Ethyltoluene	622-96-8	120	0.200	0.982	0.204	1.00		1	WG982086
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.245	1.38		1	WG982086
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.350	1.73		1	WG982086
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG982086
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG982086
Heptane	142-82-5	100	0.200	0.818	0.595	2.43		1	WG982086
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG982086
n-Hexane	110-54-3	86.20	0.200	0.705	1.33	4.69		1	WG982086
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG982086
Methylene Chloride	75-09-2	84.90	0.200	0.694	1.20	4.15		1	WG982086
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG982086
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	ND	ND		1	WG982086
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG982086
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG982086
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG982086
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG982086
2-Propanol	67-63-0	60.10	1.25	3.07	2.00	4.92		1	WG982086
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG982086
Styrene	100-42-5	104	0.200	0.851	ND	ND		1	WG982086
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG982086
Tetrachloroethylene	127-18-4	166	0.200	1.36	29.4	199		1	WG982086
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	ND	ND		1	WG982086
Toluene	108-88-3	92.10	0.200	0.753	3.43	12.9		1	WG982086
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 05/17/17 09:00

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Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch	
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG982086	¹ Cp
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG982086	² Tc
Trichloroethylene	79-01-6	131	0.200	1.07	3.73	20.0		1	WG982086	³ Ss
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	0.289	1.42		1	WG982086	⁴ Cn
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	ND	ND		1	WG982086	⁵ Sr
2,2,4-Trimethylpentane	540-84-1	114.22	0.200	0.934	0.448	2.09		1	WG982086	⁶ Qc
Vinyl chloride	75-01-4	62.50	0.200	0.511	1.29	3.29		1	WG982086	⁷ Gl
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG982086	⁸ Al
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG982086	⁹ Sc
m&p-Xylene	1330-20-7	106	0.400	1.73	0.722	3.13		1	WG982086	
o-Xylene	95-47-6	106	0.200	0.867	0.262	1.13		1	WG982086	
1,1-Difluoroethane	75-37-6	66.05	0.200	0.540	29.5	79.7		1	WG982086	
1,2,3-Trimethylbenzene	526-73-8	120.10	0.200	0.982	ND	ND		1	WG982086	
Chlorodifluoromethane	75-45-6	86.50	0.200	0.708	1.46	5.16		1	WG982086	
Ethyl Acetate	141-78-6	88	0.200	0.720	ND	ND		1	WG982086	
Dicyclopentadiene	77-73-6	132.20	0.200	1.08	ND	ND		1	WG982086	
Methyl Cyclohexane	108-87-2	98.1860	0.200	0.803	0.348	1.40		1	WG982086	
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.200	0.951	ND	ND		1	WG982086	
TPH (GC/MS) Low Fraction	8006-61-9	101	50.0	207	118	486		1	WG982086	
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.6				WG982597	
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		95.8				WG982086	



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Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	Result	Result	Qualifier	Dilution	Batch
			ppbv	ug/m3	ppbv	ug/m3			
Acetone	67-64-1	58.10	1.25	2.97	11.8	28.0		1	WG982086
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG982086
Benzene	71-43-2	78.10	0.200	0.639	0.260	0.830		1	WG982086
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG982086
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG982086
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG982086
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG982086
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG982086
Carbon disulfide	75-15-0	76.10	0.200	0.622	0.240	0.746		1	WG982086
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG982086
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG982086
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG982086
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG982086
Chloromethane	74-87-3	50.50	0.200	0.413	0.467	0.965		1	WG982086
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG982086
Cyclohexane	110-82-7	84.20	0.200	0.689	ND	ND		1	WG982086
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG982086
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG982086
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG982086
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG982086
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG982086
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG982086
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG982086
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG982086
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	32.8	130		1	WG982086
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	0.211	0.835		1	WG982086
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG982086
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG982086
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG982086
1,4-Dioxane	123-91-1	88.10	0.200	0.721	ND	ND		1	WG982086
Ethanol	64-17-5	46.10	0.630	1.19	6.09	11.5		1	WG982086
Ethylbenzene	100-41-4	106	0.200	0.867	0.383	1.66		1	WG982086
4-Ethyltoluene	622-96-8	120	0.200	0.982	0.450	2.21		1	WG982086
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.242	1.36		1	WG982086
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.350	1.73		1	WG982086
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG982086
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG982086
Heptane	142-82-5	100	0.200	0.818	ND	ND		1	WG982086
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG982086
n-Hexane	110-54-3	86.20	0.200	0.705	ND	ND		1	WG982086
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG982086
Methylene Chloride	75-09-2	84.90	0.200	0.694	5.07	17.6		1	WG982086
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG982086
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	2.15	6.35		1	WG982086
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG982086
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG982086
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG982086
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG982086
2-Propanol	67-63-0	60.10	1.25	3.07	ND	ND		1	WG982086
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG982086
Styrene	100-42-5	104	0.200	0.851	ND	ND		1	WG982086
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG982086
Tetrachloroethylene	127-18-4	166	2.00	13.6	139	945		10	WG982597
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	1.01	2.98		1	WG982086
Toluene	108-88-3	92.10	0.200	0.753	4.06	15.3		1	WG982086
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 05/17/17 09:10

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Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG982086
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG982086
Trichloroethylene	79-01-6	131	0.200	1.07	13.2	70.7		1	WG982086
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	0.607	2.98		1	WG982086
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	ND	ND		1	WG982086
2,2,4-Trimethylpentane	540-84-1	114.22	0.200	0.934	ND	ND		1	WG982086
Vinyl chloride	75-01-4	62.50	0.200	0.511	3.16	8.07		1	WG982086
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG982086
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG982086
m&p-Xylene	1330-20-7	106	0.400	1.73	1.62	7.02		1	WG982086
o-Xylene	95-47-6	106	0.200	0.867	0.519	2.25		1	WG982086
1,1-Difluoroethane	75-37-6	66.05	2.00	5.40	98.1	265		10	WG982597
1,2,3-Trimethylbenzene	526-73-8	120.10	0.200	0.982	0.223	1.10		1	WG982086
Chlorodifluoromethane	75-45-6	86.50	0.200	0.708	1.96	6.93		1	WG982086
Ethyl Acetate	141-78-6	88	0.200	0.720	ND	ND		1	WG982086
Dicyclopentadiene	77-73-6	132.20	0.200	1.08	ND	ND		1	WG982086
Methyl Cyclohexane	108-87-2	98.1860	0.200	0.803	ND	ND		1	WG982086
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.200	0.951	ND	ND		1	WG982086
TPH (GC/MS) Low Fraction	8006-61-9	101	50.0	207	259	1070		1	WG982086
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.8				WG982597
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		98.4				WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	Result	Result	Qualifier	Dilution	Batch
			ppbv	ug/m3	ppbv	ug/m3			
Acetone	67-64-1	58.10	1.25	2.97	16.1	38.3		1	WG982086
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG982086
Benzene	71-43-2	78.10	0.200	0.639	0.222	0.708		1	WG982086
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG982086
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG982086
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG982086
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG982086
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG982086
Carbon disulfide	75-15-0	76.10	0.200	0.622	0.248	0.771		1	WG982086
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG982086
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG982086
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG982086
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG982086
Chloromethane	74-87-3	50.50	0.200	0.413	0.611	1.26		1	WG982086
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG982086
Cyclohexane	110-82-7	84.20	0.200	0.689	0.820	2.83		1	WG982086
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG982086
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG982086
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG982086
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG982086
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG982086
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG982086
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG982086
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG982086
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	5.42	21.5		1	WG982086
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG982086
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG982086
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG982086
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG982086
1,4-Dioxane	123-91-1	88.10	0.200	0.721	ND	ND		1	WG982086
Ethanol	64-17-5	46.10	12.6	23.8	347	654		20	WG982597
Ethylbenzene	100-41-4	106	0.200	0.867	0.241	1.04		1	WG982086
4-Ethyltoluene	622-96-8	120	0.200	0.982	ND	ND		1	WG982086
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.219	1.23		1	WG982086
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.370	1.83		1	WG982086
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG982086
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG982086
Heptane	142-82-5	100	0.200	0.818	0.226	0.926		1	WG982086
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG982086
n-Hexane	110-54-3	86.20	0.200	0.705	ND	ND		1	WG982086
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG982086
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.763	2.65		1	WG982086
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG982086
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	ND	ND		1	WG982086
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG982086
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG982086
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG982086
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG982086
2-Propanol	67-63-0	60.10	1.25	3.07	3.81	9.37		1	WG982086
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG982086
Styrene	100-42-5	104	0.200	0.851	ND	ND		1	WG982086
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG982086
Tetrachloroethylene	127-18-4	166	0.200	1.36	20.7	141		1	WG982086
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	0.452	1.33		1	WG982086
Toluene	108-88-3	92.10	0.200	0.753	3.57	13.4		1	WG982086
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG982086

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Collected date/time: 05/17/17 09:05

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Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG982086
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG982086
Trichloroethylene	79-01-6	131	0.200	1.07	2.46	13.2		1	WG982086
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	ND	ND		1	WG982086
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	ND	ND		1	WG982086
2,2,4-Trimethylpentane	540-84-1	114.22	0.200	0.934	ND	ND		1	WG982086
Vinyl chloride	75-01-4	62.50	0.200	0.511	0.496	1.27		1	WG982086
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG982086
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG982086
m&p-Xylene	1330-20-7	106	0.400	1.73	0.666	2.89		1	WG982086
o-Xylene	95-47-6	106	0.200	0.867	0.228	0.990		1	WG982086
1,1-Difluoroethane	75-37-6	66.05	0.200	0.540	24.5	66.1		1	WG982086
1,2,3-Trimethylbenzene	526-73-8	120.10	0.200	0.982	ND	ND		1	WG982086
Chlorodifluoromethane	75-45-6	86.50	0.200	0.708	1.60	5.66		1	WG982086
Ethyl Acetate	141-78-6	88	0.200	0.720	0.319	1.15		1	WG982086
Dicyclopentadiene	77-73-6	132.20	0.200	1.08	ND	ND		1	WG982086
Methyl Cyclohexane	108-87-2	98.1860	0.200	0.803	ND	ND		1	WG982086
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.200	0.951	ND	ND		1	WG982086
TPH (GC/MS) Low Fraction	8006-61-9	101	50.0	207	84.8	350		1	WG982086
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		93.2				WG982597
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		98.1				WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 05/17/17 09:20

L910291

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	Result	Result	Qualifier	Dilution	Batch
			ppbv	ug/m3	ppbv	ug/m3			
Acetone	67-64-1	58.10	31.2	74.1	87.8	209		25	WG982597
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG982086
Benzene	71-43-2	78.10	0.200	0.639	0.727	2.32		1	WG982086
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG982086
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG982086
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG982086
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG982086
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG982086
Carbon disulfide	75-15-0	76.10	0.200	0.622	ND	ND		1	WG982086
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG982086
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG982086
Chloroethane	75-00-3	64.50	0.200	0.528	0.403	1.06		1	WG982086
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG982086
Chloromethane	74-87-3	50.50	0.200	0.413	1.19	2.45		1	WG982086
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG982086
Cyclohexane	110-82-7	84.20	0.200	0.689	2.67	9.19		1	WG982086
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG982086
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG982086
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG982086
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG982086
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG982086
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG982086
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG982086
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG982086
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	2.84	11.3		1	WG982086
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG982086
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG982086
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG982086
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG982086
1,4-Dioxane	123-91-1	88.10	0.200	0.721	ND	ND		1	WG982086
Ethanol	64-17-5	46.10	15.8	29.8	564	1060		25	WG982597
Ethylbenzene	100-41-4	106	5.00	21.7	156	675		25	WG982597
4-Ethyltoluene	622-96-8	120	5.00	24.5	764	3750		25	WG982597
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.256	1.44		1	WG982086
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.376	1.86		1	WG982086
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG982086
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG982086
Heptane	142-82-5	100	0.200	0.818	16.2	66.2		1	WG982086
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG982086
n-Hexane	110-54-3	86.20	0.200	0.705	3.60	12.7		1	WG982086
Isopropylbenzene	98-82-8	120.20	5.00	24.6	34.2	168		25	WG982597
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.570	1.98		1	WG982086
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG982086
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	18.8	55.4		1	WG982086
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG982086
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG982086
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG982086
Naphthalene	91-20-3	128	0.630	3.30	4.63	24.2		1	WG982086
2-Propanol	67-63-0	60.10	1.25	3.07	12.4	30.5		1	WG982086
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG982086
Styrene	100-42-5	104	0.200	0.851	ND	ND		1	WG982086
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG982086
Tetrachloroethylene	127-18-4	166	0.200	1.36	9.90	67.2		1	WG982086
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	36.3	107		1	WG982086
Toluene	108-88-3	92.10	5.00	18.8	86.3	325		25	WG982597
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 05/17/17 09:20

L910291

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG982086
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG982086
Trichloroethylene	79-01-6	131	0.200	1.07	1.28	6.86		1	WG982086
1,2,4-Trimethylbenzene	95-63-6	120	5.00	24.5	682	3340		25	WG982597
1,3,5-Trimethylbenzene	108-67-8	120	5.00	24.5	248	1210		25	WG982597
2,2,4-Trimethylpentane	540-84-1	114.22	5.00	23.4	107	498		25	WG982597
Vinyl chloride	75-01-4	62.50	0.200	0.511	0.376	0.961		1	WG982086
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG982086
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG982086
m&p-Xylene	1330-20-7	106	10.0	43.4	1360	5910		25	WG982597
o-Xylene	95-47-6	106	5.00	21.7	493	2140		25	WG982597
1,1-Difluoroethane	75-37-6	66.05	0.200	0.540	17.6	47.6		1	WG982086
1,2,3-Trimethylbenzene	526-73-8	120.10	5.00	24.6	99.9	491		25	WG983150
Chlorodifluoromethane	75-45-6	86.50	0.200	0.708	3.06	10.8		1	WG982086
Ethyl Acetate	141-78-6	88	0.200	0.720	ND	ND		1	WG982086
Dicyclopentadiene	77-73-6	132.20	0.200	1.08	ND	ND		1	WG982086
Methyl Cyclohexane	108-87-2	98.1860	0.200	0.803	12.1	48.6		1	WG982086
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.200	0.951	ND	ND		1	WG982086
TPH (GC/MS) Low Fraction	8006-61-9	101	1250	5160	7620	31500		25	WG982597
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.0				WG982597
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		108				WG983150
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		133				WG982086

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3220294-3 05/22/17 10:59

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.0569	1.25
Allyl Chloride	U		0.0546	0.200
Benzene	U		0.0460	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0436	0.200
Bromoform	U		0.0786	0.600
Bromomethane	U		0.0609	0.200
1,3-Butadiene	U		0.0563	2.00
Carbon disulfide	U		0.0544	0.200
Carbon tetrachloride	U		0.0585	0.200
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.200
Chloroform	U		0.0574	0.200
Chloromethane	U		0.0544	0.200
2-Chlorotoluene	U		0.0605	0.200
Cyclohexane	U		0.0534	0.200
Dibromochloromethane	U		0.0494	0.200
1,2-Dibromoethane	U		0.0185	0.200
1,2-Dichlorobenzene	U		0.0603	0.200
1,3-Dichlorobenzene	U		0.0597	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0616	0.200
1,1-Dichloroethane	U		0.0514	0.200
1,1-Dichloroethene	U		0.0490	0.200
cis-1,2-Dichloroethene	U		0.0389	0.200
trans-1,2-Dichloroethene	U		0.0464	0.200
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.200
trans-1,3-Dichloropropene	U		0.0435	0.200
1,4-Dioxane	U		0.0554	0.200
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Trichlorofluoromethane	U		0.0673	0.200
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.200
1,2-Dichlorotetrafluoroethane	U		0.0458	0.200
Heptane	U		0.0626	0.200
Hexachloro-1,3-butadiene	U		0.0656	0.630
n-Hexane	U		0.0457	0.200
Isopropylbenzene	U		0.0563	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3220294-3 05/22/17 10:59

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Methylene Chloride	U		0.0465	0.200
Methyl Butyl Ketone	U		0.0682	1.25
2-Butanone (MEK)	U		0.0493	1.25
4-Methyl-2-pentanone (MIBK)	U		0.0650	1.25
Methyl Methacrylate	U		0.0773	0.200
MTBE	U		0.0505	0.200
Naphthalene	U		0.154	0.630
2-Propanol	U		0.0882	1.25
Propene	U		0.0932	0.400
Styrene	U		0.0465	0.200
1,1,2,2-Tetrachloroethane	U		0.0576	0.200
Tetrachloroethylene	U		0.0497	0.200
Tetrahydrofuran	U		0.0508	0.200
Toluene	U		0.0499	0.200
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0665	0.200
1,1,2-Trichloroethane	U		0.0287	0.200
Trichloroethylene	U		0.0545	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
Vinyl chloride	U		0.0457	0.200
Vinyl Bromide	U		0.0727	0.200
Vinyl acetate	U		0.0639	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
Ethanol	0.157	U	0.0832	0.630
TPH (GC/MS) Low Fraction	8.08	U	6.91	50.0
1,1-Difluoroethane	U		0.0325	0.200
1,2,3-Trimethylbenzene	U		0.0325	0.200
Chlorodifluoromethane	U		0.0325	0.200
Dicyclopentadiene	U		0.0325	0.200
Ethyl acetate	U		0.0325	0.200
Methyl Cyclohexane	U		0.0325	0.200
Tert-Amyl Ethyl Ether	U		0.0325	0.200
(S) 1,4-Bromofluorobenzene	97.1		60.0-140	

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3220294-1 05/22/17 09:36 • (LCSD) R3220294-2 05/22/17 10:17

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	3.39	3.39	90.5	90.3	52.0-158			0.200	25
Propene	3.75	3.92	3.74	105	99.6	54.0-155			4.80	25
Dichlorodifluoromethane	3.75	3.57	3.57	95.2	95.1	69.0-143			0.150	25
1,2-Dichlorotetrafluoroethane	3.75	4.25	4.11	113	109	70.0-130			3.46	25
Chloromethane	3.75	3.86	3.67	103	97.7	70.0-130			5.24	25
Vinyl chloride	3.75	4.05	3.93	108	105	70.0-130			2.94	25
1,3-Butadiene	3.75	3.87	3.86	103	103	70.0-130			0.280	25
Bromomethane	3.75	3.92	4.19	105	112	70.0-130			6.65	25
Chloroethane	3.75	3.88	4.23	103	113	70.0-130			8.70	25
Trichlorofluoromethane	3.75	4.19	4.54	112	121	70.0-130			7.88	25
1,1,2-Trichlorotrifluoroethane	3.75	4.07	3.97	108	106	70.0-130			2.47	25
1,1-Dichloroethene	3.75	4.11	3.98	110	106	70.0-130			3.28	25
1,1-Dichloroethane	3.75	3.96	3.90	106	104	70.0-130			1.68	25
Acetone	3.75	3.71	3.61	98.9	96.2	70.0-130			2.73	25
2-Propanol	3.75	3.78	3.74	101	99.6	66.0-150			1.05	25
Carbon disulfide	3.75	3.99	3.92	106	105	70.0-130			1.88	25
Methylene Chloride	3.75	4.03	3.98	107	106	70.0-130			1.22	25
MTBE	3.75	3.89	3.83	104	102	70.0-130			1.57	25
trans-1,2-Dichloroethene	3.75	3.97	3.83	106	102	70.0-130			3.60	25
n-Hexane	3.75	3.84	3.73	102	99.6	70.0-130			2.73	25
Vinyl acetate	3.75	3.94	3.79	105	101	70.0-130			3.95	25
Methyl Ethyl Ketone	3.75	3.76	3.61	100	96.3	70.0-130			3.92	25
cis-1,2-Dichloroethene	3.75	3.92	3.85	105	103	70.0-130			1.69	25
Chloroform	3.75	4.02	3.95	107	105	70.0-130			1.75	25
Cyclohexane	3.75	3.91	3.83	104	102	70.0-130			2.19	25
1,1,1-Trichloroethane	3.75	4.03	3.97	107	106	70.0-130			1.48	25
Carbon tetrachloride	3.75	3.97	3.90	106	104	70.0-130			1.61	25
Benzene	3.75	3.96	3.85	106	103	70.0-130			2.88	25
1,2-Dichloroethane	3.75	4.27	4.12	114	110	70.0-130			3.53	25
Heptane	3.75	4.06	3.93	108	105	70.0-130			3.21	25
Trichloroethylene	3.75	3.96	3.88	106	103	70.0-130			2.21	25
1,2-Dichloropropane	3.75	3.96	3.88	106	104	70.0-130			1.98	25
1,4-Dioxane	3.75	3.79	3.78	101	101	70.0-152			0.260	25
Bromodichloromethane	3.75	3.99	3.89	106	104	70.0-130			2.46	25
cis-1,3-Dichloropropene	3.75	3.89	3.81	104	102	70.0-130			1.95	25
4-Methyl-2-pentanone (MIBK)	3.75	3.96	3.89	106	104	70.0-142			1.86	25
Toluene	3.75	3.95	3.88	105	103	70.0-130			1.76	25
trans-1,3-Dichloropropene	3.75	3.93	3.84	105	102	70.0-130			2.27	25
1,1,2-Trichloroethane	3.75	3.99	3.89	106	104	70.0-130			2.34	25
Tetrachloroethylene	3.75	3.86	3.83	103	102	70.0-130			0.660	25

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3220294-1 05/22/17 09:36 • (LCSD) R3220294-2 05/22/17 10:17

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methyl Butyl Ketone	3.75	3.92	3.90	104	104	70.0-150			0.360	25
Dibromochloromethane	3.75	3.94	3.89	105	104	70.0-130			1.17	25
1,2-Dibromoethane	3.75	3.93	3.88	105	103	70.0-130			1.28	25
Chlorobenzene	3.75	3.92	3.90	104	104	70.0-130			0.400	25
Ethylbenzene	3.75	3.94	3.89	105	104	70.0-130			1.22	25
m&p-Xylene	7.50	7.90	7.88	105	105	70.0-130			0.250	25
o-Xylene	3.75	3.98	3.97	106	106	70.0-130			0.100	25
Styrene	3.75	3.88	3.89	103	104	70.0-130			0.420	25
Bromoform	3.75	3.85	3.86	103	103	70.0-130			0.220	25
1,1,2,2-Tetrachloroethane	3.75	4.09	4.08	109	109	70.0-130			0.300	25
4-Ethyltoluene	3.75	4.04	4.04	108	108	70.0-130			0.0600	25
1,3,5-Trimethylbenzene	3.75	4.13	4.14	110	110	70.0-130			0.300	25
1,2,4-Trimethylbenzene	3.75	4.11	4.14	110	110	70.0-130			0.750	25
1,3-Dichlorobenzene	3.75	4.02	4.06	107	108	70.0-130			0.800	25
1,4-Dichlorobenzene	3.75	4.28	4.32	114	115	70.0-130			1.11	25
Benzyl Chloride	3.75	4.12	4.18	110	111	70.0-144			1.47	25
1,2-Dichlorobenzene	3.75	4.02	4.07	107	109	70.0-130			1.22	25
1,2,4-Trichlorobenzene	3.75	3.97	4.05	106	108	70.0-155			1.99	25
Hexachloro-1,3-butadiene	3.75	3.85	3.90	103	104	70.0-145			1.34	25
Naphthalene	3.75	3.97	4.08	106	109	70.0-155			2.56	25
TPH (GC/MS) Low Fraction	176	190	187	108	106	70.0-130			1.55	25
Allyl Chloride	3.75	3.81	3.74	102	99.6	70.0-130			1.98	25
2-Chlorotoluene	3.75	4.18	4.18	112	111	70.0-130			0.170	25
Methyl Methacrylate	3.75	3.78	3.72	101	99.1	70.0-130			1.65	25
Tetrahydrofuran	3.75	3.93	3.85	105	103	70.0-140			2.08	25
2,2,4-Trimethylpentane	3.75	3.88	3.80	103	101	70.0-130			2.05	25
Vinyl Bromide	3.75	3.85	4.23	103	113	70.0-130			9.62	25
Isopropylbenzene	3.75	3.92	3.90	105	104	70.0-130			0.600	25
1,1-Difluoroethane	3.75	4.11	3.88	110	104	70.0-130			5.67	25
1,2,3-Trimethylbenzene	3.75	4.48	4.50	120	120	70.0-130			0.290	25
Chlorodifluoromethane	3.75	4.20	4.04	112	108	70.0-130			3.85	25
Dicyclopentadiene	3.75	4.66	4.63	124	124	70.0-130			0.450	25
Ethyl acetate	3.75	3.92	3.83	104	102	70.0-130			2.09	25
Methyl Cyclohexane	3.75	3.96	3.85	106	103	70.0-130			2.77	25
Tert-Amyl Ethyl Ether	3.75	3.83	3.78	102	101	70.0-130			1.33	25
(S) 1,4-Bromofluorobenzene				98.8	100	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3220796-3 05/24/17 10:05

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.0569	1.25
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Isopropylbenzene	U		0.0563	0.200
Tetrachloroethylene	U		0.0497	0.200
Toluene	U		0.0499	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
Ethanol	U		0.0832	0.630
TPH (GC/MS) Low Fraction	U		6.91	50.0
1,1-Difluoroethane	U		0.0325	0.200
<i>(S) 1,4-Bromofluorobenzene</i>	94.3			60.0-140

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3220796-1 05/24/17 08:32 • (LCSD) R3220796-2 05/24/17 09:17

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	3.95	3.98	105	106	52.0-158			0.760	25
Acetone	3.75	4.48	4.52	119	120	70.0-130			0.860	25
Toluene	3.75	4.51	4.49	120	120	70.0-130			0.550	25
Tetrachloroethylene	3.75	4.54	4.49	121	120	70.0-130			1.15	25
Ethylbenzene	3.75	4.59	4.57	123	122	70.0-130			0.420	25
m&p-Xylene	7.50	9.22	9.18	123	122	70.0-130			0.470	25
o-Xylene	3.75	4.57	4.55	122	121	70.0-130			0.540	25
4-Ethyltoluene	3.75	4.83	4.81	129	128	70.0-130			0.590	25
1,3,5-Trimethylbenzene	3.75	4.79	4.76	128	127	70.0-130			0.630	25
1,2,4-Trimethylbenzene	3.75	4.71	4.69	126	125	70.0-130			0.510	25
TPH (GC/MS) Low Fraction	176	205	204	116	116	70.0-130			0.520	25
2,2,4-Trimethylpentane	3.75	4.50	4.46	120	119	70.0-130			0.960	25
Isopropylbenzene	3.75	4.63	4.62	123	123	70.0-130			0.150	25
1,1-Difluoroethane	3.75	4.82	4.82	128	128	70.0-130			0.0300	25
<i>(S) 1,4-Bromofluorobenzene</i>				98.4	98.4	60.0-140				



Method Blank (MB)

(MB) R3221163-3 05/25/17 09:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
1,2,3-Trimethylbenzene	U		0.0325	0.200
(S) 1,4-Bromofluorobenzene	94.0			60.0-140

1 Cp

2 Tc

3 Ss

4 Cn

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3221163-1 05/25/17 07:27 • (LCSD) R3221163-2 05/25/17 08:15

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
1,2,3-Trimethylbenzene	3.75	3.49	3.38	93.0	90.1	70.0-130			3.13	25
(S) 1,4-Bromofluorobenzene				99.6	98.5	60.0-140				

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

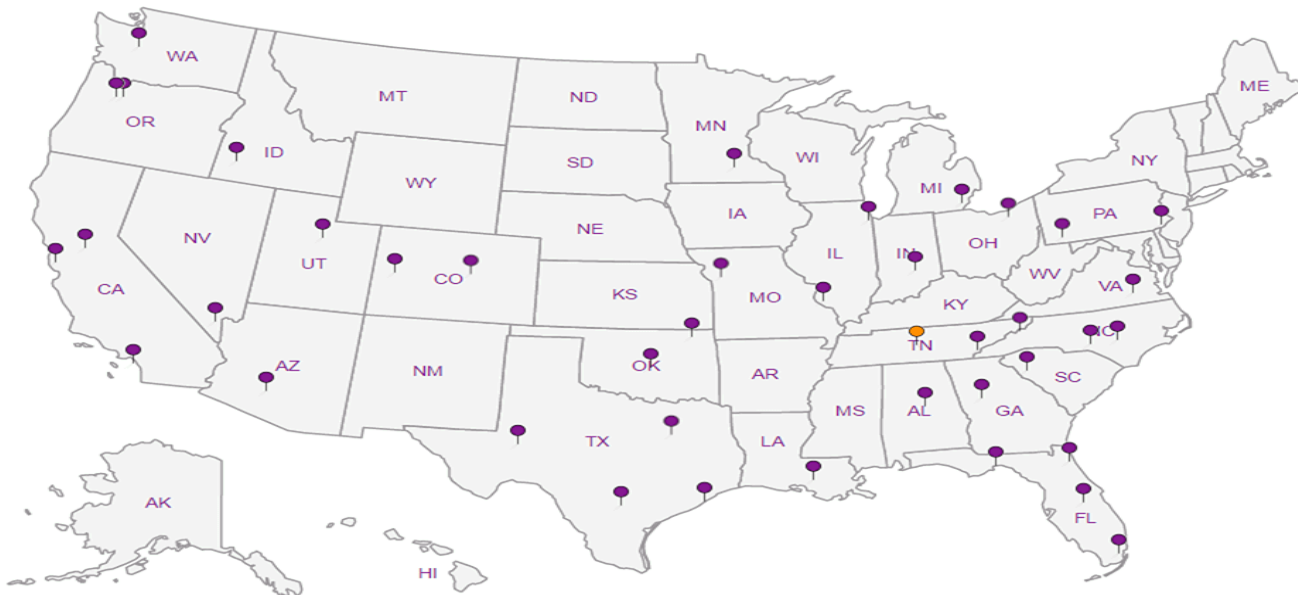
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



MSA Professional Services
 332 W. Superior Street, Suite 600
 Duluth, MN 55802

Billing Information:
MSA Professionals
 332 W. Superior Street, Suite 600
 Duluth, MN 55802

Report to:
Jeff Anderson

Email To: jkanderson@msa-ps.com

Project Description: **902-904 Belknap Street**

City/State Collected: **Superior, WI**

Phone: **218-722-3915** Fax: **218-722-4548**

Client Project # **17711000** Lab Project # **MSAPRODMN-17711000**

Collected by (print): **Erica Klingfus** Site/Facility ID # **SUPERIOR, WI** P.O. #

Collected by (signature): *[Signature]* **Rush?** (Lab MUST Be Notified)
 Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Quote # _____ Date Results Needed _____

Immediately Packed on Ice: **N N/A**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Entrs	Analysis / Container / Preservative
IA-1	24hr comp	Air	-	5/16-5/17/17	0920-0900	1	TO-15TIC Summa
IA-2		Air	-		0930-0910	1	
IA-3		Air	-		0925-0905	1	
IA-4		Air	-		0935-0920	1	

Chain of Custody Page ___ of ___



ESC
 L.A.B S.C.I.E.N.C.E.S

YOUR LAB OF CHOICE

12065 Lebanon Rd
 Mount Juliet, TN 37122
 Phone: 615-758-5858
 Phone: 800-767-5859
 Fax: 615-758-5859



L# **910291**

L201

Acctnum: **MSAPRODMN**

Template: **T123436**

Prelogin: **P600665**

TSR: **341 - John Hawkins**

PB: **6/8**

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Entrs	Analysis / Container / Preservative
IA-1	24hr comp	Air	-	5/16-5/17/17	0920-0900	1	X
IA-2		Air	-		0930-0910	1	X
IA-3		Air	-		0925-0905	1	X
IA-4		Air	-		0935-0920	1	X

* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other _____

Remarks: **IA-4 is in the 2nd box w/ 1 unused canister. IA-1, -2, -3 are in 1st box.**

PH _____ Temp _____
 Flow _____ Other _____

Sample Receipt Checklist:
 COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 If Applicable
 VOA Zero Headpace: Y N
 Preservation Correct/Checked: Y N

Samples returned via: UPS FedEx Courier _____ Tracking # _____

Relinquished by: (Signature) <i>[Signature]</i>	Date: 5/17/17	Time: 1030	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeOH TBR
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp °C 16.5 Bottles Received: 4
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: 5/18/17 Time: 0845 Hold: Condition: NCF / OK

MSA Professional Services

Sample Delivery Group: L914871
Samples Received: 06/09/2017
Project Number: 17711000
Description: 902-904 Belknap Street
Site: SUPERIOR, WI
Report To: Jeff Anderson
332 W. Superior Street, Suite 600
Duluth, MN 55802

Entire Report Reviewed By:












John Hawkins

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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BASEMENT ROOM L914871-01 Air

Collected by: Jeff Anderson
 Collected date/time: 06/08/17 14:15
 Received date/time: 06/09/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG988046	1	06/11/17 11:15	06/11/17 11:15	MJ
Volatile Organic Compounds (MS) by Method TO-15	WG988195	10	06/12/17 20:59	06/12/17 20:59	MJ

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John Hawkins
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

BASEMENT ROOM

SAMPLE RESULTS - 01



Collected date/time: 06/08/17 14:15

L914871

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1	RDL2	Result	Result	Qualifier	Dilution	Batch
			ppbv	ug/m3	ppbv	ug/m3			
Acetone	67-64-1	58.10	1.25	2.97	22.8	54.2		1	WG988046
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG988046
Benzene	71-43-2	78.10	0.200	0.639	ND	ND		1	WG988046
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG988046
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG988046
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG988046
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG988046
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG988046
Carbon disulfide	75-15-0	76.10	0.200	0.622	ND	ND		1	WG988046
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG988046
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG988046
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG988046
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG988046
Chloromethane	74-87-3	50.50	0.200	0.413	0.546	1.13		1	WG988046
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG988046
Cyclohexane	110-82-7	84.20	0.200	0.689	0.323	1.11		1	WG988046
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG988046
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG988046
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG988046
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG988046
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND		1	WG988046
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG988046
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG988046
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG988046
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	19.2	76.1		1	WG988046
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG988046
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG988046
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG988046
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG988046
1,4-Dioxane	123-91-1	88.10	0.200	0.721	ND	ND		1	WG988046
Ethanol	64-17-5	46.10	0.630	1.19	25.3	47.8		1	WG988046
Ethylbenzene	100-41-4	106	0.200	0.867	0.991	4.30		1	WG988046
4-Ethyltoluene	622-96-8	120	0.200	0.982	0.417	2.05		1	WG988046
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.228	1.28		1	WG988046
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.301	1.49		1	WG988046
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG988046
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG988046
Heptane	142-82-5	100	0.200	0.818	0.424	1.73		1	WG988046
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG988046
n-Hexane	110-54-3	86.20	0.200	0.705	0.586	2.07		1	WG988046
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG988046
Methylene Chloride	75-09-2	84.90	0.200	0.694	5.73	19.9		1	WG988046
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG988046
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	2.12	6.26		1	WG988046
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG988046
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG988046
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG988046
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG988046
2-Propanol	67-63-0	60.10	1.25	3.07	16.7	41.0		1	WG988046
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG988046
Styrene	100-42-5	104	0.200	0.851	0.890	3.79		1	WG988046
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG988046
Tetrachloroethylene	127-18-4	166	2.00	13.6	38.3	260		10	WG988195
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	0.965	2.84		1	WG988046
Toluene	108-88-3	92.10	0.200	0.753	13.7	51.7		1	WG988046
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG988046

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 06/08/17 14:15

L914871

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG988046
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG988046
Trichloroethylene	79-01-6	131	0.200	1.07	10.1	54.4		1	WG988046
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	0.522	2.56		1	WG988046
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	ND	ND		1	WG988046
2,2,4-Trimethylpentane	540-84-1	114.22	0.200	0.934	1.44	6.73		1	WG988046
Vinyl chloride	75-01-4	62.50	0.200	0.511	1.76	4.49		1	WG988046
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG988046
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG988046
m&p-Xylene	1330-20-7	106	0.400	1.73	3.71	16.1		1	WG988046
o-Xylene	95-47-6	106	0.200	0.867	1.35	5.87		1	WG988046
1,1-Difluoroethane	75-37-6	66.05	2.00	5.40	50.2	136		10	WG988195
1,2,3-Trimethylbenzene	526-73-8	120.10	0.200	0.982	ND	ND		1	WG988046
Chlorodifluoromethane	75-45-6	86.50	0.200	0.708	4.65	16.5		1	WG988046
Ethyl Acetate	141-78-6	88	0.200	0.720	1.33	4.80		1	WG988046
Dicyclopentadiene	77-73-6	132.20	0.200	1.08	ND	ND		1	WG988046
Methyl Cyclohexane	108-87-2	98.1860	0.200	0.803	0.995	4.00		1	WG988046
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.200	0.951	ND	ND		1	WG988046
TPH (GC/MS) Low Fraction	8006-61-9	101	50.0	207	215	887		1	WG988046
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		100				WG988195
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		103				WG988046

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3224807-2 06/11/17 09:09

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Acetone	U		0.0569	1.25
Allyl Chloride	U		0.0546	0.200
Benzene	U		0.0460	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0436	0.200
Bromoform	U		0.0786	0.600
Bromomethane	U		0.0609	0.200
1,3-Butadiene	U		0.0563	2.00
Carbon disulfide	U		0.0544	0.200
Carbon tetrachloride	U		0.0585	0.200
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.200
Chloroform	U		0.0574	0.200
Chloromethane	U		0.0544	0.200
2-Chlorotoluene	U		0.0605	0.200
Cyclohexane	U		0.0534	0.200
Dibromochloromethane	U		0.0494	0.200
1,2-Dibromoethane	U		0.0185	0.200
1,2-Dichlorobenzene	U		0.0603	0.200
1,3-Dichlorobenzene	U		0.0597	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0616	0.200
1,1-Dichloroethane	U		0.0514	0.200
1,1-Dichloroethene	U		0.0490	0.200
cis-1,2-Dichloroethene	U		0.0389	0.200
trans-1,2-Dichloroethene	U		0.0464	0.200
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.200
trans-1,3-Dichloropropene	U		0.0435	0.200
1,4-Dioxane	U		0.0554	0.200
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Trichlorofluoromethane	U		0.0673	0.200
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.200
1,2-Dichlorotetrafluoroethane	U		0.0458	0.200
Heptane	U		0.0626	0.200
Hexachloro-1,3-butadiene	U		0.0656	0.630
n-Hexane	U		0.0457	0.200
Isopropylbenzene	U		0.0563	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3224807-2 06/11/17 09:09

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Methylene Chloride	0.0700	J	0.0465	0.200
Methyl Butyl Ketone	U		0.0682	1.25
2-Butanone (MEK)	U		0.0493	1.25
4-Methyl-2-pentanone (MIBK)	U		0.0650	1.25
Methyl Methacrylate	U		0.0773	0.200
MTBE	U		0.0505	0.200
Naphthalene	U		0.154	0.630
2-Propanol	U		0.0882	1.25
Propene	U		0.0932	0.400
Styrene	U		0.0465	0.200
1,1,2,2-Tetrachloroethane	U		0.0576	0.200
Tetrahydrofuran	U		0.0508	0.200
Toluene	U		0.0499	0.200
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0665	0.200
1,1,2-Trichloroethane	U		0.0287	0.200
Trichloroethylene	U		0.0545	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
Vinyl chloride	U		0.0457	0.200
Vinyl Bromide	U		0.0727	0.200
Vinyl acetate	U		0.0639	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
Ethanol	U		0.0832	0.630
TPH (GC/MS) Low Fraction	U		6.91	50.0
1,2,3-Trimethylbenzene	U		0.0325	0.200
Chlorodifluoromethane	U		0.0325	0.200
Dicyclopentadiene	U		0.0325	0.200
Ethyl acetate	U		0.0325	0.200
Methyl Cyclohexane	U		0.0325	0.200
Tert-Amyl Ethyl Ether	U		0.0325	0.200
(S) 1,4-Bromofluorobenzene	97.6			60.0-140

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3224807-1 06/11/17 08:21 • (LCSD) R3224807-3 06/11/17 09:56

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	3.73	3.76	99.4	100	52.0-158			0.790	25
Propene	3.75	3.78	3.80	101	101	54.0-155			0.450	25
Dichlorodifluoromethane	3.75	3.94	3.89	105	104	69.0-143			1.33	25
1,2-Dichlorotetrafluoroethane	3.75	3.80	3.82	101	102	70.0-130			0.360	25
Chloromethane	3.75	3.80	3.70	101	98.6	70.0-130			2.77	25
Vinyl chloride	3.75	3.85	3.86	103	103	70.0-130			0.0900	25
1,3-Butadiene	3.75	4.00	4.14	107	110	70.0-130			3.51	25
Bromomethane	3.75	3.78	3.92	101	105	70.0-130			3.83	25
Chloroethane	3.75	3.73	3.86	99.6	103	70.0-130			3.26	25
Trichlorofluoromethane	3.75	3.26	3.37	86.8	89.8	70.0-130			3.36	25
1,1,2-Trichlorotrifluoroethane	3.75	3.64	3.65	97.0	97.3	70.0-130			0.310	25
1,1-Dichloroethene	3.75	3.65	3.66	97.2	97.6	70.0-130			0.390	25
1,1-Dichloroethane	3.75	3.67	3.67	97.8	97.8	70.0-130			0.0600	25
Acetone	3.75	3.67	3.64	97.9	97.2	70.0-130			0.760	25
2-Propanol	3.75	3.73	3.73	99.4	99.4	66.0-150			0.0300	25
Carbon disulfide	3.75	3.65	3.68	97.4	98.1	70.0-130			0.730	25
Methylene Chloride	3.75	3.48	3.49	92.8	93.1	70.0-130			0.320	25
MTBE	3.75	3.66	3.66	97.6	97.5	70.0-130			0.0500	25
trans-1,2-Dichloroethene	3.75	3.69	3.68	98.4	98.1	70.0-130			0.320	25
n-Hexane	3.75	3.65	3.71	97.4	99.1	70.0-130			1.72	25
Vinyl acetate	3.75	3.66	3.66	97.6	97.6	70.0-130			0.0300	25
Methyl Ethyl Ketone	3.75	3.66	3.62	97.6	96.6	70.0-130			1.04	25
cis-1,2-Dichloroethene	3.75	3.65	3.65	97.3	97.4	70.0-130			0.0500	25
Chloroform	3.75	3.64	3.64	97.0	97.0	70.0-130			0.0800	25
Cyclohexane	3.75	3.69	3.69	98.4	98.3	70.0-130			0.0400	25
1,1,1-Trichloroethane	3.75	3.63	3.62	96.7	96.5	70.0-130			0.290	25
Carbon tetrachloride	3.75	3.60	3.58	95.9	95.4	70.0-130			0.520	25
Benzene	3.75	3.65	3.66	97.2	97.7	70.0-130			0.420	25
1,2-Dichloroethane	3.75	3.66	3.66	97.6	97.6	70.0-130			0.0300	25
Heptane	3.75	3.72	3.75	99.1	100	70.0-130			0.940	25
Trichloroethylene	3.75	3.63	3.63	96.7	96.7	70.0-130			0.0500	25
1,2-Dichloropropane	3.75	3.65	3.68	97.4	98.2	70.0-130			0.880	25
1,4-Dioxane	3.75	3.41	3.45	91.0	92.1	70.0-152			1.21	25
Bromodichloromethane	3.75	3.67	3.65	97.8	97.3	70.0-130			0.520	25
cis-1,3-Dichloropropene	3.75	3.67	3.67	97.9	97.7	70.0-130			0.130	25
4-Methyl-2-pentanone (MIBK)	3.75	3.77	3.80	100	101	70.0-142			0.860	25
Toluene	3.75	3.70	3.70	98.6	98.6	70.0-130			0.0200	25
trans-1,3-Dichloropropene	3.75	3.64	3.66	97.1	97.7	70.0-130			0.600	25
1,1,2-Trichloroethane	3.75	3.67	3.68	97.9	98.2	70.0-130			0.260	25
Methyl Butyl Ketone	3.75	3.80	3.81	101	102	70.0-150			0.330	25

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3224807-1 06/11/17 08:21 • (LCSD) R3224807-3 06/11/17 09:56

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Dibromochloromethane	3.75	3.76	3.76	100	100	70.0-130			0.0700	25
1,2-Dibromoethane	3.75	3.78	3.79	101	101	70.0-130			0.0400	25
Chlorobenzene	3.75	3.81	3.84	101	102	70.0-130			1.01	25
Ethylbenzene	3.75	3.82	3.80	102	101	70.0-130			0.540	25
m&p-Xylene	7.50	7.63	7.58	102	101	70.0-130			0.610	25
o-Xylene	3.75	3.83	3.79	102	101	70.0-130			0.970	25
Styrene	3.75	3.91	3.86	104	103	70.0-130			1.13	25
Bromoform	3.75	3.76	3.74	100	99.6	70.0-130			0.760	25
1,1,2,2-Tetrachloroethane	3.75	3.80	3.79	101	101	70.0-130			0.360	25
4-Ethyltoluene	3.75	4.02	3.98	107	106	70.0-130			0.980	25
1,3,5-Trimethylbenzene	3.75	3.92	3.88	104	103	70.0-130			1.03	25
1,2,4-Trimethylbenzene	3.75	3.91	3.88	104	103	70.0-130			0.760	25
1,3-Dichlorobenzene	3.75	3.84	3.82	102	102	70.0-130			0.550	25
1,4-Dichlorobenzene	3.75	3.95	3.93	105	105	70.0-130			0.740	25
Benzyl Chloride	3.75	4.08	4.08	109	109	70.0-144			0.0100	25
1,2-Dichlorobenzene	3.75	3.82	3.81	102	102	70.0-130			0.420	25
1,2,4-Trichlorobenzene	3.75	3.93	3.66	105	97.6	70.0-155			7.24	25
Hexachloro-1,3-butadiene	3.75	3.83	3.53	102	94.2	70.0-145			8.10	25
Naphthalene	3.75	3.68	3.53	98.2	94.1	70.0-155			4.28	25
TPH (GC/MS) Low Fraction	176	179	177	101	101	70.0-130			0.770	25
Allyl Chloride	3.75	3.62	3.57	96.6	95.1	70.0-130			1.50	25
2-Chlorotoluene	3.75	3.91	3.88	104	104	70.0-130			0.770	25
Methyl Methacrylate	3.75	3.74	3.73	99.7	99.6	70.0-130			0.130	25
Tetrahydrofuran	3.75	3.70	3.72	98.6	99.2	70.0-140			0.700	25
2,2,4-Trimethylpentane	3.75	3.74	3.73	99.6	99.6	70.0-130			0.0700	25
Vinyl Bromide	3.75	3.08	3.17	82.1	84.5	70.0-130			2.77	25
Isopropylbenzene	3.75	3.83	3.81	102	102	70.0-130			0.560	25
1,2,3-Trimethylbenzene	3.75	4.02	4.01	107	107	70.0-130			0.140	25
Chlorodifluoromethane	3.75	3.71	3.73	98.9	99.5	70.0-130			0.630	25
Dicyclopentadiene	3.75	4.04	4.03	108	108	70.0-130			0.120	25
Ethyl acetate	3.75	3.45	3.42	92.0	91.3	70.0-130			0.850	25
Methyl Cyclohexane	3.75	3.70	3.72	98.8	99.2	70.0-130			0.440	25
Tert-Amyl Ethyl Ether	3.75	3.65	3.65	97.3	97.2	70.0-130			0.0800	25
(S) 1,4-Bromofluorobenzene				102	102	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3224858-3 06/12/17 09:21

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Tetrachloroethylene	U		0.0497	0.200
1,1-Difluoroethane	U		0.0325	0.200
<i>(S) 1,4-Bromofluorobenzene</i>	97.8			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3224858-1 06/12/17 07:49 • (LCSD) R3224858-2 06/12/17 08:34

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
Tetrachloroethylene	3.75	3.72	3.77	99.2	101	70.0-130			1.44	25
1,1-Difluoroethane	3.75	3.80	3.80	101	101	70.0-130			0.0700	25
<i>(S) 1,4-Bromofluorobenzene</i>				103	103	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

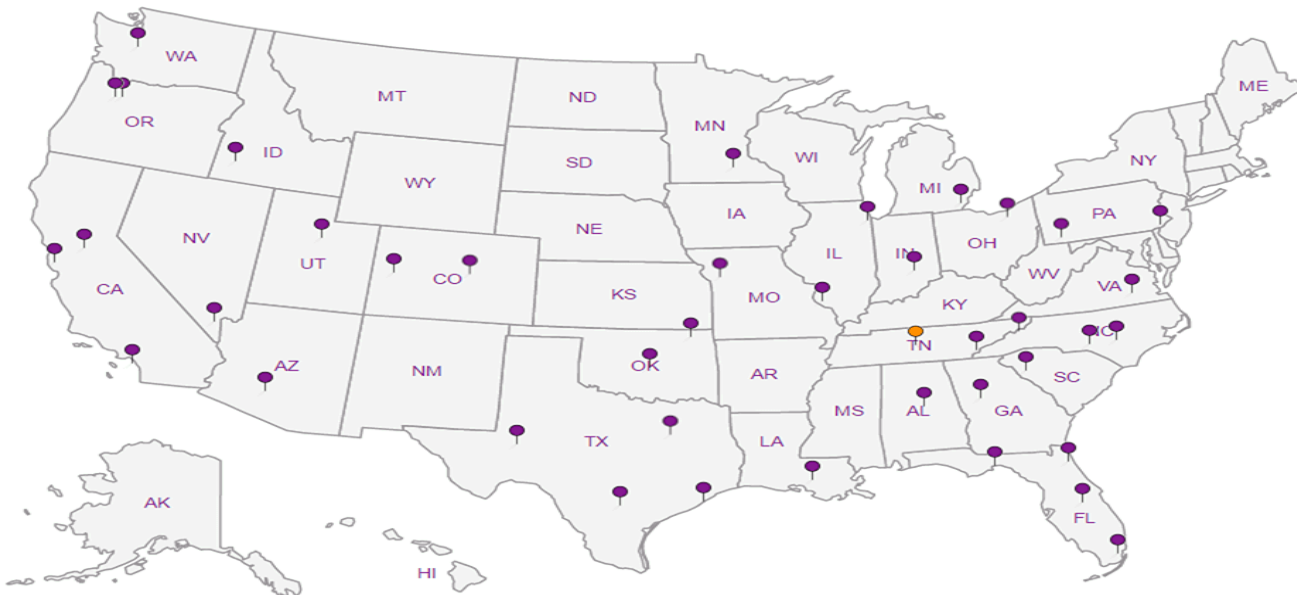
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



MSA Professional Services

332 W. Superior Street, Suite 600
Duluth, MN 55802

Billing Information:
MSA Professionals
332 W. Superior Street, Suite 600
Duluth, MN 55802

Report to:
Jeff Anderson

Email To: jkanderson@msa-ps.com

Project
Description: 902-904 Belknap Street

City/State
Collected:

Phone: 218-722-3915
Fax: 218-722-4548

Client Project #
17711000

Lab Project #
MSAPRODMN-17711000

Collected by (print):
Jeff Anderson

Site/Facility ID #
SUPERIOR, WI

P.O. #

Collected by (signature):
[Signature]

Rush? (Lab MUST Be Notified)
Same Day ___ Five Day ___
Next Day ___ 5 Day (Rad Only) ___
Two Day ___ 10 Day (Rad Only) ___
Three Day ___

Quote #
Date Results Needed

Immediately
Packed on Ice N Y ___

No. of
Cnts

TO-15 TIC Summa

Analysis / Container / Preservative

Chain of Custody Page 1 of 1



YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5856
Phone: 800-767-5808
Fax: 615-758-5859



L# 914871
M023

Tabl
Acctnum: MSAPRODMN

Template: T123436

Prelogin: P605125

TSR: 341 - John Hawkins

PB: LL 6/2

Shipped Via: FedEx Ground

Remarks Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cnts														
Basement Room	Comp	Air	—	6-7-17	2:15	1	X													
		Air		+6-8-17		1	X													

24-hr
sample
collected
from
6-7-17
to 6-8-17

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks:
pH ___ Temp ___
Flow ___ Other ___
Samples returned via:
UPS FedEx ___ Courier ___
Tracking # 758441987732

Sample Receipt Checklist
COC Seal Present/Intact: Y ___ N
COC Signed/Accurate: Y ___ N
Bottles arrive intact: Y ___ N
Correct bottles used: Y ___ N
Sufficient volume sent: Y ___ N
If Applicable
VQA Zero Headspace: ___ Y ___ N
Preservation Correct/Checked: ___ Y ___ N

Relinquished by: (Signature) <i>[Signature]</i>	Date: 6-8-17	Time: 3:15	Received by: (Signature)	Trip Blank Received: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> HCL/MeOH TBR	Temp: °C Amb	Bottles Received: 1	If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Hold:	Condition: NCF / OK
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: 6/9/17	Time: 0845		

September 20, 2017

MSA Professional Services

Sample Delivery Group: L934880
Samples Received: 09/08/2017
Project Number: 17711000
Description: 902/904 Belknap

Report To: Mark Davidson
332 W. Superior Street, Suite 600
Duluth, MN 55802

Entire Report Reviewed By:



John Hawkins
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1	1 Cp
Tc: Table of Contents	2	2 Tc
Ss: Sample Summary	3	3 Ss
Cn: Case Narrative	4	4 Cn
Sr: Sample Results	5	5 Sr
INDOOR AIR-9/7/17 L934880-01	5	5 Sr
Qc: Quality Control Summary	7	6 Qc
Volatile Organic Compounds (MS) by Method TO-15	7	5 Sr
Gl: Glossary of Terms	12	7 Gl
Al: Accreditations & Locations	13	8 Al
Sc: Sample Chain of Custody	14	9 Sc

SAMPLE SUMMARY



INDOOR AIR-9/7/17 L934880-01 Air

Collected by: Mark Davidson
 Collected date/time: 09/07/17 09:09
 Received date/time: 09/08/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1019235	1	09/12/17 20:49	09/12/17 20:49	DWR
Volatile Organic Compounds (MS) by Method TO-15	WG1020389	25	09/15/17 05:06	09/15/17 05:06	DWR

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John Hawkins
Technical Service Representative

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	1.25	2.97	25.7	61.0		1	WG1019235
Allyl chloride	107-05-1	76.53	0.200	0.626	ND	ND		1	WG1019235
Benzene	71-43-2	78.10	0.200	0.639	0.229	0.732		1	WG1019235
Benzyl Chloride	100-44-7	127	0.200	1.04	ND	ND		1	WG1019235
Bromodichloromethane	75-27-4	164	0.200	1.34	ND	ND		1	WG1019235
Bromoform	75-25-2	253	0.600	6.21	ND	ND		1	WG1019235
Bromomethane	74-83-9	94.90	0.200	0.776	ND	ND		1	WG1019235
1,3-Butadiene	106-99-0	54.10	2.00	4.43	ND	ND		1	WG1019235
Carbon disulfide	75-15-0	76.10	0.200	0.622	ND	ND		1	WG1019235
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1019235
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG1019235
Chloroethane	75-00-3	64.50	0.200	0.528	ND	ND		1	WG1019235
Chloroform	67-66-3	119	0.200	0.973	ND	ND		1	WG1019235
Chloromethane	74-87-3	50.50	0.200	0.413	0.643	1.33		1	WG1019235
2-Chlorotoluene	95-49-8	126	0.200	1.03	ND	ND		1	WG1019235
Cyclohexane	110-82-7	84.20	0.200	0.689	0.309	1.06		1	WG1019235
Dibromochloromethane	124-48-1	208	0.200	1.70	ND	ND		1	WG1019235
1,2-Dibromoethane	106-93-4	188	0.200	1.54	ND	ND		1	WG1019235
1,2-Dichlorobenzene	95-50-1	147	0.200	1.20	ND	ND		1	WG1019235
1,3-Dichlorobenzene	541-73-1	147	0.200	1.20	ND	ND		1	WG1019235
1,4-Dichlorobenzene	106-46-7	147	0.200	1.20	ND	ND	J4	1	WG1019235
1,2-Dichloroethane	107-06-2	99	0.200	0.810	ND	ND		1	WG1019235
1,1-Dichloroethane	75-34-3	98	0.200	0.802	ND	ND		1	WG1019235
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1019235
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	1.90	7.51		1	WG1019235
trans-1,2-Dichloroethene	156-60-5	96.90	0.200	0.793	ND	ND		1	WG1019235
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG1019235
cis-1,3-Dichloropropene	10061-01-5	111	0.200	0.908	ND	ND		1	WG1019235
trans-1,3-Dichloropropene	10061-02-6	111	0.200	0.908	ND	ND		1	WG1019235
1,4-Dioxane	123-91-1	88.10	0.200	0.721	1.44	5.20		1	WG1019235
Ethanol	64-17-5	46.10	15.8	29.8	153	289		25	WG1020389
Ethylbenzene	100-41-4	106	0.200	0.867	2.45	10.6		1	WG1019235
4-Ethyltoluene	622-96-8	120	0.200	0.982	ND	ND		1	WG1019235
Trichlorofluoromethane	75-69-4	137.40	0.200	1.12	0.229	1.29		1	WG1019235
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.647	3.20		1	WG1019235
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.200	1.53	ND	ND		1	WG1019235
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.200	1.40	ND	ND		1	WG1019235
Heptane	142-82-5	100	0.200	0.818	0.357	1.46		1	WG1019235
Hexachloro-1,3-butadiene	87-68-3	261	0.630	6.73	ND	ND		1	WG1019235
n-Hexane	110-54-3	86.20	0.200	0.705	0.506	1.78		1	WG1019235
Isopropylbenzene	98-82-8	120.20	0.200	0.983	ND	ND		1	WG1019235
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.877	3.04		1	WG1019235
Methyl Butyl Ketone	591-78-6	100	1.25	5.11	ND	ND		1	WG1019235
2-Butanone (MEK)	78-93-3	72.10	1.25	3.69	1.59	4.68		1	WG1019235
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	1.25	5.12	ND	ND		1	WG1019235
Methyl methacrylate	80-62-6	100.12	0.200	0.819	ND	ND		1	WG1019235
MTBE	1634-04-4	88.10	0.200	0.721	ND	ND		1	WG1019235
Naphthalene	91-20-3	128	0.630	3.30	ND	ND		1	WG1019235
2-Propanol	67-63-0	60.10	1.25	3.07	13.7	33.8		1	WG1019235
Propene	115-07-1	42.10	0.400	0.689	ND	ND		1	WG1019235
Styrene	100-42-5	104	0.200	0.851	0.491	2.09		1	WG1019235
1,1,2,2-Tetrachloroethane	79-34-5	168	0.200	1.37	ND	ND		1	WG1019235
Tetrachloroethylene	127-18-4	166	0.200	1.36	4.08	27.7		1	WG1019235
Tetrahydrofuran	109-99-9	72.10	0.200	0.590	0.346	1.02		1	WG1019235
Toluene	108-88-3	92.10	0.200	0.753	4.18	15.7		1	WG1019235
1,2,4-Trichlorobenzene	120-82-1	181	0.630	4.66	ND	ND		1	WG1019235

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG1019235
1,1,2-Trichloroethane	79-00-5	133	0.200	1.09	ND	ND		1	WG1019235
Trichloroethylene	79-01-6	131	0.200	1.07	0.845	4.53		1	WG1019235
1,2,4-Trimethylbenzene	95-63-6	120	0.200	0.982	0.289	1.42		1	WG1019235
1,3,5-Trimethylbenzene	108-67-8	120	0.200	0.982	ND	ND		1	WG1019235
2,2,4-Trimethylpentane	540-84-1	114.22	0.200	0.934	2.31	10.8		1	WG1019235
Vinyl chloride	75-01-4	62.50	0.200	0.511	0.203	0.519		1	WG1019235
Vinyl Bromide	593-60-2	106.95	0.200	0.875	ND	ND		1	WG1019235
Vinyl acetate	108-05-4	86.10	0.200	0.704	ND	ND		1	WG1019235
m&p-Xylene	1330-20-7	106	0.400	1.73	8.87	38.5		1	WG1019235
o-Xylene	95-47-6	106	0.200	0.867	2.56	11.1		1	WG1019235
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		104				WG1019235
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.8				WG1020389

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3248906-3 09/12/17 10:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Acetone	U		0.0569	1.25
Allyl Chloride	U		0.0546	0.200
Benzene	U		0.0460	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0436	0.200
Bromoform	U		0.0786	0.600
Bromomethane	U		0.0609	0.200
1,3-Butadiene	U		0.0563	2.00
Carbon disulfide	U		0.0544	0.200
Carbon tetrachloride	U		0.0585	0.200
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.200
Chloroform	U		0.0574	0.200
Chloromethane	U		0.0544	0.200
2-Chlorotoluene	U		0.0605	0.200
Cyclohexane	U		0.0534	0.200
Dibromochloromethane	U		0.0494	0.200
1,2-Dibromoethane	U		0.0185	0.200
1,2-Dichlorobenzene	U		0.0603	0.200
1,3-Dichlorobenzene	U		0.0597	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0616	0.200
1,1-Dichloroethane	U		0.0514	0.200
1,1-Dichloroethene	U		0.0490	0.200
cis-1,2-Dichloroethene	U		0.0389	0.200
trans-1,2-Dichloroethene	U		0.0464	0.200
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.200
trans-1,3-Dichloropropene	U		0.0435	0.200
1,4-Dioxane	U		0.0554	0.200
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Trichlorofluoromethane	U		0.0673	0.200
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.200
1,2-Dichlorotetrafluoroethane	U		0.0458	0.200
Heptane	U		0.0626	0.200
Hexachloro-1,3-butadiene	U		0.0656	0.630
n-Hexane	U		0.0457	0.200
Isopropylbenzene	U		0.0563	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3248906-3 09/12/17 10:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Methylene Chloride	U		0.0465	0.200
Methyl Butyl Ketone	U		0.0682	1.25
2-Butanone (MEK)	U		0.0493	1.25
4-Methyl-2-pentanone (MIBK)	U		0.0650	1.25
Methyl Methacrylate	U		0.0773	0.200
MTBE	U		0.0505	0.200
Naphthalene	U		0.154	0.630
2-Propanol	0.130	U	0.0882	1.25
Propene	U		0.0932	0.400
Styrene	U		0.0465	0.200
1,1,2,2-Tetrachloroethane	U		0.0576	0.200
Tetrachloroethylene	U		0.0497	0.200
Tetrahydrofuran	U		0.0508	0.200
Toluene	U		0.0499	0.200
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0665	0.200
1,1,2-Trichloroethane	U		0.0287	0.200
Trichloroethylene	U		0.0545	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
Vinyl chloride	U		0.0457	0.200
Vinyl Bromide	U		0.0727	0.200
Vinyl acetate	U		0.0639	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
(S) 1,4-Bromofluorobenzene	98.5			60.0-140

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3248906-1 09/12/17 08:48 • (LCSD) R3248906-2 09/12/17 09:35

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
Propene	3.75	4.10	4.13	109	110	54.0-155			0.640	25
Dichlorodifluoromethane	3.75	3.74	3.77	99.7	100	69.0-143			0.700	25
1,2-Dichlorotetrafluoroethane	3.75	4.15	4.18	111	112	70.0-130			0.900	25
Chloromethane	3.75	3.87	4.00	103	107	70.0-130			3.24	25
Vinyl chloride	3.75	3.93	3.94	105	105	70.0-130			0.0300	25
1,3-Butadiene	3.75	3.91	3.94	104	105	70.0-130			0.720	25



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3248906-1 09/12/17 08:48 • (LCSD) R3248906-2 09/12/17 09:35

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromomethane	3.75	3.96	3.96	106	106	70.0-130			0.180	25
Chloroethane	3.75	4.10	3.97	109	106	70.0-130			3.14	25
Trichlorofluoromethane	3.75	4.11	4.16	110	111	70.0-130			1.26	25
1,1,2-Trichlorotrifluoroethane	3.75	4.14	4.17	110	111	70.0-130			0.740	25
1,1-Dichloroethene	3.75	4.09	4.14	109	110	70.0-130			1.19	25
1,1-Dichloroethane	3.75	4.07	4.11	109	110	70.0-130			0.900	25
Acetone	3.75	4.07	4.14	109	110	70.0-130			1.79	25
2-Propanol	3.75	4.23	4.29	113	114	66.0-150			1.39	25
Carbon disulfide	3.75	4.13	4.15	110	111	70.0-130			0.320	25
Methylene Chloride	3.75	4.00	4.03	107	107	70.0-130			0.560	25
MTBE	3.75	4.12	4.13	110	110	70.0-130			0.150	25
trans-1,2-Dichloroethene	3.75	4.12	4.15	110	111	70.0-130			0.670	25
n-Hexane	3.75	4.04	4.13	108	110	70.0-130			2.09	25
Vinyl acetate	3.75	4.20	4.23	112	113	70.0-130			0.840	25
Methyl Ethyl Ketone	3.75	4.16	4.19	111	112	70.0-130			0.670	25
cis-1,2-Dichloroethene	3.75	4.11	4.14	110	110	70.0-130			0.680	25
Chloroform	3.75	4.08	4.11	109	110	70.0-130			0.710	25
Cyclohexane	3.75	4.12	4.11	110	110	70.0-130			0.160	25
1,1,1-Trichloroethane	3.75	4.11	4.11	109	109	70.0-130			0.000	25
Carbon tetrachloride	3.75	4.10	4.10	109	109	70.0-130			0.0700	25
Benzene	3.75	4.13	4.16	110	111	70.0-130			0.720	25
1,2-Dichloroethane	3.75	4.09	4.12	109	110	70.0-130			0.690	25
Heptane	3.75	4.17	4.12	111	110	70.0-130			1.22	25
Trichloroethylene	3.75	4.11	4.16	110	111	70.0-130			1.01	25
1,2-Dichloropropane	3.75	4.08	4.13	109	110	70.0-130			1.26	25
1,4-Dioxane	3.75	4.12	4.29	110	114	70.0-152			4.03	25
Bromodichloromethane	3.75	4.15	4.17	111	111	70.0-130			0.610	25
cis-1,3-Dichloropropene	3.75	4.18	4.20	112	112	70.0-130			0.440	25
4-Methyl-2-pentanone (MIBK)	3.75	4.27	4.35	114	116	70.0-142			1.78	25
Toluene	3.75	4.18	4.23	112	113	70.0-130			1.12	25
trans-1,3-Dichloropropene	3.75	4.25	4.27	113	114	70.0-130			0.250	25
1,1,2-Trichloroethane	3.75	4.13	4.17	110	111	70.0-130			0.860	25
Tetrachloroethylene	3.75	4.21	4.22	112	113	70.0-130			0.350	25
Methyl Butyl Ketone	3.75	4.56	4.66	121	124	70.0-150			2.27	25
Dibromochloromethane	3.75	4.31	4.33	115	116	70.0-130			0.680	25
1,2-Dibromoethane	3.75	4.29	4.32	115	115	70.0-130			0.640	25
Chlorobenzene	3.75	4.27	4.31	114	115	70.0-130			0.800	25
Ethylbenzene	3.75	4.27	4.31	114	115	70.0-130			0.900	25
m&p-Xylene	7.50	8.52	8.62	114	115	70.0-130			1.18	25
o-Xylene	3.75	4.24	4.27	113	114	70.0-130			0.650	25

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3248906-1 09/12/17 08:48 • (LCSD) R3248906-2 09/12/17 09:35

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Styrene	3.75	4.49	4.53	120	121	70.0-130			1.02	25
Bromoform	3.75	4.48	4.53	119	121	70.0-130			1.13	25
1,1,2,2-Tetrachloroethane	3.75	4.22	4.28	113	114	70.0-130			1.54	25
4-Ethyltoluene	3.75	4.52	4.59	121	122	70.0-130			1.36	25
1,3,5-Trimethylbenzene	3.75	4.39	4.45	117	119	70.0-130			1.31	25
1,2,4-Trimethylbenzene	3.75	4.40	4.45	117	119	70.0-130			1.19	25
1,3-Dichlorobenzene	3.75	4.71	4.79	126	128	70.0-130			1.72	25
1,4-Dichlorobenzene	3.75	5.07	5.16	135	138	70.0-130	J4	J4	1.84	25
Benzyl Chloride	3.75	5.24	5.37	140	143	70.0-144			2.45	25
1,2-Dichlorobenzene	3.75	4.53	4.61	121	123	70.0-130			1.74	25
1,2,4-Trichlorobenzene	3.75	4.83	5.03	129	134	70.0-155			4.06	25
Hexachloro-1,3-butadiene	3.75	4.32	4.38	115	117	70.0-145			1.43	25
Naphthalene	3.75	4.73	4.91	126	131	70.0-155			3.71	25
Allyl Chloride	3.75	4.11	4.12	110	110	70.0-130			0.210	25
2-Chlorotoluene	3.75	4.38	4.43	117	118	70.0-130			1.23	25
Methyl Methacrylate	3.75	4.18	4.23	112	113	70.0-130			1.22	25
Tetrahydrofuran	3.75	4.12	4.16	110	111	70.0-140			0.870	25
2,2,4-Trimethylpentane	3.75	4.18	4.20	112	112	70.0-130			0.520	25
Vinyl Bromide	3.75	4.11	4.14	109	110	70.0-130			0.900	25
Isopropylbenzene	3.75	4.25	4.31	113	115	70.0-130			1.43	25
(S) 1,4-Bromofluorobenzene				103	103	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3249653-3 09/15/17 00:05

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Ethanol	U		0.0832	0.630
<i>(S) 1,4-Bromofluorobenzene</i>	97.0			60.0-140

1 Cp

2 Tc

3 Ss

4 Cn

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3249653-1 09/14/17 22:35 • (LCSD) R3249653-2 09/14/17 23:20

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
Ethanol	3.75	3.15	3.23	84.1	86.2	52.0-158			2.52	25
<i>(S) 1,4-Bromofluorobenzene</i>				102	102	60.0-140				

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 AI

9 Sc

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

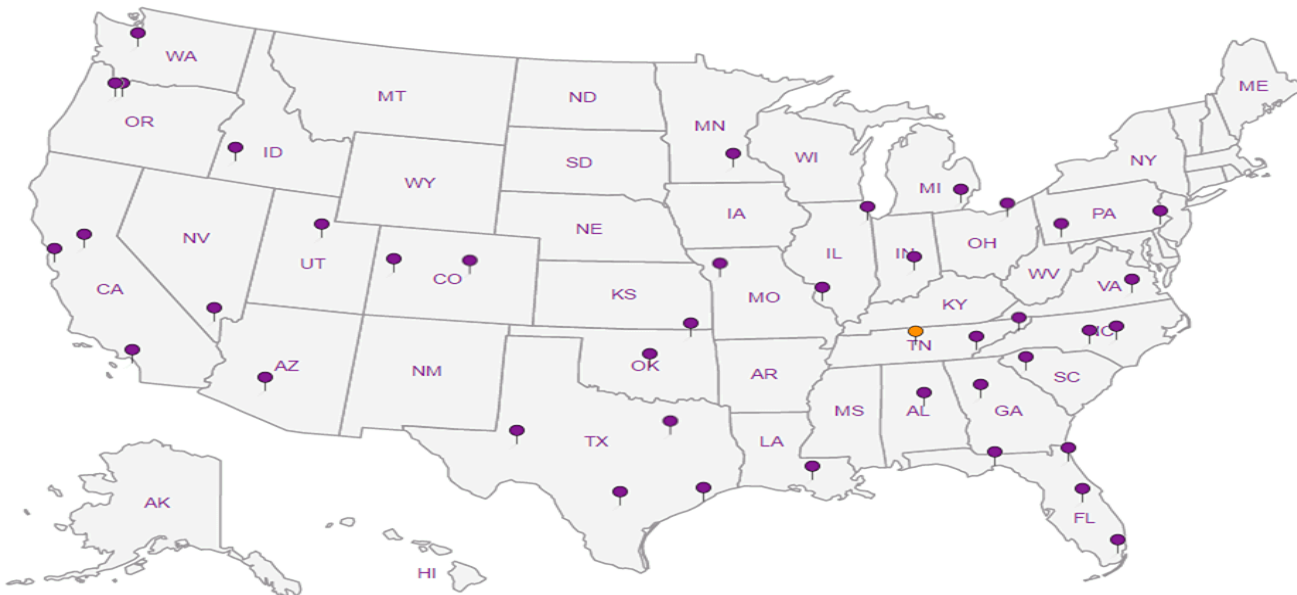
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



1
Cp

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Tc

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Ss

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Cn

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Qc

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November 02, 2017

MSA Professional Services

Sample Delivery Group: L946458
Samples Received: 10/26/2017
Project Number: 17711000
Description: 902-904 Belknap Street
Site: SUPERIOR, WI
Report To: Mark Davidson
332 W. Superior Street, Suite 600
Duluth, MN 55802

Entire Report Reviewed By:



John Hawkins

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1	¹Cp
Tc: Table of Contents	2	²Tc
Ss: Sample Summary	3	³Ss
Cn: Case Narrative	4	⁴Cn
Sr: Sample Results	5	⁵Sr
IA-5 L946458-01	5	
IA-6 L946458-02	7	
IA-7 L946458-03	9	
IA-8 L946458-04	11	
Qc: Quality Control Summary	13	⁶Qc
Volatile Organic Compounds (MS) by Method TO-15	13	
Gl: Glossary of Terms	18	⁷Gl
Al: Accreditations & Locations	19	⁸Al
Sc: Sample Chain of Custody	20	⁹Sc

SAMPLE SUMMARY



IA-5 L946458-01 Air

Collected by
Erica Klingfus
Collected date/time
10/25/17 08:40
Received date/time
10/26/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1035799	1	10/26/17 15:35	10/26/17 15:35	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1036268	10	10/27/17 12:59	10/27/17 12:59	MBF

¹Cp

²Tc

³Ss

IA-6 L946458-02 Air

Collected by
Erica Klingfus
Collected date/time
10/25/17 08:45
Received date/time
10/26/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1035799	1	10/26/17 16:25	10/26/17 16:25	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1036268	25	10/27/17 13:45	10/27/17 13:45	MBF

⁴Cn

⁵Sr

⁶Qc

IA-7 L946458-03 Air

Collected by
Erica Klingfus
Collected date/time
10/25/17 08:30
Received date/time
10/26/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1035799	1	10/26/17 17:17	10/26/17 17:17	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1036268	10	10/27/17 14:31	10/27/17 14:31	MBF

⁷Gl

⁸Al

⁹Sc

IA-8 L946458-04 Air

Collected by
Erica Klingfus
Collected date/time
10/25/17 08:35
Received date/time
10/26/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1035799	1	10/26/17 18:09	10/26/17 18:09	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1036268	10	10/27/17 15:16	10/27/17 15:16	MBF



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John Hawkins
Technical Service Representative

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Collected date/time: 10/25/17 08:40

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	0.190	0.451	8.11	19.3		1	WG1035799
Allyl chloride	107-05-1	76.53	0.182	0.570	ND	ND		1	WG1035799
Benzene	71-43-2	78.10	0.153	0.489	ND	ND		1	WG1035799
Benzyl Chloride	100-44-7	127	0.199	1.03	ND	ND		1	WG1035799
Bromodichloromethane	75-27-4	164	0.145	0.973	ND	ND		1	WG1035799
Bromoform	75-25-2	253	0.262	2.71	ND	ND		1	WG1035799
Bromomethane	74-83-9	94.90	0.203	0.788	ND	ND		1	WG1035799
1,3-Butadiene	106-99-0	54.10	0.188	0.416	ND	ND		1	WG1035799
Carbon disulfide	75-15-0	76.10	0.181	0.563	ND	ND		1	WG1035799
Carbon tetrachloride	56-23-5	154	0.195	1.23	ND	ND		1	WG1035799
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG1035799
Chloroethane	75-00-3	64.50	0.163	0.430	ND	ND		1	WG1035799
Chloroform	67-66-3	119	0.191	0.930	ND	ND		1	WG1035799
Chloromethane	74-87-3	50.50	0.181	0.374	0.491	1.01		1	WG1035799
2-Chlorotoluene	95-49-8	126	0.202	1.04	ND	ND		1	WG1035799
Cyclohexane	110-82-7	84.20	0.178	0.613	ND	ND		1	WG1035799
Dibromochloromethane	124-48-1	208	0.165	1.40	ND	ND		1	WG1035799
1,2-Dibromoethane	106-93-4	188	0.0617	0.474	ND	ND		1	WG1035799
1,2-Dichlorobenzene	95-50-1	147	0.201	1.21	ND	ND		1	WG1035799
1,3-Dichlorobenzene	541-73-1	147	0.199	1.20	ND	ND		1	WG1035799
1,4-Dichlorobenzene	106-46-7	147	0.186	1.12	ND	ND		1	WG1035799
1,2-Dichloroethane	107-06-2	99	0.205	0.830	ND	ND		1	WG1035799
1,1-Dichloroethane	75-34-3	98	0.171	0.685	ND	ND		1	WG1035799
1,1-Dichloroethene	75-35-4	96.90	0.163	0.646	ND	ND		1	WG1035799
cis-1,2-Dichloroethene	156-59-2	96.90	0.130	0.515	0.496	1.97		1	WG1035799
trans-1,2-Dichloroethene	156-60-5	96.90	0.155	0.614	ND	ND		1	WG1035799
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG1035799
cis-1,3-Dichloropropene	10061-01-5	111	0.196	0.890	ND	ND		1	WG1035799
trans-1,3-Dichloropropene	10061-02-6	111	0.145	0.658	ND	ND		1	WG1035799
1,4-Dioxane	123-91-1	88.10	0.185	0.667	ND	ND		1	WG1035799
Ethanol	64-17-5	46.10	2.77	5.22	105	197		10	WG1036268
Ethylbenzene	100-41-4	106	0.169	0.733	ND	ND		1	WG1035799
4-Ethyltoluene	622-96-8	120	0.222	1.09	ND	ND		1	WG1035799
Trichlorofluoromethane	75-69-4	137.40	0.224	1.26	ND	ND		1	WG1035799
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.251	1.24		1	WG1035799
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.229	1.76	ND	ND		1	WG1035799
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.153	1.07	ND	ND		1	WG1035799
Heptane	142-82-5	100	0.209	0.855	0.262	1.07		1	WG1035799
Hexachloro-1,3-butadiene	87-68-3	261	0.219	2.34	ND	ND		1	WG1035799
n-Hexane	110-54-3	86.20	0.152	0.536	ND	ND		1	WG1035799
Isopropylbenzene	98-82-8	120.20	0.188	0.924	ND	ND		1	WG1035799
Methylene Chloride	75-09-2	84.90	0.155	0.538	ND	ND		1	WG1035799
Methyl Butyl Ketone	591-78-6	100	0.227	0.928	ND	ND		1	WG1035799
2-Butanone (MEK)	78-93-3	72.10	0.164	0.484	0.342	1.01		1	WG1035799
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	0.217	0.888	ND	ND		1	WG1035799
Methyl methacrylate	80-62-6	100.12	0.258	1.06	ND	ND		1	WG1035799
MTBE	1634-04-4	88.10	0.168	0.605	ND	ND		1	WG1035799
Naphthalene	91-20-3	128	0.513	2.69	ND	ND		1	WG1035799
2-Propanol	67-63-0	60.10	0.294	0.723	0.968	2.38		1	WG1035799
Propene	115-07-1	42.10	0.311	0.536	ND	ND		1	WG1035799
Styrene	100-42-5	104	0.155	0.659	ND	ND		1	WG1035799
1,1,2,2-Tetrachloroethane	79-34-5	168	0.192	1.32	ND	ND		1	WG1035799
Tetrachloroethylene	127-18-4	166	0.166	1.13	0.964	6.55		1	WG1035799
Tetrahydrofuran	109-99-9	72.10	0.169	0.498	ND	ND		1	WG1035799
Toluene	108-88-3	92.10	0.166	0.625	1.16	4.38		1	WG1035799
1,2,4-Trichlorobenzene	120-82-1	181	0.493	3.65	ND	ND		1	WG1035799

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

ACCOUNT:

MSA Professional Services

PROJECT:

17711000

SDG:

L946458

DATE/TIME:

11/02/17 10:19

PAGE:

5 of 21



Collected date/time: 10/25/17 08:40

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.222	1.21	ND	ND		1	WG1035799
1,1,2-Trichloroethane	79-00-5	133	0.0957	0.521	ND	ND		1	WG1035799
Trichloroethylene	79-01-6	131	0.182	0.975	0.202	1.08		1	WG1035799
1,2,4-Trimethylbenzene	95-63-6	120	0.161	0.790	ND	ND		1	WG1035799
1,3,5-Trimethylbenzene	108-67-8	120	0.210	1.03	ND	ND		1	WG1035799
2,2,4-Trimethylpentane	540-84-1	114.22	0.152	0.710	0.347	1.62		1	WG1035799
Vinyl chloride	75-01-4	62.50	0.152	0.389	ND	ND		1	WG1035799
Vinyl Bromide	593-60-2	106.95	0.242	1.06	ND	ND		1	WG1035799
Vinyl acetate	108-05-4	86.10	0.213	0.750	ND	ND		1	WG1035799
m&p-Xylene	1330-20-7	106	0.315	1.37	0.390	1.69		1	WG1035799
o-Xylene	95-47-6	106	0.211	0.915	ND	ND		1	WG1035799
1,1-Difluoroethane	75-37-6	66.05	0.108	0.292	3.18	8.58		1	WG1035799
1,2,3-Trimethylbenzene	526-73-8	120.10	0.108	0.531	ND	ND		1	WG1035799
Chlorodifluoromethane	75-45-6	86.50	0.108	0.382	ND	ND		1	WG1035799
Ethyl Acetate	141-78-6	88	0.108	0.389	ND	ND		1	WG1035799
Dicyclopentadiene	77-73-6	132.20	0.108	0.584	ND	ND		1	WG1035799
Methyl Cyclohexane	108-87-2	98.1860	0.108	0.434	ND	ND		1	WG1035799
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.108	0.513	ND	ND		1	WG1035799
TPH (GC/MS) Low Fraction	8006-61-9	101	23.0	95.0	74.1	306		1	WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		93.4				WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		95.2				WG1036268

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Volatile Organic Compounds (MS) by Method TO-15 - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetamide, N,N-Dimethyl-	000127-19-5	87	0.000	0.000	18.5	65.9	J	1	WG1035799
Butanamide, 2,2,3,3,4,4,4-Heptaflu	055471-01-7	493	0.000	0.000	4.28	86.3	J	10	WG1036268
3-Hydroxymandelic Acid, Ethyl Este	000000-00-0	340	0.000	0.000	7.65	106	J	1	WG1035799
Butane	000106-97-8	58	0.000	0.000	6.38	15.1	J	1	WG1035799
Alpha-Pinene	000080-56-8	136	0.000	0.000	3.31	18.4	J	1	WG1035799
Hexanal	000066-25-1	100	0.000	0.000	1.25	5.11	J	1	WG1035799
3-Carene	013466-78-9	136	0.000	0.000	1.07	5.95	J	1	WG1035799
Phenol	000108-95-2	94	0.000	0.000	0.830	3.19	J	1	WG1035799
Bicyclo[3.1.1]Heptane, 6,6-Dimethy	018172-67-3	136	0.000	0.000	0.820	4.56	J	1	WG1035799
Phenol	000108-95-2	94	0.000	0.000	0.790	3.04	J	1	WG1035799
Cyclotrisiloxane, Hexamethyl-	000541-05-9	222	0.000	0.000	0.560	5.08	J	1	WG1035799
Decane, 2-Methyl-	006975-98-0	156	0.000	0.000	0.520	3.32	J	1	WG1035799

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.



Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	0.190	0.451	7.03	16.7		1	WG1035799
Allyl chloride	107-05-1	76.53	0.182	0.570	ND	ND		1	WG1035799
Benzene	71-43-2	78.10	0.153	0.489	ND	ND		1	WG1035799
Benzyl Chloride	100-44-7	127	0.199	1.03	ND	ND		1	WG1035799
Bromodichloromethane	75-27-4	164	0.145	0.973	ND	ND		1	WG1035799
Bromoform	75-25-2	253	0.262	2.71	ND	ND		1	WG1035799
Bromomethane	74-83-9	94.90	0.203	0.788	ND	ND		1	WG1035799
1,3-Butadiene	106-99-0	54.10	0.188	0.416	ND	ND		1	WG1035799
Carbon disulfide	75-15-0	76.10	0.181	0.563	ND	ND		1	WG1035799
Carbon tetrachloride	56-23-5	154	0.195	1.23	ND	ND		1	WG1035799
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG1035799
Chloroethane	75-00-3	64.50	0.163	0.430	ND	ND		1	WG1035799
Chloroform	67-66-3	119	0.191	0.930	ND	ND		1	WG1035799
Chloromethane	74-87-3	50.50	0.181	0.374	0.541	1.12		1	WG1035799
2-Chlorotoluene	95-49-8	126	0.202	1.04	ND	ND		1	WG1035799
Cyclohexane	110-82-7	84.20	0.178	0.613	ND	ND		1	WG1035799
Dibromochloromethane	124-48-1	208	0.165	1.40	ND	ND		1	WG1035799
1,2-Dibromoethane	106-93-4	188	0.0617	0.474	ND	ND		1	WG1035799
1,2-Dichlorobenzene	95-50-1	147	0.201	1.21	ND	ND		1	WG1035799
1,3-Dichlorobenzene	541-73-1	147	0.199	1.20	ND	ND		1	WG1035799
1,4-Dichlorobenzene	106-46-7	147	0.186	1.12	ND	ND		1	WG1035799
1,2-Dichloroethane	107-06-2	99	0.205	0.830	ND	ND		1	WG1035799
1,1-Dichloroethane	75-34-3	98	0.171	0.685	ND	ND		1	WG1035799
1,1-Dichloroethene	75-35-4	96.90	0.163	0.646	ND	ND		1	WG1035799
cis-1,2-Dichloroethene	156-59-2	96.90	0.130	0.515	0.389	1.54		1	WG1035799
trans-1,2-Dichloroethene	156-60-5	96.90	0.155	0.614	ND	ND		1	WG1035799
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG1035799
cis-1,3-Dichloropropene	10061-01-5	111	0.196	0.890	ND	ND		1	WG1035799
trans-1,3-Dichloropropene	10061-02-6	111	0.145	0.658	ND	ND		1	WG1035799
1,4-Dioxane	123-91-1	88.10	0.185	0.667	ND	ND		1	WG1035799
Ethanol	64-17-5	46.10	6.92	13.0	324	611		25	WG1036268
Ethylbenzene	100-41-4	106	0.169	0.733	ND	ND		1	WG1035799
4-Ethyltoluene	622-96-8	120	0.222	1.09	ND	ND		1	WG1035799
Trichlorofluoromethane	75-69-4	137.40	0.224	1.26	ND	ND		1	WG1035799
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.262	1.30		1	WG1035799
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.229	1.76	ND	ND		1	WG1035799
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.153	1.07	ND	ND		1	WG1035799
Heptane	142-82-5	100	0.209	0.855	ND	ND		1	WG1035799
Hexachloro-1,3-butadiene	87-68-3	261	0.219	2.34	ND	ND		1	WG1035799
n-Hexane	110-54-3	86.20	0.152	0.536	ND	ND		1	WG1035799
Isopropylbenzene	98-82-8	120.20	0.188	0.924	ND	ND		1	WG1035799
Methylene Chloride	75-09-2	84.90	0.155	0.538	0.274	0.952		1	WG1035799
Methyl Butyl Ketone	591-78-6	100	0.227	0.928	ND	ND		1	WG1035799
2-Butanone (MEK)	78-93-3	72.10	0.164	0.484	ND	ND		1	WG1035799
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	0.217	0.888	ND	ND		1	WG1035799
Methyl methacrylate	80-62-6	100.12	0.258	1.06	ND	ND		1	WG1035799
MTBE	1634-04-4	88.10	0.168	0.605	ND	ND		1	WG1035799
Naphthalene	91-20-3	128	0.513	2.69	ND	ND		1	WG1035799
2-Propanol	67-63-0	60.10	0.294	0.723	1.08	2.64		1	WG1035799
Propene	115-07-1	42.10	0.311	0.536	ND	ND		1	WG1035799
Styrene	100-42-5	104	0.155	0.659	ND	ND		1	WG1035799
1,1,2,2-Tetrachloroethane	79-34-5	168	0.192	1.32	ND	ND		1	WG1035799
Tetrachloroethylene	127-18-4	166	0.166	1.13	0.912	6.19		1	WG1035799
Tetrahydrofuran	109-99-9	72.10	0.169	0.498	ND	ND		1	WG1035799
Toluene	108-88-3	92.10	0.166	0.625	1.98	7.44		1	WG1035799
1,2,4-Trichlorobenzene	120-82-1	181	0.493	3.65	ND	ND		1	WG1035799

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 10/25/17 08:45

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.222	1.21	ND	ND		1	WG1035799
1,1,2-Trichloroethane	79-00-5	133	0.0957	0.521	ND	ND		1	WG1035799
Trichloroethylene	79-01-6	131	0.182	0.975	ND	ND		1	WG1035799
1,2,4-Trimethylbenzene	95-63-6	120	0.161	0.790	ND	ND		1	WG1035799
1,3,5-Trimethylbenzene	108-67-8	120	0.210	1.03	ND	ND		1	WG1035799
2,2,4-Trimethylpentane	540-84-1	114.22	0.152	0.710	0.218	1.02		1	WG1035799
Vinyl chloride	75-01-4	62.50	0.152	0.389	ND	ND		1	WG1035799
Vinyl Bromide	593-60-2	106.95	0.242	1.06	ND	ND		1	WG1035799
Vinyl acetate	108-05-4	86.10	0.213	0.750	ND	ND		1	WG1035799
m&p-Xylene	1330-20-7	106	0.315	1.37	ND	ND		1	WG1035799
o-Xylene	95-47-6	106	0.211	0.915	ND	ND		1	WG1035799
1,1-Difluoroethane	75-37-6	66.05	0.108	0.292	3.73	10.1		1	WG1035799
1,2,3-Trimethylbenzene	526-73-8	120.10	0.108	0.531	ND	ND		1	WG1035799
Chlorodifluoromethane	75-45-6	86.50	0.108	0.382	0.424	1.50		1	WG1035799
Ethyl Acetate	141-78-6	88	0.108	0.389	ND	ND		1	WG1035799
Dicyclopentadiene	77-73-6	132.20	0.108	0.584	ND	ND		1	WG1035799
Methyl Cyclohexane	108-87-2	98.1860	0.108	0.434	ND	ND		1	WG1035799
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.108	0.513	ND	ND		1	WG1035799
TPH (GC/MS) Low Fraction	8006-61-9	101	23.0	95.0	67.5	279		1	WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		92.9				WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		102				WG1036268

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Volatile Organic Compounds (MS) by Method TO-15 - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Butane	000106-97-8	58	0.000	0.000	44.4	105	↓	1	WG1035799
Acetamide, N,N-Dimethyl-	000127-19-5	87	0.000	0.000	3.30	11.7	↓	1	WG1035799
(1R)-2,6,6-Trimethylbicyclo[3.1.1]	007785-70-8	136	0.000	0.000	2.41	13.4	↓	1	WG1035799
Butane, 2-Methyl-	000078-78-4	72	0.000	0.000	1.05	3.09	↓	1	WG1035799
Heptane	000142-82-5	100	0.000	0.000	1.04	4.25	↓	1	WG1035799
Cyclotrisiloxane, Hexamethyl-	000541-05-9	222	0.000	0.000	0.970	8.81	↓	1	WG1035799
Hexanal	000066-25-1	100	0.000	0.000	0.960	3.93	↓	1	WG1035799
Cyclopropane, Ethylidene-	018631-83-9	68	0.000	0.000	0.870	2.42	↓	1	WG1035799
1-Butanol	000071-36-3	74	0.000	0.000	0.630	1.91	↓	1	WG1035799
Pentane	000109-66-0	72	0.000	0.000	0.600	1.77	↓	1	WG1035799
Norflurane	000811-97-2	102	0.000	0.000	0.550	2.29	↓	1	WG1035799
1-Pentanol	000071-41-0	88	0.000	0.000	0.510	1.84	↓	1	WG1035799
Pentanal	000110-62-3	86	0.000	0.000	0.450	1.58	↓	1	WG1035799
3-Carene	013466-78-9	136	0.000	0.000	0.420	2.34	↓	1	WG1035799

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.



Collected date/time: 10/25/17 08:30

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	0.190	0.451	11.8	28.1		1	WG1035799
Allyl chloride	107-05-1	76.53	0.182	0.570	ND	ND		1	WG1035799
Benzene	71-43-2	78.10	0.153	0.489	ND	ND		1	WG1035799
Benzyl Chloride	100-44-7	127	0.199	1.03	ND	ND		1	WG1035799
Bromodichloromethane	75-27-4	164	0.145	0.973	ND	ND		1	WG1035799
Bromoform	75-25-2	253	0.262	2.71	ND	ND		1	WG1035799
Bromomethane	74-83-9	94.90	0.203	0.788	ND	ND		1	WG1035799
1,3-Butadiene	106-99-0	54.10	0.188	0.416	ND	ND		1	WG1035799
Carbon disulfide	75-15-0	76.10	0.181	0.563	ND	ND		1	WG1035799
Carbon tetrachloride	56-23-5	154	0.195	1.23	ND	ND		1	WG1035799
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG1035799
Chloroethane	75-00-3	64.50	0.163	0.430	ND	ND		1	WG1035799
Chloroform	67-66-3	119	0.191	0.930	ND	ND		1	WG1035799
Chloromethane	74-87-3	50.50	0.181	0.374	0.557	1.15		1	WG1035799
2-Chlorotoluene	95-49-8	126	0.202	1.04	ND	ND		1	WG1035799
Cyclohexane	110-82-7	84.20	0.178	0.613	0.223	0.769		1	WG1035799
Dibromochloromethane	124-48-1	208	0.165	1.40	ND	ND		1	WG1035799
1,2-Dibromoethane	106-93-4	188	0.0617	0.474	ND	ND		1	WG1035799
1,2-Dichlorobenzene	95-50-1	147	0.201	1.21	ND	ND		1	WG1035799
1,3-Dichlorobenzene	541-73-1	147	0.199	1.20	ND	ND		1	WG1035799
1,4-Dichlorobenzene	106-46-7	147	0.186	1.12	ND	ND		1	WG1035799
1,2-Dichloroethane	107-06-2	99	0.205	0.830	ND	ND		1	WG1035799
1,1-Dichloroethane	75-34-3	98	0.171	0.685	ND	ND		1	WG1035799
1,1-Dichloroethene	75-35-4	96.90	0.163	0.646	ND	ND		1	WG1035799
cis-1,2-Dichloroethene	156-59-2	96.90	0.130	0.515	0.710	2.82		1	WG1035799
trans-1,2-Dichloroethene	156-60-5	96.90	0.155	0.614	ND	ND		1	WG1035799
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG1035799
cis-1,3-Dichloropropene	10061-01-5	111	0.196	0.890	ND	ND		1	WG1035799
trans-1,3-Dichloropropene	10061-02-6	111	0.145	0.658	ND	ND		1	WG1035799
1,4-Dioxane	123-91-1	88.10	0.185	0.667	ND	ND		1	WG1035799
Ethanol	64-17-5	46.10	2.77	5.22	72.9	137		10	WG1036268
Ethylbenzene	100-41-4	106	0.169	0.733	ND	ND		1	WG1035799
4-Ethyltoluene	622-96-8	120	0.222	1.09	ND	ND		1	WG1035799
Trichlorofluoromethane	75-69-4	137.40	0.224	1.26	ND	ND		1	WG1035799
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.269	1.33		1	WG1035799
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.229	1.76	ND	ND		1	WG1035799
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.153	1.07	ND	ND		1	WG1035799
Heptane	142-82-5	100	0.209	0.855	0.320	1.31		1	WG1035799
Hexachloro-1,3-butadiene	87-68-3	261	0.219	2.34	ND	ND		1	WG1035799
n-Hexane	110-54-3	86.20	0.152	0.536	0.178	0.627		1	WG1035799
Isopropylbenzene	98-82-8	120.20	0.188	0.924	ND	ND		1	WG1035799
Methylene Chloride	75-09-2	84.90	0.155	0.538	0.168	0.582		1	WG1035799
Methyl Butyl Ketone	591-78-6	100	0.227	0.928	ND	ND		1	WG1035799
2-Butanone (MEK)	78-93-3	72.10	0.164	0.484	1.07	3.16		1	WG1035799
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	0.217	0.888	ND	ND		1	WG1035799
Methyl methacrylate	80-62-6	100.12	0.258	1.06	ND	ND		1	WG1035799
MTBE	1634-04-4	88.10	0.168	0.605	ND	ND		1	WG1035799
Naphthalene	91-20-3	128	0.513	2.69	ND	ND		1	WG1035799
2-Propanol	67-63-0	60.10	0.294	0.723	1.22	3.00		1	WG1035799
Propene	115-07-1	42.10	0.311	0.536	ND	ND		1	WG1035799
Styrene	100-42-5	104	0.155	0.659	ND	ND		1	WG1035799
1,1,2,2-Tetrachloroethane	79-34-5	168	0.192	1.32	ND	ND		1	WG1035799
Tetrachloroethylene	127-18-4	166	0.166	1.13	1.58	10.7		1	WG1035799
Tetrahydrofuran	109-99-9	72.10	0.169	0.498	ND	ND		1	WG1035799
Toluene	108-88-3	92.10	0.166	0.625	1.37	5.15		1	WG1035799
1,2,4-Trichlorobenzene	120-82-1	181	0.493	3.65	ND	ND		1	WG1035799

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

ACCOUNT:

MSA Professional Services

PROJECT:

17711000

SDG:

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DATE/TIME:

11/02/17 10:19

PAGE:

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Collected date/time: 10/25/17 08:30

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.222	1.21	ND	ND		1	WG1035799
1,1,2-Trichloroethane	79-00-5	133	0.0957	0.521	ND	ND		1	WG1035799
Trichloroethylene	79-01-6	131	0.182	0.975	0.589	3.15		1	WG1035799
1,2,4-Trimethylbenzene	95-63-6	120	0.161	0.790	ND	ND		1	WG1035799
1,3,5-Trimethylbenzene	108-67-8	120	0.210	1.03	ND	ND		1	WG1035799
2,2,4-Trimethylpentane	540-84-1	114.22	0.152	0.710	0.267	1.25		1	WG1035799
Vinyl chloride	75-01-4	62.50	0.152	0.389	0.297	0.759		1	WG1035799
Vinyl Bromide	593-60-2	106.95	0.242	1.06	ND	ND		1	WG1035799
Vinyl acetate	108-05-4	86.10	0.213	0.750	ND	ND		1	WG1035799
m&p-Xylene	1330-20-7	106	0.315	1.37	0.426	1.85		1	WG1035799
o-Xylene	95-47-6	106	0.211	0.915	ND	ND		1	WG1035799
1,1-Difluoroethane	75-37-6	66.05	0.108	0.292	5.10	13.8		1	WG1035799
1,2,3-Trimethylbenzene	526-73-8	120.10	0.108	0.531	ND	ND		1	WG1035799
Chlorodifluoromethane	75-45-6	86.50	0.108	0.382	0.568	2.01		1	WG1035799
Ethyl Acetate	141-78-6	88	0.108	0.389	ND	ND		1	WG1035799
Dicyclopentadiene	77-73-6	132.20	0.108	0.584	ND	ND		1	WG1035799
Methyl Cyclohexane	108-87-2	98.1860	0.108	0.434	ND	ND		1	WG1035799
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.108	0.513	ND	ND		1	WG1035799
TPH (GC/MS) Low Fraction	8006-61-9	101	23.0	95.0	46.2	191		1	WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.2				WG1036268
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.3				WG1035799

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Volatile Organic Compounds (MS) by Method TO-15 - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
(1S)-2,6,6-Trimethylbicyclo[3.1.1]	007785-26-4	136	0.000	0.000	6.63	36.9	J	1	WG1035799
Benzaldehyde, 2,4-Bis(trimethyl)sil	033617-38-8	282	0.000	0.000	2.73	31.5	J	1	WG1035799
Hexanal	000066-25-1	100	0.000	0.000	1.93	7.89	J	1	WG1035799
Bicyclo[3.1.1]Heptane, 6,6-Dimethyl	018172-67-3	136	0.000	0.000	1.11	6.17	J	1	WG1035799
Butane, 2-Methyl-	000078-78-4	72	0.000	0.000	0.970	2.86	J	1	WG1035799
Cyclopropane, Ethylidene-	018631-83-9	68	0.000	0.000	0.870	2.42	J	1	WG1035799
Cyclotrisiloxane, Hexamethyl-	000541-05-9	222	0.000	0.000	0.700	6.36	J	1	WG1035799
Norflurane	000811-97-2	102	0.000	0.000	0.650	2.71	J	1	WG1035799
Pentane	000109-66-0	72	0.000	0.000	0.630	1.86	J	1	WG1035799
Decane	000124-18-5	142	0.000	0.000	0.600	3.48	J	1	WG1035799
D-Limonene	005989-27-5	136	0.000	0.000	0.600	3.34	J	1	WG1035799
3-Carene	013466-78-9	136	0.000	0.000	0.510	2.84	J	1	WG1035799
Nonadecane	000629-92-5	268	0.000	0.000	0.460	5.04	J	1	WG1035799
Pentanal	000110-62-3	86	0.000	0.000	0.460	1.62	J	1	WG1035799
1-Pentanol	000071-41-0	88	0.000	0.000	0.410	1.48	J	1	WG1035799

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.



Collected date/time: 10/25/17 08:35

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	0.190	0.451	15.1	35.8		1	WG1035799
Allyl chloride	107-05-1	76.53	0.182	0.570	ND	ND		1	WG1035799
Benzene	71-43-2	78.10	0.153	0.489	ND	ND		1	WG1035799
Benzyl Chloride	100-44-7	127	0.199	1.03	ND	ND		1	WG1035799
Bromodichloromethane	75-27-4	164	0.145	0.973	ND	ND		1	WG1035799
Bromoform	75-25-2	253	0.262	2.71	ND	ND		1	WG1035799
Bromomethane	74-83-9	94.90	0.203	0.788	ND	ND		1	WG1035799
1,3-Butadiene	106-99-0	54.10	0.188	0.416	ND	ND		1	WG1035799
Carbon disulfide	75-15-0	76.10	0.181	0.563	ND	ND		1	WG1035799
Carbon tetrachloride	56-23-5	154	0.195	1.23	ND	ND		1	WG1035799
Chlorobenzene	108-90-7	113	0.200	0.924	ND	ND		1	WG1035799
Chloroethane	75-00-3	64.50	0.163	0.430	ND	ND		1	WG1035799
Chloroform	67-66-3	119	0.191	0.930	0.213	1.04		1	WG1035799
Chloromethane	74-87-3	50.50	0.181	0.374	0.437	0.902		1	WG1035799
2-Chlorotoluene	95-49-8	126	0.202	1.04	ND	ND		1	WG1035799
Cyclohexane	110-82-7	84.20	0.178	0.613	ND	ND		1	WG1035799
Dibromochloromethane	124-48-1	208	0.165	1.40	ND	ND		1	WG1035799
1,2-Dibromoethane	106-93-4	188	0.0617	0.474	ND	ND		1	WG1035799
1,2-Dichlorobenzene	95-50-1	147	0.201	1.21	ND	ND		1	WG1035799
1,3-Dichlorobenzene	541-73-1	147	0.199	1.20	ND	ND		1	WG1035799
1,4-Dichlorobenzene	106-46-7	147	0.186	1.12	ND	ND		1	WG1035799
1,2-Dichloroethane	107-06-2	99	0.205	0.830	ND	ND		1	WG1035799
1,1-Dichloroethane	75-34-3	98	0.171	0.685	ND	ND		1	WG1035799
1,1-Dichloroethene	75-35-4	96.90	0.163	0.646	ND	ND		1	WG1035799
cis-1,2-Dichloroethene	156-59-2	96.90	0.130	0.515	16.9	66.9		1	WG1035799
trans-1,2-Dichloroethene	156-60-5	96.90	0.155	0.614	0.172	0.680		1	WG1035799
1,2-Dichloropropane	78-87-5	113	0.200	0.924	ND	ND		1	WG1035799
cis-1,3-Dichloropropene	10061-01-5	111	0.196	0.890	ND	ND		1	WG1035799
trans-1,3-Dichloropropene	10061-02-6	111	0.145	0.658	ND	ND		1	WG1035799
1,4-Dioxane	123-91-1	88.10	0.185	0.667	ND	ND		1	WG1035799
Ethanol	64-17-5	46.10	0.277	0.522	6.23	11.7		1	WG1035799
Ethylbenzene	100-41-4	106	0.169	0.733	0.359	1.56		1	WG1035799
4-Ethyltoluene	622-96-8	120	0.222	1.09	0.889	4.36		1	WG1035799
Trichlorofluoromethane	75-69-4	137.40	0.224	1.26	0.279	1.57		1	WG1035799
Dichlorodifluoromethane	75-71-8	120.92	0.200	0.989	0.291	1.44		1	WG1035799
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.229	1.76	ND	ND		1	WG1035799
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.153	1.07	ND	ND		1	WG1035799
Heptane	142-82-5	100	0.209	0.855	1.09	4.44		1	WG1035799
Hexachloro-1,3-butadiene	87-68-3	261	0.219	2.34	ND	ND		1	WG1035799
n-Hexane	110-54-3	86.20	0.152	0.536	0.154	0.544		1	WG1035799
Isopropylbenzene	98-82-8	120.20	0.188	0.924	ND	ND		1	WG1035799
Methylene Chloride	75-09-2	84.90	0.155	0.538	2.01	6.97		1	WG1035799
Methyl Butyl Ketone	591-78-6	100	0.227	0.928	ND	ND		1	WG1035799
2-Butanone (MEK)	78-93-3	72.10	0.164	0.484	ND	ND		1	WG1035799
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	0.217	0.888	ND	ND		1	WG1035799
Methyl methacrylate	80-62-6	100.12	0.258	1.06	ND	ND		1	WG1035799
MTBE	1634-04-4	88.10	0.168	0.605	ND	ND		1	WG1035799
Naphthalene	91-20-3	128	0.513	2.69	ND	ND		1	WG1035799
2-Propanol	67-63-0	60.10	0.294	0.723	0.627	1.54		1	WG1035799
Propene	115-07-1	42.10	0.311	0.536	ND	ND		1	WG1035799
Styrene	100-42-5	104	0.155	0.659	ND	ND		1	WG1035799
1,1,2,2-Tetrachloroethane	79-34-5	168	0.192	1.32	ND	ND		1	WG1035799
Tetrachloroethylene	127-18-4	166	0.166	1.13	31.5	214		1	WG1035799
Tetrahydrofuran	109-99-9	72.10	0.169	0.498	0.928	2.74		1	WG1035799
Toluene	108-88-3	92.10	0.166	0.625	4.34	16.4		1	WG1035799
1,2,4-Trichlorobenzene	120-82-1	181	0.493	3.65	ND	ND		1	WG1035799

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

ACCOUNT:

MSA Professional Services

PROJECT:

17711000

SDG:

L946458

DATE/TIME:

11/02/17 10:19

PAGE:

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Collected date/time: 10/25/17 08:35

L946458

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.222	1.21	ND	ND		1	WG1035799
1,1,2-Trichloroethane	79-00-5	133	0.0957	0.521	ND	ND		1	WG1035799
Trichloroethylene	79-01-6	131	0.182	0.975	6.66	35.7		1	WG1035799
1,2,4-Trimethylbenzene	95-63-6	120	0.161	0.790	1.03	5.06		1	WG1035799
1,3,5-Trimethylbenzene	108-67-8	120	0.210	1.03	ND	ND		1	WG1035799
2,2,4-Trimethylpentane	540-84-1	114.22	0.152	0.710	1.04	4.87		1	WG1035799
Vinyl chloride	75-01-4	62.50	0.152	0.389	2.93	7.49		1	WG1035799
Vinyl Bromide	593-60-2	106.95	0.242	1.06	ND	ND		1	WG1035799
Vinyl acetate	108-05-4	86.10	0.213	0.750	ND	ND		1	WG1035799
m&p-Xylene	1330-20-7	106	0.315	1.37	1.78	7.72		1	WG1035799
o-Xylene	95-47-6	106	0.211	0.915	0.659	2.86		1	WG1035799
1,1-Difluoroethane	75-37-6	66.05	1.08	2.92	123	332		10	WG1036268
1,2,3-Trimethylbenzene	526-73-8	120.10	0.108	0.531	ND	ND		1	WG1035799
Chlorodifluoromethane	75-45-6	86.50	0.108	0.382	1.51	5.35		1	WG1035799
Ethyl Acetate	141-78-6	88	0.108	0.389	ND	ND		1	WG1035799
Dicyclopentadiene	77-73-6	132.20	0.108	0.584	ND	ND		1	WG1035799
Methyl Cyclohexane	108-87-2	98.1860	0.108	0.434	ND	ND		1	WG1035799
Tert-Amyl Ethyl Ether	919-94-8	116.20	0.108	0.513	ND	ND		1	WG1035799
TPH (GC/MS) Low Fraction	8006-61-9	101	23.0	95.0	228	943		1	WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		101				WG1035799
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.1				WG1036268

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Volatile Organic Compounds (MS) by Method TO-15 - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
.Alpha.-Pinene	000080-56-8	136	0.000	0.000	8.89	49.4	J	1	WG1035799
Nonane	000111-84-2	128	0.000	0.000	9.96	52.1	J	10	WG1036268
Norflurane	000811-97-2	102	0.000	0.000	7.30	30.5	J	10	WG1036268
Undecane	001120-21-4	156	0.000	0.000	3.89	24.8	J	1	WG1035799
Octane, 2-Methyl-	003221-61-2	128	0.000	0.000	3.26	17.1	J	1	WG1035799
Norflurane	000811-97-2	102	0.000	0.000	3.11	13.0	J	1	WG1035799
Octane, 2-Methyl-	003221-61-2	128	0.000	0.000	4.52	23.7	J	10	WG1036268
Decane, 4-Methyl-	002847-72-5	156	0.000	0.000	2.74	17.5	J	1	WG1035799
Undecane	001120-21-4	156	0.000	0.000	4.40	28.1	J	10	WG1036268
Cyclohexane, Butyl-	001678-93-9	140	0.000	0.000	2.60	14.9	J	1	WG1035799
Octane, 3-Methyl-	002216-33-3	128	0.000	0.000	2.49	13.0	J	1	WG1035799
.Beta.-Pinene	000127-91-3	136	0.000	0.000	1.79	9.96	J	1	WG1035799
Decane, 3-Methyl-	013151-34-3	156	0.000	0.000	1.71	10.9	J	1	WG1035799

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.



Method Blank (MB)

(MB) R3260985-3 10/26/17 10:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Acetone	U		0.0569	0.190
Allyl Chloride	U		0.0546	0.182
Benzene	U		0.0460	0.153
Benzyl Chloride	U		0.0598	0.199
Bromodichloromethane	U		0.0436	0.145
Bromoform	U		0.0786	0.262
Bromomethane	U		0.0609	0.203
1,3-Butadiene	U		0.0563	0.188
Carbon disulfide	U		0.0544	0.181
Carbon tetrachloride	U		0.0585	0.195
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.163
Chloroform	U		0.0574	0.191
Chloromethane	U		0.0544	0.181
2-Chlorotoluene	U		0.0605	0.202
Cyclohexane	U		0.0534	0.178
Dibromochloromethane	U		0.0494	0.165
1,2-Dibromoethane	U		0.0185	0.0617
1,2-Dichlorobenzene	U		0.0603	0.201
1,3-Dichlorobenzene	U		0.0597	0.199
1,4-Dichlorobenzene	U		0.0557	0.186
1,2-Dichloroethane	U		0.0616	0.205
1,1-Dichloroethane	U		0.0514	0.171
1,1-Dichloroethene	U		0.0490	0.163
cis-1,2-Dichloroethene	U		0.0389	0.130
trans-1,2-Dichloroethene	U		0.0464	0.155
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.196
trans-1,3-Dichloropropene	U		0.0435	0.145
1,4-Dioxane	U		0.0554	0.185
Ethylbenzene	U		0.0506	0.169
4-Ethyltoluene	U		0.0666	0.222
Trichlorofluoromethane	U		0.0673	0.224
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.229
1,2-Dichlorotetrafluoroethane	U		0.0458	0.153
Heptane	U		0.0626	0.209
Hexachloro-1,3-butadiene	U		0.0656	0.219
n-Hexane	U		0.0457	0.152
Isopropylbenzene	U		0.0563	0.188

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3260985-3 10/26/17 10:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Methylene Chloride	U		0.0465	0.155
Methyl Butyl Ketone	U		0.0682	0.227
2-Butanone (MEK)	U		0.0493	0.164
4-Methyl-2-pentanone (MIBK)	U		0.0650	0.217
Methyl Methacrylate	U		0.0773	0.258
MTBE	U		0.0505	0.168
Naphthalene	U		0.154	0.513
2-Propanol	U		0.0882	0.294
Propene	U		0.0932	0.311
Styrene	U		0.0465	0.155
1,1,2,2-Tetrachloroethane	U		0.0576	0.192
Tetrachloroethylene	U		0.0497	0.166
Tetrahydrofuran	U		0.0508	0.169
Toluene	U		0.0499	0.166
1,2,4-Trichlorobenzene	U		0.148	0.493
1,1,1-Trichloroethane	U		0.0665	0.222
1,1,2-Trichloroethane	U		0.0287	0.0957
Trichloroethylene	U		0.0545	0.182
1,2,4-Trimethylbenzene	U		0.0483	0.161
1,3,5-Trimethylbenzene	U		0.0631	0.210
2,2,4-Trimethylpentane	U		0.0456	0.152
Vinyl chloride	U		0.0457	0.152
Vinyl Bromide	U		0.0727	0.242
Vinyl acetate	U		0.0639	0.213
m&p-Xylene	U		0.0946	0.315
o-Xylene	U		0.0633	0.211
Ethanol	U		0.0832	0.277
TPH (GC/MS) Low Fraction	U		6.91	23.0
1,1-Difluoroethane	U		0.0325	0.108
1,2,3-Trimethylbenzene	U		0.0325	0.108
Chlorodifluoromethane	U		0.0325	0.108
Dicyclopentadiene	U		0.0325	0.108
Ethyl acetate	U		0.0325	0.108
Methyl Cyclohexane	U		0.0325	0.108
Tert-Amyl Ethyl Ether	U		0.0325	0.108
(S) 1,4-Bromofluorobenzene	89.2			60.0-140

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3260985-1 10/26/17 08:47 • (LCSD) R3260985-2 10/26/17 09:35

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	3.81	3.80	102	101	52.0-158			0.360	25
Propene	3.75	3.78	3.68	101	98.2	54.0-155			2.56	25
Dichlorodifluoromethane	3.75	3.38	3.41	90.3	91.1	69.0-143			0.880	25
1,2-Dichlorotetrafluoroethane	3.75	3.94	3.84	105	102	70.0-130			2.58	25
Chloromethane	3.75	3.76	3.68	100	98.2	70.0-130			2.01	25
Vinyl chloride	3.75	3.76	3.71	100	98.8	70.0-130			1.38	25
1,3-Butadiene	3.75	3.78	3.66	101	97.6	70.0-130			3.10	25
Bromomethane	3.75	3.83	3.69	102	98.3	70.0-130			3.82	25
Chloroethane	3.75	3.79	3.68	101	98.1	70.0-130			3.04	25
Trichlorofluoromethane	3.75	3.80	3.67	101	97.8	70.0-130			3.54	25
1,1,2-Trichlorotrifluoroethane	3.75	3.78	3.67	101	98.0	70.0-130			2.82	25
1,1-Dichloroethene	3.75	3.77	3.62	101	96.5	70.0-130			4.12	25
1,1-Dichloroethane	3.75	3.72	3.69	99.2	98.4	70.0-130			0.790	25
Acetone	3.75	3.89	3.77	104	101	70.0-130			2.90	25
2-Propanol	3.75	3.95	3.84	105	102	66.0-150			2.90	25
Carbon disulfide	3.75	3.82	3.70	102	98.6	70.0-130			3.17	25
Methylene Chloride	3.75	3.68	3.59	98.0	95.7	70.0-130			2.38	25
MTBE	3.75	3.73	3.64	99.5	97.0	70.0-130			2.45	25
trans-1,2-Dichloroethene	3.75	3.80	3.72	101	99.1	70.0-130			2.14	25
n-Hexane	3.75	3.74	3.68	99.8	98.2	70.0-130			1.68	25
Vinyl acetate	3.75	4.03	3.96	107	106	70.0-130			1.79	25
Methyl Ethyl Ketone	3.75	3.95	3.92	105	105	70.0-130			0.830	25
cis-1,2-Dichloroethene	3.75	3.93	3.88	105	103	70.0-130			1.22	25
Chloroform	3.75	3.71	3.66	99.0	97.5	70.0-130			1.50	25
Cyclohexane	3.75	3.58	3.60	95.4	96.1	70.0-130			0.640	25
1,1,1-Trichloroethane	3.75	3.59	3.63	95.7	96.9	70.0-130			1.28	25
Carbon tetrachloride	3.75	3.52	3.59	93.8	95.9	70.0-130			2.21	25
Benzene	3.75	3.65	3.65	97.2	97.4	70.0-130			0.160	25
1,2-Dichloroethane	3.75	3.70	3.62	98.6	96.5	70.0-130			2.06	25
Heptane	3.75	3.57	3.59	95.3	95.6	70.0-130			0.320	25
Trichloroethylene	3.75	3.64	3.65	97.1	97.2	70.0-130			0.200	25
1,2-Dichloropropane	3.75	3.51	3.56	93.6	94.9	70.0-130			1.46	25
1,4-Dioxane	3.75	3.70	3.86	98.7	103	70.0-152			4.27	25
Bromodichloromethane	3.75	3.58	3.62	95.6	96.6	70.0-130			1.04	25
cis-1,3-Dichloropropene	3.75	3.71	3.77	98.9	101	70.0-130			1.75	25
4-Methyl-2-pentanone (MIBK)	3.75	3.78	3.88	101	103	70.0-142			2.68	25
Toluene	3.75	3.37	3.52	89.9	93.8	70.0-130			4.24	25
trans-1,3-Dichloropropene	3.75	3.69	3.77	98.4	101	70.0-130			2.09	25
1,1,2-Trichloroethane	3.75	3.46	3.56	92.4	94.9	70.0-130			2.71	25
Tetrachloroethylene	3.75	3.31	3.41	88.4	90.9	70.0-130			2.85	25

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3260985-1 10/26/17 08:47 • (LCSD) R3260985-2 10/26/17 09:35

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methyl Butyl Ketone	3.75	4.39	4.40	117	117	70.0-150			0.270	25
Dibromochloromethane	3.75	3.39	3.51	90.4	93.5	70.0-130			3.37	25
1,2-Dibromoethane	3.75	3.50	3.53	93.3	94.0	70.0-130			0.730	25
Chlorobenzene	3.75	3.26	3.38	87.0	90.2	70.0-130			3.57	25
Ethylbenzene	3.75	3.32	3.39	88.6	90.5	70.0-130			2.10	25
m&p-Xylene	7.50	6.51	6.60	86.8	87.9	70.0-130			1.27	25
o-Xylene	3.75	3.14	3.22	83.8	85.9	70.0-130			2.42	25
Styrene	3.75	3.45	3.58	91.9	95.5	70.0-130			3.81	25
Bromoform	3.75	3.40	3.51	90.8	93.5	70.0-130			2.99	25
1,1,2,2-Tetrachloroethane	3.75	3.78	3.98	101	106	70.0-130			5.23	25
4-Ethyltoluene	3.75	3.24	3.34	86.5	89.1	70.0-130			2.96	25
1,3,5-Trimethylbenzene	3.75	3.86	3.90	103	104	70.0-130			0.910	25
1,2,4-Trimethylbenzene	3.75	3.81	3.93	102	105	70.0-130			2.96	25
1,3-Dichlorobenzene	3.75	3.22	3.37	85.8	89.8	70.0-130			4.61	25
1,4-Dichlorobenzene	3.75	3.31	3.36	88.3	89.6	70.0-130			1.44	25
Benzyl Chloride	3.75	3.14	3.18	83.7	84.8	70.0-144			1.26	25
1,2-Dichlorobenzene	3.75	3.69	3.77	98.5	101	70.0-130			2.03	25
1,2,4-Trichlorobenzene	3.75	3.36	3.59	89.6	95.7	70.0-155			6.64	25
Hexachloro-1,3-butadiene	3.75	3.67	3.59	98.0	95.9	70.0-145			2.17	25
Naphthalene	3.75	3.57	3.57	95.3	95.2	70.0-155			0.100	25
TPH (GC/MS) Low Fraction	176	176	171	100	96.9	70.0-130			3.28	25
Allyl Chloride	3.75	3.82	3.73	102	99.4	70.0-130			2.30	25
2-Chlorotoluene	3.75	3.14	3.17	83.6	84.5	70.0-130			1.03	25
Methyl Methacrylate	3.75	3.60	3.68	96.0	98.0	70.0-130			2.07	25
Tetrahydrofuran	3.75	3.72	3.72	99.3	99.3	70.0-140			0.0500	25
2,2,4-Trimethylpentane	3.75	3.80	3.70	101	98.7	70.0-130			2.73	25
Vinyl Bromide	3.75	3.89	3.75	104	100	70.0-130			3.65	25
Isopropylbenzene	3.75	3.25	3.25	86.7	86.6	70.0-130			0.200	25
1,1-Difluoroethane	3.75	3.74	3.65	99.7	97.3	70.0-130			2.43	25
1,2,3-Trimethylbenzene	3.75	3.88	3.95	103	105	70.0-130			1.84	25
Chlorodifluoromethane	3.75	3.71	3.56	98.8	94.9	70.0-130			4.07	25
Dicyclopentadiene	3.75	3.58	3.47	95.6	92.6	70.0-130			3.12	25
Ethyl acetate	3.75	4.02	3.83	107	102	70.0-130			4.99	25
Methyl Cyclohexane	3.75	3.57	3.59	95.1	95.6	70.0-130			0.550	25
Tert-Amyl Ethyl Ether	3.75	3.63	3.63	96.7	96.8	70.0-130			0.110	25
(S) 1,4-Bromofluorobenzene				98.2	97.9	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3261265-3 10/27/17 10:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Ethanol	U		0.0832	0.277
1,1-Difluoroethane	U		0.0325	0.108
<i>(S) 1,4-Bromofluorobenzene</i>	88.7			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3261265-1 10/27/17 08:35 • (LCSD) R3261265-2 10/27/17 09:25

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
Ethanol	3.75	3.83	3.84	102	102	52.0-158			0.250	25
1,1-Difluoroethane	3.75	3.71	3.77	98.9	101	70.0-130			1.72	25
<i>(S) 1,4-Bromofluorobenzene</i>				97.7	97.8	60.0-140				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 AI

9 Sc

Qualifier Description

J The identification of the analyte is acceptable; the reported value is an estimate.



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

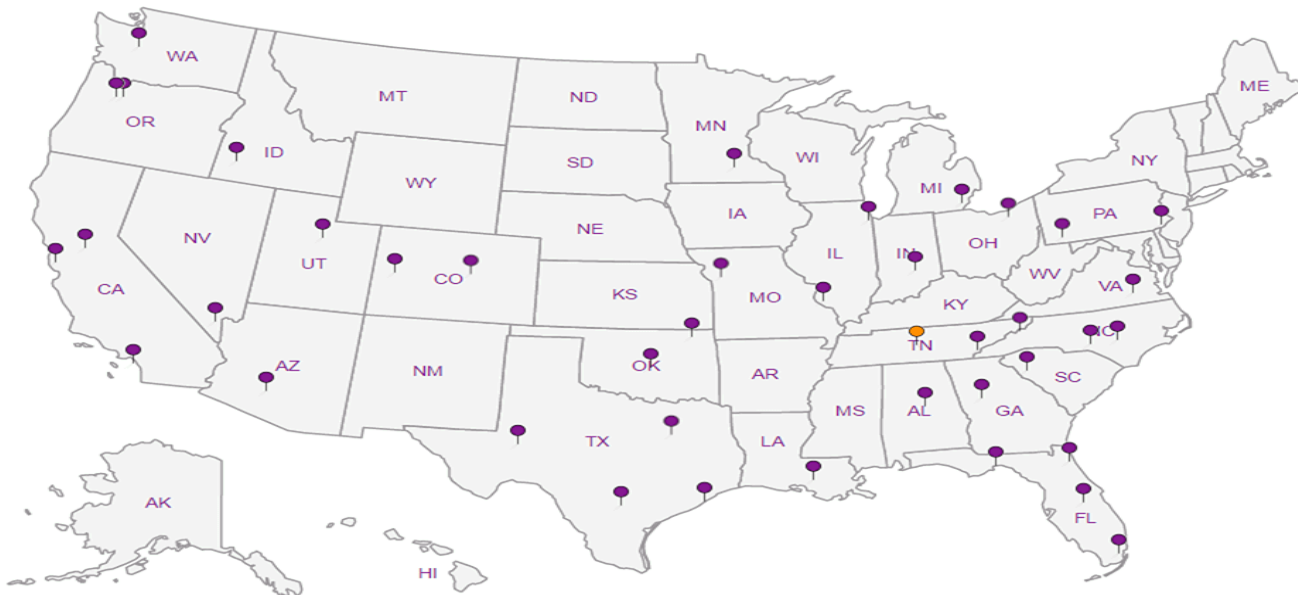
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



Company Name/Address: MSA Professional Services Inc 332 W. Superior St. Ste 600 Duluth, MN 55802	Billing Information: ←	Analysis	Chain of Custody Page <u> </u> of <u> </u>
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12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-757-5859
Fax: 615-758-5859



Report to: Mark Davidson	Email To: mdavidson@msa-ps.com
Project Description: 902-904 Belknap St	City/State Collected: Superior, WI
Phone: Fax:	Client Project # 17711000
Collected by (print): Erica Klingfus	Lab Project #
Collected by (signature): <i>[Signature]</i>	P.O. #

L# 946458
M219


Acctnum: MSAPRODMN
Template: T129174
Prelogin: P623375
TSR: John V. Hawkins
PB: BF 10/18/17
Shipped Via: Ground

Rush? (Lab MUST Be Notified)	Date Results Needed
<input type="checkbox"/> Same Day 200% <input type="checkbox"/> Next Day 100% <input type="checkbox"/> Two Day 50% <input type="checkbox"/> Three Day 25%	Email? <input type="checkbox"/> No <input type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input type="checkbox"/> Yes Canister Pressure/Vacuum

Sample ID	Sample Description	Can #	Date	Time	Initial	Final					Item/Contaminant	Sample # (lab only)
IA-5	IA-5 (Apartment)	6951	10-24-17 10-15-17	1015- 840	30	1	x					01
IA-6	IA-6 (Insurance Bldg)	5285		1020- 845	30	1	x					02
IA-7	IA-7 (office)	5766		1040- 830	26	4	x					03
IA-8	IA-8 (basement)	7189		1045- 835	30	6	x					04

Remarks: 4294 8308 4487	Hold #				
Relinquished by: (Signature) <i>[Signature]</i>	Date: 10/25/17	Time: 1200	Received by: (Signature) <i>[Signature]</i>	Samples returned via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/> _____	Condition: (lab use only) <i>[Signature]</i>
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: <i>[Signature]</i> °C Bottles Received: 4	COC Seal Intact: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: 10/26/17 Time: 8:45	pH Checked: NCF:

ESC LAB SCIENCES Cooler Receipt Form

Client:	MSAPRODIN	SDG#	946458	
Cooler Received/Opened On:	10/26/17	Temperature:	AMB	
Received by: Christian Kacar				
Signature: 				
Receipt Check List	NP	Yes	No	
COC Seal Present / Intact?	/			
COC Signed / Accurate?		/		
Bottles arrive intact?		/		
Correct bottles used?		/		
Sufficient volume sent?		/		
If Applicable				
VOA Zero headspace?				
Preservation Correct / Checked?				

ATTACHMENT C

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG
902-904 Belknap Property
902-904 Belknap Street, Superior, WI 54880
MSA Project No. 17711000



View of basement room area after cleanup activities took place in March 2017.



View of basement room prior to cleanup in January 2017.



View of sump after installation.



View of area where sump was installed prior to cleanup in January 2017.



Close up view of newly-installed sump.



View of roll off containers on site prior to hauling off site for disposal.

Photographic Log
Radon Remediation System
902 Belknap Street, Superior, WI
MSA Project No. 17711000



View of Radon System



Ventilation piping for Radon System



Overhead piping for Radon System



Sealed entryway behind Radon System



Sealed vent port



Sealed holes in ceiling



Sealed holes in wall



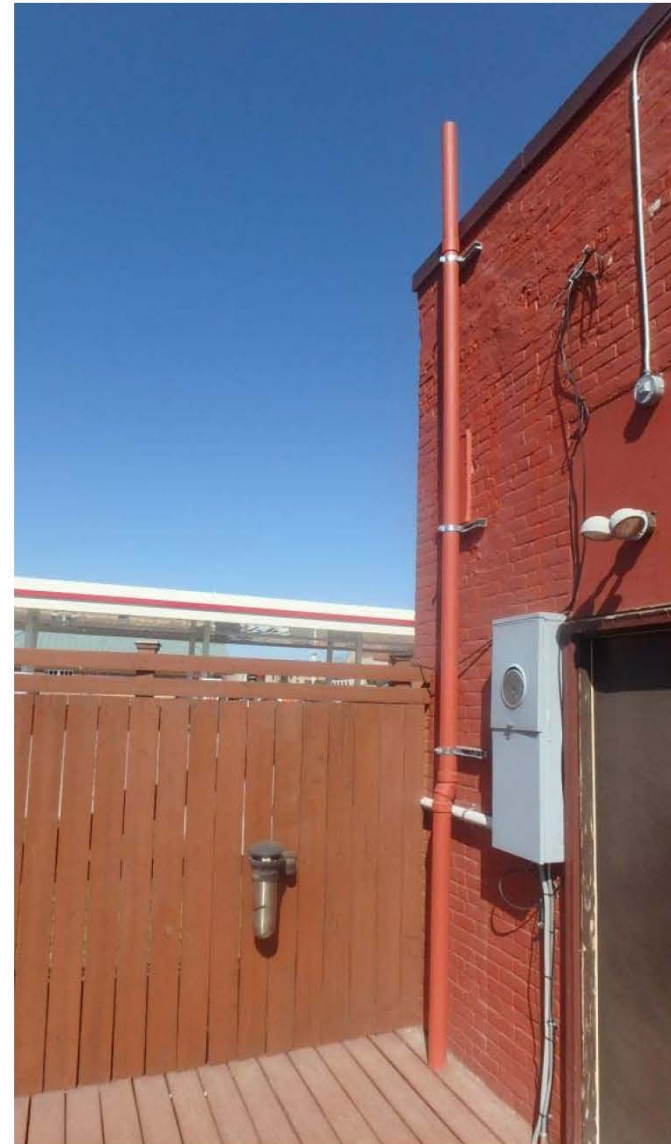
Sealed sump



Close up of Radon System and sump



Close up of piping



Outdoor vent pipe

ATTACHMENT D

RADON FAN SPECIFICATIONS

RN104 PRODUCT SPECIFICATIONS

The following chart shows fan performance for the RN104 Radon Fan:

Typical CFM Vs Static Suction "WC				
	0"	0.5"	1.0"	1.5"
RN104	112	95	70	40

Maximum Recommended Operating Pressure*	
RN104	1.8" W.C. (Sea Level Operation)**

*Reduce by 10% for High Temperature Operation

**Reduce by 4% per 1000 feet of altitude

Power Consumption @ 120 VAC	
RN104	45 - 66 watts

RN104 Inlet/Outlet: 4.5" OD (4.0" PVC Sched 40 size compatible)

RN104 Inlet/Outlet: 5.875" OD

Mounting: Mount on the duct pipe or with optional mounting bracket.

Recommended ducting: 3" or 4" Schedule 20/40 PVC Pipe

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Size: 9.5H" x 8.5" Dia.

Weight: 6 lbs.

Continuous Duty

Thermally Protected

Class B Insulation

3000 RPM

Residential Use Only

Rated for Indoor or Outdoor Use

LISTED
Electric Fan



Conforms to
UL STD. 507

Certified to
CAN/CSA STD.
C22.2 No.113