
November 24, 2004

Timothy Gelhaus
GSI Environmental
AEEC Environmental
2171 South 8th Avenue
Fort McCoy, WI 54656-5136

Dear Mr. Gelhaus,

Enclosed are the Technical Memorandum and invoice for work recently performed at the Fort McCoy Facility in Fort McCoy, WI. If you have any questions concerning this information, give me a call.

Sincerely,

Guy Leplae



Enclosure

Environmental Chemistry Consulting Services, Inc.

2525 Advance Road • Madison, WI 53718 • Phone (608) 221-8700 • FAX (608) 221-4889

TECHNICAL MEMORANDUM

November 24, 2004

To: Timothy Gelhaus
GSI Environmental

From: Guy Leplae
ECCS Inc. *gl*

Re: Volatile Organic Compound (VOC) Field Analytical Methods
Fort McCoy Facility in Fort McCoy, WI

Introduction

This Technical Memorandum provides documentation of the field analytical test method used to analyze groundwater and soil samples collected between 11/15/04 – 11/18/04 during the investigation at the Fort McCoy Facility in Fort McCoy, WI. The samples were analyzed for methyl-t-butyl ether, benzene, toluene, ethyl benzene, m,p-xylenes, o-xylene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene and naphthalene. These VOCs were measured by the “low-level” purge and trap technique with gas chromatography (GC) using a mass spectrometer detector (MSD).

Narrative

Water samples were analyzed for VOCs directly by purge and trap GC/MS and soil samples are extracted with 10 ml of methanol prior to GC/MS analysis.

Water samples have a reporting limit of 1.0 µg/L (ppb) for all compounds except m,p-xylenes and naphthalene which have a reporting limit of 1 and 3 µg/L (ppb) respectively. Soil samples have a reporting limit of 50 µg/kg (ppb) for all compounds except m,p-xylenes and naphthalene which have a reporting limit of 100 and 150 µg/kg (ppb) respectively.

The test results for water and soil samples are provided in table 1 of this report.

VOC Method Summary

Environmental Chemistry Consulting Services, Inc.

2525 Advance Road • Madison, WI 53718 • Phone (608) 221-8700 • FAX (608) 221-4889

Water Samples

Water samples were provided by the client to the field lab in 40ml VOC vials. A 10ml aliquot of the sample was withdrawn from the vial with a 10ml gas-tight syringe. 10 ul of a 25ug/mL surrogate and internal standard solution was then added to the 10ml water sample syringe. The resulting concentration of the surrogate and internal standard solution was 25ug/L. The internal standards used were pentafluorobenzene, 1,4-difluorobenzene, chlorobenzene-d5 and 1,4-dichlorobenzene-d4. The surrogate standards were dibromofluorobenzene, toluene-d8, and bromofluorobenzene. The sample was then immediately loaded onto a Tekmar ALS 2016 autosampler with a Tekmar LSC 2000 purge and trap concentrator for GC/MS analysis.

Soil Samples

Soil samples were provided by the client to the field lab in 4 ounce soil jars. 10 grams of sample were weighed out into a scintillation vial and extracted with 10 ml of purge and trap grade methanol. The sample extract was then vortexed for 30 seconds and left to settle. 10 ml of water was drawn into a 10ml gas-tight syringe and 200 µl of sample extract plus 10 ul of a 25ug/mL surrogate and internal standard solution was then added to the syringe. The sample was then immediately loaded onto a purge and trap GC/MS.

Quality control consisted of the following items:

- Initial calibration of GC/MS system in a range of 0.5 to 100 ppb was performed with a correlation coefficient greater than 0.95 obtained from analysis of five calibration standards
- Continuing Calibration Verification standards analyzed at a frequency of every ten samples
- Surrogate standard was added to all samples and standards
- Blank samples were analyzed for every day of analysis.
- Matrix spike and Matrix Spike Duplicate samples analyzed at a frequency of every twenty samples.

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-1-1	G-1-2	G-2-1	G-2-2	G-3-1	G-3-2	G-4-1	G-4-2	G-5-1	G-5-2	G-6-1	G-6-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	50	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	-	-	-	-	-
Xylene, -o	50	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	50	54	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	50	70	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	150	160	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-7-1	G-7-2	G-8-1	G-8-2	G-9-1	G-9-2	G-10-1	G-10-2	G-11-1	G-11-2	G-12-1	G-12-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	50	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	-	-	-	-	-
Xylene, -o	50	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	150	-	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit

E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-13-1	G-13-2	G-14-1	G-14-2	G-15-1	G-15-2	G-16-1	G-16-2	G-17-1	G-17-2	G-18-1	G-18-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	50	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	-	-	-	-	-
Xylene, -o	50	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	150	-	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-19-1	G-19-3	G-20-1	G-20-2	G-21-1	G-21-2	G-22-1	G-22-2	G-23-1	G-23-2	G-24-1	G-24-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	100	-	-	-	-	-	-	-
Toluene	50	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	-	-	-	-	-
Xylene, -o	50	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	50	-	-	-	-	-	-	-	-	-	69	-	-
Naphthalene	150	-	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-26-2	G-27-2	G-28-2	G-29-2	G-30-2	G-31-2	G-32-2	G-33-2	G-34-2	G-35-2	G-36-2	G-37-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	50	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	-	330	-	-	-
Xylene, -o	50	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	50	-	-	-	-	-	-	-	-	520	-	-	-
1,2,4-Trimethylbenzene	50	-	-	-	-	-	-	-	-	2000	-	-	-
Naphthalene	150	-	-	-	-	-	-	-	-	490	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-38-2	G-39-2	G-40-2	G-41-2	G-52-2	G-53-2	G-54-2	G-55-1	G-55-2	G-56-1	G-56-2	G-57-1
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	-	-	-	-	110	240	-	75	-
Toluene	50	-	-	-	-	-	-	-	210	430	70	540	-
Ethylbenzene	50	-	-	-	-	-	-	-	110	600	-	270	-
Xylenes, -m, -p	100	-	-	-	-	-	-	-	480	2900	120	1400	-
Xylene, -o	50	-	-	-	-	-	-	-	270	2100	59	780	-
1,3,5-Trimethylbenzene	50	-	-	-	-	-	-	-	650	4400	140	430	-
1,2,4-Trimethylbenzene	50	-	-	-	-	-	-	-	640	14000 ^E	130	1700	-
Naphthalene	150	-	-	-	-	-	-	-	420	12000 ^E	110	1100	-

- = Less Than Reporting Limit
^E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-57-2	G-58-2	G-59-2	G-63-2	G-64-1	G-64-2	G-65-1	G-65-2	G-66-1	G-66-2	G-67-1	G-67-2
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	50	-	-	-	190	140	7100 ^E	91	84	-	-	-	-
Toluene	50	-	-	-	650	530	17000 ^E	340	440	-	-	-	-
Ethylbenzene	50	-	-	-	63	150	4500	75	170	-	-	-	-
Xylenes, -m, -p	100	-	210	-	280	590	4700	280	640	-	73	-	-
Xylene, -o	50	-	86	-	140	290	7900 ^E	130	290	-	-	-	-
1,3,5-Trimethylbenzene	50	-	180	-	-	470	4300	160	140	-	-	-	-
1,2,4-Trimethylbenzene	50	-	150	-	170	420	7300 ^E	130	540	-	59	-	-
Naphthalene	150	-	98	-	320	150	22000 ^E	81	450	-	-	-	-

- = Less Than Reporting Limit
^E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Soil Samples

Sample Description

	Reporting Limit ug/kg	G-68-1	G-68-2	G-69-1	G-69-2	G-70-2							
VOLATILES													
Methyl-t-butyl ether	50	-	-	-	-	-							
Benzene	50	-	-	-	-	-							
Toluene	50	-	-	-	-	-							
Ethylbenzene	50	-	-	-	-	-							
Xylenes, -m, -p	100	-	-	-	-	-							
Xylene, -o	50	-	-	-	-	-							
1,3,5-Trimethylbenzene	50	-	-	-	-	-							
1,2,4-Trimethylbenzene	50	-	-	-	94	-							
Naphthalene	150	-	-	-	110	-							

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-1	G-2	G-3	G-4	G-5	G-6	G-7	G-8	G-9	G-10	G-11	G-12
VOLATILES													
Methyl-t-butyl ether	1	-	< 5.0	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	5.0	-	-	-	-	-	4.4	-	-	-	-
Toluene	1	-	14	-	-	-	-	-	2.5	1.0	-	-	-
Ethylbenzene	1	-	51	-	-	-	-	-	25	-	-	-	-
Xylenes, -m, -p	2	-	120	-	-	-	-	-	29	-	-	-	-
Xylene, -o	1	-	14	-	-	-	-	-	2.6	-	-	-	-
1,3,5-Trimethylbenzene	1	-	93	-	-	-	-	-	2.4	-	-	-	-
1,2,4-Trimethylbenzene	1	-	48	-	-	-	-	-	22	-	-	-	-
Naphthalene	3	-	< 15	-	3.4	-	-	-	4.1	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-13	G-14	G-15	G-16	G-17	G-18	G-19	G-20	G-21	G-22	G-23	G-24
VOLATILES													
Methyl-t-butyl ether	1	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	1	-	-	-	-	-	-	-	-	-	-	11	-
Ethylbenzene	1	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes, -m, -p	2	-	-	-	-	-	-	-	-	-	-	1.1	-
Xylene, -o	1	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	1	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	1	-	-	1.8	-	-	-	-	-	-	-	-	-
Naphthalene	3	-	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-25	G-26	G-27	G-28	G-29	G-30	G-31	G-32	G-33	G-34	G-35	G-36
VOLATILES													
Methyl-t-butyl ether	1	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	1	-	-	-	-	-	-	-	-	-	73	110	56
Toluene	1	-	-	-	-	-	-	-	-	-	18	5.2	-
Ethylbenzene	1	-	-	-	-	-	-	-	-	-	140 ^E	20	-
Xylenes, -m, -p	2	-	-	-	-	-	-	-	-	-	220 ^E	90	-
Xylene, -o	1	-	-	-	-	-	-	-	-	-	13	-	-
1,3,5-Trimethylbenzene	1	-	-	-	-	-	-	-	-	-	150 ^E	46	-
1,2,4-Trimethylbenzene	1	-	-	-	-	-	-	-	-	-	450 ^E	170	-
Naphthalene	3	-	-	-	-	-	-	-	-	-	36	20	-

- = Less Than Reporting Limit

^E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-37	G-38	G-39	G-40	G-41	G-42	G-43	G-44	G-45	G-46	G-47	G-48
VOLATILES													
Methyl-t-butyl ether	1	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	1	150	27	56	1100	390	-	-	-	-	-	-	-
Toluene	1	7.6	-	6.0	140	5.9	-	-	-	-	-	-	-
Ethylbenzene	1	1.7	-	1.0	24	10	-	-	-	-	-	-	-
Xylenes, -m, -p	2	-	-	1.1	15	-	-	-	-	-	-	-	-
Xylene, -o	1	-	-	1.0	16	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	1	-	-	-	6.3	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	1	-	-	-	16	-	-	-	-	-	-	-	-
Naphthalene	3	-	-	-	-	-	-	-	-	-	-	-	-

- = Less Than Reporting Limit
E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-49	G-50	G-51	G-52	G-53	G-54	G-55	G-56	G-57	G-58	G-59	G-60
VOLATILES													
Methyl-t-butyl ether	1	-	-	-	-	-	-	-	-	-	< 50	-	-
Benzene	1	-	3.2	1.4	200 ^E	1500 ^E	1700 ^E	1500 ^E	1700 ^E	1.2	1100	-	-
Toluene	1	-	-	-	130 ^E	1500 ^E	2900 ^E	1600 ^E	2300 ^E	5.0	2400	-	1.2
Ethylbenzene	1	-	-	-	110 ^E	390	470	690 ^E	930 ^E	-	580	-	-
Xylenes, -m, -p	2	-	-	-	97	800 ^E	2200 ^E	870 ^E	1600 ^E	3.3	3000	-	1.4
Xylene, -o	1	1.1	1.9	-	25	810 ^E	790 ^E	600 ^E	1100 ^E	1.9	1500	-	-
1,3,5-Trimethylbenzene	1	-	-	-	-	60	530 ^E	860 ^E	310	-	1200	-	-
1,2,4-Trimethylbenzene	1	-	-	-	44	250	460	660 ^E	1100 ^E	1.3	980	-	-
Naphthalene	3	-	-	-	28	160	110	520 ^E	410	3.0	340	-	-

- = Less Than Reporting Limit

^E = Approximate concentration

TABLE 1
Fort McCoy - Wisconsin
Water Samples

Sample Description

	Reporting Limit ug/L	G-61	G-62	G-63	G-64	G-65	G-66	G-67	G-68	G-69	G-70		
VOLATILES													
Methyl-t-butyl ether	1	-	-	-	< 1000	< 1000	< 50	-	-	< 5.0	-		
Benzene	1	7.4	33	-	30000	29000	4200	190 ^E	-	200	-		
Toluene	1	-	-	1.0	44000	27000	2800	1.6	-	62	-		
Ethylbenzene	1	-	-	-	2700	1700	290	16	-	160	1.4		
Xylenes, -m, -p	2	-	5.4	-	9700	6100	9800	4.1	1.4	510	6.1		
Xylene, -o	1	-	-	-	4700	2900	390	3.9	-	200	2.8		
1,3,5-Trimethylbenzene	1	-	-	-	< 1000	< 1000	53	1.4	3.6	280	-		
1,2,4-Trimethylbenzene	1	-	-	-	1900	1100	160	3.0	2.0	900	-		
Naphthalene	3	-	-	-	< 3000	< 3000	52	4.4	1.5	200	-		

- = Less Than Reporting Limit

^E = Approximate concentration