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Technical Bulletin

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Evaluation of 3M™ Organic Vapor Monitor, 3500+, 3510+

1. Background

Sampler Validation consists of lab tests designed to demonstrate that a Sampler functions as claimed. Since the scope of the claim includes a range of environmental conditions that may exist in the environments sampled, exposure conditions are varied so that each reader may consult the data herein to determine the suitability of a Sampler for a particular application. Protocols published by NIOSH(a), ANSI/ISEA(b), ASTM(c), CEN(d) have been consulted in selecting the tests performed in these studies.

(a) Cassinelli, M.E., Hull, R.D, Crable, J.V., and Teass, A.W., "Protocol for the Evaluation of Passive Monitors," in Diffusive Sampling, Royal Society of Chemistry, London, England, 1987, pp. 190-202.

(b) ANSI/ISEA 104-1998 (R2015)

(c) ASTM D6246-98

(d) EN 838:1996

2. Facilities, Equipment & Apparatus

Facilities in a chemical challenge laboratory were used including laboratory benches and sinks, fume hoods, exposure chambers, lab ware, pumps, chemical reagents, and safety devices. Extraction and analysis of test and reference samplers were conducted in Assay Technology's AIHA-accredited industrial hygiene test labs including benches, sinks, hoods, etc. as well as gas chromatographs. In some cases, test and reference samplers were presented with "natural" exposures in a field environment and analyzed by other accredited Labs.

3. Plan of Study

In the chemical challenge lab, dynamic (flowing and continuously renewed) test atmospheres were typically generated by controlled vaporization of liquid analytes metered into a flowing stream (with heating when required) from the Miller-Nelson HCS 401 or 501 Atmosphere Generator at a controlled flow rate, temperature, and relative humidity.

The atmosphere generated was conducted through inert tubing into an exposure chamber which featured an inert inner compartment in which generated vapors flow by each set of samplers at the same time (Fig 1). The desired linear flow velocity at the sampler's face was developed by a DC motor driven fan installed in the inner compartment and near to the samplers. Reference samplers were typically active samplers in which the front end penetrated the test chamber while the back end was connected to a critical orifice air sampler external to the exposure chamber.

After exposures, all samplers were capped and submitted to an accredited IH lab which extracted samplers and performed the analysis. Typically, results were analyzed by direct comparison of test samplers to reference samplers.

Dynamic atmospheres generated under variable environmental conditions were designed to challenge the samplers as suggested in the referenced test protocols to demonstrate sampler performance under the challenge conditions.

3.1 Nominal Uptake (Sampling) Rate Determination

Constant concentrations of several analytes were generated and presented to several test and reference samplers concomitantly during a fixed duration. This test was repeated for several groups each containing multiple analytes at different exposure concentrations and times deemed appropriate for the particular analyte. Replicate results for each analyte at multiple concentrations were assessed to determine average uptake (sampling) rate.

3.2 Air Velocity/Sampler Orientation

A constant concentration of analyte was generated and presented to several test and reference samplers as in Section 3.1. The tests were repeated at high and low values of air velocity and different orientations, after which the amounts recovered from test and reference samplers were compared to assess any differences due to air velocity or orientation.

3.3 Analyte Loss by Evaporation (Reverse Diffusion)

A constant concentration of selected volatile analytes was generated and presented to several test samplers as in Section 3.1. After a short exposure (1-2 hr), diffusive samplers were split into two groups. Group 1 was capped and stored for analysis, while Group 2 was returned to the chamber and subjected to a zero concentration exposure (pure air only) for another 4-6 hours (to later assess for analyte loss compared to the capped, stored controls. After exposure completion, samplers were capped and submitted for analysis. Analyte recovery for Group 2 was compared to recovery from Group 1 to determine the degree of analyte loss (due to reverse diffusion).

3.4 Effect on Uptake (Sampling) Rate of Temperature & Relative Humidity

A constant concentration of selected volatile analytes was generated and presented to several test and reference samplers as in Section 3.1 with temperature and humidity controlled at extreme values. The amount of analyte recovered from the sampler groups exposed at different extreme temperatures and humidities were compared with charcoal tubes subject to the same exposure to assess the effects of temperature and %RH on sampling rate.

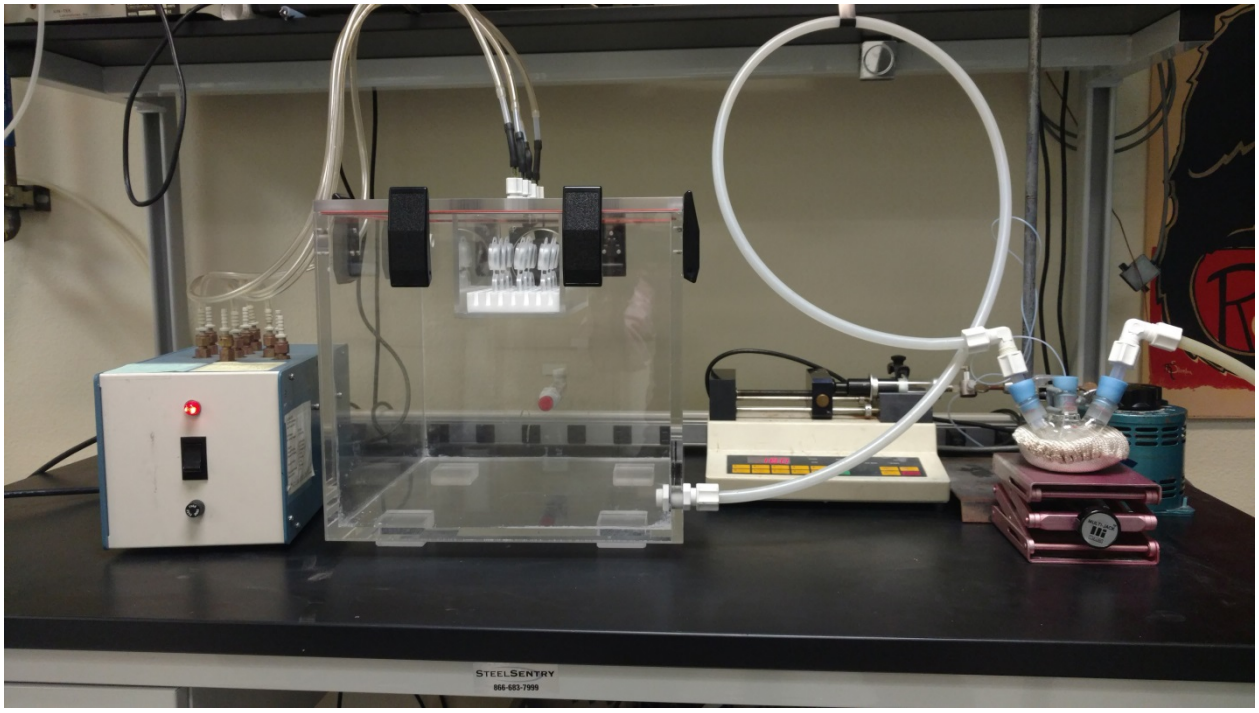
3.5 Analyte Stability on Storage (after exposure)

A constant concentration of selected volatile analytes was generated and presented to test samplers as in Section 3.1. After a typical exposure (2-4 hr), diffusive samplers were split into several groups, and each groups was capped and stored for a specified storage conditions, e.g, Group 1 (freezer at -20C), Group 2 (room temperature at 20-25C), Group 3 (frig at 2-8C). Freezer samples were analyzed as controls. Each separate storage group was submitted to an accredited IH Lab, then extracted and analyzed after specific storage times, e.g., 1 week, 2 weeks, etc. The amount of analyte recovered from the different sampler Groups at different storage times were compared to assess analyte stability on the sampler.

3.6 Background Blank

Several test samplers were extracted and analyzed by the lab in the same fashion as in Sections 3.1- 3.5. The amount of analytes (if any) found in micrograms were reported to confirm the validity of the claimed Reporting Limit for each analyte.

Fig 1Test Chamber Used for Laboratory Evaluation of Samplers



Results Are Summarized in Following Tables.

Table 3.1.1

Typical Uptake (Sampling) Rate Determination

Analyte	Target Concn (µg/L)	Sampl'g Time (min)	Sampler Tested	Qty	Amount Found Tube (µg/L)	(±)	Badge (µg)	(±)	Sampling Rate (L/min)
Acetone	504	120	3500+/3510+	5	346	9%	576	3%	0.0139
	252	120	3500+/3510+	5	167	1%	292	2%	0.0145
							Average	=	**0.0142**
Benzene	64	120	3500+/3510+	5	34	8%	43.6	2%	0.0108
	32	120	3500+/3510+	5	17	1%	22	0%	0.0110
							Average	=	**0.0109**
Perchloroethylene	251	120	3500+/3510+	5	245	7%	238	2%	0.00811
	129	120	3500+/3510+	5	117	3%	120	0%	0.00852
							Average	=	**0.00831**
Cyclohexane	503	120	3500+/3510+	5	477	9%	520	2%	0.00908
	251	120	3500+/3510+	5	232	2%	262	2%	0.00943
							Average	=	**0.00926**
1,2-Dichloroethane	126	120	3500+/3510+	5	116	8%	138	3%	0.00989
	65	120	3500+/3510+	5	57	5%	68.8	2%	0.01014
							Average	=	**0.01002**
Methylene Chloride	63	120	3500+/3510+	5	78	10%	99.6	1%	0.01061
	31	120	3500+/3510+	5	39	1%	52	2%	0.01114
							Average	=	**0.0109**
Chloroform	127	120	3500+/3510+	5	105	9%	170	0%	0.01344
	63	120	3500+/3510+	5	51	1%	59.2	3%	0.00966
							Average	=	**0.0115**
Tetrahydrofuran	313	120	3500+/3510+	5	247	9%	292	4%	0.00986
	156	120	3500+/3510+	5	121	3%	142	3%	0.00981
							Average	=	**0.0098**
Toluene	313	120	3500+/3510+	5	267	8%	180	1%	0.00561
	158	120	3500+/3510+	5	132	3%	150	0%	0.00950
							Average	=	**0.0076**
Xylenes	252	120	3500+/3510+	5	213	9%	218	2%	0.00853
	126	120	3500+/3510+	5	103	3%	106	5%	0.00855
							Average	=	**0.0085**

Table 3.1.2

Typical Uptake (Sampling) Rate Determination

Analyte	Target Concn (µg/L)	Sampl'g Time (min)	Sampler Tested	Qty	Amount Found Tube (µg/L)	(+)	Badge (µg)	(+)	Sampling Rate (L/min)
1,1,1-Trichloroethane	387	120	3500+/3510+	5	325	8%	322	3%	0.0083
	196	120	3500+/3510+	5	159	3%	156	4%	0.0082
							Average	**=**	**0.0082**
1- Butanol	264	120	3500+/3510+	5	164	8%	192	4%	0.0097
	133	120	3500+/3510+	5	60	24%	83.4	5%	0.0116
							Average	**=**	**0.0107**
2- Butoxyethanol	68	120	3500+/3510+	5	27	3%	28.4	4%	0.0087
	34	120	3500+/3510+	5	12	23%	13.4	4%	0.0092
							Average	**=**	**0.0089**
Acetonitrile	67	120	3500+/3510+	5	50	8%	85.6	4%	0.0143
	34	120	3500+/3510+	5	24	1%	43.4	4%	0.0149
							Average	**=**	**0.0146**
Heptane	332	120	3500+/3510+	5	287	7%	286	3%	0.0083
	164	120	3500+/3510+	5	137	13%	82.2	10%	0.0050
							Average	**=**	**0.0067**
Isopropyl Alcohol	531	120	3500+/3510+	5	454	9%	648	4%	0.0119
	265	120	3500+/3510+	5	227	2%	320	3%	0.0117
							Average	**=**	**0.0118**
Methyl Ethyl Ketone	398	120	3500+/3510+	5	299	10%	384	3%	0.0107
	198	120	3500+/3510+	5	148	2%	186	3%	0.0105
							Average	**=**	**0.0106**
Methyl Methacrylate	135	120	3500+/3510+	5	70	7%	47.4	4%	0.0057
	66	120	3500+/3510+	5	25	10%	22.6	4%	0.0075
							Average	**=**	**0.0066**
Naphthalene	68	120	3500+/3510+	5	41	3%	47	3%	0.0095
	31	120	3500+/3510+	5	23	16%	27.8	3%	0.0099
							Average	**=**	**0.0097**

Table 3.1.3

Typical Uptake (Sampling) Rate Determination

Analyte	Target Concn (µg/L)	Sampling Time (min)	Sampler Tested	Qty	Amount Found Tube (µg/L)		Badge (µg)		Sampling Rate (L/min)
Cyclohexanone	96	120	3500+/3510+	5	72	Nom	67.4	3%	0.00777
	48	120	3500+/3510+	5	36	Nom	34.2	1%	0.00789
							Average	**=**	**0.00783**
Ethyl Acetate	490	120	3500+/3510+	5	522	5%	596	3%	0.0095
	245	120	3500+/3510+	5	261	2%	306	2%	0.0098
							Average	**=**	**0.0096**
Ethylbenzene	69	120	3500+/3510+	5	73	1%	70.2	6%	0.0080
	35	120	3500+/3510+	5	35	8%	37.4	1%	0.0088
							Average	**=**	**0.0084**
Hexane	483	120	3500+/3510+	5	380	4%	390	2%	0.0085
	241	120	3500+/3510+	5	190	1%	210	0%	0.0092
							Average	**=**	**0.0089**
Isobutyl Alcohol	103	120	3500+/3510+	5	87	4%	108	4%	0.0104
	52	120	3500+/3510+	5	43	1%	54.2	4%	0.0106
							Average	**=**	**0.0105**
Hexone (MIBK)	246	120	3500+/3510+	5	223	3%	240	4%	0.0090
	123	120	3500+/3510+	5	109	4%	120	0%	0.0092
							Average	**=**	**0.0091**
N,N-Dimethyl Formamide	123	120	3500+/3510+	5	103	6%	170	3%	0.0137
	61	120	3500+/3510+	5	51	7%	73.8	4%	0.0120
							Average	**=**	**0.0129**
Propylene Glycol Methyl Ether Acetate	297	120	3500+/3510+	5	221	4%	212	4%	0.0080
	149	120	3500+/3510+	5	107	8%	106	5%	0.0083
							Average	**=**	**0.0081**
t-Butyl Acetate	195	120	3500+/3510+	5	193	3%	180	3%	0.0078
	97	120	3500+/3510+	5	96	4%	96	1%	0.0084
							Average	**=**	**0.0081**
Trichloroethylene	296	120	3500+/3510+	5	235	3%	252	3%	0.0089
	148	120	3500+/3510+	5	116	3%	130	0%	0.0093
							Average	**=**	**0.0091**

Table 3.2

Air Velocity/Sampler Orientation

Analyte(s) Tested	Target Concn	Air Velocity	Sampler Oriented	Sampler Tested	Qty	Amount Found Ave	Amount Found (±)	Comparison to Tube
	(ppm)	(cm/sec)				(ppm)	(%)	(%)
1,1-dichloro-2,2,2-trifluoroethane	8	153	perpendicular	C Tube	3	6.36	5%	100%
			perpendicular	Monitor	6	6.28	10%	99%
			parallel	Monitor	5	6.50	5%	102%
1,1-dichloro-2,2,2-trifluoroethane	60	19	perpendicular	C Tube	5	53.6	9%	100%
			perpendicular	Monitor	6	58.1	4%	109%
			parallel	Monitor	5	54.1	5%	101%

Table 3.3.1

Analyte Loss by Evaporation

(Reverse Diffusion or Back Diffusion)

	All Data				*Outliers Removed*		
	% Initial Recovery found after				**% Initial Recovery found after**		
Analyte	**2 hr**	**4 hr**	**8 hr**		**2 hr**	**4 hr**	**8 hr**
Acetone	97	96	**92**		96	94	**93**
Acetone	101	97	**95**			N/C	
Acetonitrile	89	84	**76**		89	84	**76**
Acetonitrile	91	86	**84**			N/C	
Acetonitrile (0.5 PEL, solo)	93	88	**79**		93	86	**79**
Acetonitrile (2.0 PEL, solo)	92	88	**77**			N/C	
Acrylonitrile	95	94	**89**			N/C	
Benzene	98	95	**96**			N/C	
Butanol	102	101	**99**			N/C	
2-Butoxyethanol (solo)	108	104	**107**		104	104	**107**
2-Butoxyethanol	109	102	**93**			N/C	
Butyl (n) Acetate	100	102	**104**			N/C	
Carbon Tetrachloride	102	98	**91**			N/C	
Chloroform	102	100	**93**			N/C	
Cyclohexane	101	98	**89**		101	89	**89**
Cyclohexane	111	103	**92**			N/C	
Cyclohexanone	99	99	**96**			N/C	
Diacetone Alcohol	94	93	**88**			N/C	
Dimethylformamide	96	95	**80**			N/C	
Dimethylformamide	102	99	**86**			N/C	
Ethanol	90	87	**81**		95	92	**86**
Ethanol	96	94	**86**			N/C	
2-Ethoxylethanol	100	98	**102**			N/C	
Ethyl Acetate	103	100	**100**			N/C	
Ethyl Benzene	105	101	**101**			N/C	
Ethyl Ether	94	99	**99**			N/C	
Ethylene Dichloride	95	99	**95**			N/C	
Heptane	97	103	**94**		95	105	**90**
Hexane	95	101	**90**		91	105	**82**
Isobutanol	101	99	**95**			N/C	
Isobutyl Acetate	100	102	**102**			N/C	

Table 3.3.2

Analyte Loss by Evaporation

(Reverse Diffusion or Back Diffusion)

	All Data			*Outliers Removed*		
	% Initial Recovery found after			**% Initial Recovery found after**		
Analyte	**2 hr**	**4 hr**	**8 hr**	**2 hr**	**4 hr**	**8 hr**
Isopropanol	97	96	**91**	97	98	**93**
Isopropanol	94	95	**93**		N/C	
Isopropyl Acetate	97	100	**100**		N/C	
Mesitylene	99	100	**98**		N/C	
Methylene Chloride	93	91	**88**	95	93	**90**
Methylene Chloride	96	93	**90**		N/C	
Methylene Chloride, 546	95	93	**90**		N/C	
Methyl Ethyl Ketone	98	98	**96**	100	101	**99**
Methyl Ethyl Ketone	98	95	**102**		N/C	
Methyl Isobutyl Ketone	97	94	**95**		N/C	
Methyl Methacrylate	103	100	**98**		N/C	
Nonane	99	101	**96**		N/C	
Octane	99	102	**96**		N/C	
Pentane	91	97	**84**	85	98	**73**
Perchloroethylene	94	95	**93**		N/C	
Propanol (n)	93	93	**90**	100	101	**97**
Propanol (n)	103	101	**99**		N/C	
Propyl Acetate	103	99	**100**		N/C	
Propyleneglycolmethylether	103	99	**94**		N/C	
Styrene	94	96	**95**		N/C	
1122-Tetrachloroethane	101	104	**94**		N/C	
Tetrahydrofuran	98	96	**91**	98	98	**94**
Tetrahydrofuran	97	94	**92**		N/C	
Toluene	97	96	**97**		N/C	
111-Trichloroethane	89	81	**81**		N/C	
Trichloroethylene	97	95	**94**		N/C	
112-Trichlorotrifluoroethane	89	81	**80**		N/C	
Vinyl Chloride	93	87	**80**		N/C	
m-Xylene	98	96	**99**		N/C	

Table 3.4

Effect on Uptake (Sampling) Rate of Temperature & Relative Humidity

Analyte(s) Tested	Target Concn	Test Temp	Test Humidity	Sampler Tested	Qty	Amount Found Ave	Amount Found (±)	Comparison to Tube
	(ppm)	(°C)	(%RH)			(ppm)	(%)	(%)
1,1-dichloro-2,2,2-trifluoroethane	100	10	14	C Tube	4	101	3%	100%
				Monitor	6	113	6%	112%
1,1-dichloro-2,2,2-trifluoroethane	100	40	15	C Tube	4	106.0	5%	100%
				Monitor	6	111.5	3%	105%
1,1-dichloro-2,2,2-trifluoroethane	100	10	74	C Tube	4	98.1	3%	100%
				Monitor	6	105.1	3%	107%
1,1-dichloro-2,2,2-trifluoroethane	100	40	72	C Tube	3	96.6	3%	100%
				Monitor	6	97.7	4%	101%

Table 3.5

Analyte Stability on Storage

(after exposure)

			% of Initial Recovery found after					
Analyte	**0 days** (µg)	RSD(±)	**4 days** (%)	RSD(±)	**7 days** (%)	RSD(±)	**14 days** (%)	RSD(±)
Acetone	**719**	1.1%	**103**	2.2%	**106**	1.3%	**104**	1.6%
Acetonitrile	**26**	2.9%	**97**	3.9%	**100**	2.3%	**101**	0.9%
Benzene	**27**	5.5%	**99**	0.5%	**99**	2.6%	**96**	2.5%
Butanol (n)	**56**	0.7%	**99**	0.9%	**96**	2.2%	**97**	1.6%
2-Butoxyethanol	**16**	5.6%	**95**	2.3%	**81**	2.8%	**105**	4.6%
Butyl (n) Acetate	**296**	1.3%	**100**	3.0%	**99**	1.9%	**103**	8.1%
Carbon Tetrachloride	**36**	5.4%	**82**	4.1%	**84**	4.6%	**88**	4.3%
Chloroform	**26**	4.7%	**95**	0.9%	**98**	4.3%	**94**	3.0%
Cyclohexane	**385**	1.8%	**96**	7.1%	**92**	3.3%	**84**	0.9%
Cyclohexanone	**32**	0.9%	**102**	6.2%	**107**	1.7%	**87**	2.1%
Diacetone Alcohol	**45**	9.3%	**93**	4.8%	**113**	1.8%	**102**	6.5%
Dimethylformamide	**25**	1.3%	**94**	2.1%	**97**	4.1%	**90**	4.0%
2-Ethoxylethanol	**222**	4.2%	**95**	2.1%	**95**	2.0%	**95**	4.0%
Ethyl Acetate	**696**	2.7%	**101**	1.7%	**104**	2.8%	**97**	0.7%
Ethyl Benzene	**197**	3.4%	**108**	2.2%	**103**	1.4%	**105**	2.3%
Ethyl Ether	**478**	1.8%	**102**	3.2%	**105**	0.7%	**102**	2.9%
Ethylene Dichloride	**28**	1.3%	**101**	3.0%	**105**	6.4%	**106**	3.1%
Heptane	**681**	10.9%	**94**	1.5%	**97**	2.3%	**92**	5.1%
Hexane	**78**	15.9%	**93**	5.6%	**104**	2.8%	**96**	11.0%
Isobutanol	**72**	2.6%	**97**	1.4%	**98**	2.3%	**97**	3.7%
Isobutyl Actetate	**320**	1.5%	**92**	3.0%	**99**	2.1%	**102**	8.4%
Isopropanol	**330**	1.8%	**105**	1.5%	**108**	2.4%	**105**	1.8%
Isopropyl Acetate	**463**	2.2%	**104**	3.0%	**100**	1.7%	**99**	7.3%
Mesitylene	**42**	2.8%	**109**	6.7%	**101**	2.4%	**102**	2.2%
Methylene Chloride	**655**	4.5%	**96**	2.5%	**99**	1.7%	**99**	1.2%
Methyl Ethyl Ketone	**212**	7.1%	**97**	4.7%	**100**	0.9%	**101**	2.2%
Methyl Isobutyl Ketone	**78**	1.3%	**104**	3.3%	**95**	1.4%	**98**	4.0%
Methyl Methacrylate	**171**	4.5%	**106**	1.9%	**108**	3.9%	**101**	3.7%
Nonane	**606**	8.5%	**97**	0.7%	**99**	2.2%	**97**	2.9%
Octane	**635**	10.0%	**96**	0.5%	**100**	1.4%	**96**	3.8%
Pentane	**546**	17.7%	**90**	10.3%	**99**	4.6%	**89**	13.6%
Perchloroethylene	**70**	2.2%	**108**	3.7%	**107**	8.2%	**105**	4.4%
Propanol (n)	**411**	1.2%	**99**	0.4%	**102**	2.8%	**97**	5.9%
Propyl Acetate	**390**	1.4%	**98**	1.4%	**100**	2.6%	**102**	1.0%
Propylenegylcolmethylether	**135**	3.0%	**103**	4.4%	**104**	1.3%	**110**	3.8%
Styrene	**95**	1.2%	**106**	3.6%	**107**	8.0%	**103**	3.4%
1122-Tetrachloroethane	**20**	1.5%	**96**	1.6%	**98**	3.0%	**92**	2.3%
Tetrahydrofuran	**189**	9.7%	**101**	3.4%	**103**	1.0%	**102**	3.3%
Toluene	**147**	5.9%	**109**	1.0%	**107**	2.2%	**107**	2.3%
111-Trichloroethane	**694**	6.6%	**107**	1.9%	**114**	3.2%	**116**	0.6%
112-Trichlorotrifluoroethane	**2201**	8.1%	**101**	4.9%	**98**	3.1%	**111**	8.0%
Vinyl Chloride	**11**	4.0%	**114**	3.5%	**119**	0.2%	**111**	2.9%
m-Xylene	**126**	6.1%	**113**	1.4%	**115**	2.0%	**110**	3.0%

Table 3.6.1

Background Blank

Analyte	Sampler	Spike Amt, (µg/mL)	Reporting Limit (µg)	Reporting Limit (µg/mL)	Blank Value (µg/mL)	Recovery (µg/mL)
1,1,1 Trichloroethane	3500+/3510+	1.48	3.0	1.5	<0.2	1.281
1,2 DCB	3500+/3510+	0.24	0.5	0.3	0.2	0.354
1,2 Dichloroethane	3500+/3510+	0.98	2.0	1.0	<0.2	0.956
1,2 Dichloroethylene trans	3500+/3510+	1.00	2.0	1.0	<0.2	0.000
1,2-Dibromoethane	3500+/3510+	0.96	2.3	1.2	<0.2	0.000
1,3-Butadiene	3500+/3510+	0.30	0.6	0.3	<0.2	0.213
1,3-Dioxolane	3500+/3510+	0.99	2.0	1.0	<0.2	0.936
1,4 DCB	3500+/3510+	0.45	1.0	0.5	<0.2	0.510
1-4 Dioxane	3500+/3510+	0.93	2.0	1.0	<0.2	0.912
1-Butanol	3500+/3510+	0.50	1.0	0.5	<0.2	0.439
1-Methyl-2-Pyrrolidinone	3500+/3510+	5.47	11.0	5.5	<0.2	0.000
2-Ethoxyethanol	3500+/3510+	0.49	2.0	1.0	<0.2	0.604
2-Ethyl-1-hexanol	3500+/3510+	2.50	2.5	5.0	0.2	0.000
2-Hexanone	3500+/3510+	0.24	0.5	0.3	<0.2	0.185
2-Methoxyethyl Acetate	3500+/3510+	2.48	5.0	2.5	<0.2	5.168
2-Methoxyethanol	3500+/3510+	0.92	2.2	1.1	<0.2	0.000
3-Pentanone(DIEK)	3500+/3510+	0.68	3.0	1.5	<0.2	0.000
4-Vinylcyclohexene	3500+/3510+	0.15	0.3	0.2	<0.2	0.000
Acetonitrile	3500+/3510+	0.59	1.4	0.7	0.4	0.561
Acetophenone	3500+/3510+	2.48	5.0	2.5	<0.2	0.000
AK-225	3500+/3510+	1.02	2.0	2.0	<0.2	0.000
Amyl acetate	3500+/3510+	0.38	0.9	0.5	<0.2	0.423
Aniline	3500+/3510+	0.29	0.6	0.3	<0.2	0.290
Benzene	3500+/3510+	0.20	0.4	0.2	<0.2	0.248
Benzene-D6	3500+/3510+	0.19	0.4	0.2	<0.2	0.000
Benzyl Chloride	3500+/3510+	0.17	0.5	0.3	<0.2	0.240
beta-Pinene	3500+/3510+	0.20	0.4	0.2	<0.2	0.000
Butyl Carbitol	3500+/3510+	4.99	10.0	5.0	<0.2	0.000
Camphor	3500+/3510+	0.30	0.6	0.3	<0.2	0.000
Cumene	3500+/3510+	0.25	0.5	0.3	<0.2	0.255
Cyclohexane	3500+/3510+	0.28	0.6	0.3	<0.2	0.301
Cyclohexanone	3500+/3510+	0.26	0.6	0.3	<0.2	0.379
Cyclohexanol	3500+/3510+	0.28	0.7	0.4	<0.2	0.272
D P Glycol Methyl Ether	3500+/3510+	7.16	17.0	8.5	<0.2	0.000
Diacetone	3500+/3510+	0.47	1.0	0.5	<0.2	0.526
Dicyclopentadiene	3500+/3510+	0.84	2.0	1.0	<0.2	0.990
Dibromoethane	3500+/3510+	1.49	3.0	1.5	<0.2	1.379
Dodecane	3500+/3510+	2.48	5.0	2.5	<0.2	2.192
Epichlorohydrin	3500+/3510+	0.57	1.2	0.6	<0.2	0.497
Ethanol	3500+/3510+	5.00	10.0	5.0	<0.2	3.838
Ethy Methacrylate	3500+/3510+	0.50	1.0	0.5	<0.2	0.448
Ethyl Acetate	3500+/3510+	1.00	2.0	1.0	<0.2	0.794
Ethyl Benzene	3500+/3510+	0.25	0.5	0.3	<0.2	0.231

Table 3.6.2

Background Blank

Analyte	Sampler	Spike Amt, (µg/mL)	Reporting Limit (µg)	Reporting Limit (µg/mL)	Blank Value (µg/mL)	Recovery (µg/mL)
Ethylene Chlorohydrin	3500+/3510+	0.65	1.4	0.7	<0.2	0.830
Ethyl Ether	3500+/3510+	1.50	3.0	1.5	<0.2	1.277
Ethyl Lactate	3500+/3510+	0.42	1.0	0.5	<0.2	0.400
Heptane	3500+/3510+	0.25	0.5	0.3	<0.2	0.294
Hexane	3500+/3510+	0.25	0.6	0.3	<0.2	0.269
Isobutyl Acetate	3500+/3510+	0.44	1.0	0.5	<0.2	0.440
Isobutyl alcohol	3500+/3510+	0.34	0.7	0.4	<0.2	0.280
Isooctane	3500+/3510+	0.48	1.5	0.8	<0.2	0.525
Isophorone	3500+/3510+	0.28	0.6	0.3	<0.2	0.302
Isopropyl Acetate	3500+/3510+	0.44	1.0	0.5	<0.2	0.405
Isopropyl Alcohol	3500+/3510+	0.50	1.0	0.5	<0.2	0.520
Limonene	3500+/3510+	0.84	2.0	1.0	<0.2	0.638
m,p-Xylene	3500+/3510+	0.50	1.0	0.5	<0.2	0.527
Methanol	3500+/3510+	1.50	3.0	1.5	<0.2	1.111
Methyl Acetate	3500+/3510+	0.34	1.0	0.5	<0.2	0.366
Methyl Ethly Ketone	3500+/3510+	0.40	0.8	0.4	<0.2	0.408
Methyl Ethyl Ketoxamine	3500+/3510+	0.72	1.4	0.7	<0.2	1.020
Methyl Isoamyl Ketone	3500+/3510+	0.24	0.5	0.3	<0.2	0.213
Methyl Isobutyl Ketone	3500+/3510+	0.34	0.7	0.4	<0.2	0.292
Methyl Methacrylate	3500+/3510+	0.42	1.0	0.5	<0.2	0.423
Methylcyclohexene	3500+/3510+	0.23	0.5	0.3	<0.2	0.230
Methylene Chloride	3500+/3510+	1.49	3.0	1.5	<0.2	1.245
MTBE	3500+/3510+	0.44	0.9	0.5	<0.2	0.652
N,N-Dimethylformamide	3500+/3510+	0.57	1.3	0.7	<0.2	0.463
Naphthalene	3500+/3510+	3.21	6.5	3.3	<0.2	3.980
n-Butyl Acetate	3500+/3510+	0.44	0.9	0.5	<0.2	0.431
N-Nonane	3500+/3510+	0.12	0.5	0.3	<0.2	0.577
n-Propyl Bromide	3500+/3510+	0.81	2.0	1.0	<0.2	1.102
Octane	3500+/3510+	0.84	2.0	1.0	<0.2	0.819
o-Xylene	3500+/3510+	0.50	1.0	0.5	<0.2	0.517
Pentane	3500+/3510+	0.25	0.6	0.3	<0.2	0.264
Perchloroethylene	3500+/3510+	0.81	2.0	1.0	<0.2	0.998
PGMEA	3500+/3510+	0.42	1.0	0.5	<0.2	0.437
PGMME	3500+/3510+	0.99	2.0	1.0	<0.2	1.441
Propyl Acetate	3500+/3510+	0.49	1.0	0.5	<0.2	0.566
Propylene Oxide	3500+/3510+	0.50	1.0	0.5	<0.2	0.264
Pyridine	3500+/3510+	0.39	0.9	0.5	0.7	0.450
Styrene	3500+/3510+	0.22	0.5	0.3	<0.2	0.110
Tert Butyl Acetate	3500+/3510+	0.86	2.0	1.0	<0.2	0.791
Tetrahydrofuran	3500+/3510+	0.39	0.8	0.4	<0.2	0.519
Toluene	3500+/3510+	1.00	2.0	1.0	<0.2	0.786
Trichloroethylene	3500+/3510+	0.83	2.0	1.0	<0.2	0.978
Vinyl Acetate	3500+/3510+	0.42	1.0	0.5	<0.2	0.359
Vinyl Chloride	3500+/3510+	0.24	0.5	0.3	<0.2	0.239

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