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Clean Harbors Services, Inc.
11800 S. Stony Island Ave.
Chicago, IL 60617

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April 19, 2003

Volume 2b
Section E

APPENDIX F

ANALYTICAL CHEMISTRY RESULTS

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MAY - 0
IEPA-BOL
PERMIT SECTION

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Purge & Trap Compounds – GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
328	Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	98	ND	18.0	114
329	Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	108	ND	18.0	108
347	Toluene	ND	6.0	1.42	ND	ND	18.0	97	ND	18.0	97
352	Bromoform	ND	4.7	ND	ND	ND	18.0	102	ND	18.0	131
354	1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	109	ND	18.0	111
355	1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	100	ND	18.0	102
356	Trichloroethylene	ND	1.9	ND	ND	ND	18.0	101	ND	18.0	101
358	Trichlorofluoromethane	ND	10	ND	ND	ND	18.0	98	ND	18.0	116
364	1,2,3-Trichloropropane	ND	10	ND	ND	ND	18.0	98	ND	18.0	105
373	Vinyl chloride	ND	10	13.9	9.27	ND	18.0	99	ND	18.0	175
	Acetone	28.0	10	20.0	34.8	17.3	90.0	76	28.0	90.0	103
	Ethylbenzene	ND	7.2	ND	ND	ND	18.0	102	ND	18.0	103
	2-Hexanone	ND	10	ND	ND	ND	90.0	78	ND	90.0	78
	Methyl-iso-butyl ketone	ND	10	ND	ND	ND	90.0	96	ND	90.0	93
	Styrene	ND	10	ND	ND	ND	18.0	102	ND	18.0	104
	Vinyl acetate	ND	10	ND	ND	ND	90.0	88	ND	90.0	72
	m-Xylene	ND	10	ND	ND	ND	15.0	105	ND	15.0	110
	o+p-Xylenes	ND	10	2.66	2.54	ND	30.0	104	ND	30.0	110

* Recovery normally variable using established methodology.

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 29, 1987

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Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	11MPDE	870501	1405	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
31	Benzene	ND	4.4	6.40	6.34	ND	18.0	105	ND	18.0	100
50	Methyl bromide	ND	10	ND	ND	ND	18.0	128	ND	18.0	169
59	Carbon disulfide	ND	10	ND	ND	ND	18.0	32	ND	18.0	159
65A	Chloroethane	ND	10	ND	ND	ND	18.0	94	ND	18.0	132
72	Chlorobenzene	ND	6.0	ND	ND	ND	18.0	99	ND	18.0	98
	2-Chloro-1,3-butadiene	ND		ND	ND	ND	0	-	ND	0	-
76	2-Chloroethylvinyl ether	ND	10	ND	ND	ND	18.0	0.	ND	18.0	0.
77	Chloroform	ND	1.6	ND	ND	ND	18.0	98	ND	18.0	85
78	Methyl chloride	ND	10	ND	ND	ND	18.0	103	ND	18.0	153
	3-chloropropene	ND		ND	ND	ND	0	-	ND	0	-
111	1,2-Dibromo-3-chloropropane	ND	10	ND	ND	ND	18.0	101	ND	18.0	103
112	1,2-Dibromoethane	ND	10	ND	ND	ND	50.0	106	ND	50.0	108
113	Dibromomethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	80
120	1,4-Dichloro-2-butene	ND	10	ND	ND	ND	50.0	93	ND	50.0	87
121	Dichlorodifluoromethane	ND	10	ND	ND	ND	18.0	102	ND	18.0	166
122	1,1-Dichloroethane	ND	4.7	ND	ND	ND	18.0	93	ND	18.0	92
123	1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	99	ND	18.0	90
124	1,2-Trans-dichloroethylene	ND	1.6	ND	ND	ND	18.0	89	ND	18.0	72
126	1,1-Dichloroethylene	ND	2.8	18.5	15.4	ND	18.0	108	ND	18.0	98
127	Methylene chloride	8.37	2.8	5.27	9.68	ND	18.0	82	8.37	18.0	87
133	1,2-Dichloropropane	ND	6.0	ND	ND	ND	18.0	96	ND	18.0	90
136A	cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18.0	104	ND	18.0	101
136B	trans-1,3-Dichloropropylene	ND	10	ND	ND	ND	18.0	105	ND	18.0	90
191A	Chlorodibromomethane	ND	3.1	ND	ND	ND	18.0	99	ND	18.0	109
191B	Dichlorobromomethane	ND	2.2	ND	ND	ND	18.0	105	ND	18.0	100
182	Ethyl methacrylate	ND	10	ND	ND	ND	50.0	99	ND	50.0	99
209	Iodomethane	ND	10	ND	ND	ND	50.0	82	ND	50.0	99
235	Methyl ethyl ketone	ND	10	ND	ND	ND	18.0	94	ND	18.0	82
238	Methyl methacrylate	ND	10	ND	ND	ND	50.0	100	ND	50.0	98
285	Pentachloroethane	ND	10	ND	ND	ND	50.0	96	ND	50.0	66
326	1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	97
327	1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	96	ND	18.0	92

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2	Acetophenone	ND	10	110	123	ND	100	136	ND	103	107
4	2-Acetylaminofluorene	ND	10	142	197	ND	250	67	ND	256	55
14	4-Aminobiphenyl	ND	10	71.0	84.0	ND	250	55	ND	256	28
18	Aniline	ND	10	137	161	ND	150	103	ND	154	89
20	Aramite	ND	10	275	212	ND	250	98	ND	256	107
30	Benzo(a)anthracene	ND	8.0	85.1	97.9	ND	100	100	ND	103	83
34	Benzenethiol	IND		IND	IND	IND	300	0	IND	308	0
36	Benzo(b)fluoranthene	ND	10	173	198	ND	100	149	ND	103	169
38	Benzo(a)pyrene	ND	2.6	165	193	ND	100	165	ND	103	161
39	p-Benzoquinone	ND	10	ND	ND	ND	150	0	ND	154	0
35	Benzidine	ND	45	ND	ND	ND	100	0	ND	103	0
43	bis(2-Chloroethoxy)methane	ND	5.4	90.2	103	ND	100	103	ND	103	88
44	bis(2-Chloroethyl) ether	ND	5.8	107	107	ND	100	123	ND	103	104
46	bis(2-Chloroisopropyl)ether	ND	5.8	85.8	102	ND	100	102	ND	103	84
48	bis(2-Ethylhexyl)phthalate	ND	10	135	142	ND	100	164	ND	103	132
51	4-Bromophenyl phenyl ether	ND	1.9	108	111	ND	100	122	ND	103	105
54	Butyl benzyl phthalate	ND	10	78.0	80.3	ND	100	88	ND	103	76
55	2-sec-Butyl-4,6-dinitrophen	ND	10	225	258	ND	300	85	ND	308	73
71	p-Chloroaniline	ND	10	171	219	ND	150	147	ND	154	111
74	p-Chloro-m-cresol	ND	3.1	83.1	76.4	ND	100	91	ND	103	81
80	2-Chloronaphthalene	ND	1.9	113	136	ND	100	133	ND	103	110
81	2-Chlorophenol	ND	3.4	82.1	71.3	ND	100	114	ND	103	80
83	3-Chloropropionitrile	ND	10	105	ND	ND	250	69	ND	256	41
85	Chrysene	ND	2.6	89.7	92.3	ND	100	116	ND	103	87
87A	Acenaphthene	ND	1.9	84.0	100	ND	100	103	ND	103	82
87B	Acenaphthylene	ND	3.6	81.7	103	ND	100	101	ND	103	80
87C	Anthracene	ND	1.9	95.8	111	ND	100	109	ND	103	93
87D	Benzo(ghi)perylene	ND	4.2	ND	ND	ND	0	-	ND	0	-
87E	Benzo(k)fluoranthene	ND	3.6	166	215	ND	100	219	ND	103	162
87F	Fluorene	ND	1.9	76.7	94.2	ND	100	102	ND	103	75
87G	Phenanthrene	ND	5.5	92.6	108	ND	100	106	ND	103	90
87H	Pyrene	ND	1.9	67.9	73.4	ND	100	87	ND	103	66

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9-Heated Purge and Trap Compounds-GC/MS Analysis Data (QR57)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1	Acetonitrile	ND	10	ND	ND	ND	100	102	ND	100	82
7	Acrolein	ND	100	ND	ND	ND	100	79	ND	100	105
9	Acrylonitrile	ND	100	ND	ND	ND	100	72	ND	100	74
12	Allyl alcohol	ND	8.0	ND	ND	ND	500	191	ND	500	47
168	1,4-Dioxane	ND	10	ND	ND	ND	500	160	57.2	500	36
177	Ethyl cyanide	ND	8.0	ND	ND	ND	500	95	ND	500	116
180	Ethylene oxide	ND		ND	ND	ND	0	-	ND	0	-
212	Isobutyl alcohol	ND	8.0	ND	ND	ND	500	108	ND	500	72
226	Methacrylonitrile	ND	40	ND	ND	ND	500	81	ND	500	103
276	N-Nitrosopyrrolidine	IND		IND	IND	IND	500	0	IND	500	0
307	2-Propyn-1-ol	IND		IND	IND	IND	500	0	IND	50	0
308	Pyridine	ND	80	ND	ND	ND	500	222a	ND	50	19a

a Recover [illegible] methodology.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
* "specifies no standard or reference spectra available.
"IND" Indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
89B 2-Nitrophenol	ND	3.7	69.6	66.8	ND	100	100	ND	103	68
90A o-Cresol	ND	10	81.1	87.7	ND	100	84	ND	103	79
90B m+p-Cresols	ND	10	154	168	ND	200	80	ND	205	75
106 Dibenzo(a,h)anthracene	ND	10	ND	ND	ND	0	-	ND	0	-
108 Dibenzo(a,e)pyrene	ND		ND	ND	ND	0	-	ND	0	-
109 Dibenzo(a,h)pyrene	-	-	-	-	-	-	-	-	-	-
110 Dibenzo(a,i)pyrene	IND		IND	IND	IND	500	0	IND	513	0
114 Di-n-butyl phthalate	BMDL	10	112	131	ND	100	125	1.57	103	107
115 1,2-Dichlorobenzene	ND	1.9	87.1	96.5	ND	100	99	ND	103	85
116 1,3-Dichlorobenzene	ND	1.9	80.0	90.4	ND	100	87	ND	103	78
117 1,4-Dichlorobenzene	ND	4.5	74.8	89.0	ND	100	88	ND	103	73
119 3,3'-Dichlorobenzidine	ND	17	74.4	77.4	ND	100	102	ND	103	73
128 2,4-Dichlorophenol	ND	2.8	77.8	72.0	ND	100	106	ND	103	76
129 2,6-Dichlorophenol	ND	10	106	102	ND	100	112	ND	103	103
143 Diethyl phthalate	ND	10	70.3	94.4	ND	100	89	ND	103	69
150 3,3'-Dimethoxybenzidine	ND	10	ND	ND	ND	150	0	ND	154	0
151 p-Dimethylaminoazobenzene	ND	10	156	147	ND	150	117	ND	154	102
152 7,12-Dimethylbenzo(a)anthra	ND	10	122	157	ND	150	95	ND	154	79
153 3,3'-Dimethylbenzidine	ND	10	ND	ND	ND	150	29	ND	154	0
158 a-a-Dimethylphenethylamine	-	-	-	-	-	-	-	-	-	-
159 2,4-Dimethylphenol	ND	2.8	104	121	ND	100	111	ND	103	101
160 Dimethyl phthalate	ND	10	73.8	93.3	ND	100	93	ND	103	72
162A m-Dinitrobenzene	ND	10	110	142	ND	150	92	ND	154	71
163 4,6-Dinitro-o-cresol	ND	24	67.8	91.9	ND	100	41	ND	103	66
164 2,4-Dinitrophenol	ND	43	83.6	124	ND	100	0	ND	103	81
165 2,4-Dinitrotoluene	ND	5.8	67.7	92.8	ND	100	79	ND	103	66
166 2,6-Dinitrotoluene	ND	1.9	83.2	102	ND	100	101	ND	103	81
167 Di-n-octyl phthalate	ND	10	137	176	ND	100	154	ND	103	133
169 Diphenylamine	ND	10	216	242	ND	150	173	ND	154	141
170 1,2-Diphenylhydrazine	ND	10	92.0	108	ND	100	121	ND	103	90
171 N-Nitrosodi-n-propylamine	ND	10	89.8	97.1	ND	100	105	ND	103	88
184 Fluoranthene	ND	2.2	74.5	84.7	ND	100	96	ND	103	73

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-*specifies no standard or reference spectra available.
"IND" Indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound not qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
194	Hexachlorobenzene	ND	1.9	98.1	105	ND	100	105	ND	103	96
195	Hexachlorobutadiene	ND	.92	66.5	79.6	ND	100	82	ND	103	65
197	Hexachlorocyclopentadiene	ND	10	ND	ND	ND	0	-	ND	0	-
198	Hexachloroethane	ND	1.6	72.8	85.7	ND	100	79	ND	103	71
199	Isodrin	ND	6.0	132	166	ND	150	105	ND	154	86
200	Hexachlorophene	ND	10	ND	ND	ND	300	0	ND	308	0
201	Hexachloropropene	ND	10	43.4	23.5	ND	150	20	ND	154	28
208	Indeno(1,2,3-cd)pyrene	ND	10	ND	ND	ND	0	-	ND	0	-
213	Isosafrole	ND	10	43.2	55.9	ND	150	24	ND	154	28
222	Malononitrile	IND		IND	IND	IND	500	0	IND	513	0
228	Methapyrilene	IND		IND	IND	IND	500	0	IND	513	0
232	3-Methylcholanthrene	ND	10	82.2	112	ND	150	68	ND	154	53
234	4,4'-Methylenebis(2-chloro	ND	10	57.8	33.8	ND	150	63	ND	154	38
239	Methyl methanesulfonate	ND	10	63.9	68.0	ND	150	71	ND	154	42
245	Naphthalene	ND	1.6	92.7	100	ND	100	100	ND	103	90
246	1,4-Naphthoquinone	ND	10	7.00	14.3	ND	150	79	ND	154	5
247	1-Naphthylamine	ND	10	94.8	160	ND	150	108	ND	154	62
248	2-Naphthylamine	ND	10	57.4	69.6	ND	150	57	ND	154	37
255	p-Nitroaniline	ND	10	75.8	80.3	ND	100	91	ND	103	74
256	Nitrobenzene	ND	1.9	93.0	98.9	ND	100	108	ND	103	91
261	4-Nitrophenol	ND	2.4	ND	ND	ND	100	0	ND	103	0
263A	N-Nitrosodiphenylamine	ND	1.9	182	240	ND	100	251	ND	103	177
264	N-Nitrosodi-n-butylamine	ND	10	141	163	ND	100	164	ND	103	138
266	N-Nitrosodiethylamine	ND	10	95.7	ND	ND	150	83	ND	154	62
267	N-Nitrosodimethylamine	ND	10	ND	ND	ND	100	0	ND	103	0
269	N-Nitrosomethylethylamine	ND	10	186	196	ND	500	41	ND	513	36
273	N-Nitrosomorpholine	ND	10	118	138	ND	150	85	ND	154	77
275	N-Nitrosopiperidine	ND	10	138	144	ND	150	105	ND	154	90
278	5-Nitro-o-toluidine	ND	10	367	447	ND	250	171	ND	256	143
284	Pentachlorobenzene	ND	10	133	151	ND	150	107	ND	154	87
286	Pentachloronitrobenzene	ND	10	223	274	ND	250	97	ND	256	87
287	Pentachlorophenol	ND	3.7	98.8	107	ND	100	65	ND	103	96

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

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S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

Compound #		Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
288	Phenacetin	ND	10	98.2	100	ND	150	77	ND	154	64
289	Phenol	ND	1.5	91.5	75.2	ND	100	105	ND	103	89
299	2-Picoline	ND	10	86.6	91.5	ND	150	104	ND	154	56
303	Pronamide	ND	10	115	137	ND	150	90	ND	154	75
310	Resorcinol	ND	10	ND	ND	ND	300	0	ND	308	0
312	Safrole	ND	10	131	157	ND	150	101	ND	154	85
323	1,2,4,5-Tetrachlorobenzene	ND	10	121	145	ND	150	101	ND	154	79
330	2,3,4,6-Tetrachlorophenol	ND	10	111	128	ND	200	66	ND	206	54
331	Tetraethyldithiopyrophospha	ND		ND	ND	ND	0	-	ND	0	-
353	1,2,4-Trichlorobenzene	ND	1.9	81.9	83.1	ND	100	88	ND	103	80
359	2,4,5-Trichlorophenol	ND	10	79.1	81.8	ND	100	80	ND	103	77
360	2,4,6-Trichlorophenol	ND	2.8	75.9	79.1	ND	100	98	ND	103	74
368	tris(2,3-Dibromopropyl)phos	IND		IND	IND	IND	500	0	IND	513	0
	Benzoic acid	ND	10	ND	75.1	ND	100	87	ND	103	0
	Benzyl alcohol	ND	10	127	141	ND	150	91	ND	154	83
	Dibenzofuran	ND	10	122	151	ND	150	102	ND	154	79
	Isophorone	ND	2.2	87.8	97.9	ND	100	95	ND	103	86
	2-Methylnaphthalene	ND	10	128	157	ND	150	104	ND	154	83
	o-Nitroaniline	ND	10	101	139	ND	150	90	ND	154	66
	m-Nitroaniline	ND	10	79.1	186	ND	150	75	ND	154	51
	4-Chlorophenyl phenyl ether	ND	4.3	80.8	96.2	ND	100	103	ND	103	79

[illegible]

Comments on Specific Fraction

B/N/A:

The QC Blank Spike and QC Matrix Spike yielded variable recoveries. All recoveries were manually verified.

The following compounds yielded 0% recoveries for both spikes but were detected in the calibration standards used for this analysis:

3,3'-Dimethoxybenzidine

Hexachlorophene

Resorcinol

The following compounds yielded low/no recoveries but are considered normally variable:

3,3'-Dimethylbenzidine

2,4-Dinitrophenol

4-Nitrophenol

Hexachloropropene

Isosafrole

1,4-Naphthoquinone

N-Nitroso methylethylamine

Benzoic Acid

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Pest & Herb Compounds – GC Analysis Data (QR56)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l a	MDL** ug/l	First ug/l a	Second ug/l a	Blank Data ug/l a	Concen. Added ug/l	% Recov	Unspiked Sample ug/l a	Concen. Added ug/l	% Recov
11 Aldrin	ND	.09	ND	ND	ND	.481	129	ND	.463	108
63 Chlordane	ND	.93	ND	ND	ND	5.00	74	ND	4.81	96
73 Chlorobenzilate	ND	2.3	ND	ND	ND	0	-	ND	0	-
100 4,4'-DDD	ND	.093	ND	ND	ND	.962	96	ND	.926	77
101 4,4'-DDE	.117	.093	.117	.259	ND	.481	172	.254	.463	93
102 4,4'-DDT	.509	.093	.509	.701	.366	.481	307	.737	.463	99
130 2,4-D	ND	10	ND	ND	ND	50.0	0	ND	45.5	134
137 Dieldrin	ND	.093	ND	ND	ND	.481	162	ND	.463	130
144 Thionazin	ND	.93	ND	ND	ND	4.55	175	ND	4.10	151
172 Disulfoton	ND	4.6	ND	ND	ND	22.7	175	ND	20.5	162
174A Endosulfan I	ND	.093	ND	ND	ND	.481	141	ND	.463	134
174B Endosulfan II	ND	.093	ND	ND	ND	.481	97	ND	.463	80
175 Endrin	BMDL	.09	.0400	.0400	ND	.962	96	ND	.926	77
Endrin aldehyde	ND	.093	ND	ND	ND	.481	146	ND	.463	110
192 Heptachlor	ND	.093	ND	ND	ND	.481	146	ND	.463	119
193 Heptachlor epoxide	ND	.093	ND	ND	ND	.481	164	ND	.463	132
196A Alpha-BHC	ND	.093	ND	ND	ND	.481	109	ND	.463	103
196B Beta-BHC	ND	.093	ND	ND	ND	.481	115	ND	.463	103
196C Gamma-BHC	ND	.093	ND	ND	ND	.481	138	ND	.463	116
196D Delta-BHC	ND	.093	ND	ND	ND	.481	153	ND	.463	140
214 Kepone	ND	.93	ND	ND	ND	5.00	122	ND	4.81	105
230 Methoxychlor	ND	9.3	ND	ND	ND	48.1	191	ND	46.3	152
242 Methyl parathion	ND	.93	ND	ND	ND	4.55	192	ND	4.10	173
283 Parathion	ND	.93	ND	ND	ND	4.55	194	ND	4.10	168
295 Phorate	ND	.93	ND	ND	ND	4.55	15	ND	4.10	13
296 Famphur	ND	9.3	ND	ND	ND	45.5	190	ND	41.0	172
351 Toxaphene	ND	2.3	ND	ND	ND	20.0	152	ND	19.2	66
361 2,4,5-T	ND	1.0	ND	ND	ND	5.00	0	ND	4.55	112
362 2,4,5-TP (Silvex)	ND	1.0	ND	ND	ND	5.00	0	ND	4.55	99

a Refer to comment sheet.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-specified no standard available.
**ND -indeterminate. Standard and/or spikes could not be detected at current method levels.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 20, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA - Aroclors -GC Analysis Data (QR30)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
300A Aroclor 1242	ND	.93	ND	ND	ND	0	-	ND	0	-
300B Aroclor 1254	ND	.93	ND	ND	ND	0	-	ND	0	-
300C Aroclor 1260	ND	.93	ND	ND	ND	2.00	82	ND	1.64	75
300D Aroclor 1248	ND	.93	ND	ND	ND	0	-	ND	0	-
300E Aroclor 1232	ND	.93	ND	ND	ND	0	-	ND	0	-
300F Aroclor 1221	ND	.93	ND	ND	ND	0	-	ND	0	-
300G Aroclor 1016	ND	.93	ND	ND	ND	0	-	ND	0	-

*See Grand table for complete compound name and specifications.
**MDL calculated for each sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 25, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals – Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

NPDES Number	Compound		Results: Sample Concen.	Results: MDL
	Chromium, Hexavalent	ug/l	<20.0	20
	Aluminum, Total	ug/l	3150	30
	Antimony, Total	ug/l	<500	500
	Arsenic, Total	ug/l	190	4.0
	Barium, Total	ug/l	266	50
	Beryllium, Total	ug/l	<1.00	1.0
	Cadmium, Total	ug/l	5.00	3.0
	Calcium, Total	ug/l	11700	100
	Chromium, Total	ug/l	47.0	20
	Cobalt, Total	ug/l	<20.0	20
	Copper, Total	ug/l	136	20
	Iron, Total	ug/l	1270	30
	Lead, Total	ug/l	136	10
	Magnesium, Total	ug/l	1520	200
	Manganese, Total	ug/l	17.0	10
	Mercury, Total	ug/l	4.80	.50
	Nickel, Total	ug/l	<20.0	20
	Osmium, Total	mg/l	ND	
	Selenium, Total	ug/l	6.00	4.0
	Silver, Total	ug/l	<30.0	30
	Sodium, Total	ug/l	3920000	50
	Thallium, Total	ug/l	<300	300
	Tin, Total	ug/l	<1000	1000
	Vanadium, Total	ug/l	44.0	10
	Zinc, Total	ug/l	416	10
	Potassium, Total	ug/l	22000	50
	Cyanide, Total	mg/l	<.0200	.020
	Sulfide as S	mg/l	<.100	.10

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 19, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Conventional Analysis Data (QR10)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	IIMPDE	870501	1405	

NPDES Number	Results									
	Sample Concen. mg/l	MDL mg/l								
Fluoride	70.0	.10								

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 23, 1987

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery – Aqueous Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

86605

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	96	88	110
p-Bromofluorobenzene	.250	105	86	115
1,2-Dichloroethane-D4	.250	125***	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	100	70	10	94
2-Fluorophenol	100	78	21	100
2,4,6-Tribromophenol	100	77	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	50	96	35	114
2-Fluorobiphenyl	50	76	43	116
Terphenyl-D14	50	51	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	-	-	24**	154**

* USEPA Control Limits.
** Advisory Limits Only.
***Recovery manually verified.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 24, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Field Parameters (QR16)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6605	WASTE MANAGEMENT, INC.	705	1IMPDE	870501	1405	

Parameter		Results: Sample Measure	Results: MDL								
pH (Field)	std	9.00									
pH (Field)	std	9.01									
pH (Field)	std	9.02									
pH (Field)	std	9.02									
Specific Conductance (Field	um/cm	17300									
Specific Conductance (Field	um/cm	16600									
Specific Conductance (Field	um/cm	16700									
Specific Conductance (Field	um/cm	16600									
Temperature	Deg. C	52.9									

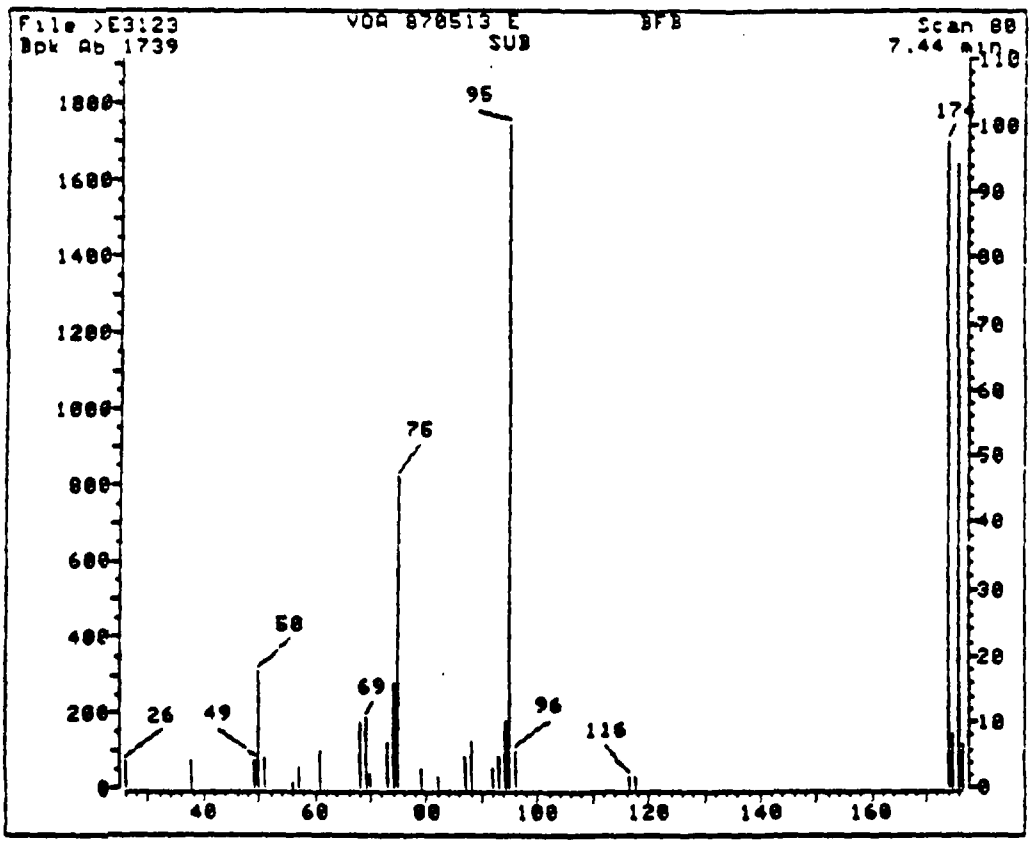

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Statu
50	15-40% of mass 95	17.94	17.94	Ok
75	30-60% of mass 95	47.10	47.10	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	5.69	5.69	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	97.53	97.53	Ok
175	5-9% of mass 174	8.17	8.37	Ok
176	95-101% of mass 174	94.36	96.76	Ok
177	5-9% of mass 176	6.44	6.83	Ok

Injection Date: 05/13/87 Analyst: [illegible]
Injection Time: 14:52 Processor: [illegible]
Run No: >E3123 QC Batch: QV7054
Spectrum No: 80 -20

KS 5/20/87

MS Data File: >E3123::U4

Name: VOA 870513 E Operator: LR5235 Date/Time: 5/13/87 14:52
Misc: BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6608V (>E3128)	870513	20:21
	S6606V (>E3130)	870513	22:21
	S6607V (>E3131)	870513	23:06

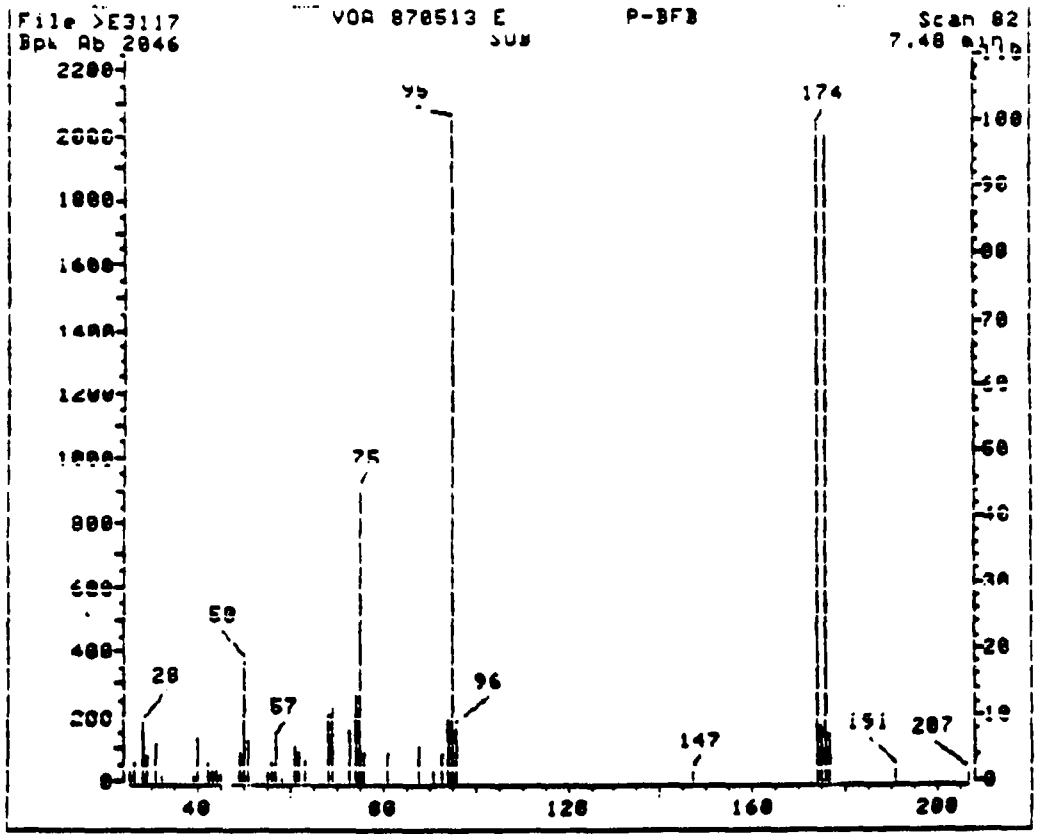

TABLE 2: METHOD PERFORMANCE DATA (WR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.13	18.13	Ok
75	30-60% of mass 95	44.43	44.43	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.11	8.11	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.32	99.32	Ok
175	5-9% of mass 174	8.26	8.32	Ok
176	95-101% of mass 174	98.09	98.77	Ok
177	5-9% of mass 176	7.04	7.17	Ok

Injection Date: 05/13/87 Analyst: K Boyle
Injection Time: 06:46 Processor: [illegible]
Run No: >E3117 WC Batch: QV 7054
Spectrum No: B2-69

KJ
5/20/87

You're already on LU: 87

MS Data File: >E3117::U5

Name: UUA 870513 E Operator: KB6656 Date/Time: 5/13/87 6:46
Misc: F-8F8

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC70S4V (>E3118)	870513	07:27
	QC70S4VS (>E3119)	870513	08:12
	QC70S4VS (>E3121)	870513	10:30
	QC70S4VS (>E3122)	870513	11:50

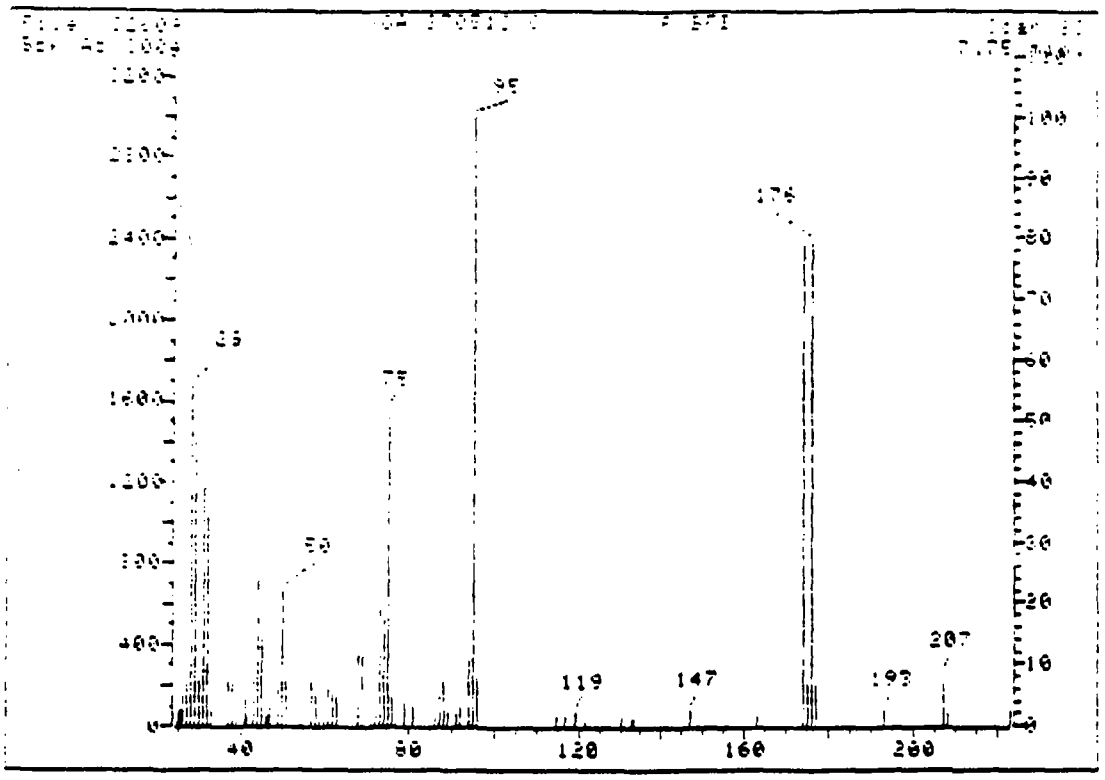

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.87	21.87	Ok
75	30-60% of mass 95	51.83	51.83	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.59	7.59	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	78.73	78.73	Ok
175	5-9% of mass 174	6.79	8.63	Ok
176	95-101% of mass 174	79.26	100.68	Ok
177	5-9% of mass 176	6.49	8.19	Ok

Injection Date: 05/13/87 Analyst: K. Boghi
Injection Time: 02:00 Processor: Sharon Matlock
Run No: XC2609 QC Batch: QW7052
Spectrum No: BB (UNaltered)

KS 5/21/87

E Data File: [illegible]

Name: [illegible] 870513 [illegible] Operator: [illegible] Date/Time: 5/13/87 [illegible]
Lab: [illegible]

This performance runs applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7052VS (?C2607)	870513	02:22
	QC7052VS (?C2608)	870513	03:02
	QC7052V (?C2611)	870513	05:25
	QC7052V (?C2612)	870513	06:10
	QC7052V (?C2613)	870513	06:57
	S6608V (?C2615)	870513	09:38
	S6602V (?C2616)	870513	10:23
	S6606V (?C2617)	870513	11:08
	QC7052V (?C2618)	870513	11:55
	S6607V (?C2619)	870513	12:44

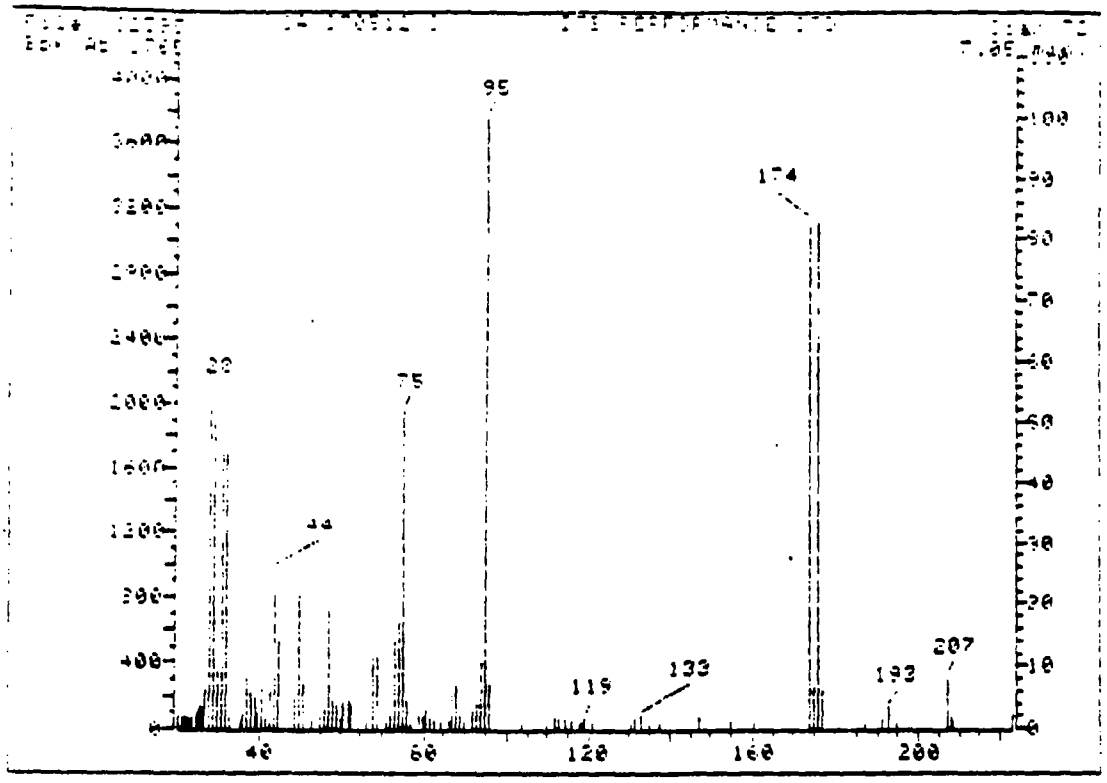

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.46	21.46	OK
75	30-60% of mass 95	51.79	51.79	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	7.09	7.09	OK
173	Less than 1% of mass 95	0.00	0.00	OK
174	Greater than 50% of mass 95	92.66	92.66	OK
175	5-9% of mass 174	6.67	8.07	OK
176	95-101% of mass 174	92.59	99.90	OK
177	5-9% of mass 176	6.00	7.27	OK

Injection Date: 05/12/87 Analyst: [signature]
Injection Time: 14:36 Processor: [signature]
Run No: X02595 QC Batch: QV7052
Spectrum No: 72

KJ
5/21/87

Data File: [illegible]

Name: [illegible] Operator: [illegible] Date/Time: [illegible]
Test: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052V (PC2596)	870512	15:33
	OC7052V (PC2597)	870512	16:17
	OC7052V (PC2598)	870512	17:02
	OC7052V (PC2599)	870512	17:48
	S6605VS (PC2601)	870512	19:44
	S6605V (PC2602)	870512	20:30
	S6604V (PC2603)	870512	21:46
	S6604VR (PC2604)	870512	22:06
	S6603V (PC2605)	870512	22:52
	OC7052VS (PC2606)	870513	01:01

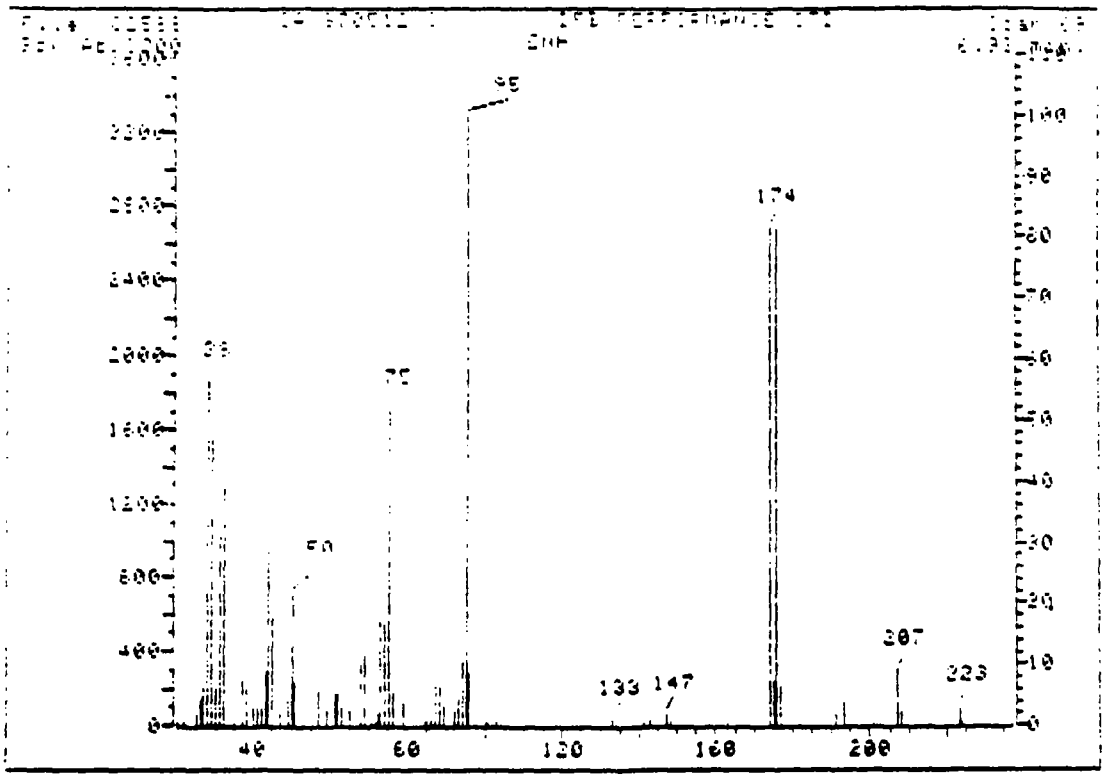

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.23	52.23	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.38	8.38	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	81.41	81.41	Ok
175	5-9% of mass 174	7.01	8.61	Ok
176	95-101% of mass 174	81.22	99.76	Ok
177	5-9% of mass 176	6.44	7.93	Ok

Injection Date: 05/12/87 Analyst: K. Boykin
Injection Time: 07:05 Processor: Sharon Maslock
Run No: C2588 QC Batch: QJ7052
Spectrum No: 69(ENH)

KS
5/21/87

S Data File: [illegible]

Name: [illegible] Operator: [illegible] Date/Time: [illegible]
Disc: EFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052VS (?C2591)	870512	09:12
	OC7052VS (?C2593)	870512	11:24
	OC7052VS (?C2594	870512	13:02

ENVIRONMENTAL
TESTING and CERTIFICATION

June 23, 1987

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery – Aqueous Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

S6606

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	93	88	110
p-Bromofluorobenzene	.250	107	86	115
1,2-Dichloroethane-D4	.250	110	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	100	99	10	94
2-Fluorophenol	100	92	21	100
2,4,6-Tribromophenol	100	50	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	50	116***	35	114
2-Fluorobiphenyl	50	72	43	116
Terphenyl-D14	50	42	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	-	-	24**	154**

* IFB EPA Control Limits.
** Advisory Limits Only.
***Recovery manually verified.

ENVIRONMENTAL
TESTING and CERTIFICATION

JUN 20, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA - Aroclors -GC Analysis Data (QR30)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
300A Aroclor 1242	ND	.86	ND	ND	ND	0	-	ND	0	-
300B Aroclor 1254	ND	.86	ND	ND	ND	0	-	ND	0	-
300C Aroclor 1260	ND	.86	ND	ND	ND	2.00	82	ND	1.64	75
300D Aroclor 1248	ND	.86	ND	ND	ND	0	-	ND	0	-
300E Aroclor 1232	ND	.86	ND	ND	ND	0	-	ND	0	-
300F Aroclor 1221	ND	.86	ND	ND	ND	0	-	ND	0	-
300G Aroclor 1016	ND	.86	ND	ND	ND	0	-	ND	0	-

*See Grand Table for complete compound name and specifications.
**MDL calculated for each sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 30, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 - Metals and Conventionals - Analysis Data (QR60)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First	Second	Blank Data	Concen. Added	% Recov	Unspiked Sample	Concen Added	% Recov
92A Cyanide, Total	<20	20								
280A Osmium	ND									
Sulfide as S	2000	100								
Fluoride	440	100								
Antimony, Total	<500	500								
Arsenic, Total	120	4.0								
Beryllium, Total	<1.0	1.0								
Cadmium, Total	<3.0	3.0								
Calcium, Total	36800	100								
Chromium, Total	<20	20								
Copper, Total	<20	20								
Iron, Total	15400	30								
Lead, Total	<10	10								
Mercury, Total	<.50	.50								
Nickel, Total	<20	20								
Potassium, Total	40000	50								
Selenium, Total	<2.0	2.0								
Silver, Total	<30	30								
Sodium, Total	121000	50								
Thallium, Total	<300	300								
Vanadium, Total	<10	10								
Zinc, Total	71	10								
Magnesium, Total	23200	200								
Manganese, Total	394	10								
Tin, Total	<1000	1000								
Cobalt, Total	<20	20								
Aluminum, Total	192	30								
Barium, Total	751	50								

A Qualitative scan for Osmium.

*See Grand Table for complete compound name and specifications.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Pest & Herb Compounds – GC Analysis Data (QR56)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l a	MDL** ug/l	First ug/l a	Second ug/l a	Blank Data ug/l a	Concen. Added ug/l	% Recov	Unspiked Sample ug/l a	Concen. Added ug/l	% Recov
11 Aldrin	ND	.086	ND	ND	ND	.481	129	ND	.463	108
63 Chlordane	ND	.86	ND	ND	ND	5.00	74	ND	4.81	96
73 Chlorobenzilate	ND	2.2	ND	ND	ND	0	-	ND	0	-
100 4,4'-DDD	ND	.086	ND	ND	ND	.962	96	ND	.926	77
101 4,4'-DDE	.980	.086	.117	.259	ND	.481	172	.254	.463	93
102 4,4'-DDT	ND	.09	.509	.701	.366	.481	307	.737	.463	99
130 2,4-D	ND	8.2	ND	ND	ND	50.0	0	ND	45.5	134
137 Dieldrin	ND	.086	ND	ND	ND	.481	162	ND	.463	130
144 Thionazin	ND	.86	ND	ND	ND	4.55	175	ND	4.10	151
172 Disulfoton	ND	4.3	ND	ND	ND	22.7	175	ND	20.5	162
174A Endosulfan I	ND	.086	ND	ND	ND	.481	141	ND	.463	134
174B Endosulfan II	ND	.086	ND	ND	ND	.481	97	ND	.463	80
175 Endrin	ND	.086	.0400	.0400	ND	.962	96	ND	.926	77
Endrin aldehyde	ND	.086	ND	ND	ND	.481	146	ND	.463	110
192 Heptachlor	ND	.086	ND	ND	ND	.481	146	ND	.463	119
193 Heptachlor epoxide	ND	.086	ND	ND	ND	.481	164	ND	.463	132
196A Alpha-BHC	ND	.086	ND	ND	ND	.481	109	ND	.463	103
196B Beta-BHC	ND	.086	ND	ND	ND	.481	115	ND	.463	103
196C Gamma-BHC	ND	.086	ND	ND	ND	.481	138	ND	.463	116
196D Delta-BHC	ND	.086	ND	ND	ND	.481	153	ND	463	140
214 Kepone	ND	.86	ND	ND	ND	5.00	122	ND	4.81	105
230 Methoxychlor	ND	8.6	ND	ND	ND	48.1	191	ND	46.3	152
242 Methyl parathion	ND	.86	ND	ND	ND	4.55	192	ND	4.10	173
283 Parathion	ND	.86	ND	ND	ND	4.55	194	ND	4.10	168
295 Phorate	ND	.86	ND	ND	ND	4.55	15	ND	4.10	13
296 Famphur	ND	8.6	ND	ND	ND	45.5	190	ND	41.0	172
351 Toxaphene	ND	2.2	ND	ND	ND	20.0	152	ND	19.2	66
361 2,4,5-T	ND	.82	ND	ND	ND	5.00	0	ND	4.55	112
362 2,4,5-TP (Silvex)	ND	.82	ND	ND	ND	5.00	0	ND	4.55	99

a Refer to comment sheet.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
***Specifications or standard available.
"ND" indicates not detected. Standard and/or spikes could not be detected at current method levels.

Comments on Specific Fractions

Pesticide and Herbicide

The presence of 4,4'-DDT detected in the QC Blank would normally warrant repeat preparation of this QC batch. However, it was determined that this original data would be qualified, and is here reported.

Because 4,4-DDT was found in the QC Blank at a reportable level and 4,4'-DDE was also found in the QC Blank, although at a level considered to be not detected, the reported presence of 4,4-DDT/4,4'-DDD in this sample should be considered suspect.

The identification of all compounds here reported as present has been confirmed by second column analysis.

The QC Spiked Blank recoveries for the herbicide compounds 2,4-D, 2,4,5-T and 2,4,5-TP have been manually verified. The QC Spiked Blank may have inadvertantly not been spiked for these compounds. The QC Matrix Spike recoveries are within acceptable limits.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
288	Phenacetin	ND	10	98.2	100	ND	150	77	ND	154	64
289	Phenol	ND	1.5	91.5	75.2	ND	100	105	ND	103	89
299	2-Picoline	ND	10	86.6	91.5	ND	150	104	ND	154	56
303	Pronamide	ND	10	115	137	ND	150	90	ND	154	75
310	Resorcinol	ND	10	ND	ND	ND	300	0	ND	308	0
312	Safrole	ND	10	131	157	ND	150	101	ND	154	85
323	1,2,4,5-Tetrachlorobenzene	ND	10	121	145	ND	150	101	ND	154	79
330	2,3,4,6-Tetrachlorophenol	ND	10	111	128	ND	200	66	ND	206	54
331	Tetraethyldithiopyrophospha	ND		ND	ND	ND	0	-	ND	0	-
353	1,2,4-Trichlorobenzene	ND	2.0	81.9	83.1	ND	100	88	ND	103	80
359	2,4,5-Trichlorophenol	ND	10	79.1	81.8	ND	100	80	ND	103	77
360	2,4,6-Trichlorophenol	ND	2.8	75.9	79.1	ND	100	98	ND	103	74
368	tris(2,3-Dibromopropyl)phos	IND		IND	IND	IND	500	0	IND	513	0
	Benzoic acid	ND	10	ND	75.1	ND	100	87	ND	103	0
	Benzyl alcohol	ND	10	127	141	ND	150	91	ND	154	83
	Dibenzofuran	BMDL	10	122	151	ND	150	102	ND	154	79
	Isophorone	ND	2.3	87.8	97.9	ND	100	95	ND	103	86
	2-Methylnaphthalene	ND	10	128	157	ND	150	104	ND	154	83
	o-Nitroaniline	ND	10	101	139.	ND	150	90	ND	154	66
	m-Nitroaniline	ND	10	79.1	186	ND	150	75	ND	154	51
	4-Chlorophenyl phenyl ether	ND	4.3	80.8	96.2	ND	100	103	ND	103	79

*This trend table for complete compound name and specifications.
**MDL: Established method detection limit.
*: specifies no standard or reference spectra available.
*ND: Indeterminate. Standard and/or spikes could not be detected at current method levels.
Results with neither "MDL" nor "(conc.added" specifies no standard available, compound was qualitatively searched for.

Comments on Specific Fraction

B/N/A:

The QC Blank Spike and QC Matrix Spike yielded variable recoveries. All recoveries were manually verified.

The following compounds yielded 0% recoveries for both spikes but were detected in the calibration standards used for this analysis:

- 3,3'-Dimethoxybenzidine
- Hexachlorophene
- Resorcinol

The following compounds yielded low/no recoveries but are considered normally variable:

- 3,3'-Dimethylbenzidine
- 2,4-Dinitrophenol
- 4-Nitrophenol
- Hexachloropropene
- Isosafrole
- 1,4-Naphthoquinone
- N-Nitroso methylethylamine
- Benzoic Acid

ET ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
89B 2-Nitrophenol	ND	3.7	69.6	66.8	ND	100	100	ND	103	68
90A o-Cresol	ND	10	81.1	87.7	ND	100	84	ND	103	79
90B m+p-Cresols	ND	10	154	168	ND	200	80	ND	205	75
106 Dibenzo(a,h)anthracene	ND	10	ND	ND	ND	0	-	ND	0	-
108 Dibenzo(a,e)pyrene	ND		ND	ND	ND	0	-	ND	0	-
109 Dibenzo(a,h)pyrene	-	-	-	-	-	-	-	-	-	-
110 Dibenzo(a,i)pyrene	IND		IND	IND	IND	500	0	IND	513	0
114 Di-n-butyl phthalate	BMDL	10	112	131	ND	100	125	1.57	103	107
115 1,2-Dichlorobenzene	ND	2.0	87.1	96.5	ND	100	99	ND	103	85
116 1,3-Dichlorobenzene	ND	2.0	80.0	90.4	ND	100	87	ND	103	78
117 1,4-Dichlorobenzene	ND	4.5	74.8	89.0	ND	100	88	ND	103	73
119 3,3'-Dichlorobenzidine	ND	17	74.4	77.4	ND	100	102	ND	103	73
128 2,4-Dichlorophenol	ND	2.8	77.8	72.0	ND	100	106	ND	103	76
129 2,6-Dichlorophenol	ND	10	106	102	ND	100	112	ND	103	103
143 Diethyl phthalate	ND	10	70.3	94.4	ND	100	89	ND	103	69
150 3,3'-Dimethoxybenzidine	ND	10	ND	ND	ND	150	0	ND	154	0
151 p-Dimethylaminoazobenzene	ND	10	156	147	ND	150	117	ND	154	102
152 7,12-Dimethylbenzo(a)anthra	ND	10	122	157	ND	150	95	ND	154	79
153 3,3'-Dimethylbenzidine	ND	10	ND	ND	ND	150	29	ND	154	0
158 a-a-Dimethylphenethylamine	-	-	-	-	-	-	-	-	-	-
159 2,4-Dimethylphenol	ND	2.8	104	121	ND	100	111	ND	103	101
160 Dimethyl phthalate	BMDL	10	73.8	93.3	ND	100	93	ND	103	72
162A m-Dinitrobenzene	ND	10	110	142	ND	150	92	ND	154	71
163 4,6-Dinitro-o-cresol	ND	25	67.8	91.9	ND	100	41	ND	103	66
164 2,4-Dinitrophenol	ND	43	83.6	124	ND	100	0	ND	103	81
165 2,4-Dinitrotoluene	ND	5.9	67.7	92.8	ND	100	79	ND	103	66
166 2,6-Dinitrotoluene	ND	2.0	83.2	102	ND	100	101	ND	103	81
167 Di-n-octyl phthalate	ND	10	137	176	ND	100	154	ND	103	133
169 Diphenylamine	ND	10	216	242	ND	150	173	ND	154	141
170 1,2-Diphenylhydrazine	ND	10	92.0	108	ND	100	121	ND	103	90
171 N-Nitrosodi-n-propylamine	ND	10	89.8	97.1	ND	100	105	ND	103	88
184 Fluoranthene	ND	2.3	74.5	84.7	ND	100	96	ND	103	73

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
"-" specifies no standard or reference spectra available.
"IND" indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen, ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen, Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
194 Hexachlorobenzene	ND	2.0	98.1	105	ND	100	105	ND	103	96
195 Hexachlorobutadiene	ND	.93	66.5	79.6	ND	100	82	ND	103	65
197 Hexachlorocyclopentadiene	ND	10	ND	ND	ND	0	-	ND	0	-
198 Hexachloroethane	ND	1.6	72.8	85.7	ND	100	79	ND	103	71
199 Isodrin	ND	6.1	132	166	ND	150	105	ND	154	86
200 Hexachlorophene	ND	10	ND	ND	ND	300	0	ND	308	0
201 Hexachloropropene	ND	10	43.4	23.5	ND	150	20	ND	154	28
208 Indeno(1,2,3-cd)pyrene	ND	10	ND	ND	ND	0	-	ND	0	-
213 Isosafrole	ND	10	43.2	55.9	ND	150	24	ND	154	28
222 Malononitrile	IND		IND	IND	IND	500	0	IND	513	0
228 Methapyrilene	IND		IND	IND	IND	500	0	IND	513	0
232 3-Methylcholanthrene	ND	10	82.2	112	ND	150	68	ND	154	53
234 4,4'-Methylenebis(2-chloroa	ND	10	57.8	33.8	ND	150	63	ND	154	38
239 Methyl methanesulfonate	ND	10	63.9	68.0	ND	150	71	ND	154	42
245 Naphthalene	4.08	1.6	92.7	100	ND	100	100	ND	103	90
246 1,4-Naphthoquinone	ND	10	7.00	14.3	ND	150	79	ND	154	5
247 1-Naphthylamine	ND	10	94.8	160	ND	150	108	ND	154	62
248 2-Naphthylamine	ND	10	57.4	69.6	ND	150	57	ND	154	37
255 p-Nitroaniline	ND	10	75.8	80.3	ND	100	91	ND	103	74
256 Nitrobenzene	ND	2.0	93.0	98.9	ND	100	108	ND	103	91
261 4-Nitrophenol	ND	2.5	ND	ND	ND	100	0	ND	103	0
263A N-Nitrosodiphenylamine	ND	2.0	182	240	ND	100	251	ND	103	177
264 N-Nitrosodi-n-butylamine	ND	10	141	163	ND	100	164	ND	103	138
266 N-Nitrosodiethylamine	ND	10	95.7	ND	ND	150	83	ND	154	62
267 N-Nitrosodimethylamine	ND	10	ND	ND	ND	100	0	ND	103	0
269 N-Nitrosomethylethylamine	ND	10	186	196	ND	500	41	ND	513	36
273 N-Nitrosomorpholine	ND	10	118	138	ND	150	85	ND	154	77
275 N-Nitrosopiperidine	ND	10	138	144	ND	150	105	ND	154	90
278 5-Nitro-o-toluidine	ND	10	367	447	ND	250	171	ND	256	143
284 Pentachlorobenzene	ND	10	133	151	ND	150	107	ND	154	87
286 Pentachloronitrobenzene	ND	10	223	274	ND	250	97	ND	256	87
287 Pentachlorophenol	ND	3.7	98.8	107	ND	100	65	ND	103	96

*See Brand table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-specifies no standard or reference spectra available.
"IND" Indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 - Purge & Trap Compounds - GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
328	Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	98	ND	18.0	114
329	Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	108	ND	18.0	108
347	Toluene	BMDL	6.0	1.42	ND	ND	18.0	97	ND	18.0	97
352	Bromoform	ND	4.7	ND	ND	ND	18.0	102	ND	18.0	131
354	1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	109	ND	18.0	111
355	1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	100	ND	18.0	102
357	Trichloromethanethiol	-	-	-	-	-	-	-	-	-	-
356	Trichloroethylene	ND	1.9	ND	ND	ND	18.0	101	ND	18.0	101
358	Trichlorofluoromethane	ND	10	ND	ND	ND	18.0	98	ND	18.0	116
364	1,2,3-Trichloropropane	ND	10	ND	ND	ND	18.0	98	ND	18.0	105
373	Vinyl chloride	ND	10	13.9	9.27	ND	18.0	99	ND	18.0	175
	Acetone	10.7	10	20.0	34.8	17.3	90.0	76	28.0	90.0	103
	Ethylbenzene	ND	7.2	ND	ND	ND	18.0	102	ND	18.0	103
	2-Hexanone	ND	10	ND	ND	ND	90.0	78	ND	90.0	78
	Methyl-iso-butyl ketone	ND	10	ND	ND	ND	90.0	96	ND	90.0	93
	Styrene	ND	10	ND	ND	ND	18.0	102	ND	18.0	104
	Vinyl acetate	ND	10	ND	ND	ND	90.0	88	ND	90.0	72
	m-Xylene	ND	10	ND	ND	ND	15.0	105	ND	15.0	110
	o+p-Xylenes	ND	10	2.66	2.54	ND	30.0	104	ND	30.0	110

* Recovery normally variable using established methodology.

*See Grand Table for complete compound name and specifications.
**MDL/RL established method detection limit.
--Specifics on standard or referenced spectra available.
"ND" Undetectable. Standard and/or spike could not be detected at current method levels.
Result with neither "MDL" nor "ND" under specifics no standard available, compound not qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen Added ug/l	% Recov
2	Acetophenone	ND	10	110	123	ND	100	136	ND	103	107
4	2-Acetylaminofluorene	ND	10	142	197	ND	250	67	ND	256	55
14	4-Aminobiphenyl	ND	10	71.0	84.0	ND	250	55	ND	256	28
18	Aniline	ND	10	137	161	ND	150	103	ND	154	89
20	Aramite	ND	10	275	212	ND	250	98	ND	256	107
30	Benzo(a)anthracene	ND	8.0	85.1	97.9	ND	100	100	ND	103	83
34	Benzenethiol	IND		IND	IND	IND	300	0	IND	308	0
36	Benzo(b)fluoranthene	ND	10	173	198	ND	100	149	ND	103	169
38	Benzo(a)pyrene	ND	2.6	165	193	ND	100	165	ND	103	161
39	p-Benzoquinone	ND	10	ND	ND	ND	150	0	ND	154	0
35	Benzidine	ND	45	ND	ND	ND	100	0	ND	103	0
43	bis(2-Chloroethoxy)methane	ND	5.5	90.2	103	ND	100	103	ND	103	88
44	bis(2-Chloroethyl) ether	ND	5.9	107	107	ND	100	123	ND	103	104
46	bis(2-Chloroisopropyl)ether	ND	5.9	85.8	102	ND	100	102	ND	103	84
48	bis(2-Ethylhexyl)phthalate	ND	10	135	142	ND	100	164	ND	103	132
51	4-Bromophenyl phenyl ether	ND	2.0	108	111	ND	100	122	ND	103	105
54	Butyl benzyl phthalate	ND	10	78.0	80.3	ND	100	88	ND	103	76
55	2-sec-Butyl-4,6-dinitrophen	ND	10	225	258	ND	300	85	ND	308	73
71	p-Chloroaniline	ND	10	171	219	ND	150	147	ND	154	111
74	p-Chloro-m-cresol	ND	3.1	83.1	76.4	ND	100	91	ND	103	81
80	2-Chloronaphthalene	ND	2.0	113	136	ND	100	133	ND	103	110
81	2-Chlorophenol	ND	3.4	82.1	71.3	ND	100	114	ND	103	80
83	3-Chloropropionitrile	ND	10	105	ND	ND	250	69	ND	256	41
85	Chrysene	ND	2.6	89.7	92.3	ND	100	116	ND	103	87
87A	Acenaphthene	BMDL	2.0	84.0	100	ND	100	103	ND	103	82
87B	Acenaphthylene	ND	3.6	81.7	103	ND	100	101	ND	103	80
87C	Anthracene	ND	2.0	95.8	111	ND	100	109	ND	103	93
87D	Benzo(ghi)perylene	ND	4.2	ND	ND	ND	0	-	ND	0	-
87E	Benzo(k)fluoranthene	ND	3.6	166	215	ND	100	219	ND	103	162
87F	Fluorene	ND	2.0	76.7	94.2	ND	100	102	ND	103	75
87G	Phenanthrene	BMDL	5.6	92.6	108	ND	100	106	ND	103	90
87H	Pyrene	ND	2.0	67.9	73.4	ND	100	87	ND	103	66

*See Appendix for complete compound name and specifications.
**Specific calculated method detection limit.
-: specifies no standard or reference spectra available.
"ND": Indeterminate. Standard and/or spikes could not be detected at current method levels.
Results with neither "BMDL" nor "ND", under specifies no standard available; concentration not statistically corrected for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9-Heated Purge and Trap Compounds-GC/MS Analysis Data (QR57)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1 Acetonitrile	ND	10	ND	ND	ND	100	102	ND	100	82
7 Acrolein	ND	100	ND	ND	ND	100	79	ND	100	105
9 Acrylonitrile	ND	100	ND	ND	ND	100	72	ND	100	74
12 Allyl alcohol	ND	8.0	ND	ND	ND	500	191	ND	500	47
168 1,4-Dioxane	ND	10	ND	ND	ND	500	160	57.2	500	36
177 Ethyl cyanide	ND	8.0	ND	ND	ND	500	95	ND	500	116
180 Ethylene oxide	ND		ND	ND	ND	0	-	ND	0	-
212 Isobutyl alcohol	ND	8.0	ND	ND	ND	500	108	ND	500	72
226 Methacrylonitrile	ND	40	ND	ND	ND	500	81	ND	500	103
276 N-Nitrosopyrrolidine	IND		IND	IND	IND	500	0	IND	500	0
307 2-Propyn-1-ol	IND		IND	IND	IND	500	0	IND	500	0
308 Pyridine	ND	80	ND	ND	ND	500	222.	ND	500	19.

* Recovery normally variable using established methodology.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-*specifies no standard or reference spectra available.
IND Undetermined. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 - Purge & Trap Compounds - GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
86606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
31	Benzene	BMDL	4.4	6.40	6.34	ND	18.0	105	ND	18.0	100
50	Methyl bromide	ND	10	ND	ND	ND	18.0	128	ND	18.0	169
59	Carbon disulfide	ND	10	ND	ND	ND	18.0	32	ND	18.0	159
65A	Chloroethane	ND	10	ND	ND	ND	18.0	94	ND	18.0	132
72	Chlorobenzene	BMDL	6.0	ND	ND	ND	18.0	99	ND	18.0	98
	2-Chloro-1,3-butadiene	ND		ND	ND	ND	0	-	ND	0	-
76	2-Chloroethylvinyl ether	ND	10	ND	ND	ND	18.0	0.	ND	18.0	0.
77	Chloroform	ND	1.6	ND	ND	ND	18.0	98	ND	18.0	85
78	Methyl chloride	ND	10	ND	ND	ND	18.0	103	ND	18.0	153
	3-chloropropene	ND		ND	ND	ND	0	-	ND	0	-
111	1,2-Dibromo-3-chloropropane	ND	10	ND	ND	ND	18.0	101	ND	18.0	103
112	1,2-Dibromoethane	ND	10	ND	ND	ND	50.0	106	ND	50.0	108
113	Dibromomethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	80
120	1,4-Dichloro-2-butene	ND	10	ND	ND	ND	50.0	93	ND	50.0	87
121	Dichlorodifluoromethane	43.8	10	ND	ND	ND	18.0	102	ND	18.0	166
122	1,1-Dichloroethane	ND	4.7	ND	ND	ND	18.0	93	ND	18.0	92
123	1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	99	ND	18.0	90
124	1,2-Trans-dichloroethylene	ND	1.6	ND	ND	ND	18.0	89	ND	18.0	72
126	1,1-Dichloroethylene	ND	2.8	18.5	15.4	ND	18.0	108	ND	18.0	98
127	Methylene chloride	ND	2.8	5.27	9.68	ND	18.0	82	8.37	18.0	87
133	1,2-Dichloropropane	ND	6.0	ND	ND	ND	18.0	96	ND	18.0	90
136A	cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18.0	104	ND	18.0	101
136B	trans-1,3-Dichloropropylene	ND	10	ND	ND	ND	18.0	105	ND	18.0	90
191A	Chlorodibromomethane	ND	3.1	ND	ND	ND	18.0	99	ND	18.0	109
191B	Dichlorobromomethane	ND	2.2	ND	ND	ND	18.0	105	ND	18.0	100
182	Ethyl methacrylate	ND	10	ND	ND	ND	50.0	99	ND	50.0	99
209	Iodomethane	ND	10	ND	ND	ND	50.0	82	ND	50.0	99
235	Methyl ethyl ketone	ND	10	ND	ND	ND	18.0	94	ND	18.0	82
238	Methyl methacrylate	ND	10	ND	ND	ND	50.0	100	ND	50.0	98
285	Pentachloroethane	ND	10	ND	ND	ND	50.0	96	ND	50.0	66
326	1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	97
327	1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	96	ND	18.0	92

*[illegible]
**[illegible] under optimum [illegible] limit.
-- [illegible] no standard or reference spectra available.
[illegible] compounds. [illegible] could not be detected at current method levels.
Result with neither "MDL" nor "Conc." [illegible] no standard available. Compound not [illegible] searched for.

196D	Delta-BHC	PEST/HERB	QR56
197	Hexachlorocyclopentadiene	A/B/N	QR59
198	Hexachloroethane	A/B/N	QR59
199	Isodrin	A/B/N	QR59
200	Hexachlorophene	A/B/N	QR59
201	Hexachloropropene	A/B/N	QR59
208	Indeno(1,2,3-cd)pyrene	A/B/N	QR59
209	Iodomethane	P&T	QR58
210A	Iron	METALS	QR60
212	Isobutyl alcohol	HTP&T	QR57
213	Isosafrole	A/B/N	QR59
214	Kepone	PEST/HERB	QR56
216A	Lead	METALS	QR60
222	Malononitrile	A/B/N	QR59
225A	Mercury	METALS	QR60
226	Methacrylonitrile	HTP&T	QR57
228	Methapyrilene	A/B/N	QR59
230	Methoxychlor	PEST/HERB	QR56
232	3-Methylcholanthrene	A/B/N	QR59
234	4,4'-Methylenebis(2-chloroaniline)	A/B/N	QR59
235	Methyl ethyl ketone	P&T	QR58
238	Methyl methacrylate	P&T	QR58
239	Methyl methanesulfonate	A/B/N	QR59
242	Methyl parathion	PEST/HERB	QR56
245	Naphthalene	A/B/N	QR59
246	1,4-Naphthoquinone	A/B/N	QR59
247	1-Naphthylamine	A/B/N	QR59
248	2-Naphthylamine	A/B/N	QR59
250A	Nickel	METALS	QR60
255	p-Nitroaniline	A/B/N	QR59
256	Nitrobenzene	A/B/N	QR59
261	4-Nitrophenol	A/B/N	QR59
263A	N-Nitrosodiphenylamine	A/B/N	QR59
264	N-Nitrosodi-n-butylamine	A/B/N	QR59
266	N-Nitrosodiethylamine	A/B/N	QR59
267	N-Nitrosodimethylamine	A/B/N	QR59
269	N-Nitrosomethylethylamine	A/B/N	QR59
273	N-Nitrosomorpholine	A/B/N	QR59
275	N-Nitrosopiperidine	A/B/N	QR59
276	N-Nitrosopyrrolidine	HTP&T	QR57
278	5-Nitro-o-toluidine	A/B/N	QR59
280A	Osmium	METALS	QR60
283	Parathion	PEST/HERB	QR56
284	Pentachlorobenzene	A/B/N	QR59
285	Pentachloroethane	P&T	QR58
286	Pentachloronitrobenzene	A/B/N	QR59
287	Pentachlorophenol	A/B/N	QR59
288	Phenacetin	A/B/N	QR59
289	Phenol	A/B/N	QR59
295	Phorate	PEST/HERB	QR56
296	Famphur	PEST/HERB	QR56
299	2-Picoline	A/B/N	QR59
300A	Aroclor 1242	PCB/GC/EC	QR30
300B	Aroclor 1254	PCB/GC/EC	QR30
300C	Aroclor 1260	PCB/GC/EC	QR30
300D	Aroclor 1248	PCB/GC/EC	QR30
300E	Aroclor 1232	PCB/GC/EC	QR30
300F	Aroclor 1221	PCB/GC/EC	QR30
300G	Aroclor 1016	PCB/GC/EC	QR30
301A	Potassium	METAL	QR60
303	Pronamide	A/B/N	QR59
307	2-Propyn-1-ol	HTP&T	QR57
308	Pyridine	HTP&T	QR57
310	Resorcinol	A/B/N	QR59
312	Safrole	A/B/N	QR59
314A	Selenium	METALS	QR60
317A	Silver	METALS	QR60

319A	Sodium	METALS	QR60
323	1,2,4,5-Tetrachlorobenzene	A/B/N	QR28
324	2,3,7,8-TCDD	DIOXIN	QR61
326	1,1,1,2-Tetrachloroethane	P&T	QR58
327	1,1,2,2-Tetrachloroethane	P&T	QR58
328	Tetrachloroethylene	P&T	QR58
329	Carbon tetrachloride	P&T	QR58
330	2,3,4,6-Tetrachlorophenol	A/B/N	QR59
331	Tetraethyldithiopyrophosphate	A/B/N	QR59
335A	Thallium	METALS	QR60
347	Toluene	P&T	QR58
351	Toxaphene	PEST/HERB	QR56
352	Bromoform	P&T	QR58
353	1,2,4-Trichlorobenzene	A/B/N	QR59
354	1,1,1-Trichloroethane	P&T	QR58
355	1,1,2-Trichloroethane	P&T	QR58
356	Trichloroethylene	P&T	QR58
357	Trichloromethanethiol	P&T	QR58
358	Trichlorofluoromethane	P&T	QR58
359	2,4,5-Trichlorophenol	A/B/N	QR59
360	2,4,6-Trichlorophenols	A/B/N	QR59
361	2,4,5-T	PEST/HERB	QR56
362	2,4,5-TP (Silvex)	PEST/HERB	QR56
364	1,2,3-Trichloropropane	P&T	QR58
368	tris(2,3-Dibromopropyl) phosphate	A/B/N	QR59
372A	Vanadium	METALS	QR60
373	Vinyl chloride	P&T	QR58
374A	Zinc	METALS	QR60
	Endrin aldehyde	PEST/HERB	QR56
	2-Chloro-1,3-butadiene	P&T	QR58
	3-Chloropropene	P&T	QR58
	Acetone	P&T	QR58
	Ethylbenzene	P&T	QR58
	2-Hexanone	P&T	QR58
	Methyl-iso-butyl ketone	P&T	QR58
	Styrene	P&T	QR58
	Vinyl acetate	P&T	QR58
	m-Xylene	P&T	QR58
	o-p Xylenes	P&T	QR58
	Magnesium	METAL	QR60
	Manganese	METAL	QR60
	Tin	METAL	QR60
	Cobalt	METAL	QR60
	Sulfide as S	METAL	QR60
	Fluoride	METAL	QR60
	Benzoic acid	A/B/N	QR59
	Benzyl alcohol	A/B/N	QR59
	Dibenzofuran	A/B/N	QR59
	Isophorone	A/B/N	QR59
	2-Methylnaphthalene	A/B/N	QR59
	o-Nitroaniline	A/B/N	QR59
	m-Nitroaniline	A/B/N	QR59
	4-Chlorophenyl phenyl ether	A/B/N	QR59
	Hexachlorodibenzo-p-dioxins	DIOXIN	QR61
	Pentachlorodibenzodioxin	DIOXIN	QR61
	Tetrachlorodibenzodioxin	DIOXIN	QR61
	Hexachlorodibenzofurans	DIOXIN	QR61
	Pentachlorodibenzofuran	DIOXIN	QR61
	Tetrachlorodibenzofuran	DIOXIN	QR61

APPENDIX IX
GRAND TABLE

	COMPOUND NAME	FRACTION	TABLE
1	Acetonitrile	HTP&T	QR57
2	Acetophenone	A/B/N	QR59
4	2-Acetylaminofluorene	A/B/N	QR59
7	Acrolein	HTP&T	QR57
9	Acrylonitrile	HTP&T	QR57
11	Aldrin	PEST/HERB	QR56
12	Allyl alcohol	HTP&T	QR57
13A	Aluminum	METALS	QR60
14	4-Aminobiphenyl	A/B/N	QR59
18	Aniline	A/B/N	QR59
19A	Antimony	METALS	QR60
20	Aramite	A/B/N	QR59
21A	Arsenic	METALS	QR60
27A	Barium	METALS	QR60
30	Benzo(a)anthracene	A/B/N	QR59
31	Benzene	P&T	QR58
34	Benzenethiol	A/B/N	QR59
35	Benzidine	A/B/N	QR59
36	Benzo(b)fluoranthene	A/B/N	QR59
38	Benzo(a)pyrene	A/B/N	QR59
39	p-Benzoquinone	A/B/N	QR59
42A	Beryllium	METALS	QR60
43	bis(2-Chloroethoxy)methane	A/B/N	QR59
44	bis(2-Chloroethyl) ether	A/B/N	QR59
46	bis(2-Chloroisopropyl)ether	A/B/N	QR59
48	bis(2-ethylhexyl)phthalate	A/B/N	QR59
50	Methyl bromide	P&T	QR58
51	4-Bromophenyl phenyl ether	A/B/N	QR59
54	Butyl benzyl phthalate	A/B/N	QR59
55	2-sec-Butyl-4,6-dinitrophenol	A/B/N	QR59
56A	Cadmium	METALS	QR60
57A	Calcium	METALS	QR60
59	Carbon disulfide	P&T	QR58
63	Chlordane	PEST/HERB	QR56
65A	Chloroethane	P&T	QR58
71	p-Chloroaniline	A/B/N	QR59
72	Chlorobenzene	P&T	QR58
73	Chlorobenzilate	PEST/HERB	QR56
74	p-Chloro-m-cresol	A/B/N	QR59
76	2-Chloroethyl vinyl ether	P&T	QR58
77	Chloroform	P&T	QR58
78	Methyl chloride	P&T	QR58
80	2-Chloronaphthalene	A/B/N	QR59
81	2-Chlorophenol	A/B/N	QR59
83	3-Chloropropionitrile	A/B/N	QR59
84A	Chromium	METALS	QR60
85	Chrysene	A/B/N	QR59
87A	Acenapthene	A/B/N	QR59
87B	Acenaphthalene	A/B/N	QR59
87C	Anthracene	A/B/N	QR59
87D	Benzo(ghi)perylene	A/B/N	QR59
87E	Benzo(k)fluoranthene	A/B/N	QR59
87F	Fluorene	A/B/N	QR59
87G	Phenathrene	A/B/N	QR59
87H	Pyrene	A/B/N	QR59
88A	Copper	METALS	QR60
89B	2-Nitrophenol	A/B/N	QR59
90A	o-Cresol	A/B/N	QR59

90B	m-p-Cresols	A/B/N	QR59
92A	Cyanide, Total	METALS	QR60
100	4,4'-DDD	PEST/HERB	QR56
101	4,4'-DDE	PEST/HERB	QR56
102	4,4'-DDT	PEST/HERB	QR56
106	Dibenzo(a,h)anthracene	A/B/N	QR59
108	Dibenzo(a,e)pyrene	A/B/N	QR59
109	Dibenzo(a,h)pyrene	A/B/N	QR59
110	Dibenzo(a,i)pyrene	A/B/N	QR59
111	1,2-Dibromo-3-chloropropane	P&T	QR58
112	1,2-Dibromoethane	P&T	QR58
113	Dibromomethane	P&T	QR58
114	Di-n-butyl phthalate	A/B/N	QR59
115	1,2-Dichlorobenzene	A/B/N	QR59
116	1,3-Dichlorobenzene	A/B/N	QR59
117	1,4-Dichlorobenzene	A/B/N	QR59
119	3,3'-Dichlorobenzidine	A/B/N	QR59
120	1,4-Dichlor0-2-butene	P&T	QR58
121	Dichlorodifluoromethane	P&T	QR58
122	1,1-Dichloroethane	P&T	QR58
123	1,2-Dichloroethane	P&T	QR58
124	1,2-Trans-dichloroethylene	P&T	QR58
126	1,1-Dichloroethylene	P&T	QR58
127	Methylene chloride	P&T	QR58
128	2,4-Dichlorophenol	A/B/N	QR59
129	2,6-Dichlorophenol	A/B/N	QR59
130	2,4-D	PEST/HERB	QR56
133	1,2-Dichloropropane	P&T	QR58
136A	cis-1,3-Dichloropropylene	P&T	QR58
136B	trans-1,3-Dichloropropylene	P&T	QR58
137	Dieldrin	PEST/HERB	QR56
143	Diethyl phthalate	A/B/N	QR59
144	Thionazin	PEST/HERB	QR56
150	3,3'-Dimethoxybenzidine	A/B/N	QR59
151	p-Dimethylaminoazobenzene	A/B/N	QR59
152	7,12-Dimethylbenzol[a]anthracene	A/B/N	QR59
153	3,3'-Dimethylbenzidine	A/B/N	QR59
158	alpha-alpha-Dimethylphenethylamine	A/B/N	QR59
159	2,4-Dimethylphenol	A/B/N	QR59
160	Dimethyl phthalate	A/B/N	QR59
162A	m-Dinitrobenzene	A/B/N	QR59
163	4,6-Dinitro-o-cresol	A/B/N	QR59
164	2,4-Dinitrophenol	A/B/N	QR59
165	2,4-Dinitrotoluene	A/B/N	QR59
166	2,6-Dinitrotoluene	A/B/N	QR59
167	Di-n-octyl phthalate	A/B/N	QR59
168	1,4-Dioxane	HTP&T	QR57
169	Diphenylamine	A/B/N	QR59
170	1,2-Diphenylhydrazine	A/B/N	QR59
171	Di-n-propylnitrosamine	A/B/N	QR59
172	Disulfoton	PEST/HERB	QR56
174A	Endosulfan I	PEST/HERB	QR56
174B	Endosulfan II	PEST/HERB	QR56
175	Endrin	PEST/HERB	QR56
177	Ethyl cyanide	HTP&T	QR57
180	Ethylene oxide	HTP&T	QR57
182	Ethyl methacrylate	P&T	QR58
184	Fluoranthene	A/B/N	QR59
191A	Chlorodibromomethane	P&T	QR58
191B	Dichlorobromomethane	P&T	QR58
192	Heptachlor	PEST/HERB	QR56
193	Heptachlor epoxide	PEST/HERB	QR56
194	Hexachlorobenzene	A/B/N	QR59
195	Hexachlorobutadiene	A/B/N	QR59
196A	Alpha-BHC	PEST/HERB	QR56
196B	Beta-BHC	PEST/HERB	QR56
196C	Gamma-BHC	PEST/HERB	QR56

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
S6606	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

This Technical Report is an INSITE℠ service generated by LODESTAR℠ Data Management Software.

... CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5800

3:02 PM SAT., 13 JUNE, 1987
ence file: S161AI
ity Code: PZ
nel #: 16

Subsequence 2
ethod: M6903F:PZ
alog-Prg Param-File
: :

lshs #Pmps Stop
5 5 1

-o Post-Btl# Post-Wshr#
0 1

ETC GC Lab Chronicle
Fraction AP9/Herb
Supervisor
Batch #s QC6903

Standard	Conc PPM	Lot No.
DW/Herb A	MIX	15786
DW/Herb B	↓	15787
DW/Herb C	↓	15787

BW 6/13/87

Bt 6/

ples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	24	PN4152	RN4152	100.0000	1.000000	1.000000
2	QC6903G	25	PN3523	RN3523	100.0000	1.000000	1.000000
3	DW HERBAA	26	PN3525	RN3525	100.0000	1.000000	1.000000
4	DW HERB A	27	PN3526	RN3526	100.0000	1.000000	1.000000
5	DW HERB B	28	PN3527	RN3527	100.0000	1.000000	1.000000
6	DW HERB C	29	PN3528	RN3528	100.0000	1.000000	1.000000
7	QC6903GS	30	PN3529	RN3529	100.0000	1.000000	1.000000
	S6606G	31	PN3531	RN3531	100.0000	1.000000	1.000000
	HEXANE	32	PN4153	RN4153	100.0000	1.000000	1.000000
10	S6606GS	33	PN3532	RN3532	100.0000	1.000000	1.000000
11	HEXANE	34	PN4154	RN4154	100.0000	1.000000	1.000000
12	S6605G	35	PN3535	RN3535	100.0000	1.000000	1.000000
13	S6605GR	36	PN3536	RN3536	100.0000	1.000000	1.000000
14	DW HERB A	37	PN3539	RN3539	100.0000	1.000000	1.000000
15	S6602G	38	PN3540	RN3540	100.0000	1.000000	1.000000
16	HEXANE	39	PN4155	RN4155	100.0000	1.000000	1.000000
17	S6603G	40	PN3541	RN3541	100.0000	1.000000	1.000000
18	S6604G	41	PN3542	RN3542	100.0000	1.000000	1.000000
19	HEXANE	42	PN4156	RN4156	100.0000	1.000000	1.000000
20	DW HERB C	43	PN3557	RN3557	100.0000	1.000000	1.000000

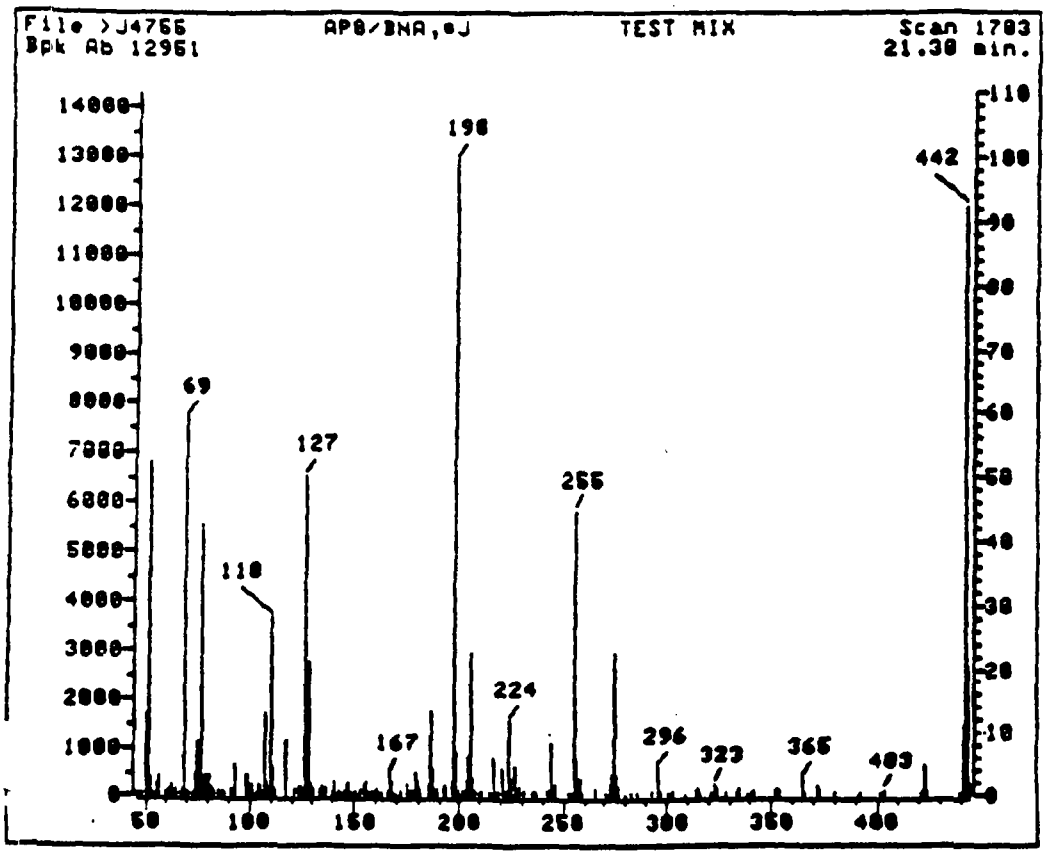

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	52.54	52.54	Ok
68	Less than 2% of mass 69	1.09	1.83	Ok
69	(reference only)	59.42	59.42	Ok
70	Less than 2% of mass 69	.69	1.16	Ok
127	40-60% of mass 198	50.29	50.29	Ok
197	Less than 1% of mass 198	.36	.36	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.03	7.03	Ok
275	10-30% of mass 198	22.58	22.58	Ok
365	Greater than 1% of mass 198	3.00	3.00	Ok
441	0-100% of mass 443	11.03	53.99	Ok
442	Greater than 40% of mass 198	92.52	92.52	Ok
443	17-23% of mass 442	20.44	22.09	Ok

Injection Date: 06/07/87 Analyst: [illegible]
Injection Time: 17:57 Processor: [illegible]
Run No: >J4755 QC Batch: QC 6702
Spectrum No: 1703

LAH

:e Data File: >J4755::U7

ame: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 17:57
isc: TEST MIX BTL#20

This performance tune applies to the following
amples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4756	870607	18:44
	STD. >J4757	870607	19:46
	S281/C >J4758	870607	20:49
	S6058 >J4759	870607	23:26
	S6059 >J4760	870608	00:18
	S7733C >J4761	870608	01:10
	S6602C >J4762	870608	02:02
	S6604C >J4763	870608	02:58
	S6606C >J4764	870608	03:53

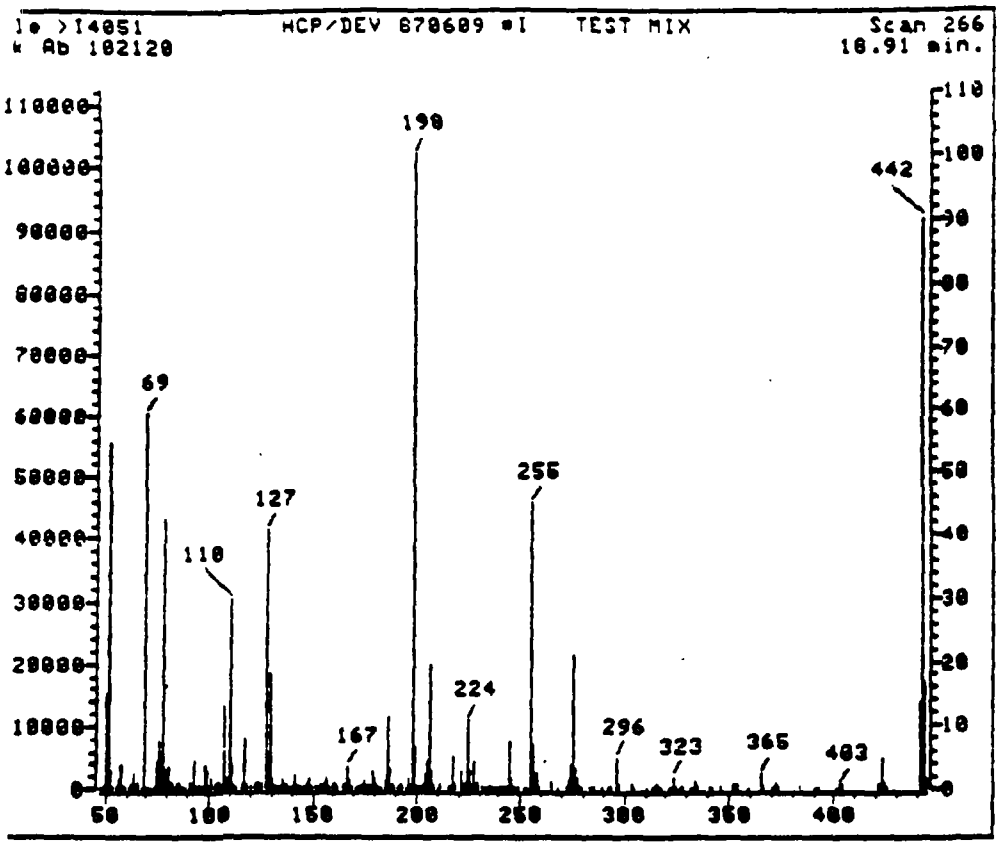

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	54.41	54.41	Ok
68	Less than 2% of mass 69	.99	1.67	Ok
69	(reference only)	59.43	59.43	Ok
70	Less than 2% of mass 69	.47	.78	Ok
127	40-60% of mass 198	40.51	40.51	Ok
197	Less than 1% of mass 198	.38	.38	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.56	6.56	Ok
275	10-30% of mass 198	20.99	20.99	Ok
365	Greater than 1% of mass 198	2.34	2.34	Ok
441	0-100% of mass 443	13.54	80.53	Ok
442	Greater than 40% of mass 198	90.15	90.15	Ok
443	17-23% of mass 442	16.81	18.65	Ok

Injection Date: 06/09/87 Analyst: MB for Brenda Hawkins
Injection Time: 19:31 Processor: [illegible]
Run No: >I4051 QC Batch: QC6767
Spectrum No: 266

LHendel 6/20/87

MS Data File: >I4051::U5

ame: HCP/DEV 870609 #I Operator: BHB334 Date/Time: 6/09/87 19:31
.isc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >I4052	870609	20:11
	STD. >I4053	870609	20:50
	STD. >I4054	870609	21:28

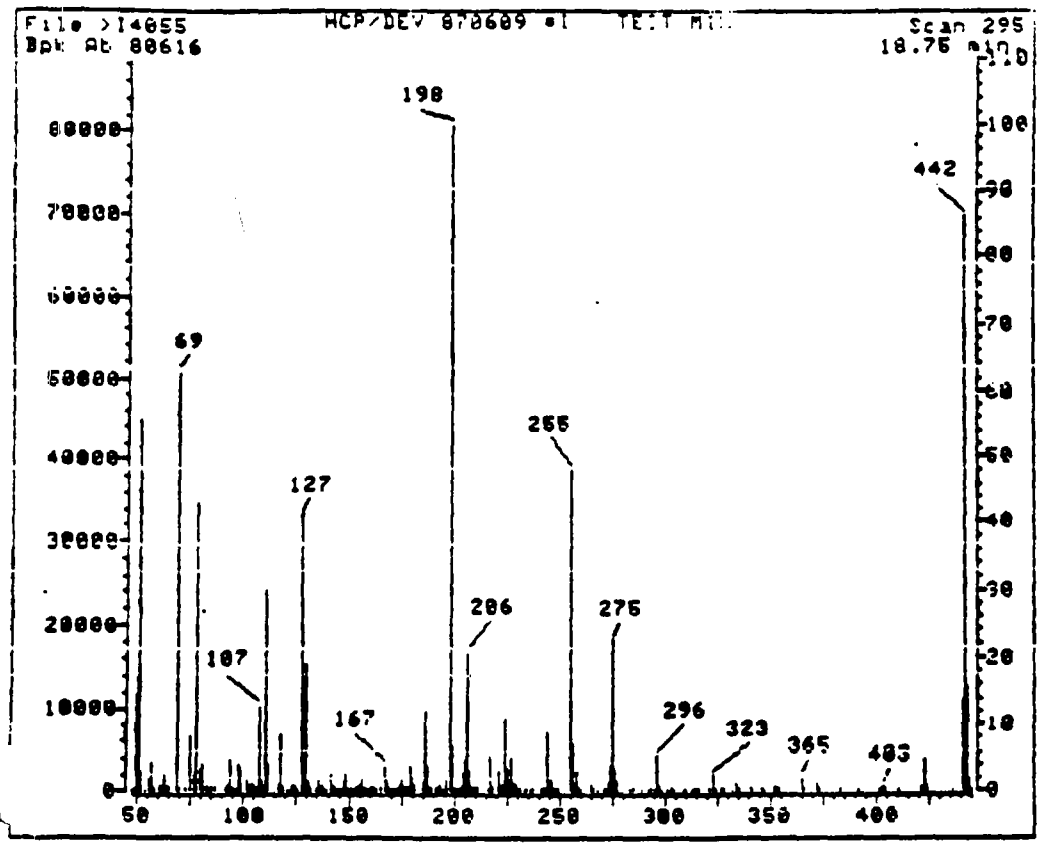

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	55.58	55.58	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.97	62.97	Ok
70	Less than 2% of mass 69	.31	.50	Ok
127	40-60% of mass 198	41.23	41.23	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.65	6.65	Ok
275	10-30% of mass 198	22.36	22.36	Ok
365	Greater than 1% of mass 198	2.03	2.03	Ok
441	0-100% of mass 443	13.59	88.02	Ok
442	Greater than 40% of mass 198	86.21	86.21	Ok
443	17-23% of mass 442	15.44	17.91	Ok

Injection Date: 06/09/87 Analyst: Brenda Hawkins
Injection Time: 22:06 Processor: [illegible]
Run No: >I4055 QC Batch: QC 6902
Spectrum No: 295 ENII

LAH

S Data File: >14055::U7

Name: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 22:06
isc: TEST MIX BTL# 5

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C>I4056	870609	22:44
	QC6902C5>I4057	870609	23:23
	S6605C>I4058	870610	00:01
	S6605C5>I4059	870610	00:39
	S6605CR>I4060	870610	01:17
	S6004C>I4061	870610	01:55
	S6008C>I4062	870610	02:33
	S6058C>I4063	870610	03:11
	S7732C>I4064	870610	03:49
	S6602C>I4065	870610	04:27
	S6603C>I4068	870610	06:21
	S6604C>I4069	870610	06:59
	S6606C>I4070	870610	07:37
	S2811C>I4071	870610	08:15
	S7733C>I4072	870610	08:54
	S6054C>I4073	870610	09:32

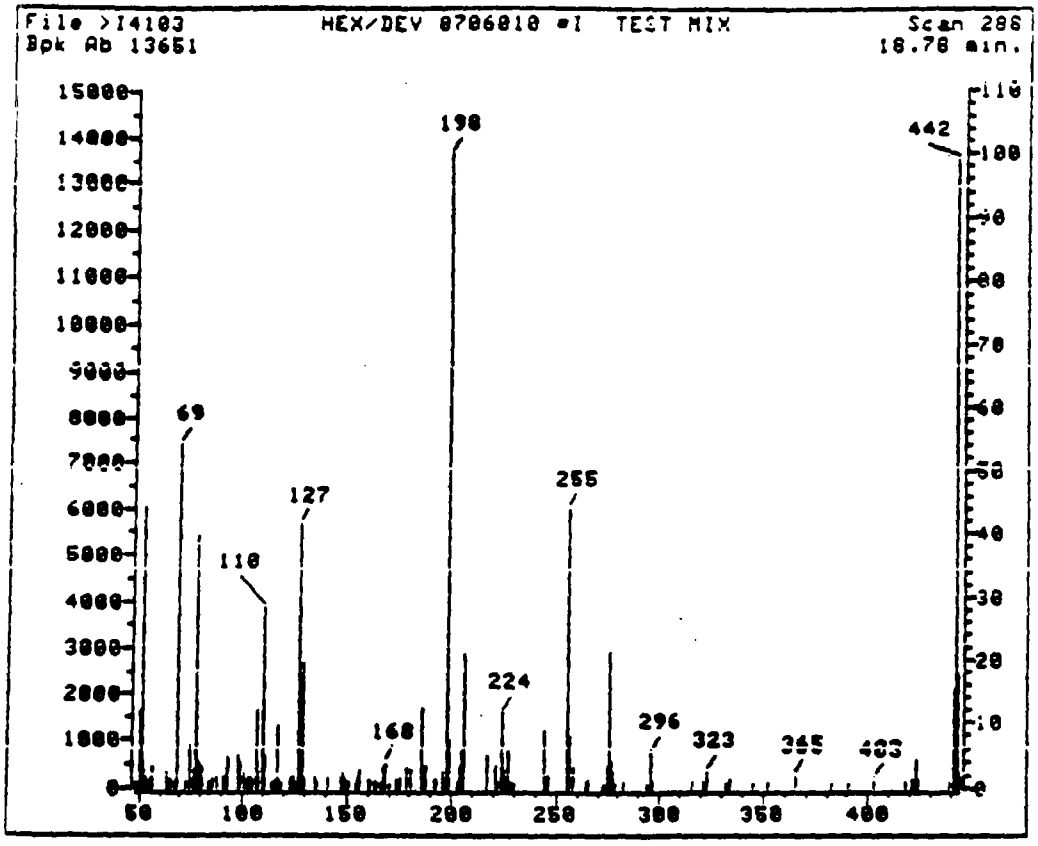

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	44.41	44.41	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	54.35	54.35	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	41.39	41.39	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.10	7.10	Ok
275	10-30% of mass 198	21.31	21.31	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	15.45	86.19	Ok
442	Greater than 40% of mass 198	99.04	99.04	Ok
443	17-23% of mass 442	17.93	18.10	Ok

Injection Date: 06/10/87 Analyst: [illegible]
Injection Time: 10:34 Processor: [illegible]
Run No: >I4103 QC Batch: [illegible]
Spectrum No: 288

MS Data File: >I4103::U5

Name: HEX/DEV 8706010 #I Operator: BH8334 Date/Time: 6/10/87 10:34
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S7731C >I4074	870610	11:58

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

ETC Job # 5 6 6 0 5

Lab ID: Gulf Coast Lab.

Facility: 705 (Facility Code)

Sample Point: Source Code — IMPD (Sample Point ID)

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: : (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
19	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l	22000	50	
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			

Appendix D
Subcontractor's Data

1) A copy of the originating subcontractor's report is included for all data not generated within ETC's laboratory.

ENVIRONMENTAL TESTING and CERTIFICATION

AIN OF CUSTODY FORM (CC1)

Seal No. [illegible] ETC Job # [illegible]

Date Sealed 4/27/87 By: M Grace

npany: Chicago Incinerator Attn.: Bob Barth Olmew

ad /Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

acility: 705 (Facility/Site Code) (Optional Sample Point Descriptions)

nple Point: I Impde TF 5/6/87 | 870501 | 1405

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr. clock) | Elapsed Hours (composite)

Source Codes:

ell ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

oil ..(S) River/Stream..(R) Generation Point....(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
	E	1L	Baked	Ext Bl	No		✓
3	F	40ml	Baked	P+T VOA	No		All Bub
	F	40ml	Baked	HP+T VOA	No		All Bub
	TB	40ml	GC/MS	Trip Blank	NO		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Grazioli Date: 5/1/87 Time: 10:15
Signature: Mike Grazioli Seal #: 79705 Intact: /

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Grazioli Date: 5/1/87 Time: 15:25
Signature: Mike Grazioli Seal #: 79706 Intact: /

AB USE ONLY Opened By: V. Vilcala Date: 5-2-87 Time: 12:50 pm

SHUTTLE # 172 TEMP. °C 20° SEAL # 79706 COND. Intact

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

TC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 7161 ETC Job # [illegible]

Date Sealed 4/27/87 By: M Grosse

Company: Chicago Incinerator Attn.: Bob Bartholomew

Facility/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: I Impade TF 56/87 | 870501 | 1405

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr. clock) | Elapsed Hours (composite)

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other .....(X)

Soil ..(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
2	E	1l	Bnhed	Extbl	NO		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Grozioli Date: 5/1/87 Time: 10:20
Signature: Mike Grozioli Seal #: 79699 Intact: ✓

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Grozioli Date: 5/1/87 Time: 15:25
Signature: Mike Grozioli Seal #: 79700 Intact: ✓

LAB USE ONLY Opened By: [illegible] Date: 5-2-87 Time: 12:48pm

SHUTTLE # 760 TEMP. °C 19 SEAL # 79700 COND. [illegible]

TESTING and CERTIFICATION ORIGINAL

HAIN OF CUSTODY FORM (CC1)

Date Sealed 4/28/87 By: [illegible]

Company: WMI Attn.: Bob Bartholomew

ity/Site: Chicago Incinerator Phone: 312-646-5700

Address: Chicago, IL

REC'D MAY 5 1987

SAMPLE IDENTIFICATION

acility: 705 (Facility/Site Code) surface pt. PE (Optional Sample Point Descriptions)

ample Point: HIMADE (Source Code (from below) / Your Sample Point ID (left justify)) 870501 (Start Date (YY/MM/DD)) 1405 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:
Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other (X)
Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	A	1gal	HNO3	Radioactivity	N		
1	B	1L	Cool	General	N		
			4 C				
1	B	1L	6NNaOH	Cn	N		
	B	1L	Zinc	Sulfide	N		
			Acetate				
1	F	500ml	HNO3	Metals (total)	N		
1	F	500ml	H2SO4	Nutrients	N		
1	I	100ml	Cool4C	Total Coliform	N		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Grazioli Date: 5/1/87 Time: 14:00
Signature: [signature] Seal #: 461 Intact: /

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Grazioli Date: 5/1/87 Time:
Signature: [signature] Seal #: 462 Intact: /

LAB USE ONLY Opened By: [signature] Date: 5-1-87 Time: 1900

SHUTTLE # TEMP. °C SEAL # COND.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56605 TF 5/1/87

Sample Point [I] [IMADE] (Source Code / Sample Point I.D)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL IN CASING (Gallons)	VOLUME PURGED (Gallons)
870501	1310	1.0		

SAMPLING METHOD: Grab

Sampler Type	0	A-Submersible Pump B-ISCO C-Bladder Pump	D-Dipper/Bottle E-Bailer F-Scoop/Shovel	X-Other _____ (SPECIFY OTHER)
Sampler Material	0	A-Teflon B-Metal	C-PVC D-Plastic	X-Other _____ (SPECIFY OTHER)
Tubing Material		A-Teflon B-Tygon	C-Polyethylene D-Silicon	X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] NO (Procedure/Proportions)

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____

Depth to Ground water (ft) _____

Groundwater Elevation (ft msl) _____

Well Depth (ft) _____

Sample Depth (non-well) (ft) _____

	pH		Spec. cond.		(other parameter)	Value	Units
1st		(STD)	1st	um/cm at 25° C			
2nd		(STD)	2nd	um/cm at 25°C			
3rd		(STD)	3rd	um/cm at 25°C			
4th		(STD)	4th	um/cm at 25°C			

Sample Temp _____ (°C)

Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: Overcast, warm, 65°F, east 10 mph

Other: See Gulf Coast Labs CC2 for details

FILTERING: Use Chain of Custody (CC1) to indicate which botties were filtered

Sampler: Mike Grazioli (Print) Employer: Gulf Coast Labs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

5/1/87 Mike Grazioli (Date: (Signature)

ORIGINAL

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # S6605 TR 51687

Sample Point I (Source Code) Impde (Sample Point I.D)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
870501	1310	1.0		

SAMPLING METHOD:

Sampler Type: D — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material: D — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material: — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited: Y/N — No (Procedure/Proportions)

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Depth to Ground water (ft)

Groundwater Elevation (ft msl)

Well Depth (ft)

Sample Depth (non-well) (ft)

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp (°C) Turbidity NTU

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other: See Gulf Coast Labs CC2 for details

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Grazioli (Print) Employer: Gulf Coast Labs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

5/11/87 Mike Grazioli (Date) (Signature)

ORIGINAL

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departme:

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml)		Comments
S6254	21354	840	1.0		CANC
S6255	↓	990	1.0		CANC
P7859	2359	990	1.0		
S6005	↓	980	1.0		
QC 7032		1000	1.0		
QC 7032	S	1000	1.0		
S6254	S	980	1.0		
S6005	R	970	1.0		

QC Batch # ~~7006~~ 7032

Analysis AP8/Ext LC

Matrix H_2O

Turnaround Norm

Date 5/26/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

* extracts on shelf 97 in Walkin I

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
AP8/Ext LC Spike I	0.5	1000 µg/ml	16016
AP8/Ext LC Spike II	0.5	1000 µg/ml	16017
AP8/Ext LC Spike III	0.5	1000 µg/ml	16018
AP8/Ext LC Spike	0.5	1000 µg/ml	16019

QC [illegible]

SURROGATE Amt. (ml)	Conc.	Lot #

Set-up: [illegible] 5/24/87

Conc.: [illegible] 5/28 [illegible] 5/24/87

UPD/Supervisor: Judie Ankeras 5/26/87

Spike/Surr. Verified: [illegible] 5/24/87

ETC FORM #10E

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 55605 5/11/87

Sample Point I (Source Code) Impde (Sample Point I.D)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
870501	1319	1.0		

SAMPLING METHOD: Grab

REC'D MAY 5 1987

Sampler Type: D — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other _____ (SPECIFY OTHER)

Sampler Material: D — A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other _____ (SPECIFY OTHER)

Tubing Material: — — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other _____ (SPECIFY OTHER)

Sample Composited: Y/N NO

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	ph		spec. cond.		(other parameter)	value	units
1st	9.00	(STD)	17300	um/cm at 25°C			
2nd	9.01	(STD)	16600	um/cm at 25°C			
3rd	9.02	(STD)	16700	um/cm at 25°C			
4th	9.02	(STD)	16600	um/cm at 25°C			

Sample Temp: 52.9 (°C) Turbidity: _____ NTU

FIELD COMMENTS

Sample Appearance: Clear, normal, no odor

Weather Conditions: Overcast, warm, 65°F, east wind 10 mph

Other: Sample obtained from stainless steel pipe coming from cooling pond water.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Grazioli (Print) Employer: Gulf Coast babs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

5/11/87 (Date) Mike Grazioli (Signature)

ORIGINAL

Sample Number	Log Link	Sample Vol. (ml)	Extr. Vol. (ml) BN	Extr. Vol. (ml) PEST ~~ACID~~	Comments
S6602	21065	530	10	5.0	
S6603		480	10	5.0	
S6604		620	10	5.0	
S6606	↓	580	10	5.0	
S6605	21084	540	10	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	1.0	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB (EC
APG/PEST (E
APG/PEST (FPD

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on shelf 98 wt 1~~

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
S1 Ec Iso	0.1 ml	25/100 mg/ml	15616
S2 Ec Temp	0.1 ml	25/250 mg/ml	15993
S3 FPDI	0.2 ml	125/125 mg/ml	15602
S4 Arochlor 1200	0.1 ml	40 mg/ml	15997

or DAN

SURROGATE Amt. (ml)	Conc.	Lot #
	BN:	
	ACID:	

Set-up: J Jekinsh 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 6-8-87

3 ~~BN~~ Conc.: [illegible] ~~Acid~~ PEST Conc.: [illegible] Spike/Surr. Verified: [illegible] 5-1-87

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6/15/87
FRACTION APB Ext LC
INSTRUMENT HP1020 ICA#
SEQUENCE FILE
METHOD FILE APEXL
CAL FILE
ANALYST(S)

SUPERVISOR
BATCH #'s DC7032 QC6557

STANDARD	CONC PPM	LOT NO
APBExLC	500	16020
	500	16021
	250	16022
	25	16023

(PLEASE INITIAL)

CURRENT CS05 STATUS			CALIBRATION UPDATED	
START	STOP	HLP	DATE	
			BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	SPECIALS (WRITE A-TYPE)
STD 16022	da3201	25			
STD 16023	da3211				
QC7032	da3221				
QC7032S	da3231				
S6005	da3241				
S6005R	da3251				
S6254	da3261				
S6254S	da3271				
R7859	da3281				
STD 16021	da3291				
QC6557	da3301				
QC6557S	da3311				
S6251	da3321				
S6251R	da3331				
S6003	da3341				
S6003S	da3351				
S6004	da3361				
S6008	da3371				
S6006	da3381				
STD 16020	da3391				

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 87/12/5 SHIFT
FRACTION AP9/PT VOA
INSTRUMENT C
TUNE FILE APEI01
SEQUENCE FILE KBC
METHOD FILE VOAC
ID FILE CAP9PT
ANALYST(S) K. [illegible]

SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL) CBAPPT

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	3/12/87
WIP		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15243	1
AP8 INS-AD	25	16,024	10
SURR	25	15719	10
ABC/XVOA	18	16028 2X	5,10,30
AP8 P+T	50	15541	5,10,30

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>C2588	1ml				OK	
QC7052V	>C2589	5.0ml	1			NG	
QC7052VS	>C2590	↓	2			NG 5 uls ABC/XVOA + AP8 P+T	
QC7052VS	>C2591	↓	3			10 uls ↓ ↓	
QC7052VS	>C2592	↓	4			NG 30 uls ↓ ↓	
QC7052VS	>C2593		4			30 ul ABC/XVOA/AP9	
QC7052VS	>C2594		3			5ml	13:0
BFB	>C2595					OK	14:3
QC7052V	>C2596	5ml	2			ok	15:[illegible]
QC7052V	>C2597	↓	3			ok	
QC7052V	>C2598	↓	4			ok	
QC7052V	>C2599	↓	5			ok	
QC7052V	>C2600	↓	6			NG	
S6605VS	>C2601	5ml	1			OK S6605VS	
S6605V	>C2602	↓	2			OK S6605V	
S6604V	>C2603	↓	3			OK S6604V	
S6604VR	>C2604	↓	4			OK S6604VR	
S6603V	>C2605	↓	5			OK	
QC7052VS	>C2606	5ml	7			5 uls ABC/XVOA + AP8 P+T	
QC7052VS	>C2607	↓	8		CBUP	10 uls ↓ ↓	
QC7052VS	>C2608	↓	9		CBUP	30 uls ↓ ↓	
P-BFB	>C2609	1ml	—			RAN DEPOSE >C2607	
QC7052V8	>C2610	5ml	1			OK SPEC VOA BLANK	
QC7052V8	>C2611	↓	2			OK ↓	
[illegible]	>C2612	↓	3			OK ↓	

Date: FRI , 12 JUNE 1987
Sequence File: S1E3HF
Security Code: QE
Channel #: 0

Fraction: A/B/PEST/PCB
Supervisor: [illegible]
Batch #: QC6904

Subsequence 1
Method: M6904P:QE
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Standard	Conc PPM	Lot No.
A 1260	0.5	15985
A 1260	1.0	15984
A 1260	5.0	15983
A 1016	0.5	15943
A 1221	0.5	15950
A 1232	0.5	15957
A 1242	0.5	15964
A 1248	0.5	15971
A 1254	0.5	15978

Samples

	Sample-Name	Btl#	P-File	P-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN3831	PN3831	100.0000	1.000000	1.000000
2	QC6904G	2	PN3832	PN3832	100.0000	1.000000	1.000000
3	A1260 0.5	3	PN3833	PN3833	100.0000	1.000000	1.000000
4	A1260 1.0	4	PN3834	PN3834	100.0000	1.000000	1.000000
5	A1260 5.0	5	PN3835	PN3835	100.0000	1.000000	1.000000
6	QC6904GS 4	6	PN3836	PN3836	100.0000	1.000000	1.000000
7	S6606G	7	PN3837	PN3837	100.0000	1.000000	1.000000
8	S6606GS 4	8	PN3838	PN3838	100.0000	1.000000	1.000000
9	S6605G	9	PN3839	PN3839	100.0000	1.000000	1.000000
10	S6605GR	10	PN3840	PN3840	100.0000	1.000000	1.000000
11	S6602G	11	PN3841	PN3841	100.0000	1.000000	1.000000
12	S6603G	12	PN3842	PN3842	100.0000	1.000000	1.000000
13	S6604G	13	PN3843	PN3843	100.0000	1.000000	1.000000
14	A1016 0.5	14	PN3844	PN3844	100.0000	1.000000	1.000000
15	A1221 0.5	15	PN3845	PN3845	100.0000	1.000000	1.000000
16	A1232 0.5	16	PN3846	PN3846	100.0000	1.000000	1.000000
17	A1242 0.5	17	PN3847	PN3847	100.0000	1.000000	1.000000
18	A1248 0.5	18	PN3848	PN3848	100.0000	1.000000	1.000000
19	A1254 0.5	19	PN3849	PN3849	100.0000	1.000000	1.000000
20	A1260 0.5	20	PN3850	PN3850	100.0000	1.000000	1.000000

KS 6/16/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

pg 1 of 2

DATE 87/13/5 SHIFT
FRACTION AP9HPT
INSTRUMENT E
TUNE FILE APEI02
SEQUENCE FILE
METHOD FILE AP9HPT
ID FILE E AP9HPT
ANALYST(S) K Boykin [illegible]

SUPERVISOR [illegible]
BATCH #'s QV7054

(PLEASE INITIAL) CB9HPT

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACQ		DATE	5/13/87
WIP		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15293	1
APB IS	25	16,024	10
SURR	25	15,719	10
APPENDIX B DAT STD	500/100	14,657	2,4,10

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>E3117	1ul				OK	06:42
QC7054V	>E3118	5ml				OK	07:27
QC7054VS	>E3119	5ml				2ul APB DAT STD	08:12
QC7054VS	>E3120	5ml				NG 4ul " "	[illegible]
QC7054VS	>E3121	5ml			CA UPD CALC	10ul " "	10:30
QC7054VS	>E3122	5ml				4ul	11:50
P-BFB	>E3123	1ul				OK	14:52
BA0106V	>E3124	5ml				NG S.B. ~~OK~~ Carry Over	15:46
BA0106VS	>E3125	5ml				NG 4ul APB DAT STD	
S6608V	>E3126	5ml				NG surrogate [illegible]	
S6608VS	>E3127	5ml				NG 4ul APB DAT STD	
(R) S6608V	>E3128	5ml				OK	20:21
S6607V	>E3129	5ml				NG Leaked	
S6606V	>E3130	5ml				OK	22:21
(R) S6607V	>E3131	5ml				OK	23:06
BA0106VR	>E3132	5ml				NG	00:18
S6605V	>E3133	5ml				~~OK~~ NG Past CBCHK	1:10
(R) BA0106V	>E3134	5ml				NG Past CBCHK	
QC7054VS	>E3136	5ml				NG 4ul ABC XVOA	
P-BFB	>E3135	1ul				NG	
P-BFB	>E3137	1ul				OK >E3137	04:08
QC7054VS	>E3138	5ml				4ul APB DAT STD	04:53
QC7054VS	>E3139	5ml			S.B. [illegible]	~~10ul~~ 2ul	
QC7054VS	>E3140	5ml			NG	10ul	
QC7054V	>E3141	5ml			NG	2ul	

ETC ENVIRONMENTAL TESTING and CERTIFICATION

ORATORY CHRONICLE: GC-M. epartment

DATE 87/13/5 SHIFT
FRACTION AP9PT/VOA
INSTRUMENT C
TUNE FILE APE201
SEQUENCE FILE KBC
METHOD FILE VOAC
ID FILE CAP9PT
ANALYST(S) K Bazzi

SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See Pg#1			
Pg 2 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
QC7052VS	PC2613	5uL	4		OK	See VOA blank	
S6607V	PC2614		1		NG	Sum	
S6608V	PC2615		2		OK		[illegible] 09
S6607V	PC2616		3		OK		10:22
S6606V	PC2617		4		OK		11:0[illegible]
QC7052V	PC2618		2		OK		
(R) S6607V	PC2619		2		OK		12:44

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) Acid	BN	DER BN	Comments
+ S6602	21065	965	1.0	1.0	1.0	APS / T
+ S6603	↓	925	1.0	1.0	1.0	↓
+ S6604	↓	975	1.0	1.0	1.0	↓
+ S6606	↓	970	1.0	1.0	1.0	
S6605	21084	980	1.0	1.0	1.0	✓
S6058	21177	1005	1.0	1.0	1.0	APS/BN, ACID, HCP
+ S6059	↓	1000	1.0	1.0	1.0	↓
+ ~~S6226~~	21204	910	1.0	1.0	1.0	CNOD
(8) 5+ ~~S6227~~	↓	930	1.0	1.0	1.0	↓
~~S5554~~	21236					
S6004	21252	1005	1.0	1.0	1.0	↓
+ S6008	↓	985	1.0	1.0	1.0	↓
+ S7731	21331	995	1.0	1.0	1.0	APS / T
+ S7732	↓	990	1.0	1.0	1.0	↓
S7733	↓	980	1.0	1.0	1.0	↓
~~S5843~~	~~21230~~	~~945~~	~~1.0~~			~~APS/ACID~~
* S1023	20231					APS/BN ACID HCP
* S1025	↓					↓
* ~~S0513~~	~~20230~~					
* S2511	20331	1025	1.0	1.0	1.0	↓
QC6902		1000	1.0	1.0	1.0	
QC6902S		1000	1.0	1.0	1.0	
S6605-MS		975	1.0	1.0	1.0	
S6605-MSD		990	1.0	1.0	1.0	

QC Batch # 6702

Analysis APS/BN, APS/ACID, APS/HCP

Matrix H2O

Turnaround NORM

Date Start 5/13/97

Neutral

Base

Acid

Derivitized BN

Extraction Method

Sep. Funnel ✓

Continuous

Other

COMMENTS

*repeat of QC 6654

HEXACHLOROPHENE STD

100 ng/ml	1.0	15.8
500 ng/ml	1.0	15.8
500 ng/ml	1.0	15.8

Extraction:

BN DER:

BN CONC:

ACID CONC:

Supervisor:

QC DOW QC Spiked Ver. W. Set. 1.1

FRACTION	SPIKE Amt (ml)	Conc. ug/ml	Lot #	SURROGATES Amt (ml)	Conc. ug/ml	Lot #
ABN/VOA 1	1.0	100/500	15,230			
ABN/VOA 2	1.0	500/100	15,232			
ABN/Acid	1.0	500/100	15,237			
VOA/BN	1.0	100	15,344			
VOA/Acid	1.0	100	15,342			
Cont. Ver. N/A				1.0	50/100	15,888

ETC FORM 0113

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 5/14/87 SHIFT
FRACTION HPTVOA
INSTRUMENT E
TUNE FILE AP8 [illegible]
SEQUENCE FILE
METHOD FILE AP9 HPT
ID FILE EA9 HPT
ANALYST(S) Steph Blaze

SUPERVISOR [illegible]
BATCH #'s QV 7054

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

See PS

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
✓ QC 7054VS	E3142	5ml			CBUPD	10ul AP8/DAI	9:03
✓ QC 7054VS	E3143				CBCAL	2ul ↓	10:27
QC 7054V	E3144					NG	
✓ QC7054V	E3145					OK	13:3
✓ S6603V	E3146					OK	14:3
✓ S6603VS	E3147					OK	15:21
(R) S6605V	E3148					NG	
✓ S6605VR	E3149					OK	16:52
S6604V	E3150					NG Sure out	
(R) BH0106V	E3151	↓			NG	~~OK~~ 5/17/87 wrong analysis	18:23
S6602V	E3152	.05ml		1:100		Re-run Straight	
-BFB	E3153	1ul				inject before → E3149	
(R) S6605V	E3154	5ml				OK	21:16
✓ (R) S6604V	E3155					OK	22:01
(R) S6602V	E3156					NG	
QC7054VS	E3157				NG	4ul AP8/DAI	
✓ QC7054VS	E3158					2ul	
✓ QC7054VS	E3159				CBCAL CBUPD	10ul	
✓ QC7054VS	E3160	↓				4ul AP8/DAI	
P-BFB	E3161	1ul			OK	PS.81 [illegible]	4:59
QC7054V	E3162	5ml				NG	
QC7054V	E3163					NG	
QC7054V	E3164					OK	07:
(R) S6602V	E3165	↓				OK	08:49

ETC FOR 4 8102

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6-8-87 SHIFT
FRACTION 1 AP8/BNA
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE
METHOD FILE BNPT
ID FILE JAP8EX
ANALYST(S) C. to

SUPERVISOR Steve Cordova
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See page 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
S7733B	>J4761		26				
S6602B	>J4762		27				
S6604B	>J4763		28				
S6606B	>J4764		29				
S6226B	>J4765		30				
S6227B	>J4766		31				
Test Mix	>J4767		32				
BNA II	>J4768		33			See page 3	
AP8/BNA II	>J4769		34				
S5843C	>J4770		35				
QC6976C	>J4771		36				
QC6976CS	>J4772		37				
S6252CS	>J4773		38				
S6253C	>J4774		39				
S6253CR	>J4775		40				
S6002C	>J4776		41				
S6003C	>J4777		42				
S6006C	>J4778		43				
Test Mix	>J4779		44				
BNA STD II	>J4780		45				
AP8/BNA II	>J4781		46				
S6007C	>J4782		47				
S6009C	>J4783		48				
S6005C	>J4784		49				
R7859C	>J4785		50				

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 5/20/06 SHIFT
FRACTION AP8/BNA
INSTRUMENT I
TUNE FILE MTJ001
SEQUENCE FILE SWJ2
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) S. Willms

SUPERVISOR Sylvia Cordova
BATCH #'s QC6902 QC6976

CBJ8EX
(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	June 7th 1987
WIP		BY	KV

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Int std	400	15561	
Test Mix			
ACID STD III, II, I	300, 100, 60	15819, 15818, 15817	
BN STD III, II, I	200, 100, 60	16079, 16078, 16077	
AP8 BN (II)	300, 500	15231	
AP8 ACID STD III, II, I	[illegible]	15236, 15235, 15234	
AP8/BN STD III, II, I	[illegible]	[illegible]	[illegible]

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test Mix	>J4736		1			OK 01:06	
BNA STD III	>J4737		2			JBNA8	
II	>J4738		3				
I	>J4739		4				
AP8/BN(II)	>J4740		5			JAP8B2	
AP8/BNA III	>J4741		6			JAP8AB	
II	>J4742		7				
I	>J4743		8				
Test Mix	>J4744		9			OK, A 08:00	
QC6902E	>J4745		10				
QC6902CS	>J4746		11				
S6605CS	>J4747		12				
S6605CR	>J4748		13				
S6603C	>J4749		14				
S6604C	>J4750		15				
S6605C	>J4751		16				
S6608C	>J4752		17				
S7731C	>J4753		18				
S7732C	>J4754		19				
Test Mix	>J4755		20		OK	17:57	
BNA STD II	>J4756		21				
AP8/BNA STD II	>J4757		22				
S2811S	>J4758		23				
S6058S	>J4759		24				
S6059S	>J4760		25				

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departr

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST BN	ACID	Comments
S6602	21065	530	10	5.0	
S6603		480	1.0	5.0	
S6604		620	1.0	5.0	
S6606	✓	580	1.0	5.0	
S6605	21084	540	1.0	5.0	
S6602	S1	520	1.0	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	1.0	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	1.0	5.0	
QC 6904	S1	500	1.0	5.0	
QC 6904	S2	520	1.0	5.0	
QC 6904	S3	510	1.0	5.0	
QC 6904	S4	550	1.0	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB
APG/PEST
APG/PEST (F

Matrix H2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98~~

FRACTION		SPIKE Amt (ml)	Conc.	Lot #
S1	Ec Iso	0.1 ml	25/100 mg/L	15616
S2	Ec Temp	0.1 ml	25/250 mg/L	15993
S3	EPDI	0.2 ml	125/125 mg/L	15602
S4	Arochlor 1260	0.1 ml	40 mg/L	15997

QC Dev

SURROGATE	Amt. (ml)	Conc.	Lot #
		BN:	
		ACID:	

Set-up: J Jetkoski 5/6/87 X:22 pm 5/6/87 UPD/Supervisor: [illegible] 5-6-87

Conc: [illegible] Spike/Surr. Verified: [illegible] 5-6-87

TC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 60987 SHIFT
FRACTION HCP OEV
INSTRUMENT mT I001
TUNE FILE I
SEQUENCE FILE BHI
METHOD FILE BHCP
D FILE IHCP
ANALYST(S) Brenda Hawkins

SUPERVISOR [illegible]
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
CO		DATE	
NP		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL
HCP std III	500		
II	300		
I	100		
Test mix			
internal std	400		

NAME	DATA FILE >	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test mix	I4051		1		OK		19:31
HEX std III	I4052		2				
II	I4053		3				
I	I4054		4				21:23
Test mix	I4055		5		OK		22:04
QC6902C	I4056		6				
QC6902CS	I4057		7				
S6605C	I4058		8				
S6605CS	I4059		9				
S6605CR	I4060		10				
S6004C	I4061		11				
S6008C	I4062		12				
S6058C	I4063		13				
S7732C	I4064		14				
S6602C	I4065		15				
Test mix	I4066		16		OK		5:05
S6603C	I4068		18				
S6604C	I4069		19				
S6606C	I4070		20				
S2811C	I4071		21				
S7733C	I4072		22				
S6059C	I4079		23				9:32
Test mix	I4103		1		OK		10:24
Hex std II	I4104		2		OK		11:12
S7731	I4074		24				

7:17 PM FRI., 19 JUNE, 1987
Sequence file: S170AB
Security Code: QZ
Channel #: 17

JS 6/19/87

Subsequence 1
Method: M6904C:QZ
Dialog-Prg Param-File
1 1

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction AP9 POST (EC)
Supervisor
Batch #s QC 6904

Standard	Conc PPM	Lot No.
TEMP A	MIX	16265
" B	MIX	16264
" C	MIX	16263
ISO 1A		16268
" 1B		16267
" 1C		16266
ISO 2A		16271
" 2B		16270
" 2C		16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN5391	RN5391	100.0000	1.000000	1.000000
2	QC6904C	2	PN5392	RN5392	100.0000	1.000000	1.000000
3	TEMP A	3	PN5393	RN5393	100.0000	1.000000	1.000000
4	TEMP B	4	PN5394	RN5394	100.0000	1.000000	1.000000
5	TEMP C	5	PN5395	RN5395	100.0000	1.000000	1.000000
6	QC6904CS 2	6	PN5396	RN5396	100.0000	1.000000	1.000000
7	S6603C	7	PN5397	RN5397	100.0000	1.000000	1.000000
8	S6603CS 2	8	PN5398	RN5398	100.0000	1.000000	1.000000
9	ISO 1A	9	PN5399	RN5399	100.0000	1.000000	1.000000
10	HEXANE	10	PN5400	RN5400	100.0000	1.000000	1.000000
11	ISO 1B	11	PN5401	RN5401	100.0000	1.000000	1.000000
12	HEXANE	12	PN5402	RN5402	100.0000	1.000000	1.000000
13	ISO 1C	13	PN5403	RN5403	100.0000	1.000000	1.000000
14	HEXANE	14	PN5404	RN5404	100.0000	1.000000	1.000000
15	TEMP B	15	PN5405	RN5405	100.0000	1.000000	1.000000
16	QC6904CS 1	16	PN5406	RN5406	100.0000	1.000000	1.000000
17	S6602C	17	PN5407	RN5407	100.0000	1.000000	1.000000
18	S6602CS 1	18	PN5408	RN5408	100.0000	1.000000	1.000000
19	ISO 2A	19	PN5409	RN5409	100.0000	1.000000	1.000000
20	ISO 2B	20	PN5410	RN5410	100.0000	1.000000	1.000000
21	S6604C	21	PN5411	RN5411	100.0000	1.000000	1.000000
22	S6605C	22	PN5412	RN5412	100.0000	1.000000	1.000000
23	S6605CR	23	PN5413	RN5413	100.0000	1.000000	1.000000
24	S6606C	24	PN5414	RN5414	100.0000	1.000000	1.000000
25	TEMP B	25	PN5415	RN5415	100.0000	1.000000	1.000000
26	ISO 2C	26	PN5416	RN5416	100.0000	1.000000	1.000000
27	ISO 1B	27	PN5417	RN5417	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN5418	RN5418	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN5419	RN5419	100.0000	1.000000	1.000000

CONFIRMATION

6/13/8

8:10 PM SAT., 13 JUNE, 1987
Sequence file: S164AA
Security Code: QA
Channel #: 13

ETC GC Lab Chronicle
Fraction APB/A PEST (GC)
Supervisor JSW
Batch #s QC 6904

Standard	Conc PPM	Lot No.
APB/PEST TEMP A	0.01 1.0	16265
APB/PEST TEMP B	0.05 5.0	16264
APB/PEST TEMP C	0.1 10	16263
APB/PEST ISO CAL IA	0.1 0.25	16268
APB/PEST ISO CAL IB	0.5 0.5 1	16267
APB/PEST ISO CAL IC	1.0 1.0 2.5	16266
APB/PEST ISO CAL IIA	0.25	16271
APB/PEST ISO CAL IIB	1.0	16270
APB/PEST ISO CAL IIC	2.5	16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Subsequence 1
Method: M6904T:QA
Dialog-Prg Param-File
: :

#Wshs	#Paps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Samples

	Sample-Name	Btl#	P-File	R-File	XDil-F	Std-Amt	Sap-Amt
1	HEXANE	1	PN4051	RN4051	100.0000	1.000000	1.000000
2	QC6904G	2	PN4052	RN4052	100.0000	1.000000	1.000000
3	TEMP A	3	PN4053	RN4053	100.0000	1.000000	1.000000
4	TEMP B	4	PN4054	RN4054	100.0000	1.000000	1.000000
5	TEMP C	5	PN4055	RN4055	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN4056	RN4056	100.0000	1.000000	1.000000
7	S6603G	7	PN4057	RN4057	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN4058	RN4058	100.0000	1.000000	1.000000
9	ISO 1A	9	PN4059	RN4059	100.0000	1.000000	1.000000
10	HEXANE	10	PN4060	RN4060	100.0000	1.000000	1.000000
11	ISO 1B	11	PN4061	RN4061	100.0000	1.000000	1.000000
12	HEXANE	12	PN4062	RN4062	100.0000	1.000000	1.000000
13	ISO 1C	13	PN4063	RN4063	100.0000	1.000000	1.000000
14	HEXANE	14	PN4064	RN4064	100.0000	1.000000	1.000000
15	TEMP B	15	PN4065	RN4065	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN4066	RN4066	100.0000	1.000000	1.000000
17	S6602G	17	PN4067	RN4067	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN4068	RN4068	100.0000	1.000000	1.000000
19	ISO 2A	19	PN4069	RN4069	100.0000	1.000000	1.000000
20	ISO 2B	20	PN4070	RN4070	100.0000	1.000000	1.000000
21	S6604G	21	PN4071	RN4071	100.0000	1.000000	1.000000
22	S6605G	22	PN4072	RN4072	100.0000	1.000000	1.000000
23	S6605GR	23	PN4073	RN4073	100.0000	1.000000	1.000000
24	S6606G	24	PN4074	RN4074	100.0000	1.000000	1.000000
25	TEMP B	25	PN4075	RN4075	100.0000	1.000000	1.000000
26	ISO 2C	26	PN4076	RN4076	100.0000	1.000000	1.000000
27	ISO 1B	27	PN4077	RN4077	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN4078	RN4078	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN4079	RN4079	100.0000	1.000000	1.000000

Pressing

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Depart

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml)		Comments
S6602	21065	620	5.0		
S6603	↓	640	5.0		
S6604	↓	680	5.0		
S6606	↓	610	5.0		
S6605	21084	500	5.0		
QC 6903		500	5.0		
QC 6903	S	500	5.0		
S6606	S	550	5.0		
S6605	R	570	5.0		

QC Batch # 6903

Analysis AP9/HERB (E

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~[illegible] on Sheet 98~~

FRACTION	SPIKE		
	Amt (ml)	Conc.	Lot #
DW/[illegible]/APP[illegible]	1.0	[illegible]	15,783

QC DAN

SURROGATE		
Amt. (ml)	Conc.	Lot #

Set-up: [illegible] 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 5/11

2:58 PM FRI., 12 JUNE, 1987
Sequence file: S160AC
Security Code: PQ
Channel #: 8

BN 6/12/87

ETC GC Lab Chronicle
Fraction APB/PST (FPB)
Supervisor RN
Batch #s QC 6904

Subsequence 1
Method: M6904F:PQ
Dialog-Prg Param-File
: :

#Wshs #Pmps Stop
5 5 1

Iso Post-Btl# Post-Wsns#
0 0 1

Standard	Conc PPM	Lot No.
APB I A	0.1	15,605
I B	0.5	15,604
I C	1.0	15,603
APB II A	0.1	15,608
II B	0.5	15,608
II C	1.0	15,607

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN2946	RN2946	100.0000	1.000000	1.000000
2	QC6904G	2	PN2947	RN2947	100.0000	1.000000	1.000000
3	APB I 0.1	3	PN2948	RN2948	100.0000	1.000000	1.000000
4	APB I 0.5	4	PN2949	RN2949	100.0000	1.000000	1.000000
5	APB I 1.0	5	PN2950	RN2950	100.0000	1.000000	1.000000
6	APB II 0.1	6	PN2951	RN2951	100.0000	1.000000	1.000000
7	APB II 0.5	7	PN2952	RN2952	100.0000	1.000000	1.000000
8	APB II 1.0	8	PN2953	RN2953	100.0000	1.000000	1.000000
9	QC6904GS 3	9	PN2954	RN2954	100.0000	1.000000	1.000000
10	S6604G	10	PN2955	RN2955	100.0000	1.000000	1.000000
11	S6604GS 3	11	PN2956	RN2956	100.0000	1.000000	1.000000
12	S6605G	12	PN2957	RN2957	100.0000	1.000000	1.000000
13	S6605GP	13	PN2958	RN2958	100.0000	1.000000	1.000000
14	S6602G	14	PN2959	RN2959	100.0000	1.000000	1.000000
15	S6603G	15	PN2960	RN2960	100.0000	1.000000	1.000000
16	S6606G	16	PN2961.	RN2961	100.0000	1.000000	1.000000
17	APB I 0.5	17	PN2962	RN2962	100.0000	1.000000	1.000000
18	APB II 0.5	18	PN2963	RN2963	100.0000	1.000000	1.000000

KS 6/25/87

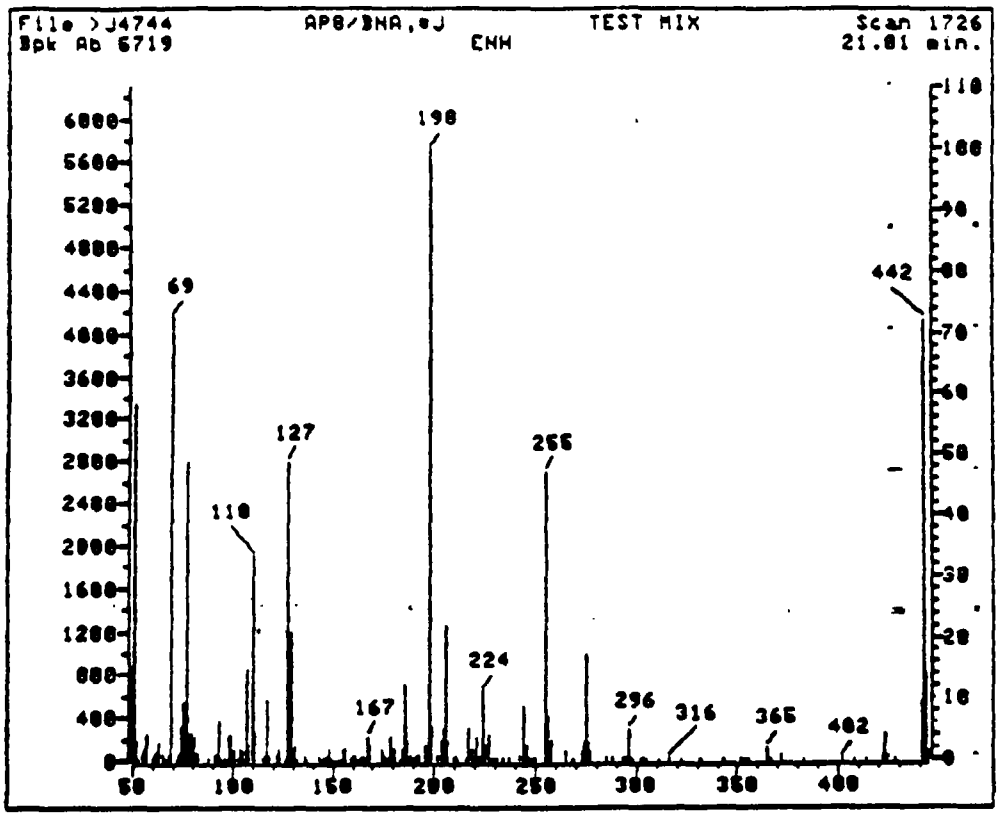

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.59	58.59	Ok
68	Less than 2% of mass 69	.82	1.12	Ok
69	(reference only)	72.85	72.85	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	48.77	48.77	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.52	5.52	Ok
275	10-30% of mass 198	17.16	17.16	Ok
365	Greater than 1% of mass 198	2.02	2.02	Ok
441	0-100% of mass 443	9.28	66.01	Ok
442	Greater than 40% of mass 198	71.91	71.91	Ok
443	17-23% of mass 442	14.05	19.55	Ok

Injection Date: 06/07/87 Analyst: K Vahut
Injection Time: 08:00 Processor: [illegible]
Run No: >J4744 QC Batch: QC 6902
Spectrum No: 1726 avg

MS Data File: >J4744::U6

Name: APB/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 8:00
Misc: TEST MIX BTL# 9

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C >J4745	870607	08:34
	QC6902CS >J4746	870607	09:36
	S6605C3 >J4747	870607	10:29
	S6605CR >J4748	870607	11:25
	S6603C >J4749	870607	12:17
	S6604C >J4750	870607	13:11
	S6605C >J4751	870607	14:04
	S6608C >J4752	870607	15:01
	S7731C >J4753	870607	15:59
	S7732C >J4754	870607	16:58

LAH

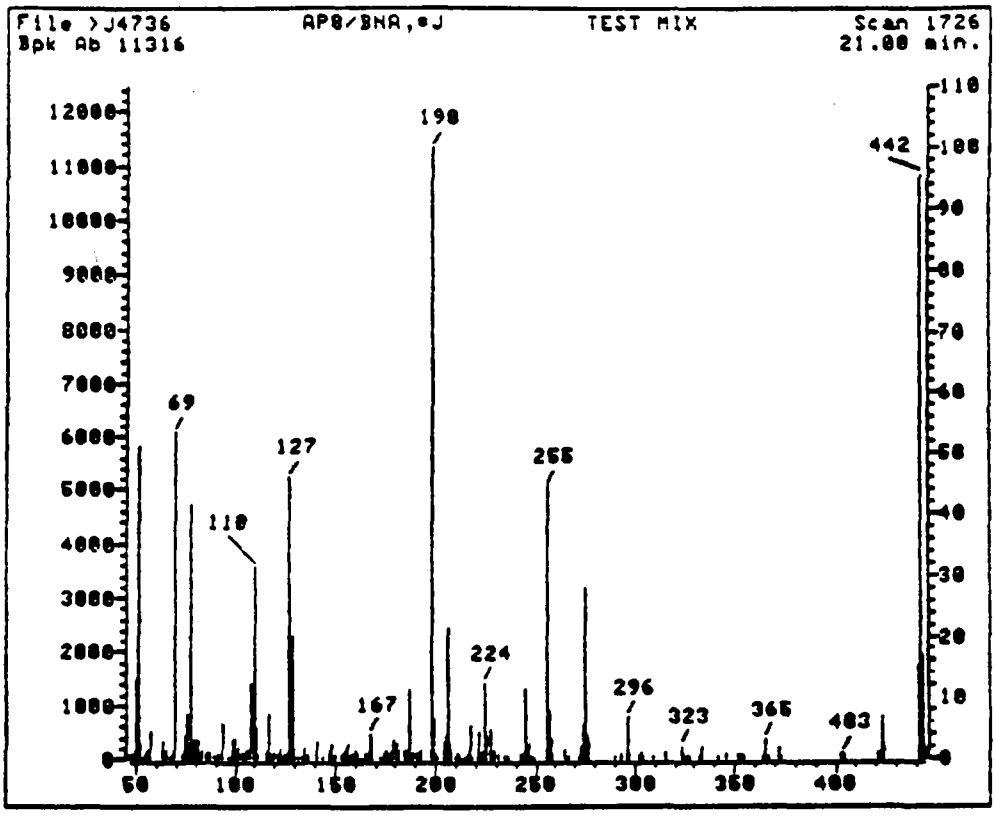

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	51.51	51.51	Ok
68	Less than 2% of mass 69	.60	1.12	Ok
69	(reference only)	53.68	53.68	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	46.31	46.31	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.48	6.48	Ok
275	10-30% of mass 198	27.79	27.79	Ok
365	Greater than 1% of mass 198	3.11	3.11	Ok
441	0-100% of mass 443	15.25	91.23	Ok
442	Greater than 40% of mass 198	95.42	95.42	Ok
443	17-23% of mass 442	16.72	17.52	Ok

Injection Date: 06/07/87 Analyst: K Valuti
Injection Time: 01:06 Processor: Mista Berkley
Run No: >J4736 QC Batch: QC6902
Spectrum No: 1726 (A)

LAHendel 6/20/87

MS Data File: >J4736::U5

Name: AP8/BNA,$J Operator: JQ6275 Date/Time: 6/07/87 1:06
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4737	870607	01:44
	STD. >J4738	870607	02:37
	STD. >J4739	870607	03:31
	STD. >J4740	870607	04:26
	STD. >J4741	870607	05:18
	STD. >J4742	870607	06:11
	STD. >J4743	870607	07:03

LAH

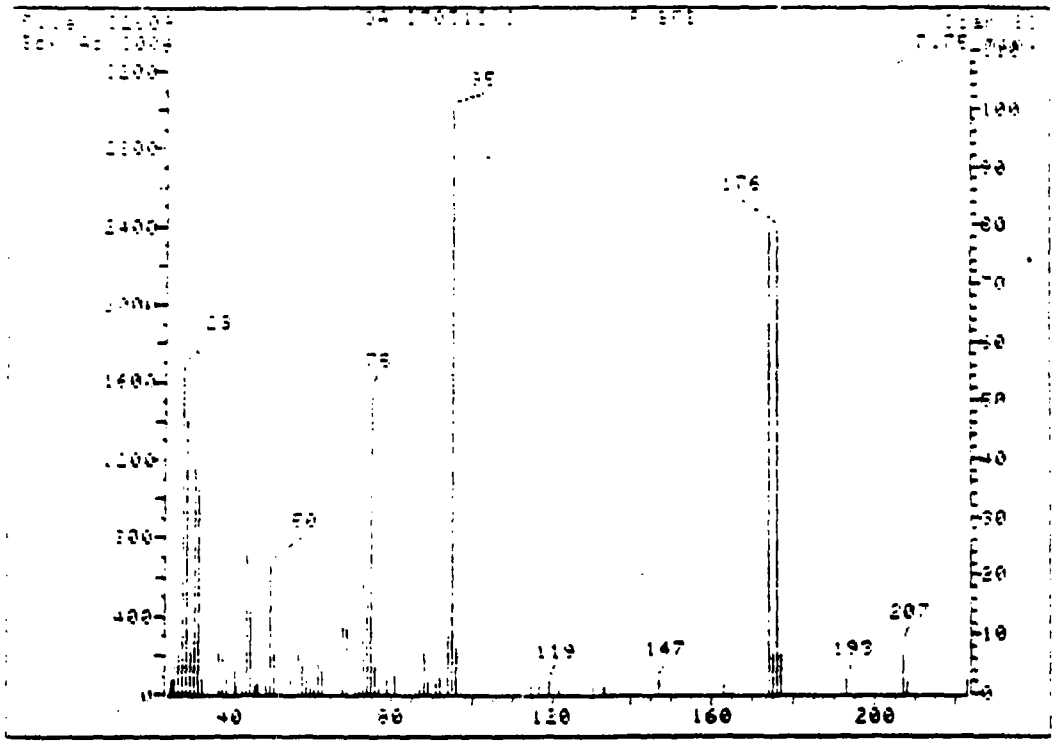

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.87	21.87	Ok
75	30-60% of mass 95	51.83	51.83	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.59	7.59	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	78.73	78.73	Ok
175	5-9% of mass 174	6.79	8.63	Ok
176	95-101% of mass 174	79.26	100.68	Ok
177	5-9% of mass 176	6.49	9.19	Ok

Injection Date: 05/13/87 Analyst: K. Boghi
Injection Time: 02:00 Processor: Sharon Matlock
Run No: [illegible] QC Batch: QW 2052
Spectrum No: BB (UNaHered)

KS 5/21/87

MS Data File: [illegible]

Name: [illegible] 870513 1 Operator: [illegible] Date Time: [illegible] 87 [illegible]
Mass: [illegible]

This performance run applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	0C70520VS (>C2607)	870513	02:22
	0C70520VS (>C2608)	870513	03:03
	0C70520V (>C2611)	870513	05:25
	0C70520V (>C2612)	870513	06:10
	0C70520V (>C2613)	870513	06:57
	966080V (>C2615)	870513	09:38
	966020V (>C2616)	870513	10:23
	966060V (>C2617)	870513	11:08
	0C70520V (>C2618)	870513	11:55
	966070V (>C2619)	870513	12:44

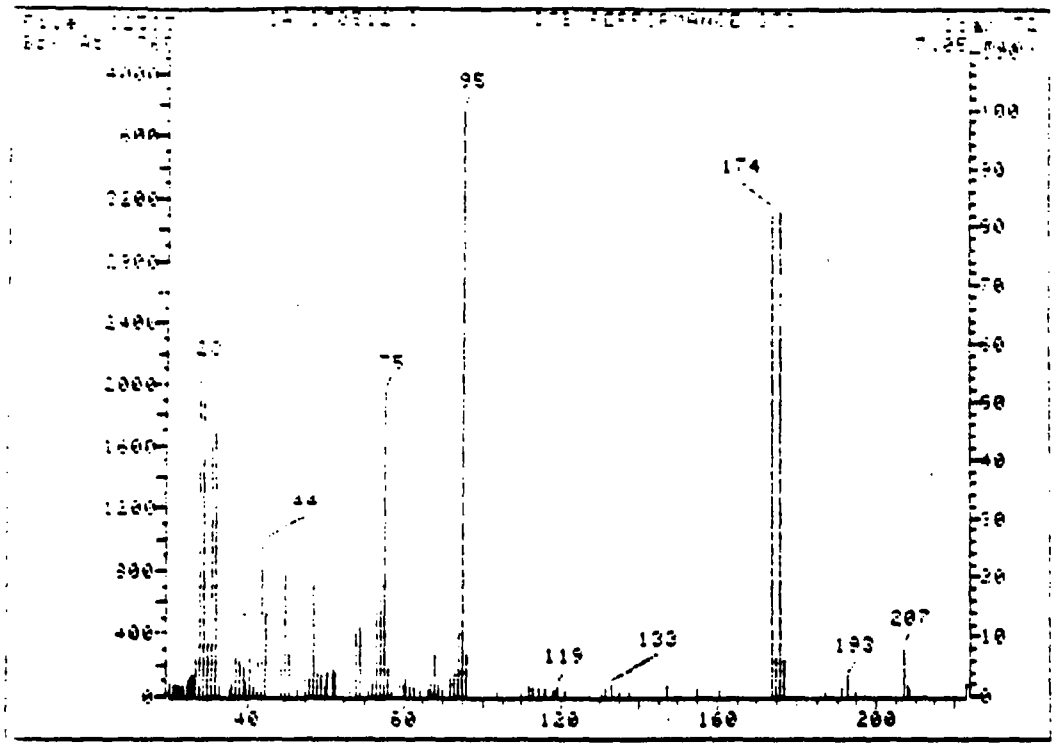

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.46	21.46	OK
75	30-60% of mass 95	51.79	51.79	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	7.09	7.09	OK
173	Less than 1% of mass 95	0.00	0.00	OK
174	Greater than 50% of mass 95	92.66	92.66	OK
175	5-9% of mass 174	6.67	8.07	OK
176	95-101% of mass 174	92.59	99.90	OK
177	5-9% of mass 176	6.00	7.27	OK

Injection Date: 05/12/87 Analyst: [illegible]
Injection Time: 14:36 Processor: [illegible]
Run No: >C2595 QC Batch: QV70S2
Spectrum No: 72

KJ
5/21/87

MS Data File: [illegible]

Name: [illegible] Operator: [illegible] Date Time: [illegible]
Misc: SFE PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052V (>C2596)	870512	15:33
	OC7052V (>C2597)	870512	16:17
	OC7052V (>C2598)	870512	17:02
	OC7052V (>C2599)	870512	17:48
	S6605VS (>C2601)	870512	19:44
	S6605V (>C2602)	870512	20:30
	S6604V (>C2603)	870512	21:46
	S6604VR (>C2604)	870512	22:06
	S6603V (>C2605)	870512	22:52
	OC7052VS (>C2606)	870513	01:01

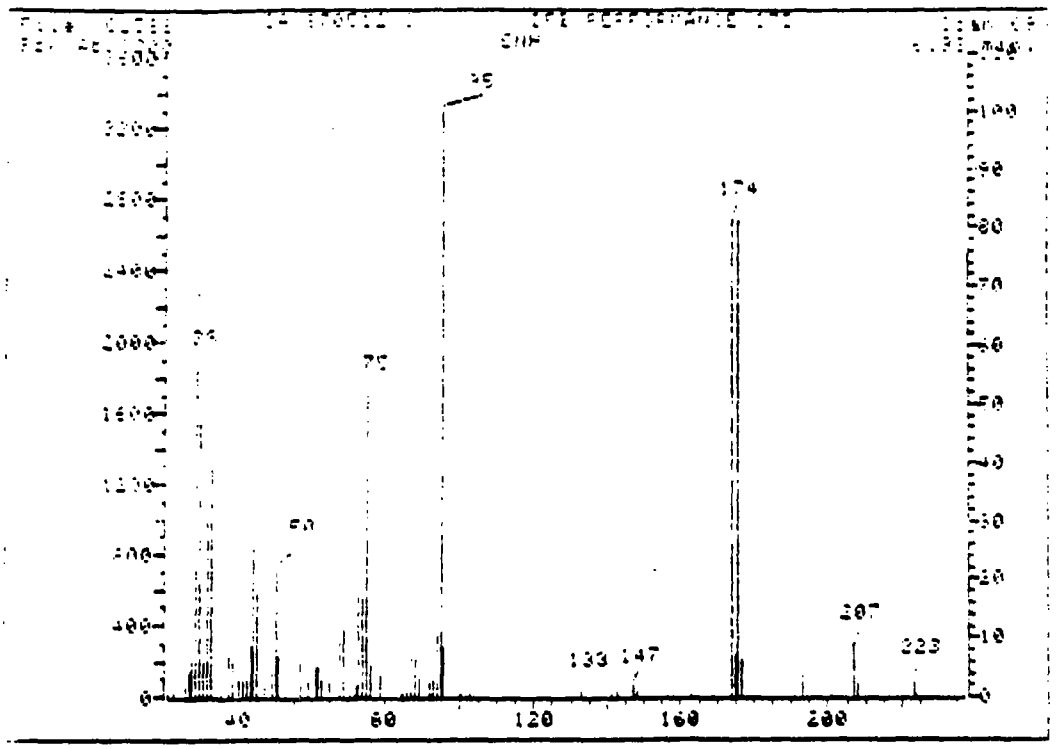

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

M/Z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.72	21.72	OK
75	30-60% of mass 95	52.23	52.23	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	8.38	8.38	OK
173	Less than 1% of mass 95	0.00	0.00	OK
174	Greater than 50% of mass 95	91.41	91.41	OK
175	5-9% of mass 174	7.01	8.61	OK
176	95-101% of mass 174	91.22	99.76	OK
177	5-9% of mass 176	6.44	7.03	OK

Injection Date: 05/12/87 Analyst: K. Boykin
Injection Time: 07:05 Processor: [illegible]
Run No: C2589 QC Batch: QJ7052
Spectrum No: 69 (ENH)

KS
5/21/87

MS Data File: [illegible]

Name: [illegible] 870512 C Operator: [illegible] Date/Time: 5/12/87 7:0[illegible]
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7052VS (?C2591)	870512	09:12
	QC7052VS (?C2593)	870512	11:24
	QC7052VS (?C2594	870512	13:02

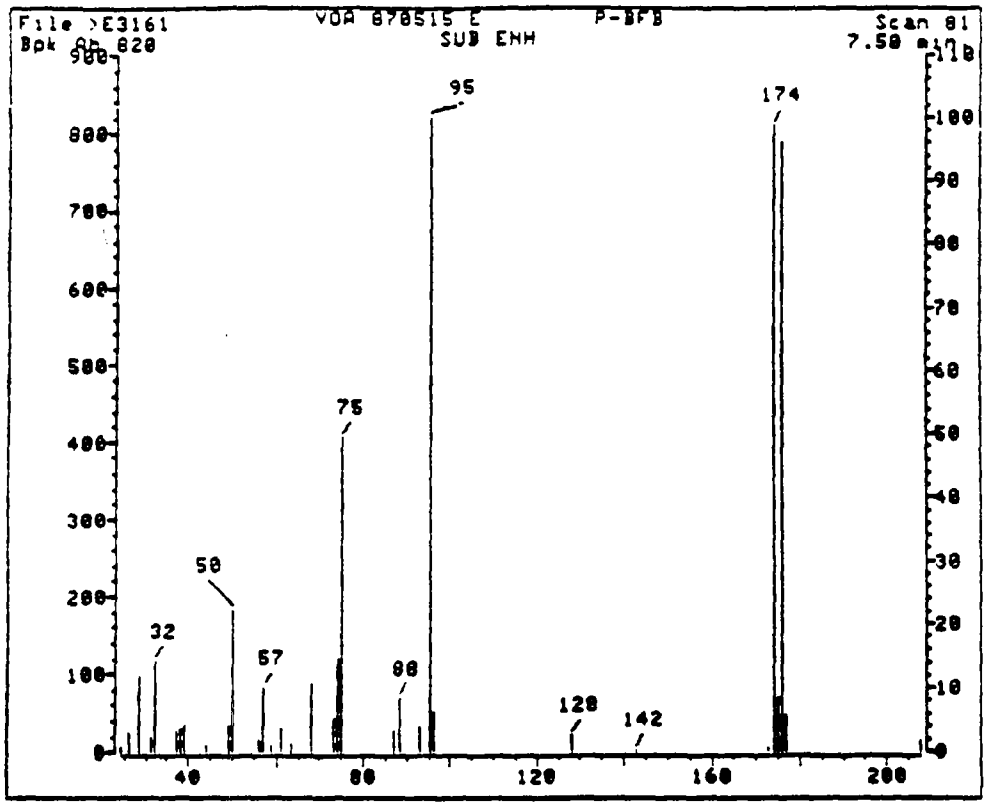

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.24	22.24	Ok
75	30-60% of mass 95	49.59	49.59	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.03	6.03	Ok
173	Less than 1% of mass 95	.56	.56	Ok
174	Greater than 50% of mass 95	98.70	98.70	Ok
175	5-9% of mass 174	8.36	8.47	Ok
176	95-101% of mass 174	96.00	97.26	Ok
177	5-9% of mass 176	5.89	6.13	Ok

Injection Date: 05/15/87 Analyst: [illegible]
Injection Time: 04:59 Processor: [illegible]
Run No: >E3161 QC Batch: QV7004
Spectrum No: PS81, ENH,-3:4, PS91
SUB,T

[illegible] 5/21/87

MS Data File: >E3161::U4

Name: VOA 870515 E Operator: SB5883 Date/Time: 5/15/87 4:59
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6602V (>E3165)	870515	08:49

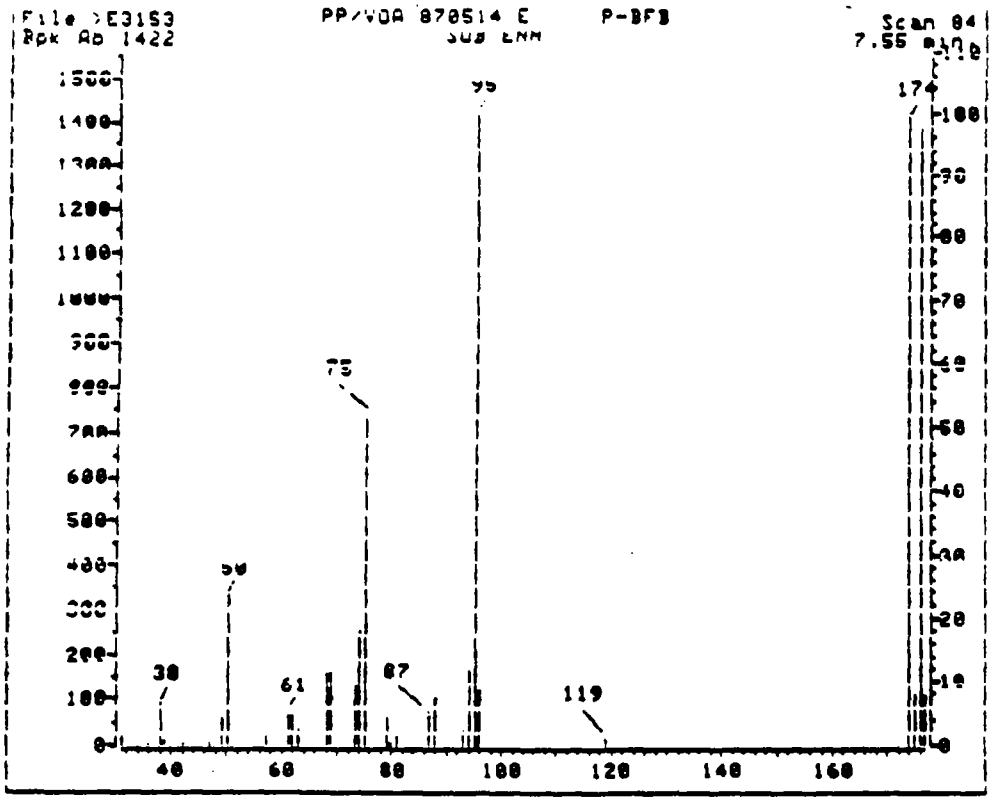

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	23.30	23.30	Ok
75	30-60% of mass 95	52.04	52.04	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.52	8.52	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.25	99.25	Ok
175	5-9% of mass 174	7.83	7.89	Ok
176	95-101% of mass 174	98.00	98.74	Ok
177	5-9% of mass 176	7.51	7.66	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 16:14 Processor: [signature]
Run No: >E3153 WC Batch: QV7054
Spectrum No: PS84 (EVH) PS 70
SUBT

[initials] 5/20/87

MS Data File: >E3153::U4

Name: PP/VOA 8/0514 E Operator: MGRMS Date/Time: 5/14/87 16:14
Misc: P-8FB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	SL605VR (>E3149)	870514	16:52
	~~SL604V (>E3151)~~	~~870514~~	~~18:23~~
	SL605V (>E3154)	870514	21:16
	SL604V (>E3155)	870514	22:01
	QC7054VS (>E3158)	870515	01:37
	QC7054VS (>E3159)	870515	02:41
	QC7054VS (>E3160)	870515	04:03

5/17/87

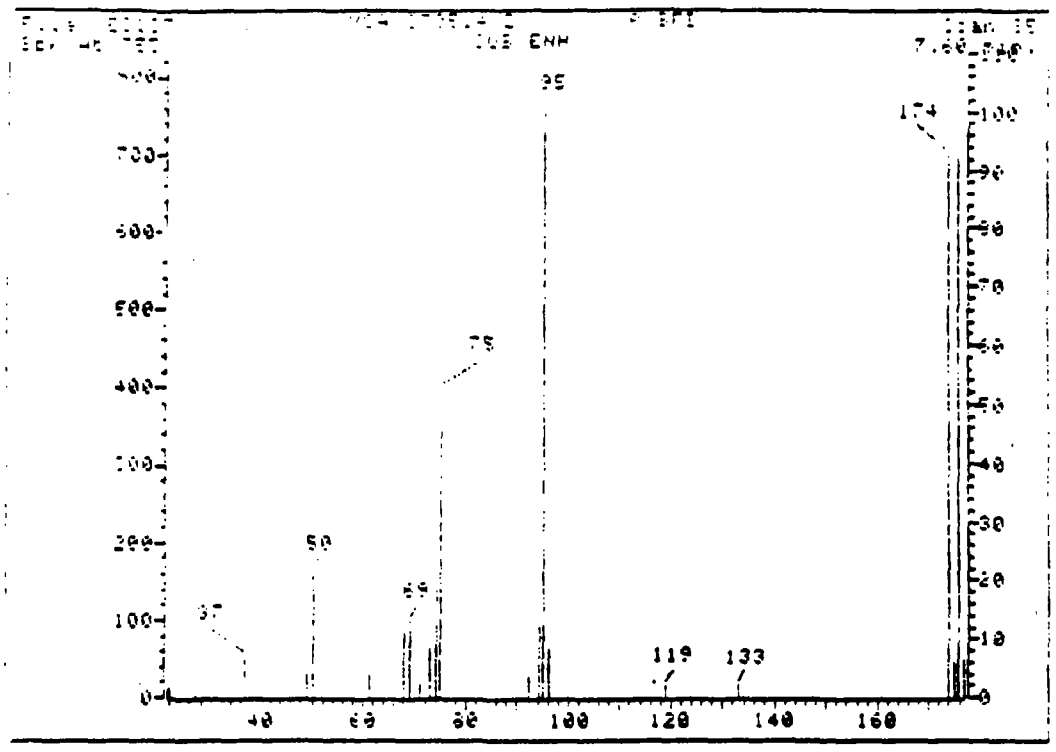

TABLE 1: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.48	52.48	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.42	8.42	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	92.53	92.53	Ok
175	5-9% of mass 174	6.07	6.56	Ok
176	95-101% of mass 174	92.40	99.86	Ok
177	5-9% of mass 176	6.12	6.62	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 04:03 Processor: [signature]
Run No: E3137 QC Batch: QV7054
Spectrum No: (85-71) ENH

5/20/87

MS Data File: \E3137::U4

Name: UOA 870514 E Operator: SB5883 Date/Time: 5/14/87 4:08
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7054VS (>E3138)	870514	04:53
	OC7054VS (>E3142)	870514	09:03
	OC7054VS (>E3143)	870514	10:27
	OC7054V (>E3145)	870514	13:30
	S6603V (>E3146)	870514	14:33
	S6603VS (>E3147)	870514	15:21

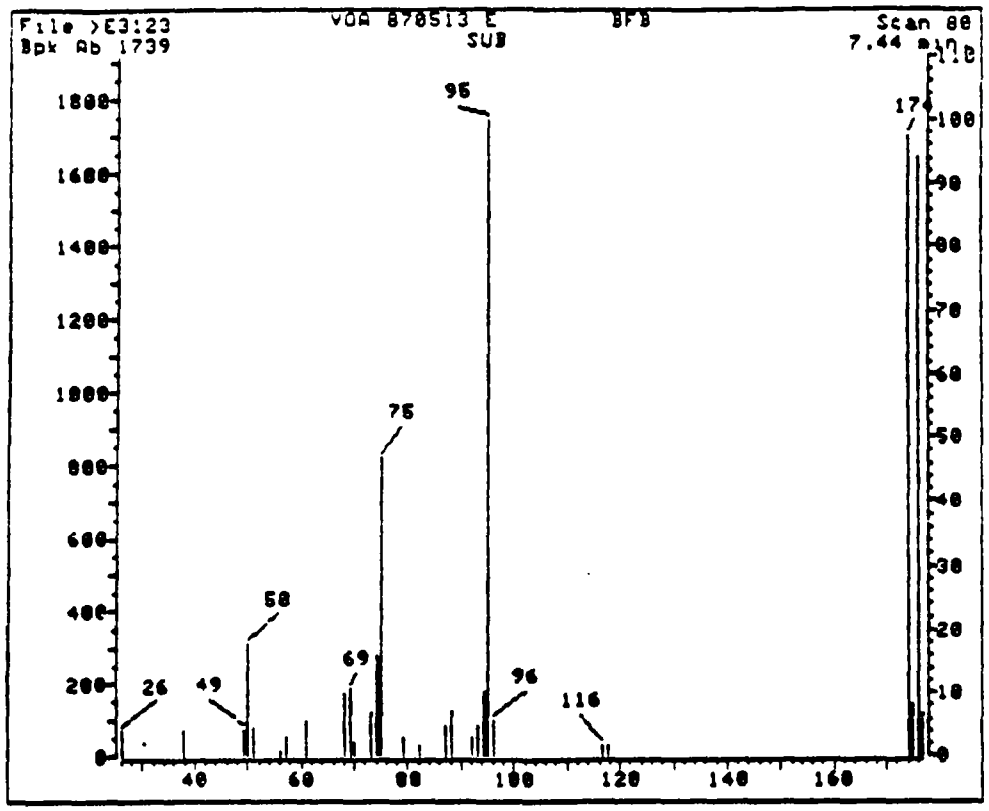

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	17.94	17.94	Ok
75	30-60% of mass 95	47.10	47.10	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	5.69	5.69	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	97.53	97.53	Ok
175	5-9% of mass 174	8.17	8.37	Ok
176	95-101% of mass 174	94.36	96.76	Ok
177	5-9% of mass 176	6.44	6.83	Ok

Injection Date: 05/13/87 Analyst: [illegible]
Injection Time: 14:52 Processor: [illegible]
Run No: >E3123 QC Batch: QV7057
Spectrum No: 70 -20

KS 5/20/87

MS Data File: >E3123::U4

Name: VOA 870513 E Operator: LR5235 Date/Time: 5/13/87 14:52
Misc: BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6608V (>E3128)	870513	20:21
	S6606V (>E3130)	870513	22:21
	S6607V (>E3131)	870513	23:06

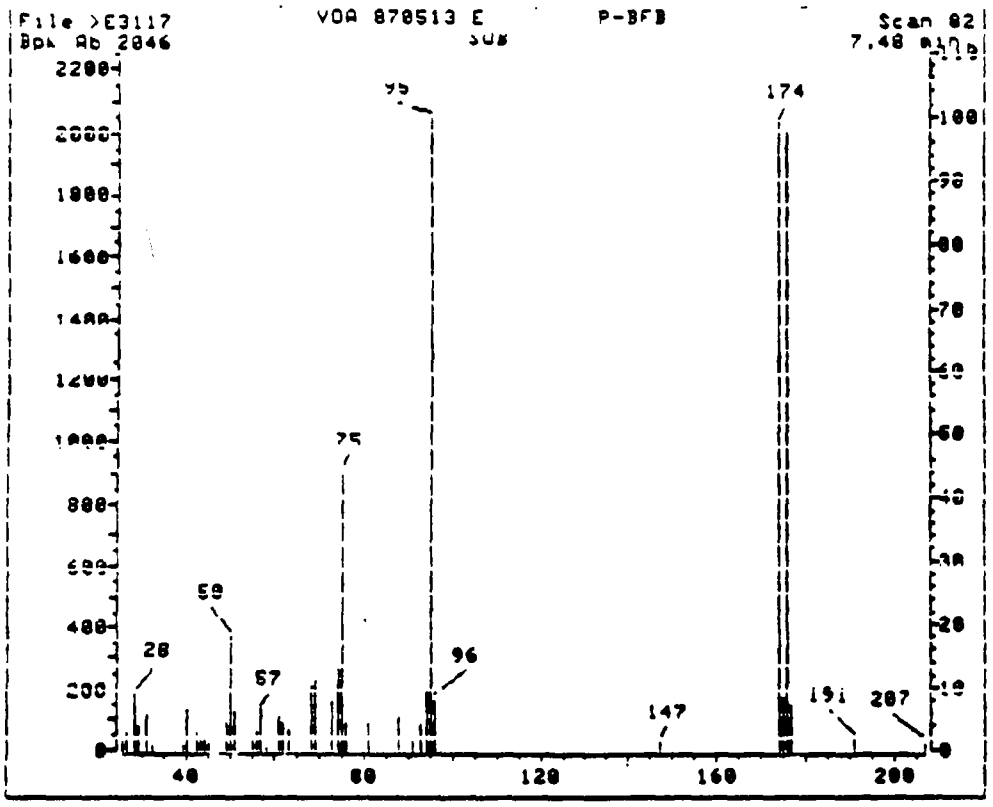

TABLE 2: METHOD PERFORMANCE DATA (WR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.13	18.13	OK
75	30-60% of mass 95	44.43	44.43	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	8.11	8.11	OK
173	Less than 1% of mass 95	0.00	0.00	OK
174	Greater than 50% of mass 95	99.32	99.32	OK
175	5-9% of mass 174	8.26	8.32	OK
176	95-101% of mass 174	98.09	98.77	OK
177	5-9% of mass 176	7.04	7.17	OK

Injection Date: 05/13/87 Analyst: K Boyle
Injection Time: 06:46 Processor: ~~[illegible]~~
Run No: >E3117 WC Batch: QV 7054
Spectrum No: 82-69

KJ
5/20/87

You're already on LU: 87

MS Data File: >E3117::U5

Name: UUA 87U513 E Operator: KB6656 Date/Time: 5/13/87 6:46
Misc: P-8P8

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC705HV (>E3118)	870513	07:27
	QC705HVS (>E3119)	870513	08:12
	QC705HVS (>E3121)	870513	10:30
	QC705HVS (>E3122)	870513	11:50

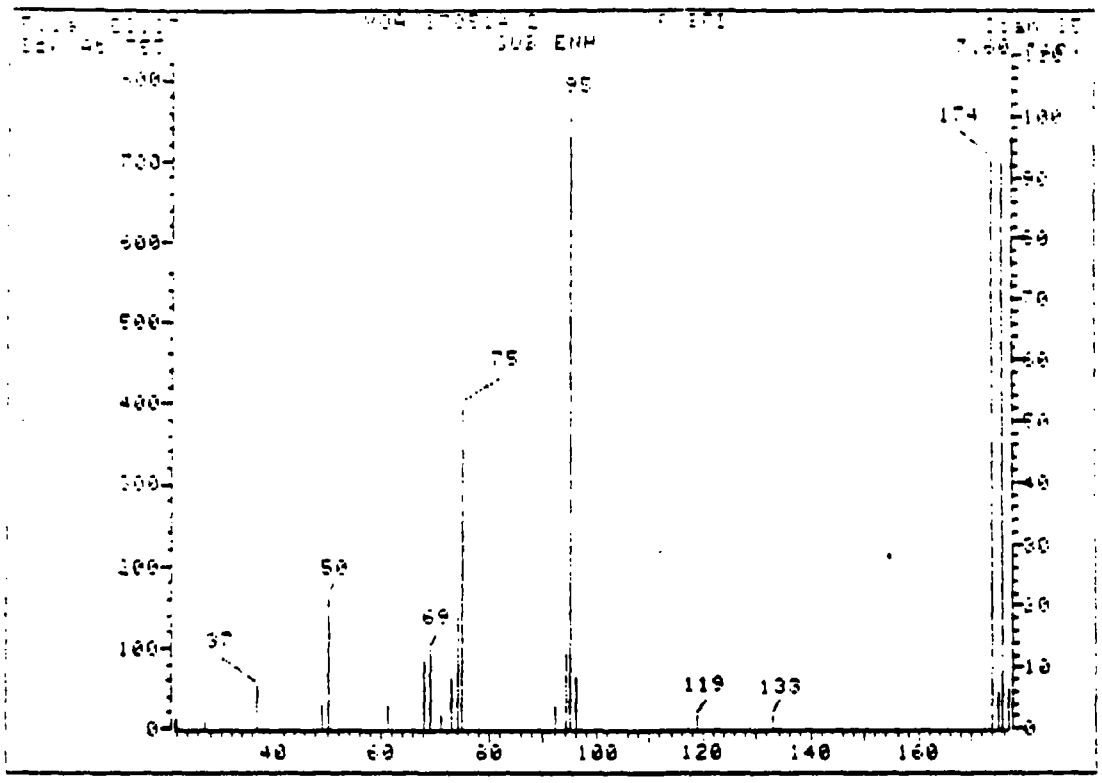

TABLE 1: METHOD PERFORMANCE DATA (OP31)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.48	52.48	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.42	8.42	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	92.53	92.53	Ok
175	5-9% of mass 174	6.07	6.56	Ok
176	95-101% of mass 174	92.40	99.86	Ok
177	5-9% of mass 176	6.12	6.62	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 04:03 Processor: [signature]
Run No: E3137 QC Batch: QV7034
Spectrum No: (85-71) ENH

5/20/87

MS Data File: E3137::04

Name: VOA 870514 E Operator: 325337 Date/Time: 5/14/87 4:08
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7054VS (>E3138)	870514	04:53
	QC7054VS (>E3142)	870514	09:03
	QC7054VS (>E3143)	870514	10:27
	QC7054V (>E3145)	870514	13:30
	S6603V (>E3146)	870514	14:33
	S6603VS (>E3147)	870514	15:21

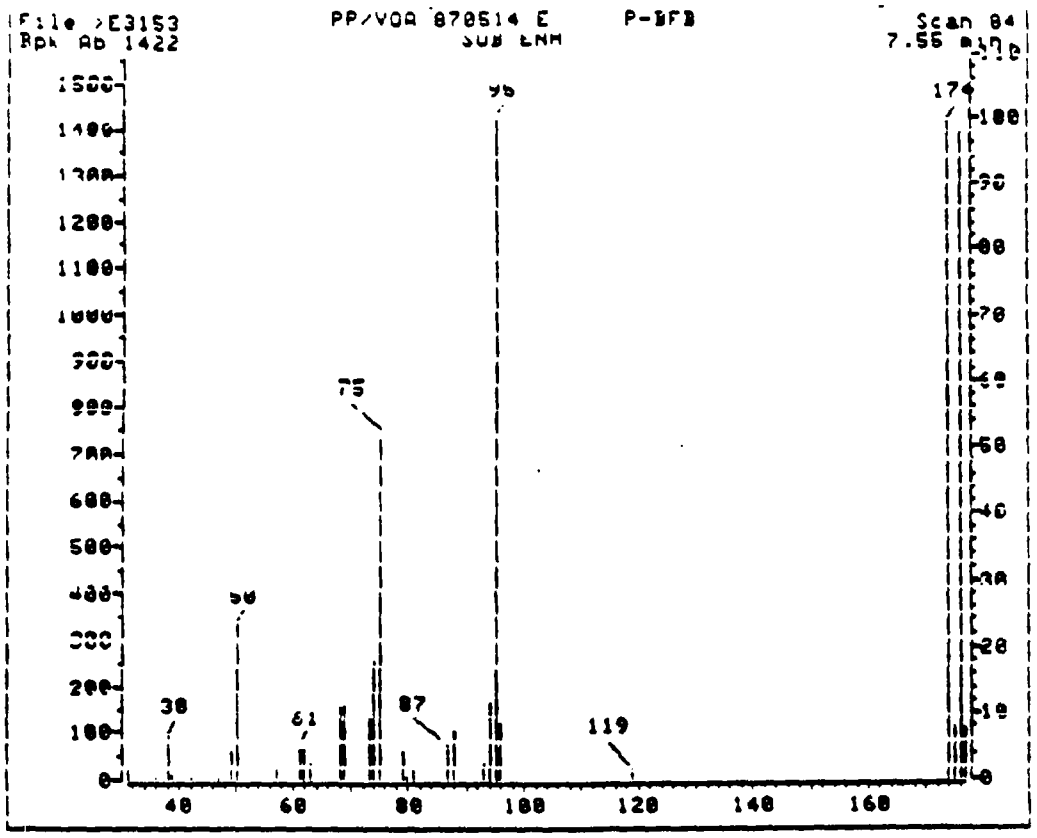

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	23.30	23.30	Ok
75	30-60% of mass 95	52.04	52.04	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.52	8.52	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.25	99.25	Ok
175	5-9% of mass 174	7.83	7.89	Ok
176	95-101% of mass 174	98.00	98.74	Ok
177	5-9% of mass 176	7.51	7.66	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 16:14 Processor: [signature]
Run No: >E3153 QC Batch: QV7054
Spectrum No: PS84 (EVH) PS70
SUBT

VS
5/20/87

MS Data File: >E3153::U4

Name: PP/VOA 870514 E Operator: MGRMS Date/Time: 5/14/87 16:14
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6605VR (>E3149)	870514	16:52
	~~[illegible]~~	~~870514~~	~~18:22~~ 5/17/87
	S6605V (>E3154)	870514	21:16
	S6604V (>E3155)	870514	22:01
	QC7054VS (>E3158)	870515	01:37
	QC7054VS (>E3159	870515	02:41
	QC7054VS (>E3160)	870515	04:03

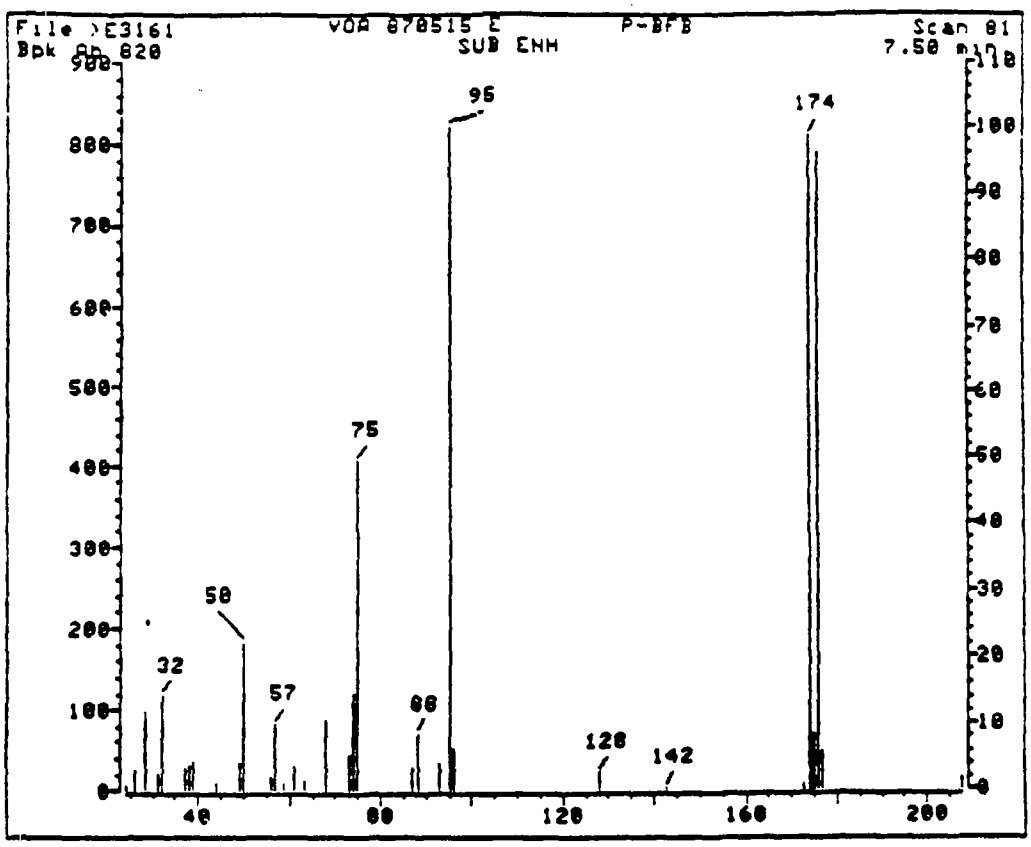

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.24	22.24	Ok
75	30-60% of mass 95	49.59	49.59	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.03	6.03	Ok
173	Less than 1% of mass 95	.56	.56	Ok
174	Greater than 50% of mass 95	98.70	98.70	Ok
175	5-9% of mass 174	8.36	8.47	Ok
176	95-101% of mass 174	96.00	97.26	Ok
177	5-9% of mass 176	5.89	6.13	Ok

Injection Date: 05/15/87 Analyst: Stephen Blaze
Injection Time: 04:59 Processor: Sharon Manlock
Run No: >E3161 QC Batch: QV7054
Spectrum No: PS81, ENH, -3:4, PS91
SUB,T

5/20/87

MS Data File: >E3161::U4

Name: VOA 870515 E Operator: SB5883 Date/Time: 5/15/87 4:59
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6602V (>E3165)	870515	08:49

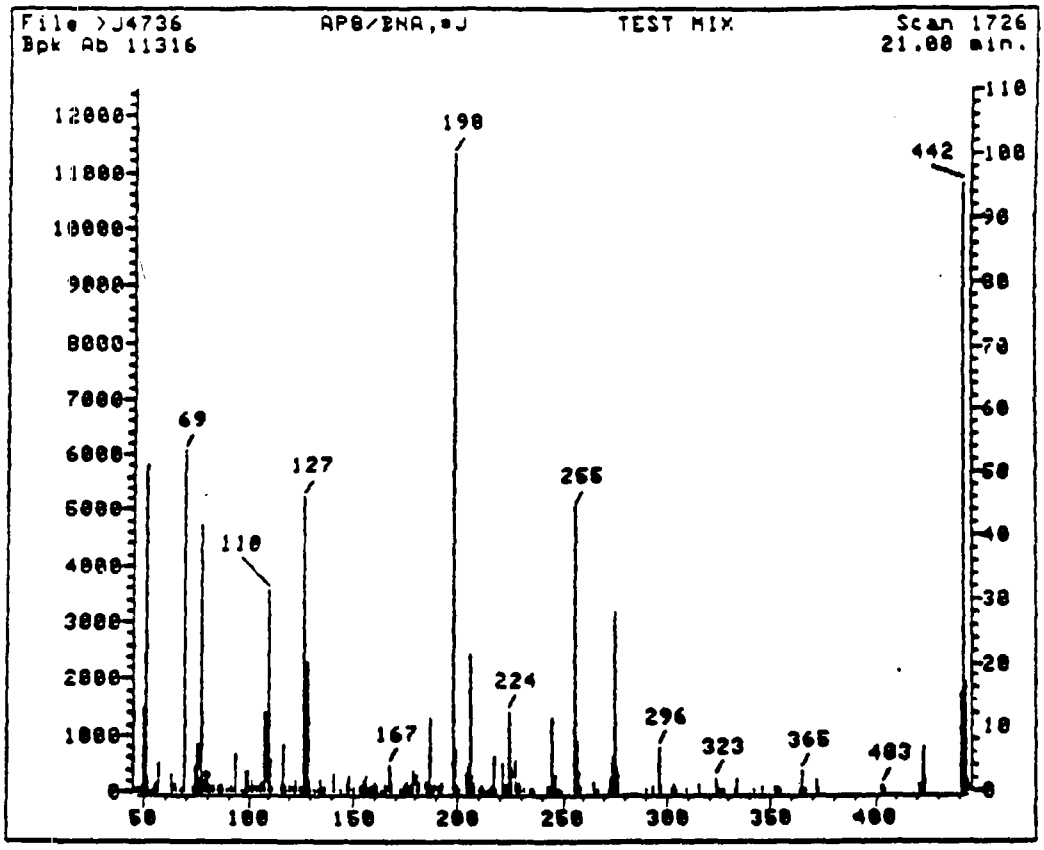

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	51.51	51.51	Ok
68	Less than 2% of mass 69	.60	1.12	Ok
69	(reference only)	53.68	53.68	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	46.31	46.31	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.48	6.48	Ok
275	10-30% of mass 198	27.79	27.79	Ok
365	Greater than 1% of mass 198	3.11	3.11	Ok
441	0-100% of mass 443	15.25	91.23	Ok
442	Greater than 40% of mass 198	95.42	95.42	Ok
443	17-23% of mass 442	16.72	17.52	Ok

Injection Date: 06/07/87 Analyst: K Valentine
Injection Time: 01:06 Processor: Misty Barkley
Run No: >J4736 QC Batch: QC6902
Spectrum No: 1726 (A)

LAtendel 6/20/87

MS Data File: >J4736::U5

Name: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 1:06
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4737	870607	01:44
	STD. >J4738	870607	02:37
	STD. >J4739	870607	03:31
	STD. >J4740	870607	04:26
	STD. >J4741	870607	05:18
	STD. >J4742	870607	06:11
	STD. >J4743	870607	07:03

LAH

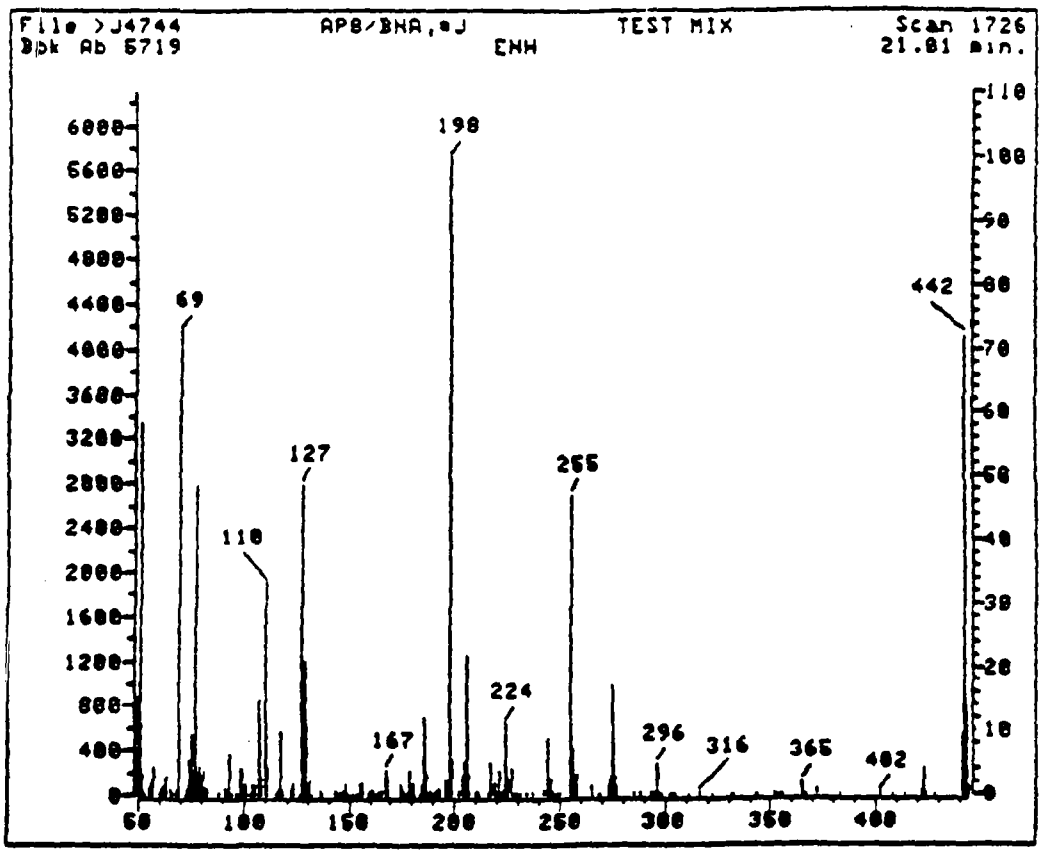

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutr
Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Sta.
51	30-60% of mass 198	58.59	58.59	Ok
68	Less than 2% of mass 69	.82	1.12	Ok
69	(reference only)	72.85	72.85	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	48.77	48.77	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.52	5.52	Ok
275	10-30% of mass 198	17.16	17.16	Ok
365	Greater than 1% of mass 198	2.02	2.02	Ok
441	0-100% of mass 443	9.28	66.01	Ok
442	Greater than 40% of mass 198	71.91	71.91	Ok
443	17-23% of mass 442	14.05	19.55	Ok

Injection Date: 06/07/87 Analyst: K Valentine
Injection Time: 08:00 Processor: [illegible]
Run No: >J4744 QC Batch: QC6902
Spectrum No: 1726 ok

MS Data File: >J4744::U6

Name: AP8/BNA,$J Operator: JQ6275 Date/Time: 6/07/87 8:00
Misc: TEST MIX BTL# 9

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C>J4745	870607	08:39
	QC6902CS>J4746	870607	09:36
	S6605CS>J4747	870607	10:29
	S6605CR>J4748	870607	11:25
	S6603C>J4749	870607	12:17
	S6004C>J4750	870607	13:11
	S6005C>J4751	870607	14:04
	S6008C>J4752	870607	15:01
	S7731C>J4753	870607	15:59
	S7732C>J4754	870607	16:58

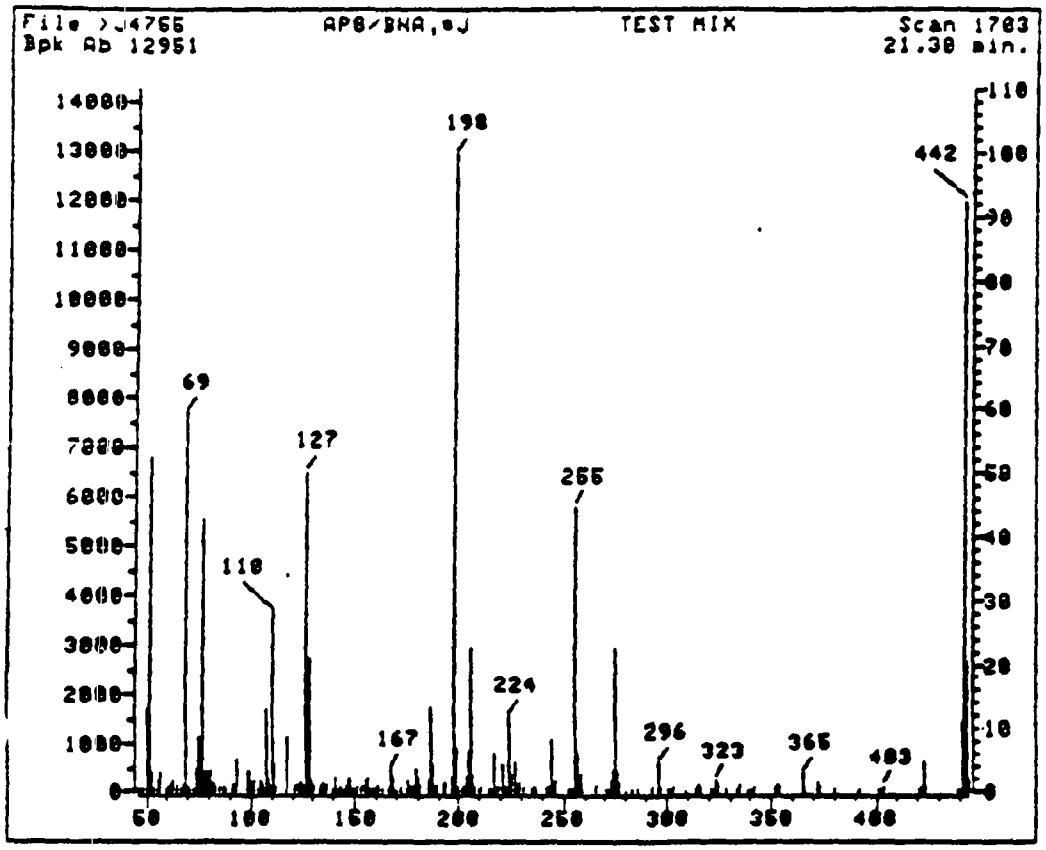

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	52.54	52.54	Ok
68	Less than 2% of mass 69	1.09	1.83	Ok
69	(reference only)	59.42	59.42	Ok
70	Less than 2% of mass 69	.69	1.16	Ok
127	40-60% of mass 198	50.29	50.29	Ok
197	Less than 1% of mass 198	.36	.36	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.03	7.03	Ok
275	10-30% of mass 198	22.58	22.58	Ok
365	Greater than 1% of mass 198	3.00	3.00	Ok
441	0-100% of mass 443	11.03	53.99	Ok
442	Greater than 40% of mass 198	92.52	92.52	Ok
443	17-23% of mass 442	20.44	22.09	Ok

Injection Date: 06/07/87 Analyst: [illegible]
Injection Time: 17:57 Processor: [illegible]
Run No: >J4755 QC Batch: QC6703
Spectrum No: 1703

'ata File: >J4755::U7

e: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 17:57
-: TEST MIX BTL#20

is performance tune applies to the following
ıples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4756	870607	18:44
	STD. >J4757	870607	19:46
	S2811C >J4758	870607	20:48
	S6058 >J4759	870607	23:26
	S6059 >J4760	870608	00:18
	S7733C >J4761	870608	01:10
	S6602C >J4762	870608	02:02
	S6604C >J4763	870608	02:58
	S6606C >J4764	870608	03:52

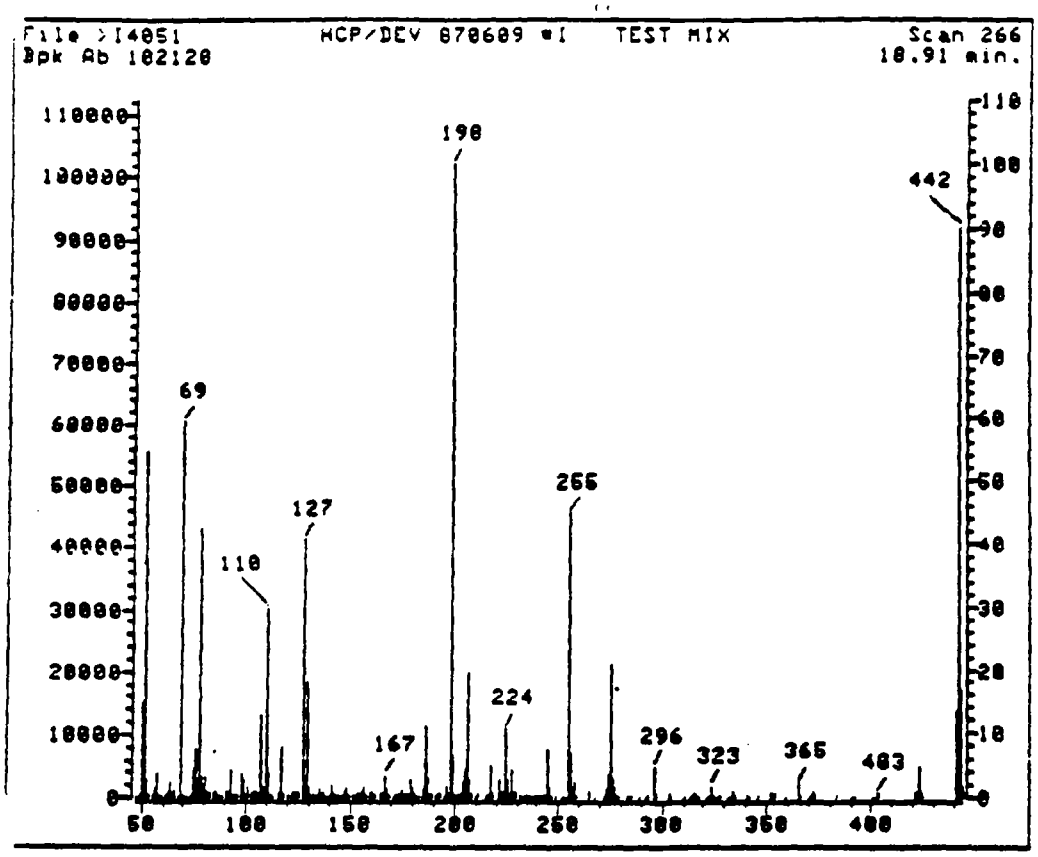

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	54.41	54.41	Ok
68	Less than 2% of mass 69	.99	1.67	Ok
69	(reference only)	59.43	59.43	Ok
70	Less than 2% of mass 69	.47	.78	Ok
127	40-60% of mass 198	40.51	40.51	Ok
197	Less than 1% of mass 198	.38	.38	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.56	6.56	Ok
275	10-30% of mass 198	20.99	20.99	Ok
365	Greater than 1% of mass 198	2.34	2.34	Ok
441	0-100% of mass 443	13.54	80.53	Ok
442	Greater than 40% of mass 198	90.15	90.15	Ok
443	17-23% of mass 442	16.81	18.65	Ok

Injection Date: 06/09/87 Analyst: MB for Brenda Hawkins
Injection Time: 19:31 Processor: [illegible]
Run No: >I4051 QC Batch: QC6767
Spectrum No: 266

LHendel 6/20/87

S Data File: >I4051::U5

ame: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 19:31
isc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >I4052	870609	20:11
	STD. >I4053	870609	20:50
	STD. >I4054	870609	21:28

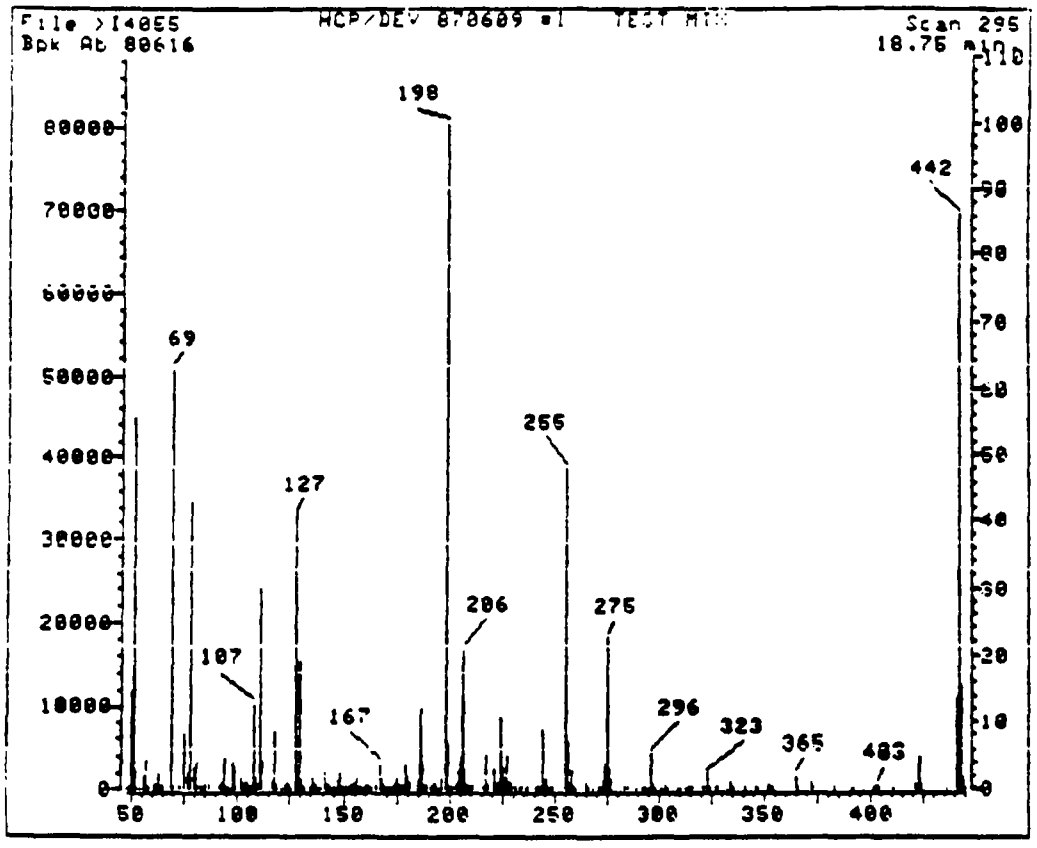

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	55.58	55.58	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.97	62.97	Ok
70	Less than 2% of mass 69	.31	.50	Ok
127	40-60% of mass 198	41.23	41.23	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.65	6.65	Ok
275	10-30% of mass 198	22.36	22.36	Ok
365	Greater than 1% of mass 198	2.03	2.03	Ok
441	0-100% of mass 443	13.59	88.02	Ok
442	Greater than 40% of mass 198	86.21	86.21	Ok
443	17-23% of mass 442	15.44	17.91	Ok

Injection Date: 06/09/87 Analyst: Brenda Hawkins
Injection Time: 22:06 Processor: [illegible]
Run No: >I4055 QC Batch: QC 6902
Spectrum No: 295 BNM

LAH

Data File: >14055::U7

ame: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 22:06
sc: TEST MIX BTL# 5

This performance tune applies to the following
amples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C>I4056	870609	22:44
	QC6902C3>I4057	870609	23:23
	S6605C>I4058	870610	00:01
	S6605C3>I4059	870610	00:39
	S6605C8>I4060	870610	01:17
	S6004C>I4061	870610	01:55
	S6008C>I4062	870610	02:33
	S6058C>I4063	870610	03:11
	S7732C>I4064	870610	03:49
	S6602C>I4065	870610	04:27
	S6603C>I4068	870610	06:21
	S6604C>I4069	870610	06:59
	S6606C>I4070	870610	07:37
	S2811C>I4071	870610	08:15
	S7733C>I4072	870610	08:54
	S6054C>I4073	870610	09:32

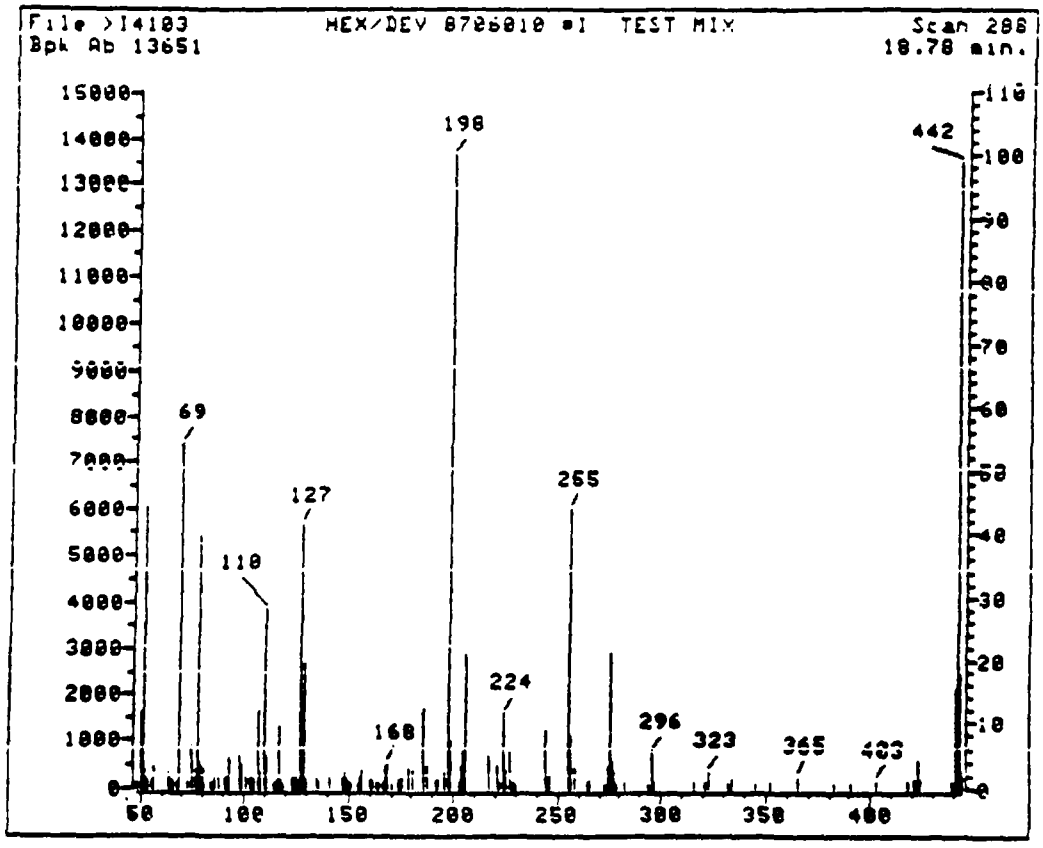

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	44.41	44.41	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	54.35	54.35	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	41.39	41.39	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.10	7.10	Ok
275	10-30% of mass 198	21.31	21.31	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	15.45	86.19	Ok
442	Greater than 40% of mass 198	99.04	99.04	Ok
443	17-23% of mass 442	17.93	18.10	Ok

Injection Date: 06/10/87 Analyst: [illegible]
Injection Time: 10:34 Processor: [illegible]
Run No: >I4103 QC Batch: QC 6403
Spectrum No: 288

:S Data File: >I4103::U5

Name: HEX/DEV 8706010 #I Operator: BH8334 Date/Time: 6/10/87 10:34
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S7731C >I4014	870610	11:58

Appendix D
Subcontractor's Data

1) A copy of the originating subcontractor's report is included for all data not generated within ETC's laboratory.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

RE.

ETC Job # 86606

Lab ID: GCL104592

Facility: 705 (Facility Code)

Sample Point: W - G120S (Source Code / Sample Point ID)

Submitted by: Jane Lukowski

5-15-87

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: 10:00 (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
CONVENTIONALS						
1	Chloride	QR 10	mg/l			
2	Fluoride	QR 10	mg/l	0.44	0.1	
3	Nitrate as N	QR 10	mg/l			
4	Sulfate as SO4	QR 10	mg/l			
5	Phenolics, Total	QR 10	mg/l			
6	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
7	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
8	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
9	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
10	Coliform, Total	QR 10	C/100			
11	Coliform, Fecal	QR 10	C/100			
12	Gross Alpha	QR 10	PCi/l			
13	Gross Beta	QR 10	pCi/l			
14	Acidity as CaCO3		mg/l			
15	Alkalinity as CaCO3		mg/l			
16	Ammonia as N		mg/l			
17	Bicarbonate as CaCO3		mg/l			
18	Biochemical Oxygen Demand		mg/l			
19	Carbonate as CaCO3		mg/l			
20	Chemical Oxygen Demand		mg/l			
21	Color, Apparent (Lab)		Pt/Co			
22	Cyanide, Total		mg/l	<0.02	0.02	
23	Hardness as CaCO3		mg/l			
24	Nitrite as N		mg/l			
25	Nitrogen Total Kjeldahl (TKN)		mg/l			
26	Nitrogen, Total Organic		mg/l			
27	Odor (Lab)		TON			
28	Oil and Grease (grav, IR)		mg/l			
29	Phosphate, ortho		mg/l			
30	Phosphate, Total		mg/l			
31	Solids, Total		mg/l			
32	Solids, Total Dissolved (ROE) 180°		mg/l			
33	Solids, Total Suspended		mg/l			
34	Sulfide as S		mg/l	2.0	0.1	
35	Surfactants (MBAS/LAS)		mg/l			
36	Turbidity (Lab)		NTU			

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

S66068

ETC Job # ~~S66604~~

Lab ID: Gulf Coast Lab

Submitted by: G. Martinez

Date: 6-10-87

Facility: 705 (Facility Code)

Sample Point: W - G/2QS (Source Code) (Sample Point)

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: : (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
19	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l	40000	50	
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 4/27/87 By: McIsaac

Company: Chicago Incinerator Attn.: Bob Bartholin

Facility/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: Facility/Site Code 120S (Optional Sample Point Descriptions)

Sample Point: W ~~G120S~~ 120S 870430 1140

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr clock) | Elapsed Hours (composite)

TP 5/18/87

Source Codes:
Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other
Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	Observations	LAB Observations
5	E	1L	Baked	Extbl.	N		✓
3	F	40ml	Baked	P+TVOA	N		✓
3	F	40ml	Baked	HP+TVOA	N		✓
	TB	40ml	GC/MS	Trip Blank	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Weight Date: 4-30-87 Time: 1120
Signature: [signature] Seal #: 79691 Intact: Yes

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Weight Date: 4-30-87 Time: 115
Signature: [signature] Seal #: 79692 Intact: Yes

LAB USE ONLY Opened By: V. Mcala Date: 5/1/87 Time: 2:30 p
SHUTTLE # 276 TEMP °C 8° SEAL # 79692 COND. [illegible]

FTC ENVIRONMENTAL TESTING and CERTIFICATION

HAIN OF CUSTODY FORM (CC1)

Date Sealed 4/27/87 By: M Grace

Company: Chicago Incinerator Attn.: Bob Barthelmen

ity/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 120S (Optional Sample Point Descriptions)

ample Point: ~~W 6120S~~ 120S 870430 1140

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr clock) | Elapsed Hours (composite)

TF 5/18/87

Source Codes:

Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other (X)

Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
5	E	1 l	Boiled	Extbl	N	Two Blue Ice Containers Were Broken on Inspection, Contents Leaked on Bottles RW 4-30	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 1128
Signature: [signature] Seal #: 79693 Intact: Yes

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1156
Signature: [signature] Seal #: 79694 Intact: Yes

LAB USE ONLY Opened By: C. Alcala Date: 4-30-87 Time: 2:40 pm

SHUTTLE # 518 TEMP. °C 8° SEAL # 79694 COND. Intact

ETC ENVIRONMENTAL TESTING and CERTIFICATION

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. ~~CCC-159~~ 497 ETC Job # S6606

Date Sealed 4/28/87 By: [illegible]

Company: WMI Attn.: Bob Bartholomew

Facility/Site: Chicago Incinerator Phone: 312-646-5700

Address: Chicago, IL

REC'D MAY 5 1987

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 120S PE (Optional Sample Point Descriptions)

Sample Point: W-~~G-20-6~~ 120S (Source Code (from below); Your Sample Point ID (left justify)) TF 5/18/87 870430 (Start Date (YY/MM/DD)) 1000 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other

Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
1	A	1gal	HNO3	Radioactivity	Y		
X 1	B	1L	Cool	General	Y		
			4 C				
1	B	1L	6NNaOH	Cn	Y		
1	B	1L	Zinc	Sulfide	Y		
			Acetate				
X 1	F	500ml	HNO3	Metals (dissolved)	Y		
1	F	500ml	HNO3	Metals (total)	N		
1	F	500ml	H2SO4	Nutrients	Y		
1	I	100ml	Cool4C	Total Coliform	N		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) RICHARD WEIGHT Date: 4-30-87 Time: 0800
   Signature: [signature] Seal #: 497 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) RICHARD WEIGHT Date: 4-30-87 Time: 1440
   Signature: [signature] Seal #: 498 Intact: YES

LAB USE ONLY Opened By: Lynn Gifford [signature] Date: 4/30/87 Time: 1730

SHUTTLE # TEMP. °C SEAL # 498 COND.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56606 TP 5/3/87

Sample Point W ~~61ZOS~~ 1 2 3 5
Source Code Sample Point ID

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump B-ISCO C-Bladder Pump D-Dipper/Bottle E-Bailer F-Scoop/Shovel X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon B-Metal C-PVC D-Plastic X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon B-Tygon C-Polyethylene D-Silicon X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

1st	ph (STD)	1st	spec. cond.	um/cm at 25° C	(other parameter)	value	units
2nd	ph (STD)	2nd	spec. cond.	um/cm at 25°C	(other parameter)	value	units
3rd	ph (STD)	3rd	spec. cond.	um/cm at 25°C	(other parameter)	value	units
4th	ph (STD)	4th	spec. cond.	um/cm at 25°C	(other parameter)	value	units

Sample Temp (°C) Turbidity NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Richard Weight (Print) Employer: Gulf Coast Labs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # S6606

Sample Point W 1205 (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: REC'D MAY - 5 1987

Sampler Type: A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material: A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material: A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited Y/N _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: SCATTERED CLOUDS, ~55°F, WIND N ~10-20 MPH

Other: APP. 1X SAMPLED 4-30 (INSTEAD OF 4-29) DUE TO LATE SHIPMENT OF SHUTTLES. REFER TO QCL CC2 WITH ETC # S2942 FOR FIELD PROCEDURES AND FIELD MEASUREMENTS.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LABS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 (Date) [signature] (Signature)

ORIGINAL

ETC ENVIRONMENTAL TESTING and CERTIFICATION

ELD PARAMETER FORM (CC2)

ETC JOB # 56606 Tr 5/12/87

Sample Point W ~~61205~~ 12 E S
Source Code Sample Point ID

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

1st	ph (STD)	1st	spec. cond. um/cm at 25°C	(other parameter)	value	units
2nd	ph (STD)	2nd	spec. cond. um/cm at 25°C	(other parameter)	value	units
3rd	ph (STD)	3rd	spec. cond. um/cm at 25°C	(other parameter)	value	units
4th	ph (STD)	4th	spec. cond. um/cm at 25°C	(other parameter)	value	units

Sample Temp (°C) Turbidity NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Richard Weight (Print) Employer: Gulf Coast Labs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

56059 E 17JY760 | | KS | |

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6-8-87 SHIFT
FRACTION AP8/BNA
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) C to

SUPERVISOR Sonia Cordova
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VC
			MT
See page			
		page 2	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
S77336	>J4761		26				
S66028	>J4762		27				
S66045	>J4763		28				
S66065	>J4764		29				
S62265	>J4765		30				
S62275	>J4766		31				
Test Mix	>J4767		32				
BNA II	>J4768		33			See page 3	
AP8/BNA II	>J4769		34				
S58436	>J4770		35				
QC6976C	>J4771		36				
QC6976CS	>J4772		37				
S62528S	>J4773		38				
S62538C	>J4774		39				
S62538CR	>J4775		40				
S60020C	>J4776		41				
S60030C	>J4777		42				
S60060C	>J4778		43				
Test Mix	>J4779		44				
BNA STD II	>J4780		45				
AP8/BNA II	>J4781		46				
S60070C	>J4782		47				
S60090C	>J4783		48				
S60050C	>J4784		49				
A76650	>J4785		50				

FTC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

pg 1 of 3

DATE 60987 SHIFT
FRACTION HCP OEV
INSTRUMENT mTI001
FILE I
SEQUENCE FILE BHI
METHOD FILE BHCP
FILE IHCP
ANALYST(S) Brenda Hawkins

SUPERVISOR [signature]
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
CO		DATE	
		BY	[initials]

STANDARD	CONC PPM	LOT NO.	LOT VOL
HCP Std III	500		
II	300		
I	100		
Test mix			
internal std	400		

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test mix	I4051		1		OK		19:31
Hex std III	I4052		2				
II	I4053		3				
I	I4054		4				21:23
Test mix	I4055		5		OK		22:04
QC6902C	I4056		6				
QC6902CS	I4057		7				
S6605C	I4058		8				
S6605CS	I4059		9				
S6605CR	I4060		10				
S8004C	I4061		11				
S6008C	I4062		12				
S6058C	I4063		13				
S7732C	I4064		14				
S6602C	I4065		15				
Test mix	I4066		16		OK		5:05
S6603C	I4068		18				
S6604C	I4069		19				
S6606C	I4070		20				
S2811C	I4071		21				
S7733C	I4072		22				
S6059C	I4073		23				9:32
Test mix	I4103		1		OK		10:34
Hex std II	I4104		2		OK		11:12
S7731	I4074		24				

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Depar.

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST BN	Extract Vol. (ml) PEST ACID	Comments
S6602	21065	530	10	50	
S6603		480	10	5.0	
S6604		620	10	5.0	
S6606	✓	580	10	50	
S6605	21084	540	10	5.0	
S6602	S1	520	10	50	
S6603	S2	540	1.0	5.0	
S6604	S3	600	10	50	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	50	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APY/PCE
APY/PEST
APY/PEST CF

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on shelf 98~~

	FRACTION	SPIKE Amt (ml)	Conc.	Lot #
S1	Ec Iso	0.1 ml	25/100 mg/L	15616
S2	Ec Temp	0.1 ml	25/250 g/L	15993
S3	FPDI	0.2 ml	125/125 mg/L	15602
S4	Aroclor 1260	0.1 ml	10 mg/L	15997

SURROGATE		
Amt. (ml)	Conc.	Lo.
	BN:	
	ACID:	

Set-up: [illegible] 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 6-8-87

6/13/87

8:[illegible] PM SAT., 13 JUNE, 1987
[illegible]nce file: S164AA
[illegible]urity Code: QA
[illegible]nnel #: 13

ETC QC Lab Chronicle
Fraction APB/A PEST (EC)
Supervisor JSW
Batch #s QC 6904

Standard	Conc PPM	Lot No.
APB/PEST TEMPA	0.01, 1.0	16265
APB/PEST TEMPB	0.05, 5.0	16264
APB/PEST TEMPC	0.1, 10	16263
APB/PEST ISO CAL IA	0.01, 0.25	16268
APB/PEST ISO CAL IB	0.05, 0.5, 1	16267
APB/PEST ISO CAL IC	0.1, 0.25	16266
APB/PEST ISO CAL IIA	0.25	16271
APB/PEST ISO CAL IIB	1.0	16270
APB/PEST ISO CAL IIC	2.5	16269
INDIV: A	0.05	2377
INDIV B	0.05	2361

Subsequence 1
Method: M6904T:QA
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN4051	RN4051	100.0000	1.000000	1.000000
2	QC6904G	2	PN4052	RN4052	100.0000	1.000000	1.000000
3	TEMP A	3	PN4053	RN4053	100.0000	1.000000	1.000000
4	TEMP B	4	PN4054	RN4054	100.0000	1.000000	1.000000
5	TEMP C	5	PN4055	RN4055	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN4056	RN4056	100.0000	1.000000	1.000000
7	S6603G	7	PN4057	RN4057	100.0000	1.000000	1.000000
[illegible]	S6603GS 2	8	PN4058	RN4058	100.0000	1.000000	1.000000
[illegible]	ISO 1A	9	PN4059	RN4059	100.0000	1.000000	1.000000
[illegible]	HEXANE	10	PN4060	RN4060	100.0000	1.000000	1.000000
[illegible]	ISO 1B	11	PN4061	RN4061	100.0000	1.000000	1.000000
12	HEXANE	12	PN4062	RN4062	100.0000	1.000000	1.000000
13	ISO 1C	13	PN4063	RN4063	100.0000	1.000000	1.000000
14	HEXANE	14	PN4064	RN4064	100.0000	1.000000	1.000000
15	TEMP B	15	PN4065	RN4065	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN4066	RN4066	100.0000	1.000000	1.000000
17	S6602G	17	PN4067	RN4067	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN4068	RN4068	100.0000	1.000000	1.000000
19	ISO 2A	19	PN4069	RN4069	100.0000	1.000000	1.000000
20	ISO 2B	20	PN4070	RN4070	100.0000	1.000000	1.000000
21	S6604G	21	PN4071	RN4071	100.0000	1.000000	1.000000
22	S6605G	22	PN4072	RN4072	100.0000	1.000000	1.000000
23	S6605GR	23	PN4073	RN4073	100.0000	1.000000	1.000000
24	S6606G	24	PN4074	RN4074	100.0000	1.000000	1.000000
25	TEMP B	25	PN4075	RN4075	100.0000	1.000000	1.000000
26	ISO 2C	26	PN4076	RN4076	100.0000	1.000000	1.000000
27	ISO 1B	27	PN4077	RN4077	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN4078	RN4078	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN4079	RN4079	100.0000	1.000000	1.000000

Pressing

7:17 PM FRI., 19 JUNE, 1987
Sequence file: S170AB
Security Code: QZ
Channel #: 17

JS 6/19/87

Subsequence 1
Method: M6904C:QZ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction AP9/PEST(EC)
Supervisor
Batch #s QC 6904

Standard	Conc PPM	Lot No.
TEMP A	MIX	16265
" B	MIX	16264
" C	MIX	16263
ISO IA		16268
" IB		16267
" IC		16266
ISO 2A		16271
" 2B		16270
" 2C		16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN5391	RN5391	100.0000	1.000000	1.000000
2	QC6904G	2	PN5392	RN5392	100.0000	1.000000	1.000000
3	TEMP A	3	PN5393	RN5393	100.0000	1.000000	1.000000
4	TEMP B	4	PN5394	RN5394	100.0000	1.000000	1.000000
5	TEMP C	5	PN5395	RN5395	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN5396	RN5396	100.0000	1.000000	1.000000
7	S6603G	7	PN5397	RN5397	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN5398	RN5398	100.0000	1.000000	1.000000
9	ISO 1A	9	PN5399	RN5399	100.0000	1.000000	1.000000
10	HEXANE	10	PN5400	RN5400	100.0000	1.000000	1.000000
11	ISO 1B	11	PN5401	RN5401	100.0000	1.000000	1.000000
12	HEXANE	12	PN5402	RN5402	100.0000	1.000000	1.000000
13	ISO 1C	13	PN5403	RN5403	100.0000	1.000000	1.000000
14	HEXANE	14	PN5404	RN5404	100.0000	1.000000	1.000000
15	TEMP B	15	PN5405	RN5405	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN5406	RN5406	100.0000	1.000000	1.000000
17	S6602G	17	PN5407	RN5407	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN5408	RN5408	100.0000	1.000000	1.000000
19	ISO 2A	19	PN5409	RN5409	100.0000	1.000000	1.000000
20	ISO 2B	20	PN5410	RN5410	100.0000	1.000000	1.000000
21	S6604G	21	PN5411	RN5411	100.0000	1.000000	1.000000
22	S6605G	22	PN5412	RN5412	100.0000	1.000000	1.000000
23	S6605GR	23	PN5413	RN5413	100.0000	1.000000	1.000000
24	S6606G	24	PN5414	RN5414	100.0000	1.000000	1.000000
25	TEMP B	25	PN5415	RN5415	100.0000	1.000000	1.000000
26	ISO 2C	26	PN5416	RN5416	100.0000	1.000000	1.000000
27	ISO 1B	27	PN5417	RN5417	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN5418	RN5418	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN5419	RN5419	100.0000	1.000000	1.000000

CONFIRMATION

2:58 PM FRI., 12 JUNE, 1987
Sequence File: S160AC
Priority Code: PQ
Channel #: 8

BN 6/12/87

Subsequence 1
Method: M6904F:PQ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction APB/PST (FPB)
Supervisor RH
Batch #s QC6904

Standard	Conc PPM	Lot No.
APB IA	0.1	15,605
IB	0.5	15,604
IC	1.0	15,603
APB IIA	0.1	15,609
IIB	0.5	15,608
IIC	1.0	15,607

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN2946	RN2946	100.0000	1.000000	1.000000
2	QC6904G	2	PN2947	RN2947	100.0000	1.000000	1.000000
3	APB I 0.1	3	PN2948	RN2948	100.0000	1.000000	1.000000
4	APB I 0.5	4	PN2949	RN2949	100.0000	1.000000	1.000000
5	APB I 1.0	5	PN2950	RN2950	100.0000	1.000000	1.000000
6	APB II 0.1	6	PN2951	RN2951	100.0000	1.000000	1.000000
7	APB II 0.5	7	PN2952	RN2952	100.0000	1.000000	1.000000
8	APB II 1.0	8	PN2953	RN2953	100.0000	1.000000	1.000000
	QC6904GS 3	9	PN2954	RN2954	100.0000	1.000000	1.000000
	S6604G	10	PN2955	RN2955	100.0000	1.000000	1.000000
11	S6604GS 3	11	PN2956	RN2956	100.0000	1.000000	1.000000
12	S6605G	12	PN2957	RN2957	100.0000	1.000000	1.000000
13	S6605GP	13	PN2958	RN2958	100.0000	1.000000	1.000000
14	S6602G	14	PN2959	RN2959	100.0000	1.000000	1.000000
15	S6603G	15	PN2960	RN2960	100.0000	1.000000	1.000000
16	S6606G	16	PN2961	RN2961	100.0000	1.000000	1.000000
17	APB I 0.5	17	PN2962	RN2962	100.0000	1.000000	1.000000
18	APB II 0.5	18	PN2963	RN2963	100.0000	1.000000	1.000000

KS 6/25/87

John J. Fitzgerald
Vice President
Research and Operations

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Comments on Specific Fraction

AP9/PCDX:

The high recoveries are a result of the difference in chlorination between the (native) compound and the internal standard used for quantitation. The samples results were unaffected because the respective compounds were not detected.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 25, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Total Polychlorinated Dibenzo Dioxins/Furans GC/MS Analysis Data (QR61)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
BA2904	WASTE MANAGEMENT, INC.	705	W120S	870430	1140	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ppt	MDL ppt	First ppt	Second ppt	Blank Data ppt	Concen. Added ppt	% Recov	Unspiked Sample ppt	Concen. Added ppt	% Recov
2,3,7,8-TCDD	ND	1.09	ND	ND	ND	12.7	83	ND	10.0	100
TCDD	ND	1.09.	ND	ND	ND	12.7	83	ND	10.0	100
PCDD	ND	4.43	ND	ND	ND	12.7	109	ND	10.0	124
HxCDD	ND	7.11	ND	ND	ND	12.7	69	ND	10.0	94
TCDF	ND	4.04	ND	ND	ND	12.7	75	ND	10.0	92
PCDF	ND	7.04	ND	ND	ND	12.7	326.	ND	10.0	150.
HxCDF	ND	17.68	ND	ND	ND	12.7	99	ND	10.0	366.

[illegible] Method Detection Limit for TCDD (total) is based on 2,3,7,8-TCDD specific isomer.

[illegible] See comments.

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: TCDD EXTRACTION

Sample Number	Log Link	Sample Amt. ml	%REC.	Comments formerly
BA2901	21628	930		56602
BA2902		900		56603
BA2903		900		56604
BA2904		980		56606
QT 0915	A	1000		
QT 0915	B	1000		
QT 0915	S	1000		
BA2902	S	790		
BA2903	R	880		

QT Batch # 0915

Analysis AP9/PCDX

Matrix WATER

Date 6/9 – 6/10/87

Supervisor S. D. G[illegible]

Extraction Teen.

B. C[illegible]
P. C[illegible]
M. V[illegible]

Cleanup A, B, 1/

Standard or Reagent	Conc PPM	Lot #
Internal Standard		1/620[illegible]
Surrogate		"
Recovery Standard		
Native		1/620[illegible]
Acid Alumina	/////	
Basic Alumina	/////	
Carbopack/Calite	/////	

COMMENTS

UPD/Supervisor: [signature] 6-12-87

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6/15/87- 6/16/87 SHIFT
FUNCTION PCDX - AFP
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE JRH
METHOD FILE PCDXH9
D FILE H9PCDX
ANALYST(S) J Hendell
SUPERVISOR J Hendell
BATCH #'s QT0915

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
CQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL (ml)
PC		C-051-03	2
CC2		16253	2
Recovery Std		15695	5

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N TIME
PC	>H0940	2ul			H-232		1808
CCII	H0941						1913
QT0915AT	H0942						2011
QT0915BT	H0943						2129
QT0915TS	H0944						2222
BA2902TS	H0945						2350
PC	H0946						0043
CCII	H0947						0209
BA2901T	H0948						0300
BA2902T	H0949						0412
BA2903T	H0950						0526
BA2903TR	H0951						0633
BA2904T	H0952						0743
PC	H0953						0851
CCII	H0954	✓				Not Run	0956

ETC [redacted] LA[redacted]RATORY CHRONICLE: GC-MS [redacted]epartment

DATE 870615 SHIFT
FRACTION MI-PCDX
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE
METHOD FILE PCDYH9
ID FILE H9PCDX
ANALYST(S) Tom Rusowicz

SUPERVISOR Thomas Rusowicz
BATCH #'s INIT-CALIB

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC ~~PPM~~ ng/ml	LOT NO	LOT VOL
PC		C-091-03	
CC1	200	16252	
CC2	500	16253	
CC3	1000	16254	
CC4	2000	16255	
CC5	5000	16256	

NAME	DATA FILE ~~HH~~	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	~~PLUS YIR~~ Time
PC	~~0920~~ 0919	2ul			H-233		1624
CC1	0921						2357
CC1	0922						0052
CC1	0923						0144
CC2	0924						0255
CC2	0925						0406
CC2	0926						0458
CC3	0927						0604
CC3	0928						0738
CC3	0929						0848
CC4	0930						0952
CC4	0931						1146
CC4	0932						1244
PC	0933						1429
PC	0934						1847
CC5	0935						1941
CC5	0936						2057
CC5	0937						2212
CC2	0938						2313
PC	0939	✓					0107

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

John J. Fitzgerald

Vice President
Research and Operations

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APPENDIX IX
GRAND TABLE

	COMPOUND NAME	FRACTION	TABLE
1	Acetonitrile	HTP&T	QR57
2	Acetophenone	A/B/N	QR59
4	2-Acetylaminofluorene	A/B/N	QR59
7	Acrolein	HTP&T	QR57
9	Acrylonitrile	HTP&T	QR57
11	Aldrin	PEST/HERB	QR56
12	Allyl alcohol	HTP&T	QR57
13A	Aluminum	METALS	QR60
14	4-Aminobiphenyl	A/B/N	QR59
18	Aniline	A/B/N	QR59
19A	Antimony	METALS	QR60
20	Aramite	A/B/N	QR59
21A	Arsenic	METALS	QR60
27A	Barium	METALS	QR60
30	Benzo(a)anthracene	A/B/N	QR59
31	Benzene	P&T	QR58
34	Benzenethiol	A/B/N	QR59
35	Benzidine	A/B/N	QR59
36	Benzo(b)fluoranthene	A/B/N	QR59
38	Benzo(a)pyrene	A/B/N	QR59
39	p-Benzoquinone	A/B/N	QR59
42A	Beryllium	METALS	QR60
43	bis(2-Chloroethoxy)methane	A/B/N	QR59
44	bis(2-Chloroethyl) ether	A/B/N	QR59
46	bis(2-Chloroisopropyl)ether	A/B/N	QR59
48	bis(2-ethylhexyl)phthalate	A/B/N	QR59
50	Methyl bromide	P&T	QR58
51	4-Bromophenyl phenyl ether	A/B/N	QR59
54	Butyl benzyl phthalate	A/B/N	QR59
55	2-sec-Butyl-4,6-dinitrophenol	A/B/N	QR59
56A	Cadmium	METALS	QR60
57A	Calcium	METALS	QR60
59	Carbon disulfide	P&T	QR58
63	Chlordane	PEST/HERB	QR56
65A	Chloroethane	P&T	QR58
71	p-Chloroaniline	A/B/N	QR59
72	Chlorobenzene	P&T	QR58
73	Chlorobenzilate	PEST/HERB	QR56
74	p-Chloro-m-cresol	A/B/N	QR59
76	2-Chloroethyl vinyl ether	P&T	QR58
77	Chloroform	P&T	QR58
78	Methyl chloride	P&T	QR58
80	2-Chloronaphthalene	A/B/N	QR59
81	2-Chlorophenol	A/B/N	QR59
83	3-Chloropropionitrile	A/B/N	QR59
84A	Chromium	METALS	QR60
85	Chrysene	A/B/N	QR59
87A	Acenapthene	A/B/N	QR59
87B	Acenaphthalene	A/B/N	QR59
87C	Anthracene	A/B/N	QR59
87D	Benzo(ghi)perylene	A/B/N	QR59
87E	Benzo(k)fluoranthene	A/B/N	QR59
87F	Fluorene	A/B/N	QR59
87G	Phenathrene	A/B/N	QR59
87H	Pyrene	A/B/N	QR59
88A	Copper	METALS	QR60
89B	2-Nitrophenol	A/B/N	QR59
90A	o-Cresol	A/B/N	QR59

90B	m-p-Cresols	A/B/N	QR59
92A	Cyanide Total	METALS	QR60
100	4,4'-DDD	PEST/HERB	QR56
101	4,4'-DDE	PEST/HERB	QR56
102	4,4'-DDT	PEST/HERB	QR56
106	Dibenzo(a,h)anthracene	A/B/N	QR59
108	Dibenzo(a,e)pyrene	A/B/N	QR59
109	Dibenzo(a,h)pyrene	A/B/N	QR59
110	Dibenzo(a,i)pyrene	A/B/N	QR59
111	1,2-Dibromo-3-chloropropane	P&T	QR58
112	1,2-Dibromoethane	P&T	QR58
113	Dibromomethane	P&T	QR58
114	Di-n-butyl phthalate	A/B/N	QR59
115	1,2-Dichlorobenzene	A/B/N	QR59
116	1,3-Dichlorobenzene	A/B/N	QR59
117	1,4-Dichlorobenzene	A/B/N	QR59
119	3,3'-Dichlorobenzidine	A/B/N	QR59
120	1,4-Dichloro0-2-butene	P&T	QR58
121	Dichlorodifluoromethane	P&T	QR58
122	1,1-Dichloroethane	P&T	QR58
123	1,2-Dichloroethane	P&T	QR58
124	1,2-Trans-dichloroethylene	P&T	QR58
126	1,1-Dichloroethylene	P&T	QR58
127	Methylene chloride	P&T	QR58
128	2,4-Dichlorophenol	A/B/N	QR59
129	2,6-Dichlorophenol	A/B/N	QR59
130	2,4-D	PEST/HERB	QR56
133	1,2-Dichloropropane	P&T	QR58
136A	cis-1,3-Dichloropropylene	P&T	QR58
136B	trans-1,3-Dichloropropylene	P&T	QR58
137	Dieldrin	PEST/HERB	QR56
143	Diethyl phthalate	A/B/N	QR59
144	Diazinon	PEST/HERB	QR56
150	3,3'-Dimethoxybenzidine	A/B/N	QR59
151	p-Dimethylaminoazobenzene	A/B/N	QR59
152	7,12-Dimethylbenzol[a]anthracene	A/B/N	QR59
153	3,3'-Dimethylbenzidine	A/B/N	QR59
158	alpha-alpha-Dimethylphenethylamine	A/B/N	QR59
159	2,4-Dimethylphenol	A/B/N	QR59
160	Dimethyl phthalate	A/B/N	QR59
162A	m-Dinitrobenzene	A/B/N	QR59
163	4,6-Dinitro-o-cresol	A/B/N	QR59
164	2,4-Dinitrophenol	A/B/N	QR59
165	2,4-Dinitrotoluene	A/B/N	QR59
166	2,6-Dinitrotoluene	A/B/N	QR59
167	Di-n-octyl phthalate	A/B/N	QR59
168	1,4-Dioxane	HTP&T	QR57
169	Diphenylamine	A/B/N	QR59
170	1,2-Diphenylhydrazine	A/B/N	QR59
171	Di-n-propylnitrosamine	A/B/N	QR59
172	Disulfoton	PEST/HERB	QR56
174A	Endosulfan I	PEST/HERB	QR56
174B	Endosulfan II	PEST/HERB	QR56
175	Endrin	PEST/HERB	QR56
177	Ethyl cyanide	HTP&T	QR57
180	Ethylene oxide	HTP&T	QR57
182	Ethyl methacrylate	P&T	QR58
184	Fluoranthene	A/B/N	QR59
191A	Chlorodibromomethane	P&T	QR58
191B	Dichlorobromomethane	P&T	QR58
192	Heptachlor	PEST/HERB	QR56
193	Heptachlor epoxide	PEST/HERB	QR56
194	Hexachlorobenzene	A/B/N	QR59
195	Hexachlorobutadiene	A/B/N	QR59
196A	Alpha-BHC	PEST/HERB	QR56
196B	Beta-BHC	PEST/HERB	QR56
196C	Gamma-BHC	PEST/HERB	QR56

196D	Delta-BHC	PEST/HERB	QR56
197	Hexachlorocyclopentadiene	A/B/N	QR59
198	Hexachloroethane	A/B/N	QR59
199	Isodrin	A/B/N	QR59
200	Hexachlorophene	A/B/N	QR59
201	Hexachloropropene	A/B/N	QR59
208	Indeno(1,2,3-cd)pyrene	A/B/N	QR59
209	Iodomethane	P&T	QR58
210A	Iron	METALS	QR60
212	Isobutyl alcohol	HTP&T	QR57
213	Isosafrole	A/B/N	QR59
214	Kepone	PEST/HERB	QR56
216A	Lead	METALS	QR60
222	Malononitrile	A/B/N	QR59
225A	Mercury	METALS	QR60
226	Methacrylonitrile	HTP&T	QR57
228	Methapyrilene	A/B/N	QR59
230	Methoxychlor	PEST/HERB	QR56
232	3-Methylcholanthrene	A/B/N	QR59
234	4,4'-Methylenebis(2-chloroaniline)	A/B/N	QR59
235	Methyl ethyl ketone	P&T	QR58
238	Methyl methacrylate	P&T	QR58
239	Methyl methanesulfonate	A/B/N	QR59
242	Methyl parathion	PEST/HERB	QR56
245	Naphthalene	A/B/N	QR59
246	1,4-Naphthoquinone	A/B/N	QR59
247	1-Naphthylamine	A/B/N	QR59
248	2-Naphthylamine	A/B/N	QR59
250A	Nickel	METALS	QR60
255	p-Nitroaniline	A/B/N	QR59
256	Nitrobenzene	A/B/N	QR59
261	4-Nitrophenol	A/B/N	QR59
263A	N-Nitrosodiphenylamine	A/B/N	QR59
264	N-Nitrosodi-n-butylamine	A/B/N	QR59
266	N-Nitrosodiethylamine	A/B/N	QR59
267	N-Nitrosodimethylamine	A/B/N	QR59
269	N-Nitrosomethylethylamine	A/B/N	QR59
273	N-Nitrosomorpholine	A/B/N	QR59
275	N-Nitrosopiperidine	A/B/N	QR59
276	N-Nitrosopyrrolidine	HTP&T	QR57
278	5-Nitro-o-toluidine	A/B/N	QR59
280A	Osmium	METALS	QR60
283	Parathion	PEST/HERB	QR56
284	Pentachlorobenzene	A/B/N	QR59
285	Pentachloroethane	P&T	QR58
286	Pentachloronitrobenzene	A/B/N	QR59
287	Pentachlorophenol	A/B/N	QR59
288	Phenacetin	A/B/N	QR59
289	Phenol	A/B/N	QR59
295	Phorate	PEST/HERB	QR56
296	Famphur	PEST/HERB	QR56
299	2-Picoline	A/B/N	QR59
300A	Aroclor 1242	PCB/GC/EC	QR30
300B	Aroclor 1254	PCB/GC/EC	QR30
300C	Aroclor 1260	PCB/GC/EC	QR30
300D	Aroclor 1248	PCB/GC/EC	QR30
300E	Aroclor 1232	PCB/GC/EC	QR30
300F	Aroclor 1221	PCB/GC/EC	QR30
300G	Aroclor 1016	PCB/GC/EC	QR30
301A	Potassium	METAL	QR60
303	Pronamide	A/B/N	QR59
307	2-Propyn-1-ol	HTP&T	QR57
308	Pyridine	HTP&T	QR57
310	Resorcinol	A/B/N	QR59
312	Safrole	A/B/N	QR59
314A	Selenium	METALS	QR60
317A	Silver	METALS	QR60

319A	Sodium	METALS	QR60
323	1,2,4,5-Tetrachlorobenzene	A/B/N	QR28
324	2,3,7,8-TCDD	DIOXIN	QR61
326	1,1,1,2-Tetrachloroethane	P&T	QR58
327	1,1,2,2-Tetrachloroethane	P&T	QR58
328	Tetrachloroethylene	P&T	QR58
329	Carbon tetrachloride	P&T	QR58
330	2,3,4,6-Tetrachlorophenol	A/B/N	QR59
331	Tetraethyldithiopyrophosphate	A/B/N	QR59
335A	Thallium	METALS	QR60
347	Toluene	P&T	QR58
351	Toxaphene	PEST/HERB	QR56
352	Bromoform	P&T	QR58
353	1,2,4-Trichlorobenzene	A/B/N	QR59
354	1,1,1-Trichloroethane	P&T	QR58
355	1,1,2-Trichloroethane	P&T	QR58
356	Trichloroethylene	P&T	QR58
357	Trichloromethanethiol	P&T	QR58
358	Trichlorofluoromethane	P&T	QR58
359	2,4,5-Trichlorophenol	A/B/N	QR59
360	2,4,6-Trichlorophenols	A/B/N	QR59
36[illegible]	2,4,5-T	PEST/HERB	QR56
36[illegible]	2,4,5-TP (Silvex)	PEST/HERB	QR56
36[illegible]	1,2,3-Trichloropropane	P&T	QR58
36[illegible]	tris(2,3-Dibromopropyl) phosphate	A/B/N	QR59
37[illegible]	Vanadium	METALS	QR60
37[illegible]	Vinyl chloride	P&T	QR58
37[illegible]	Zinc	METALS	QR60
	Endrin aldehyde	PEST/HERB	QR56
	2-Chloro-1,3-butadiene	P&T	QR58
	3-Chloropropene	P&T	QR58
	Acetone	P&T	QR58
	Ethylbenzene	P&T	QR58
	2-Hexanone	P&T	QR58
	Methyl-iso-butyl ketone	P&T	QR58
	Styrene	P&T	QR58
	Vinyl acetate	P&T	QR58
	m-Xylene	P&T	QR58
	o+p Xylenes	P&T	QR58
	Magnesium	METAL	QR60
	Manganese	METAL	QR60
	Tin	METAL	QR60
	Cobalt	METAL	QR60
	Sulfide as S	METAL	QR60
	Fluoride	METAL	QR60
	Benzoic acid	A/B/N	QR59
	Benzyl alcohol	A/B/N	QR59
	Dibenzofuran	A/B/N	QR59
	Isophorone	A/B/N	QR59
	2-Methylnaphthalene	A/B/N	QR59
	o-Nitroaniline	A/B/N	QR59
	m-Nitroaniline	A/B/N	QR59
	4-Chlorophenyl phenyl ether	A/B/N	QR59
	Hexachlorodibenzo-p-dioxins	DIOXIN	QR61
	Pentachlorodibenzodioxin	DIOXIN	QR61
	Tetrachlorodibenzodioxin	DIOXIN	QR61
	Hexachlorodibenzofurans	DIOXIN	QR61
	Pentachlorodibenzofuran	DIOXIN	QR61
	Tetrachlorodibenzofuran	DIOXIN	QR61

ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9-Heated Purge and Trap Compounds-GC/MS Analysis Data (QR57)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1	Acetonitrile	ND	10	ND	ND	ND	100	102	ND	100	82
7	Acrolein	ND	100	ND	ND	ND	100	79	ND	100	105
9	Acrylonitrile	ND	100	ND	ND	ND	100	72	ND	100	74
12	Allyl alcohol	ND	8.0	ND	ND	ND	500	191	ND	500	47
168	1,4-Dioxane	57.2	10	ND	ND	ND	500	160	57.2	500	36
177	Ethyl cyanide	ND	8.0	ND	ND	ND	500	95	ND	500	116
180	Ethylene oxide	ND		ND	ND	ND	0	-	ND	0	-
212	Isobutyl alcohol	ND	8.0	ND	ND	ND	500	108	ND	500	72
226	Methacrylonitrile	ND	40	ND	ND	ND	500	81	ND	500	103
276	N-Nitrosopyrrolidine	IND		IND	IND	IND	500	0	IND	500	0
307	2-Propyn-1-ol	IND		IND	IND	IND	500	0	IND	500	0
308	Pyridine	ND	80	ND	ND	ND	500	222a	ND	500	19a

a Recovery normally variable using established methodology.

*See Grand Table for complete compound name and specifications.
**MDL: estimated method detection limit.
-: Specifies no standard or reference spectra available.
-(ND): Signifies ND. Standard and/or spikes could not be detected at current method levels.
Select with neither "ND" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Purge & Trap Compounds – GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
31 Benzene	371	4.4	6.40	6.34	ND	18.0	105	ND	18.0	100
50 Methyl bromide	ND	10	ND	ND	ND	18.0	128	ND	18.0	169
59 Carbon disulfide	ND	10	ND	ND	ND	18.0	32	ND	18.0	159
65A Chloroethane	ND	10	ND	ND	ND	18.0	94	ND	18.0	132
72 Chlorobenzene	93.4	6.0	ND	ND	ND	18.0	99	ND	18.0	98
2-Chloro-1,3-butadiene	ND		ND	ND	ND	0	-	ND	0	-
76 2-Chloroethylvinyl ether	ND	10	ND	ND	ND	18.0	0[a]	ND	18.0	0[a]
77 Chloroform	ND	1.6	ND	ND	ND	18.0	98	ND	18.0	85
78 Methyl chloride	ND	10	ND	ND	ND	18.0	103	ND	18.0	153
3-chloropropene	ND		ND	ND	ND	0	-	ND	0	-
111 1,2-Dibromo-3-chloropropane	ND	10	ND	ND	ND	18.0	101	ND	18.0	103
112 1,2-Dibromoethane	ND	10	ND	ND	ND	50.0	106	ND	50.0	108
113 Dibromomethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	80
120 1,4-Dichloro-2-butene	ND	10	ND	ND	ND	50.0	93	ND	50.0	87
121 Dichlorodifluoromethane	ND	10	ND	ND	ND	18.0	102	ND	18.0	166
122 1,1-Dichloroethane	BMDL	4.7	ND	ND	ND	18.0	93	ND	18.0	92
123 1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	99	ND	18.0	90
124 1,2-Trans-dichloroethylene	BMDL	1.6	ND	ND	ND	18.0	89	ND	18.0	72
126 1,1-Dichloroethylene	BMDL	2.8	18.5	15.4	ND	18.0	108	ND	18.0	98
127 Methylene chloride	ND	2.8	5.27	9.68	ND	18.0	82	8.37	18.0	87
133 1,2-Dichloropropane	ND	6.0	ND	ND	ND	18.0	96	ND	18.0	90
136A cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18.0	104	ND	18.0	101
136B trans-1,3-Dichloropropylene	ND	10	ND	ND	ND	18.0	105	ND	18.0	90
191A Chlorodibromomethane	ND	3.1	ND	ND	ND	18.0	99	ND	18.0	109
191B Dichlorobromomethane	ND	2.2	ND	ND	ND	18.0	105	ND	18.0	100
182 Ethyl methacrylate	ND	10	ND	ND	ND	50.0	99	ND	50.0	99
209 Iodomethane	ND	10	ND	ND	ND	50.0	82	ND	50.0	99
235 Methyl ethyl ketone	ND	10	ND	ND	ND	18.0	94	ND	18.0	82
238 Methyl methacrylate	ND	10	ND	ND	ND	50.0	100	ND	50.0	98
285 Pentachloroethane	ND	10	ND	ND	ND	50.0	96	ND	50.0	66
326 1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	97
327 1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	96	ND	18.0	92

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
[a]-specifies no standard or reference spectra available.
"IND" *indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 - Purge & Trap Compounds - GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
328	Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	98	ND	18.0	114
329	Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	108	ND	18.0	108
347	Toluene	59.5	6.0	1.42	ND	ND	18.0	97	ND	18.0	97
352	Bromoform	ND	4.7	ND	ND	ND	18.0	102	ND	18.0	131
354	1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	109	ND	18.0	111
355	1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	100	ND	18.0	102
357	Trichloromethanethiol	-	-	-	-	-	-	-	-	-	-
356	Trichloroethylene	ND	1.9	ND	ND	ND	18.0	101	ND	18.0	101
358	Trichlorofluoromethane	ND	10	ND	ND	ND	18.0	98	ND	18.0	116
364	1,2,3-Trichloropropane	ND	10	ND	ND	ND	18.0	98	ND	18.0	105
373	Vinyl chloride	BMDL	10	13.9	9.27	ND	18.0	99	ND	18.0	175
	Acetone	22.2	10	20.0	34.8	17.3	90.0	76	28.0	90.0	103
	Ethylbenzene	19.8	7.2	ND	ND	ND	18.0	102	ND	18.0	103
	2-Hexanone	ND	10	ND	ND	ND	90.0	78	ND	90.0	78
	Methyl-iso-butyl ketone	BMDL	10	ND	ND	ND	90.0	96	ND	90.0	93
	Styrene	ND	10	ND	ND	ND	18.0	102	ND	18.0	104
	Vinyl acetate	ND	10	ND	ND	ND	90.0	88	ND	90.0	72
	m-Xylene	16.5	10	ND	ND	ND	15.0	105	ND	15.0	110
	o+p-Xylenes	24.0	10	2.66	2.54	ND	30.0	104	ND	30.0	110

* Recovery normally variable using established methodology.

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2 Acetophenone	ND	10	110	123	ND	100	136	ND	103	107
4 2-Acetylaminofluorene	ND	10	142	197	ND	250	67	ND	256	55
14 4-Aminobiphenyl	ND	10	71.0	84.0	ND	250	55	ND	256	28
18 Aniline	38.5	10	137	161	ND	150	103	ND	154	89
20 Aramite	ND	10	275	212	ND	250	98	ND	256	107
30 Benzo(a)anthracene	ND	8.1	85.1	97.9	ND	100	100	ND	103	83
34 Benzenethiol	IND		IND	IND	IND	300	0	IND	308	0
36 Benzo(b)fluoranthene	ND	10	173	198	ND	100	149	ND	103	169
38 Benzo(a)pyrene	ND	2.6	165	193	ND	100	165	ND	103	161
39 p-Benzoquinone	ND	10	ND	ND	ND	150	0	ND	154	0
35 Benzidine	ND	46	ND	ND	ND	100	0	ND	103	0
43 bis(2-Chloroethoxy)methane	ND	5.5	90.2	103	ND	100	103	ND	103	88
44 bis(2-Chloroethyl) ether	ND	5.9	107	107	ND	100	123	ND	103	104
46 bis(2-Chloroisopropyl)ether	ND	5.9	85.8	102	ND	100	102	ND	103	84
48 bis(2-Ethylhexyl)phthalate	ND	10	135	142	ND	100	164	ND	103	132
51 4-Bromophenyl phenyl ether	ND	2.0	108	111	ND	100	122	ND	103	105
54 Butyl benzyl phthalate	ND	10	78.0	80.3	ND	100	88	ND	103	76
55 2-sec-Butyl-4,6-dinitrophen	ND	10	225	258	ND	300	85	ND	308	73
71 p-Chloroaniline	466	10	171	219	ND	150	147	ND	154	111
74 p-Chloro-m-cresol	ND	3.1	83.1	76.4	ND	100	91	ND	103	81
80 2-Chloronaphthalene	ND	2.0	113	136	ND	100	133	ND	103	110
81 2-Chlorophenol	24.7	3.4	82.1	71.3	ND	100	114	ND	103	80
83 3-Chloropropionitrile	ND	10	105	ND	ND	250	69	ND	256	41
85 Chrysene	ND	2.6	89.7	92.3	ND	100	116	ND	103	87
87A Acenaphthene	ND	2.0	84.0	100	ND	100	103	ND	103	82
87B Acenaphthylene	ND	3.6	81.7	103	ND	100	101	ND	103	80
87C Anthracene	2.07	2.0	95.8	111	ND	100	109	ND	103	93
87D Benzo(ghi)perylene	ND	4.2	ND	ND	ND	0	-	ND	0	-
87E Benzo(k)fluoranthene	ND	3.6	166	215	ND	100	219	ND	103	162
87F Fluorene	ND	2.0	76.7	94.2	ND	100	102	ND	103	75
87G Phenanthrene	BMDL	5.6	92.6	108	ND	100	106	ND	103	90
87H Pyrene	ND	2.0	67.9	73.4	ND	100	87	ND	103	66

*See Brand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-specifics no standard or reference spectra available.
"IND" indeterminate. Standard and/or spikes could not be [illegible] current method levels.
Result [illegible] "MDL" or "Conc.added" specifics no standard available [illegible] was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
89B 2-Nitrophenol	ND	3.7	69.6	66.8	ND	100	100	ND	103	68
90A o-Cresol	BMDL	10	81.1	87.7	ND	100	84	ND	103	79
90B m+p-Cresols	30.4	10	154	168	ND	200	80	ND	205	75
106 Dibenzo(a,h)anthracene	ND	10	ND	ND	ND	0	-	ND	0	-
108 Dibenzo(a,e)pyrene	ND		ND	ND	ND	0	-	ND	0	-
109 Dibenzo(a,h)pyrene	-	-	-	-	-	-	-	-	-	-
110 Dibenzo(a,i)pyrene	IND		IND	IND	IND	500	0	IND	513	0
114 Di-n-butyl phthalate	BMDL	10	112	131	ND	100	125	1.57	103	107
115 1,2-Dichlorobenzene	6.93	2.0	87.1	96.5	ND	100	99	ND	103	85
116 1,3-Dichlorobenzene	ND	2.0	80.0	90.4	ND	100	87	ND	103	78
117 1,4-Dichlorobenzene	ND	4.6	74.8	89.0	ND	100	88	ND	103	73
119 3,3'-Dichlorobenzidine	ND	17	74.4	77.4	ND	100	102	ND	103	73
128 2,4-Dichlorophenol	16.8	2.8	77.8	72.0	ND	100	106	ND	103	76
129 2,6-Dichlorophenol	17.0	10	106	102	ND	100	112	ND	103	103
143 Diethyl phthalate	ND	10	70.3	94.4	ND	100	89	ND	103	69
150 3,3'-Dimethoxybenzidine	ND	10	ND	ND	ND	150	0	ND	154	0
151 p-Dimethylaminoazobenzene	ND	10	156	147	ND	150	117	ND	154	102
152 7,12-Dimethylbenzo(a)anthra	ND	10	122	157	ND	150	95	ND	154	79
153 3,3'-Dimethylbenzidine	ND	10	ND	ND	ND	150	29	ND	154	0
158 a-a-Dimethylphenethylamine	-	-	-	-	-	-	-	-	-	-
159 2,4-Dimethylphenol	54.6	2.8	104	121	ND	100	111	ND	103	101
160 Dimethyl phthalate	ND	10	73.8	93.3	ND	100	93	ND	103	72
162A m-Dinitrobenzene	ND	10	110	142	ND	150	92	ND	154	71
163 4,6-Dinitro-o-cresol	ND	25	67.8	91.9	ND	100	41	ND	103	66
164 2,4-Dinitrophenol	ND	44	83.6	124	ND	100	0	ND	103	81
165 2,4-Dinitrotoluene	ND	5.9	67.7	92.8	ND	100	79	ND	103	66
166 2,6-Dinitrotoluene	ND	2.0	83.2	102	ND	100	101	ND	103	81
167 Di-n-octyl phthalate	ND	10	137	176	ND	100	154	ND	103	133
169 Diphenylamine	ND	10	216	242	ND	150	173	ND	154	141
170 1,2-Diphenylhydrazine	ND	10	92.0	108	ND	100	121	ND	103	90
171 N-Nitrosodi-n-propylamine	ND	10	89.8	97.1	ND	100	105	ND	103	88
184 Fluoranthene	ND	2.3	74.5	84.7	ND	100	96	ND	103	73

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*Specifics no standard or reference spectra available.
IND cindeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifics no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
194	Hexachlorobenzene	ND	2.0	98.1	105	ND	100	105	ND	103	96
195	Hexachlorobutadiene	ND	.93	66.5	79.6	ND	100	82	ND	103	65
197	Hexachlorocyclopentadiene	ND	10	ND	ND	ND	0	-	ND	0	-
198	Hexachloroethane	ND	1.7	72.8	85.7	ND	100	79	ND	103	71
199	Isodrin	ND	6.1	132	166	ND	150	105	ND	154	86
200	Hexachlorophene	ND	10	ND	ND	ND	300	0	ND	308	0
201	Hexachloropropene	ND	10	43.4	23.5	ND	150	20	ND	154	28
208	Indeno(1,2,3-cd)pyrene	ND	10	ND	ND	ND	0	-	ND	0	-
213	Isosafrole	ND	10	43.2	55.9	ND	150	24	ND	154	28
222	Malononitrile	IND		IND	IND	IND	500	0	IND	513	0
228	Methapyrilene	IND		IND	IND	IND	500	0	IND	513	0
232	3-Methylcholanthrene	ND	10	82.2	112	ND	150	68	ND	154	53
234	4,4'-Methylenebis(2-chloroa	ND	10	57.8	33.8	ND	150	63	ND	154	38
239	Methyl methanesulfonate	ND	10	63.9	68.0	ND	150	71	ND	154	42
245	Naphthalene	214	1.7	92.7	100	ND	100	100	ND	103	90
246	1,4-Naphthoquinone	ND	10	7.00	14.3	ND	150	79	ND	154	5
247	1-Naphthylamine	ND	10	94.8	160	ND	150	108	ND	154	62
248	2-Naphthylamine	ND	10	57.4	69.6	ND	150	57	ND	154	37
255	p-Nitroaniline	ND	10	75.8	80.3	ND	100	91	ND	103	74
256	Nitrobenzene	ND	2.0	93.0	98.9	ND	100	108	ND	103	91
261	4-Nitrophenol	ND	2.5	ND	ND	ND	100	0	ND	103	0
263A	N-Nitrosodiphenylamine	ND	2.0	182	240	ND	100	251	ND	103	177
264	N-Nitrosodi-n-butylamine	ND	10	141	163	ND	100	164	ND	103	138
266	N-Nitrosodiethylamine	ND	10	95.7	ND	ND	150	83	ND	154	62
267	N-Nitrosodimethylamine	ND	10	ND	ND	ND	100	0	ND	103	0
269	N-Nitrosomethylethylamine	ND	10	186	196	ND	500	41	ND	513	36
273	N-Nitrosomorpholine	ND	10	118	138	ND	150	85	ND	154	77
275	N-Nitrosopiperidine	ND	10	138	144	ND	150	105	ND	154	90
278	5-Nitro-o-toluidine	ND	10	367	447	ND	250	171	ND	256	143
284	Pentachlorobenzene	ND	10	133	151	ND	150	107	ND	154	87
286	Pentachloronitrobenzene	ND	10	223	274	ND	250	97	ND	256	87
287	Pentachlorophenol	ND	3.7	98.8	107	ND	100	65	ND	103	96

[illegible]

Comments on Specific Fraction

B/N/A:

The QC Blank Spike and QC Matrix Spike yielded variable recoveries All recoveries were manually verified.

The following compounds yielded 0% recoveries for both spikes but were detected in the calibration standards used for this analysis:

3,3'-Dimethoxybenzidine

Hexachlorophene

Resorcinol

The following compounds yielded low/no recoveries but are considered normally variable:

3,3'-Dimethylbenzidine

2,4-Dinitrophenol

4-Nitrophenol

Hexachloropropene

Isosafrole

1,4-Naphthoquinone

N-Nitroso methylethylamine

Benzoic Acid

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
288	Phenacetin	ND	10	98.2	100	ND	150	77	ND	154	64
289	Phenol	17.1	1.6	91.5	75.2	ND	100	105	ND	103	89
299	2-Picoline	ND	10	86.6	91.5	ND	150	104	ND	154	56
303	Pronamide	ND	10	115	137	ND	150	90	ND	154	75
310	Resorcinol	ND	10	ND	ND	ND	300	0	ND	308	0
312	Safrole	ND	10	131	157	ND	150	101	ND	154	85
323	1,2,4,5-Tetrachlorobenzene	ND	10	121	145	ND	150	101	ND	154	79
330	2,3,4,6-Tetrachlorophenol	ND	10	111	128	ND	200	66	ND	206	54
331	Tetraethyldithiopyrophospha	ND		ND	ND	ND	0	-	ND	0	-
353	1,2,4-Trichlorobenzene	ND	2.0	81.9	83.1	ND	100	88	ND	103	80
359	2,4,5-Trichlorophenol	ND	10	79.1	81.8	ND	100	80	ND	103	77
360	2,4,6-Trichlorophenol	ND	2.8	75.9	79.1	ND	100	98	ND	103	74
368	tris(2,3-Dibromopropyl)phos	IND		IND	IND	IND	500	0	IND	513	0
	Benzoic acid	ND	10	ND	75.1	ND	100	87	ND	103	0
	Benzyl alcohol	ND	10	127	141	ND	150	91	ND	154	83
	Dibenzofuran	ND	10	122	151	ND	150	102	ND	154	79
	Isophorone	ND	2.3	87.8	97.9	ND	100	95	ND	103	86
	2-Methylnaphthalene	ND	10	128	157	ND	150	104	ND	154	83
	o-Nitroaniline	ND	10	101	139	ND	150	90	ND	154	66
	m-Nitroaniline	ND	10	79.1	186	ND	150	75	ND	154	51
	4-Chlorophenyl phenyl ether	ND	4.4	80.8	96.2	ND	100	103	ND	103	79

*See Grand Table for complete compound name and specifications.
**MDL/RL corresponding method detection limit.
*Specified as standard or reference spectra available.
IND Indeterminate. Standard and/or spikes could not be analyzed at target method level.
Results with neither "ND" nor "IND" specified no standard available; compound was qualitatively identified for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Pest & Herb Compounds – GC Analysis Data (QR56)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l a	MDL** ug/l	First ug/l a	Second ug/l a	Blank Data ug/l a	Concen. Added ug/l	% Recov	Unspiked Sample ug/l a	Concen. Added ug/l	% Recov
11 Aldrin	ND	.09	ND	ND	ND	.481	129	ND	.463	108
63 Chlordane	ND	.94	ND	ND	ND	5.00	74	ND	4.81	96
73 Chlorobenzilate	ND	2.4	ND	ND	ND	0	-	ND	0	-
100 4,4'-DDD	ND	.094	ND	ND	ND	.962	96	ND	.926	77
101 4,4'-DDE	ND	.094	.117	.259	ND	.481	172	.254	.463	93
102 4,4'-DDT	.475	.094	.509	.701	.366	.481	307	.737	.463	99
130 2,4-D	ND	8.1	ND	ND	ND	50.0	0	ND	45.5	134
137 Dieldrin	ND	.094	ND	ND	ND	.481	162	ND	.463	130
144 Thionazin	ND	.94	ND	ND	ND	4.55	175	ND	4.10	151
172 Disulfoton	ND	4.7	ND	ND	ND	22.7	175	ND	20.5	162
174A Endosulfan I	ND	.094	ND	ND	ND	.481	141	ND	.463	134
174B Endosulfan II	ND	.094	ND	ND	ND	.481	97	ND	.463	80
175 Endrin	ND	.094	.0400	.0400	ND	.962	96	ND	.926	77
Endrin aldehyde	ND	.094	ND	ND	ND	.481	146	ND	.463	110
192 Heptachlor	ND	.094	ND	ND	ND	.481	146	ND	.463	119
193 Heptachlor epoxide	ND	.094	ND	ND	ND	.481	164	ND	.463	132
196A Alpha-BHC	ND	.094	ND	ND	ND	.481	109	ND	.463	103
196B Beta-BHC	ND	.09	ND	ND	ND	.481	115	ND	.463	103
196C Gamma-BHC	ND	.094	ND	ND	ND	.481	138	ND	.463	116
196D Delta-BHC	ND	.094	ND	ND	ND	.481	153	ND	.463	140
214 Kepone	ND	.94	ND	ND	ND	5.00	122	ND	4.81	105
230 Methoxychlor	ND	9.4	ND	ND	ND	48.1	191	ND	46.3	152
242 Methyl parathion	ND	.94	ND	ND	ND	4.55	192	ND	4.10	173
283 Parathion	ND	.94	ND	ND	ND	4.55	194	ND	4.10	168
295 Phorate	ND	.94	ND	ND	ND	4.55	15	ND	4.10	13
296 Famphur	ND	9.4	ND	ND	ND	45.5	190	ND	41.0	172
351 Toxaphene	ND	2.4	ND	ND	ND	20.0	152	ND	19.2	66
361 2,4,5-T	ND	.81	ND	ND	ND	5.00	0	ND	4.55	112
362 2,4,5-TP (Silvex)	ND	.81	ND	ND	ND	5.00	0	ND	4.55	99

a Refer to comment sheet.

*See broad labels for complete compound name and specifications.
**MDL: calculated method detection limit.
-: specifies no standard available.
***: Abbreviations: Standard and/or spikes could not be detected at current method levels.

Comments on Specific Fractions

Pesticide and Herbicide

The presence of 4,4'-DDT detected in the QC Blank would normally warrant repeat preparation of this QC batch. However, it was determined that this original data would be qualified, and is here reported.

Because 4,4-DDT was found in the QC Blank at a reportable level and 4,4'-DDE was also found in the QC Blank, although at a level considered to be not detected, the reported presence of 4,4-DDT/4,4'-DDD in this sample should be considered suspect.

The identification of all compounds here reported as present has been confirmed by second column analysis.

The QC Spiked Blank recoveries for the herbicide compounds 2,4-D, 2,4,5-T and 2,4,5-TP have been manually verified. The QC Spiked Blank may have inadvertantly not been spiked for these compounds. The QC Matrix Spike recoveries are within acceptable limits.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 20, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA - Aroclors -GC Analysis Data (QR30)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
300A Aroclor 1242	ND	.94	ND	ND	ND	0	-	ND	0	-
300B Aroclor 1254	ND	.94	ND	ND	ND	0	-	ND	0	-
300C Aroclor 1260	ND	.94	ND	ND	ND	2.00	82	ND	1.64	75
300D Aroclor 1248	ND	.94	ND	ND	ND	0	-	ND	0	-
300E Aroclor 1232	ND	.94	ND	ND	ND	0	-	ND	0	-
300F Aroclor 1221	ND	.94	ND	ND	ND	0	-	ND	0	-
300G Aroclor 1016	ND	.94	ND	ND	ND	0	-	ND	0	-

*See Grand Table for complete compound name and specifications.
**MDL calculated for each sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 30, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals – Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6602	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

NPDES Number	Compound		Results: Sample Concen.	Results: MDL
	Aluminum, Total	ug/l	<30.0	30
	Antimony, Total	ug/l	<500	500
	Arsenic, Total	ug/l	<20.0	20
	Barium, Total	ug/l	246	50
	Beryllium, Total	ug/l	1.00	1.0
	Cadmium, Total	ug/l	<3.00	3.0
	Calcium, Total	ug/l	398000	100
	Chromium, Total	ug/l	34.0	20
	Cobalt, Total	ug/l	<20.0	20
	Copper, Total	ug/l	<20.0	20
	Iron, Total	ug/l	990	30
	Lead, Total	ug/l	<10.0	10
	Magnesium, Total	ug/l	124000	200
	Manganese, Total	ug/l	668	10
	Mercury, Total	ug/l	<.500	.50
	Nickel, Total	ug/l	28.0	20
	Osmium, Total	mg/l	ND [a]	
	Selenium, Total	ug/l	<2.00	2.0
	Silver, Total	ug/l	<30.0	30
	Sodium, Total	ug/l	5810000	50
	Thallium, Total	ug/l	<300	300
	Tin, Total	ug/l	<1000	1000
	Vanadium, Total	ug/l	<10.0	10
	Zinc, Total	ug/l	73.0	10
	Potassium, Total	ug/l	350000	50
	Cyanide, Total	mg/l	.02	.02
	Sulfide as S	mg/l	1.4	.1
	Fluoride	mg/l	2.6	.1

[a] Qualitative analysis.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 23, 1987

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery – Aqueous Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

S6602

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits * Lower	Control Limits * Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	93	88	110
p-Bromofluorobenzene	.250	109	86	115
1,2-Dichloroethane-D4	.250	129***	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	100	108****	10	94
2-Fluorophenol	100	109****	21	100
2,4,6-Tribromophenol	100	59	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	50	108	35	114
2-Fluorobiphenyl	50	77	43	116
Terphenyl-D14	50	64	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	-	-	24**	154**

* IFB EPA Control Limits.
** Advisory Limits Only.
*** Recovery manually verified.
**** Recovery variable due to sample matrix interference.

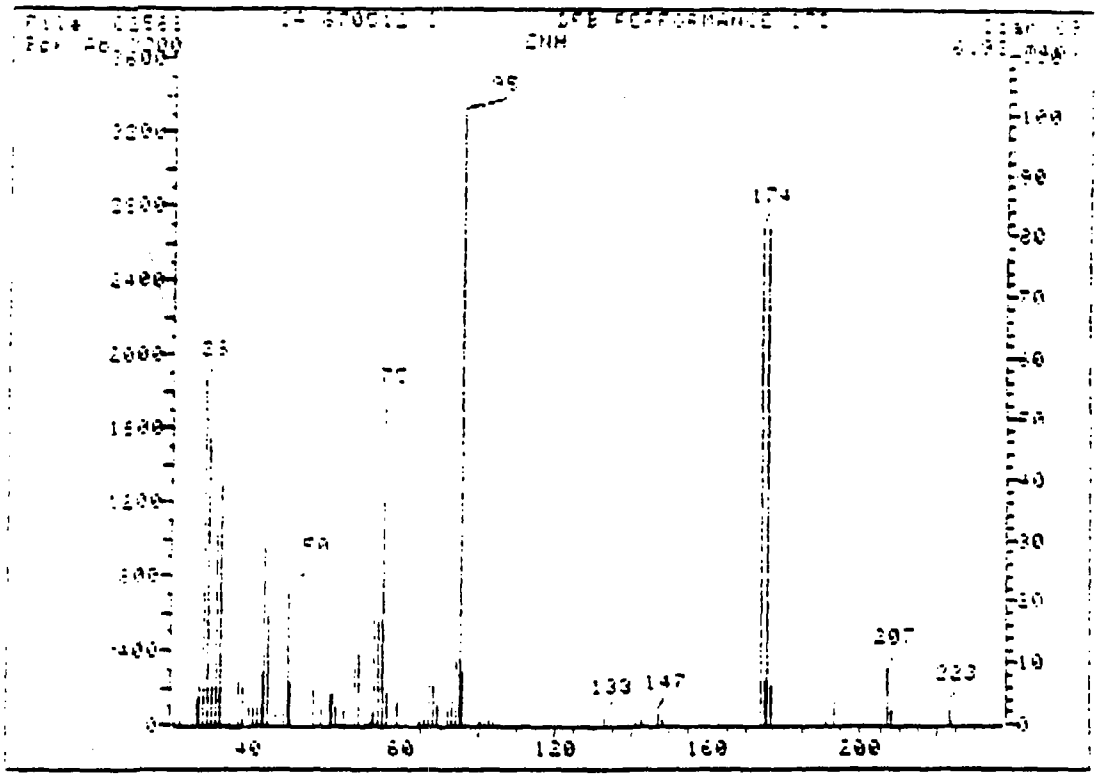

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.23	52.23	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.39	8.38	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	81.41	81.41	Ok
175	5-9% of mass 174	7.01	8.61	Ok
176	95-101% of mass 174	81.22	99.76	Ok
177	5-9% of mass 176	6.44	7.93	Ok

Injection Date: 05/12/87 Analyst: K. Boykin
Injection Time: 07:05 Processor: Sharon Maglock
Run No: >C2588 QC Batch: QJ7052
Spectrum No: 69(ENH)

KS
5/21/87

MS Data File: [illegible]

Name: [illegible] Operator: [illegible] Date/Time: [illegible]
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7052VS(?C2591)	870512	09:12
	QC7052VS(?C2593)	870512	11:24
	QC7052VS(?C2594	870512	13:02

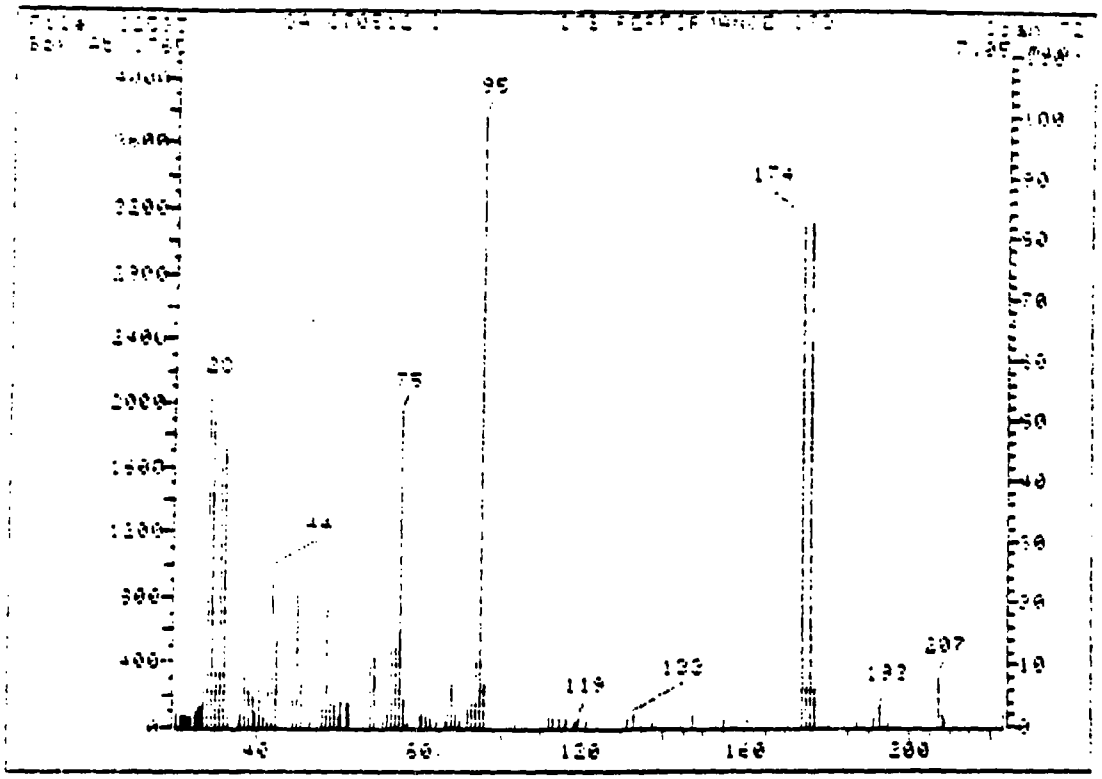

TABLE 1: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.46	21.46	Ok
75	30-60% of mass 95	51.79	51.79	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.09	7.09	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	82.66	82.66	Ok
175	5-9% of mass 174	6.67	8.07	Ok
176	95-101% of mass 174	82.59	99.90	Ok
177	5-9% of mass 176	6.00	7.27	Ok

Injection Date: 05/12/87 Analyst: [signature]
Injection Time: 14:36 Processor: [signature]
Run No: >C2595 QC Batch: QV7052
Spectrum No: 72

KJ
5/21/87

ME Data File: [illegible]

Name: [illegible] 870512 1 Operator: [illegible] Date Time: F 12 87 14:7[illegible]
Mode: EPE PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052V (>C2596)	870512	15:33
	OC7052V (>C2597)	870512	16:17
	OC7052V (>C2598)	870512	17:02
	OC7052V (>C2599)	870512	17:48
	S6605VS (>C2601)	870512	19:44
	S6605V (>C2602)	870512	20:30
	S6604V (>C2603)	870512	21:46
	S6604VB (>C2604)	870512	22:06
	S6603V (>C2605)	870512	22:52
	OC7052VS (>C2606)	870513	01:01

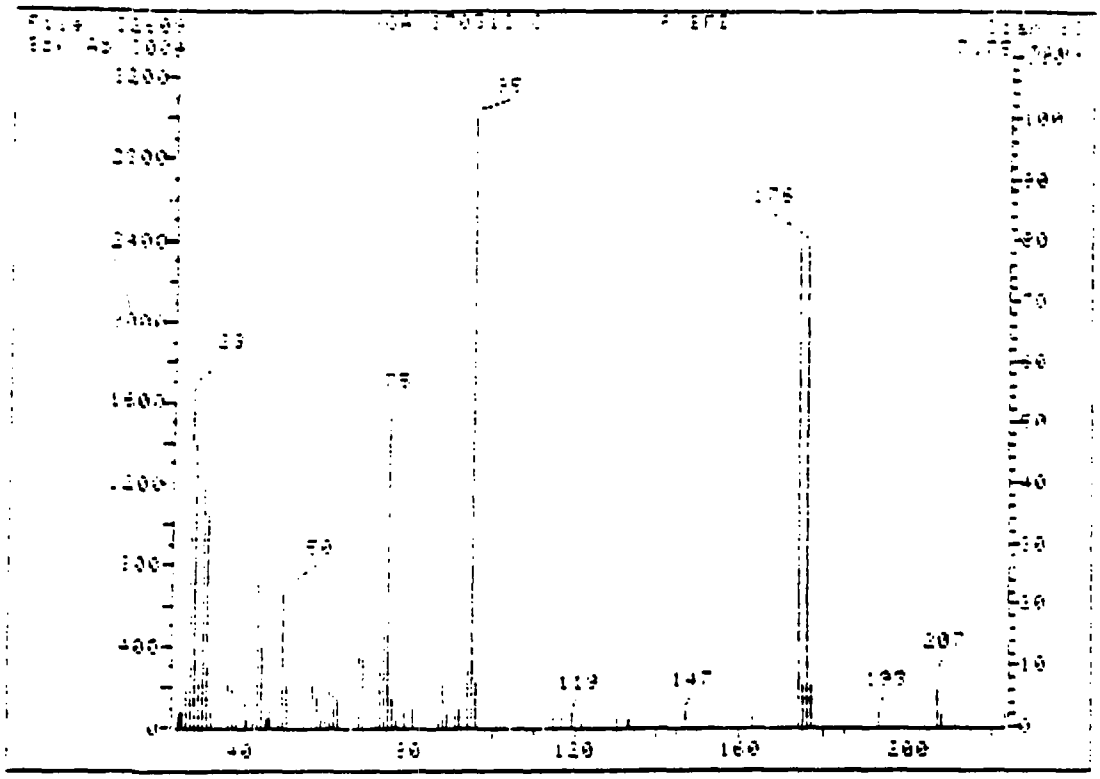

TABLE 2: METHOD PERFORMANCE DATA (QP21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.87	21.87	Ok
75	30-60% of mass 95	51.83	51.83	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.59	7.59	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	78.73	78.73	Ok
175	5-9% of mass 174	6.79	8.63	Ok
176	95-101% of mass 174	79.26	100.68	Ok
177	5-9% of mass 176	6.49	8.19	Ok

Injection Date: 05/13/87 Analyst: K. Boghi
Injection Time: 02:00 Processor: Sharon Mollock
Run No: >C2609 QC Batch: QU2052
Spectrum No: BB (UNaHered)

KB 5/21/87

MS Data File: [illegible]

Name: [illegible] Operator: [illegible] Date Time: [illegible]
Mass: [illegible]

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7052VS (>C2607)	870513	02:22
	QC7052VS (>C2608)	870513	03:02
	QC7052V (>C2611)	870513	05:25
	QC7052V (>C2612)	870513	06:10
	QC7052V (>C2613)	870513	06:57
	S6608V (>C2615)	870513	09:38
	S6602V (>C2616)	870513	10:23
	S6606V (>C2617)	870513	11:08
	QC7052V (>C2618)	870513	11:55
	S6607V (>C2619)	870513	12:44

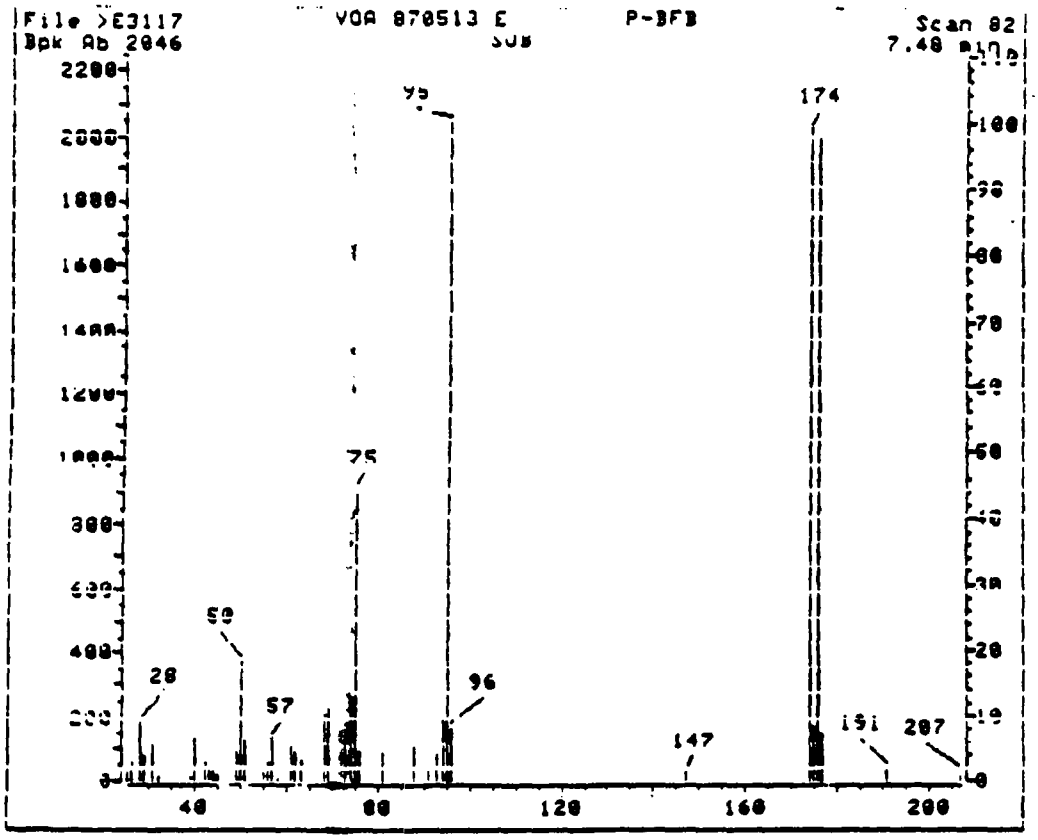

TABLE 2: METHOD PERFORMANCE DATA (WK21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.13	18.13	Ok
75	30-60% of mass 95	44.43	44.43	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.11	8.11	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.32	99.32	Ok
175	5-9% of mass 174	8.26	8.32	Ok
176	95-101% of mass 174	98.09	98.77	Ok
177	5-9% of mass 176	7.04	7.17	Ok

Injection Date: 05/13/87 Analyst: K Boyle
Injection Time: 06:46 Processor: ~~[illegible]~~
Run No: >E3117 WC Batch: QU 7054
Spectrum No: B2-69

KJ
5/20/87

You're already on LU: 87

MS Data File: >E3117::U5

Name: VOA 870513 E Operator: KB6676 Date/Time: 5/13/87 6:46
Misc: F-8F8

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7054V (>E3118)	870513	07:27
	QC7054VS (>E3119)	870513	08:12
	QC7054VS (>E3121)	870513	10:30
	QC7054VS (>E3122)	870513	11:50

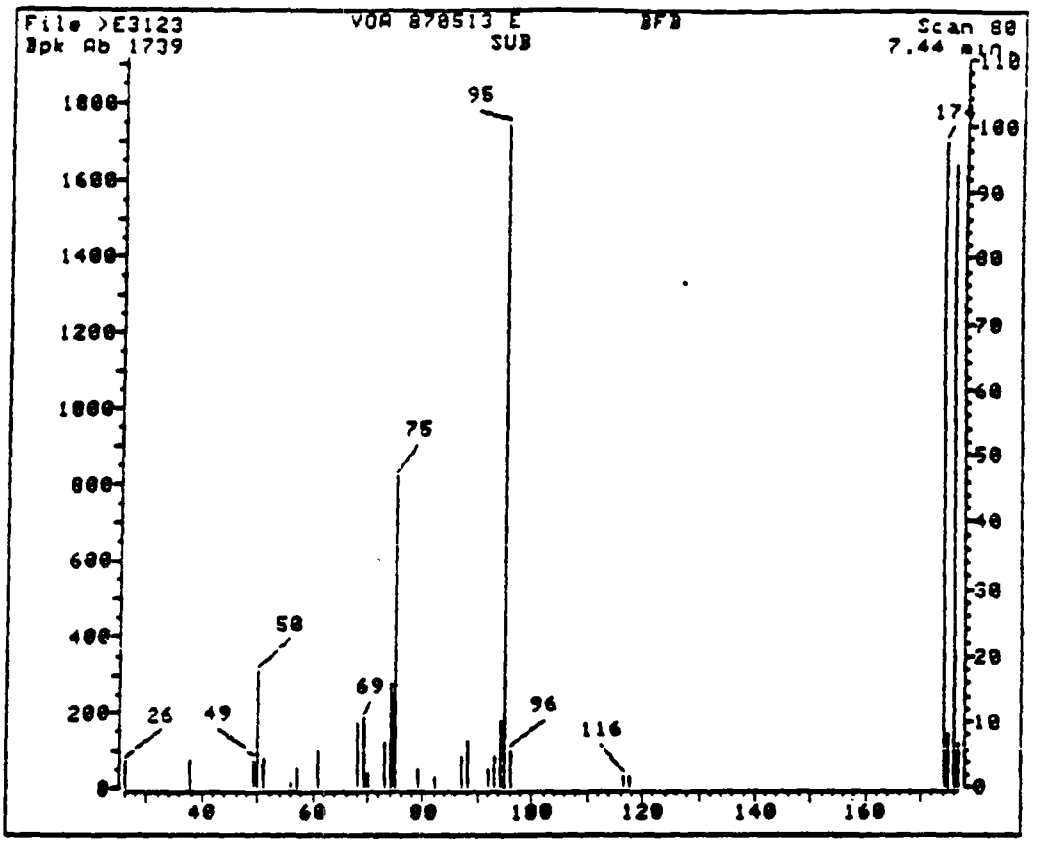

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Stat
50	15-40% of mass 95	17.94	17.94	Ok
75	30-60% of mass 95	47.10	47.10	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	5.69	5.69	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	97.53	97.53	Ok
175	5-9% of mass 174	8.17	8.37	Ok
176	95-101% of mass 174	94.36	96.76	Ok
177	5-9% of mass 176	6.44	6.83	Ok

Injection Date: 05/13/87 Analyst: [illegible]
Injection Time: 14:52 Processor: [illegible]
Run No: >E3123 QC Batch: QV7054
Spectrum No: 80 -20

KS 5/20/87

MS Data File: >E3123::U4

Name: VOA 870513 E Operator: LR5235 Date/Time: 5/13/87 14:52
Misc: BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6608V (>E3128)	870513	20:21
	S6606V (>E3130)	870513	22:21
	S6607V (>E3131)	870513	23:06

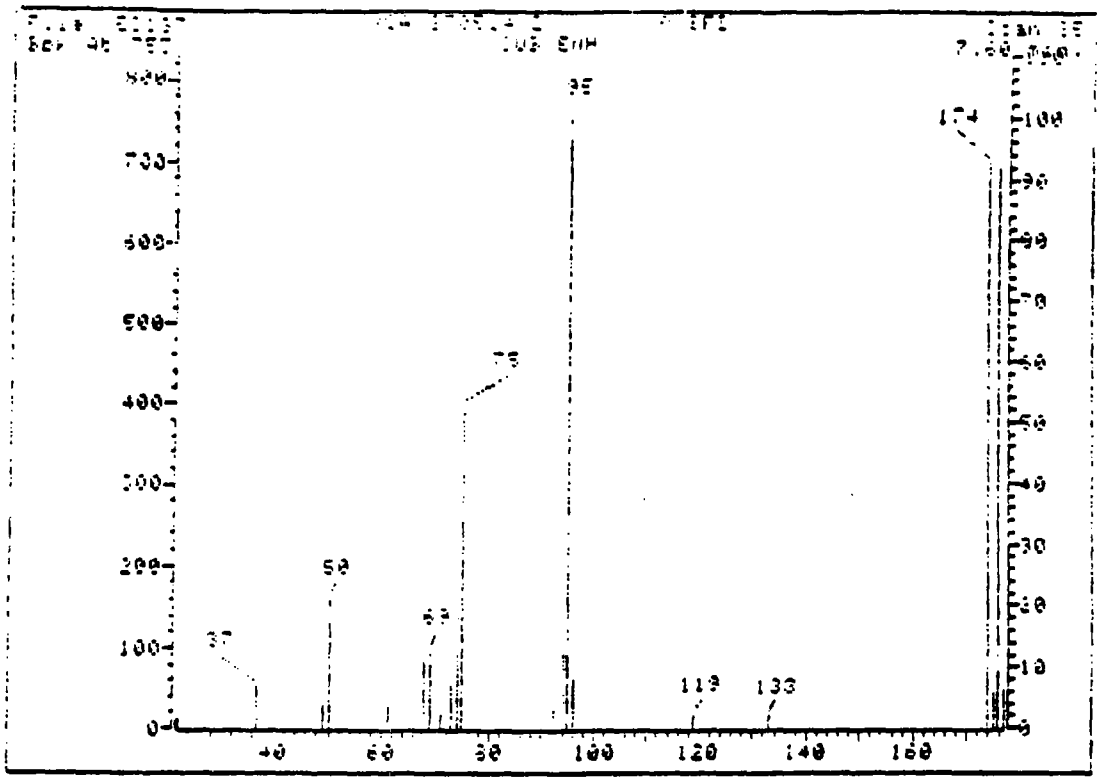

TABLE 1: METHOD PERFORMANCE DATA (OP21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance: Base Peak	Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.48	52.48	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.42	8.42	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	92.53	92.53	Ok
175	5-9% of mass 174	6.07	6.56	Ok
176	95-101% of mass 174	92.40	99.86	Ok
177	5-9% of mass 176	6.12	6.62	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 04:08 Processor: [signature]
Run No: E3137 QC Batch: QV7034
Spectrum No: (85-71) ENH

5/20/87

2:52 PM FRI., 12 JUNE, 1987
Sequence file: S160AC
Security Code: PQ
Channel #: 3

BN 6/12/87

Subsequence 1
Method: M6904F:PQ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction APB/PST (FPB)
Supervisor RH
Batch #s QC 6904

Standard	Conc PPM	Lot No.
APB IA	0.1	15,605
IB	0.5	15,604
IC	1.0	15,603
APB IIA	0.1	15,609
IIB	0.5	15,608
IIC	1.0	15,607

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN2946	RN2946	100.0000	1.000000	1.000000
2	QC6904G	2	PN2947	RN2947	100.0000	1.000000	1.000000
3	APB I 0.1	3	PN2948	RN2948	100.0000	1.000000	1.000000
4	APB I 0.5	4	PN2949	RN2949	100.0000	1.000000	1.000000
5	APB I 1.0	5	PN2950	RN2950	100.0000	1.000000	1.000000
6	APB II 0.1	6	PN2951	RN2951	100.0000	1.000000	1.000000
7	APB II 0.5	7	PN2952	RN2952	100.0000	1.000000	1.000000
8	APB II 1.0	8	PN2953	RN2953	100.0000	1.000000	1.000000
9	QC6904GS 3	9	PN2954	RN2954	100.0000	1.000000	1.000000
10	96604G	10	PN2955	RN2955	100.0000	1.000000	1.000000
11	96604GS 3	11	PN2956	RN2956	100.0000	1.000000	1.000000
12	96605G	12	PN2957	RN2957	100.0000	1.000000	1.000000
13	96605GP	13	PN2958	RN2958	100.0000	1.000000	1.000000
14	96602G	14	PN2959	RN2959	100.0000	1.000000	1.000000
15	96603G	15	PN2960	RN2960	100.0000	1.000000	1.000000
16	96606G	16	PN2961	RN2961	100.0000	1.000000	1.000000
17	APB I 0.5	17	PN2962	RN2962	100.0000	1.000000	1.000000
18	APB II 0.5	18	PN2963	RN2963	100.0000	1.000000	1.000000

KS 6/25/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Depar

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml)		Comments
S6602	21065	620	5.0		
S6603	↓	640	5.0		
S6604	↓	680	5.0		
S6606	↓	610	5.0		
S6605	21084	500	5.0		
QC 6903		500	5.0		
QC 6903	S	500	5.0		
S6606	S	550	5.0		
S6605	R	570	5.0		

QC Batch # 6903

Analysis APP/HERB (

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on shelf 98~~

FRACTION	SPIKE		
	Amt (ml)	Conc.	Lot #
DW/[illegible]/APP/Herb	1.0	250µg/25	15,783

QC Dan

SURROGATE		
Amt. (ml)	Conc.	L

Set-up: [illegible] 5/6/87 J. Jehovski 5/6/87

UPD/Supervisor: Judie Cickurs

Conc.: GAC Karter 5/27/87

Spike/Surr. Verified: Denise Satchell 5/6/8

6/13/97

8:10 PM SAT., 13 JUNE. 1987
Sequence file: S164AA
Security Code: QA
annel #: 13

ETC QC Lab Chronicle
Fraction APB/A PEST (EC)
Supervisor (JSW)
Batch #s QC 6904

Subsequence 1
Method: M6904T:QA
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Standard	Conc PPM	Lot No.
APB/PEST TEMPA	0.01, 1.0	16265
APB/PEST TEMPB	0.05, 5.0	16264
APB/PEST TEMPC	0.1, 10	16263
APB/PEST ISO CALI A	0.1, 0.1, 0.25	16268
APB/PEST ISO CALI B	0.5, 0.5, 1	16267
APB/PEST ISO CALI C	1.0, 1.0, 2.5	16266
APB/PEST ISO CALI II A	0.25	16271
APB/PEST ISO CALI II B	1.0	16270
APB/PEST ISO CALI II C	2.5	16269
INDIV. A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN4051	RN4051	100.0000	1.000000	1.000000
2	QC6904G	2	PN4052	RN4052	100.0000	1.000000	1.000000
3	TEMP A	3	PN4053	RN4053	100.0000	1.000000	1.000000
4	TEMP B	4	PN4054	RN4054	100.0000	1.000000	1.000000
5	TEMP C	5	PN4055	RN4055	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN4056	RN4056	100.0000	1.000000	1.000000
7	S6603G	7	PN4057	RN4057	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN4058	RN4058	100.0000	1.000000	1.000000
9	ISO 1A	9	PN4059	RN4059	100.0000	1.000000	1.000000
0	HEXANE	10	PN4060	RN4060	100.0000	1.000000	1.000000
1	ISO 1B	11	PN4061	RN4061	100.0000	1.000000	1.000000
12	HEXANE	12	PN4062	RN4062	100.0000	1.000000	1.000000
13	ISO 1C	13	PN4063	RN4063	100.0000	1.000000	1.000000
14	HEXANE	14	PN4064	RN4064	100.0000	1.000000	1.000000
15	TEMP B	15	PN4065	RN4065	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN4066	RN4066	100.0000	1.000000	1.000000
17	S6602G	17	PN4067	RN4067	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN4068	RN4068	100.0000	1.000000	1.000000
19	ISO 2A	19	PN4069	RN4069	100.0000	1.000000	1.000000
20	ISO 2B	20	PN4070	RN4070	100.0000	1.000000	1.000000
21	S6604G	21	PN4071	RN4071	100.0000	1.000000	1.000000
22	S6605G	22	PN4072	RN4072	100.0000	1.000000	1.000000
23	S6605GR	23	PN4073	RN4073	100.0000	1.000000	1.000000
24	S6606G	24	PN4074	RN4074	100.0000	1.000000	1.000000
25	TEMP B	25	PN4075	RN4075	100.0000	1.000000	1.000000
26	ISO 2C	26	PN4076	RN4076	100.0000	1.000000	1.000000
27	ISO 1B	27	PN4077	RN4077	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN4078	RN4078	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN4079	RN4079	100.0000	1.000000	1.000000

Pruning

7:17 PM FRI., 19 JUNE, 1987
Sequence File: S170AB
Security Code: QZ
Channel #: 17

JS 6/19/87

Subsequence 1
Method: M6904C:QZ
Dialog-Prg Param-File

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	8	1

ETC QC Lab Chronicle
Fraction AP9/PEST(Ec)
Supervisor
Batch #s RC 6904

Standard	Conc PPM	Lot No.
TEMP A	MIX	16265
" B	MIX	16264
" C	MIX	16263
ISO IA		16268
" IB		16267
" IC		16266
ISO 1A		16271
" 2B		16270
" 2C		16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Sap-Amt
1	HEXANE	1	PN5391	RN5391	100.0000	1.000000	1.000000
2	QC6904C	2	PN5392	RN5392	100.0000	1.000000	1.000000
3	TEMP A	3	PN5393	RN5393	100.0000	1.000000	1.000000
4	TEMP B	4	PN5394	RN5394	100.0000	1.000000	1.000000
5	TEMP C	5	PN5395	RN5395	100.0000	1.000000	1.000000
6	QC6904CS 2	6	PN5396	RN5396	100.0000	1.000000	1.000000
7	S6603C	7	PN5397	RN5397	100.0000	1.000000	1.000000
8	S6603CS 2	8	PN5398	RN5398	100.0000	1.000000	1.000000
9	ISO 1A	9	PN5399	RN5399	100.0000	1.000000	1.000000
10	HEXANE	10	PN5400	RN5400	100.0000	1.000000	1.000000
11	ISO 1B	11	PN5401	RN5401	100.0000	1.000000	1.000000
12	HEXANE	12	PN5402	RN5402	100.0000	1.000000	1.000000
13	ISO 1C	13	PN5403	RN5403	100.0000	1.000000	1.000000
14	HEXANE	14	PN5404	RN5404	100.0000	1.000000	1.000000
15	TEMP B	15	PN5405	RN5405	100.0000	1.000000	1.000000
16	QC6904CS 1	16	PN5406	RN5406	100.0000	1.000000	1.000000
17	S6602C	17	PN5407	RN5407	100.0000	1.000000	1.000000
18	S6602CS 1	18	PN5408	RN5408	100.0000	1.000000	1.000000
19	ISO 2A	19	PN5409	RN5409	100.0000	1.000000	1.000000
20	ISO 2B	20	PN5410	RN5410	100.0000	1.000000	1.000000
21	S6604C	21	PN5411	RN5411	100.0000	1.000000	1.000000
22	S6605C	22	PN5412	RN5412	100.0000	1.000000	1.000000
23	S6605CR	23	PN5413	RN5413	100.0000	1.000000	1.000000
24	S6606C	24	PN5414	RN5414	100.0000	1.000000	1.000000
25	TEMP B	25	PN5415	RN5415	100.0000	1.000000	1.000000
26	ISO 2C	26	PN5416	RN5416	100.0000	1.000000	1.000000
27	ISO 1B	27	PN5417	RN5417	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN5418	RN5418	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN5419	RN5419	100.0000	1.000000	1.000000

CONFIRMATION

ETC ENVIRONMENTAL TESTING AND CLARIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 60987 SHIFT
FRACTION HCP OEV
STRUMENT mT I001
NE FILE I
QUENCE FILE BHI
METHOD FILE BHCP
ID FILE IHCP
ANALYST(S) Brenda Hawkins

SUPERVISOR [illegible]
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	BH

STANDARD	CONC PPM	LOT NO.	LOT VOL
HCP std III	500		
II	300		
I	100		
Test mix			
internal std	400		

NAME	DATA FILE >	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test mix	I4051		1		OK		19:31
Hex std III	I4052		2				
II	I4053		3				
I	I4054		4				21:23
Test mix	I4055		5		OK		22:04
QC6902C	I4056		6				
QC6902CS	I4057		7				
S6605C	I4058		8				
S6605CS	I4059		9				
S6605CR	I4060		10				
S6004C	I4061		11				
S6008C	I4062		12				
S6058C	I4063		13				
S7732C	I4064		14				
S6602C	I4065		15				
Test mix	I4066		16		OK		5:05
S6603C	I4068		18				
S6604C	I4069		19				
S6606C	I4070		20				
S2811C	I4071		21				
S7733C	I4072		22				
S6059C	I4073		23				9:32
Test mix	I4103		1		OK		10:04
Hex std II	I4104		2		OK		11:12
S7731	I4074		24				

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Depar

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST ~~BN~~	~~ACID~~	Comments
S6602	21065	530	10	5.0	
S6603		480	10	5.0	
S6604		620	10	5.0	
S6606	✓	580	10	5.0	
S6605	21084	540	10	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	1.0	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB

APG/PEST

APG/PEST (F

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98~~

	FRACTION	SPIKE Amt (ml)	Conc.	Lot #
S1	Ec Iso	0.1 ml	25/100 ug/ml	15616
S2	Ec Temp	0.1 ml	25/250 ug/ml	15993
S3	FPDI	0.2 ml	125/125 ug/ml	15602
S4	Arochlor 1260	0.1 ml	40 ug/ml	15997

oe DAN

SURROGATE

Amt. (ml)	Conc.	L
	BN:	
	ACID:	

Set-up: J Jekinski 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 6-8-87

PCB ~~BN~~ Conc.: J Angloni PEST ~~Acid~~ Conc.: J Angloni Spike/Surr. Verified: [illegible] 5-6-87

ING CERTIFICATION

LABORATORY CHRONICLE

6/03/06	SHIFT
	APP/BNA
EN	T
E	MTJ001
CE FILE	SWJ2
FILE	BNPJ
	JAP8GX
T(S)	S Willard
ISOR	Steve Condrva
I's	QC6902, QC6976
EX	

(PLEASE INITIAL)

CURRENT OS STATUS	STANDARDS UPDATED	
	DATE	June 7th 1987
	BY	KV

STANDARD	CONC PPM	LOT NO.	VOL
Tat std	400	16561	
Test Mix			
ACID STD III, II, I	300,100,60	15819, 15818, 15817	
BN STD III, II, I	200,100,60	16079, 16078, 16077	
APP BN (II)	300,500	15231	
APP ACID STD III, II, I	300/60 100/20 60/12	15236, 15235, 15234	
APP/BN STD III, II, I	300/60 100/20 60/12	15237, 15238, 15239	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test Mix	7J4736		1			OK 01:06	
BNA STD III	7J4737		2			JBNA8	
II	7J4738		3				
I	7J4739		4				
APP/BN(II)	7J4740		5			JAP8B2	
APP/BNA III	7J4741		6			JAP8A8	
II	7J4742		7				
I	7J4743		8				
Test Mix	7J4744		9			OK, A 08:00	
QC6902P	7J4745		10				
QC6902CS	7J4746		11				
S6605CS	7J4747		12				
S6605CR	7J4748		13				
S6603C	7J4749		14				
S6604C	7J4750		15				
S6605C	7J4751		16				
S6608C	7J4752		17				
S7731C	7J4753		18				
S7732C	7J4754		19				
Test Mix	7J4755		20		OK	17:57	
BNA STD II	7J4756		21				
APP/BNA STD II	7J4757		22				
S2811S	7J4758		23				
S6058S	7J4759		24				
S6059S	7J4760		25				

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6-8-87 SHIFT
FRACTION AP8/BNA
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) C. to
SUPERVISOR Steve Cordova
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL
	See page		
		page 2	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLU Y/N
S7733C	>J4761		26				
S6602R	>J4762		27				
S6604C	>J4763		28				
S6606C	>J4764		29				
S6226C	>J4765		30				
S6227C	>J4766		31				
Test Mix	>J4767		32				
BNA II	>J4768		33			See page 3	
AP8/BNA II	>J4769		34				
S5843C	>J4770		35				
QC6976C	>J4771		36				
QC6976CS	>J4772		37				
S6252CS	>J4773		38				
S6253C	>J4774		39				
S6253CR	>J4775		40				
S6002C	>J4776		41				
S6003C	>J4777		42				
S6006C	>J4778		43				
Test Mix	>J4779		44				
BNA STD II	>J4780		45				
AP8/BNA II	>J4781		46				
S6007C	>J4782		47				
S6009C	>J4783		48				
S6005C	>J4784		49				
R7859C	>J4785		50				

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 5/14/87 SHIFT
FRACTION HPTVOA
INSTRUMENT E
TUNE FILE APE101
SEQUENCE FILE
METHOD FILE APP14PT
ID FILE EAP14PT
ANALYST(S) Steph Blge
SUPERVISOR [illegible]
BATCH #'s QV7054

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
—			

See Pg 1

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
✓ QC 7054VS	E3142	5ul			CBUPD	10ul APE/DAT	9:03
✓ QC 7054VS	E3143	↓			CBCAL	2ul ↓	10:27
QC 7054V	E3144					NG	
✓ QC7054V	E3145					OK	13:30
✓ S16603V	E3146					OK	14:33
✓ S16603VS	E3147					OK	15:21
(A) S16605V	E3148					NG	
✓ S16605VR	E3149					OK	16:52
S16604V	E3150					NG Surr out	
(A) ✓ BH0106V	E3151	↓			NG	~~OK~~ 5/17/87	18:23
S16602V	E3152	.05ul		1:100		Reinj Straight	
BFB	E3153	1ul				inject before → E3149	
(A) S16605V	E3154	5ul				OK	21:16
✓ (A) S16604V	E3155					OK	22:01
(A) S16602V	E3156					NG	
✓ QC7054VS	E3157				NG	4ul APE/DAT	
✓ QC7054VS	E3158					2ul	
✓ QC7054VS	E3159				CBCAL CBUPD	10ul ↓	
✓ QC7054VS	E3160	↓				4ul APE/DAT	
BFB	E3161	1ul				OK PS.81 EM-3:4.891	4:59
QC7054V	E3162	5ul				NG	
QC7054V	E3163					NG	
QC7054V	E3164					OK	07:48
(B) S16602V	E3165	↓				OK	09:49

ETC-FORM 2-8/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LA_ _RATORY CHRONICLE: Sa...ple Preparation Depar

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) Acid	BN	DER BN	Comments
+ S6602	21063	965	1.0	1.0	1.0	APS / T
+ S6603	↓	965	1.0	1.0	1.0	↓
+ S6604	↓	975	1.0	1.0	1.0	↓
+ S6606	↓	970	1.0	1.0	1.0	↓
S6605	21084	980	1.0	1.0	1.0	↓
S6058	21177	1005	1.0	1.0	1.0	APS/AC, ACID, HCP
+ S6059	↓	1000	1.0	1.0	1.0	↓
+ ~~S6226~~	21204	910	1.0	1.0	1.0	CNID
+ ~~S6227~~	↓	930	1.0	1.0	1.0	↓
~~S6554~~	21236					
S6004	21252	1005	1.0	1.0	1.0	↓
+ S6008	↓	995	1.0	1.0	1.0	↓
+ S7731	21331	995	1.0	1.0	1.0	APS / T
+ S7732	↓	990	1.0	1.0	1.0	↓
S7733	↓	980	1.0	1.0	1.0	↓
~~S5543~~	~~21236~~	~~945~~	~~1.0~~			~~APS/ACID~~
* S1023	20221					APS/BN, ACID, HCP
* S1025	↓					↓
* ~~S0513~~	~~20230~~					
* S2511	20331	1005	1.0	1.0	1.0	↓
QC 6902		1000	1.0	1.0	1.0	
QC 6902S		1000	1.0	1.0	1.0	
S6605-MS		975	1.0	1.0	1.0	
S6605-MSD		960	1.0	1.0	1.0	

QC Batch # 6702

Analysis APS/BN

APS/ACID

APS/HCP

Matrix H_2O

Turnaround NORM

Date Start 5/13/97

Neutral

Base

Acid

Derivitized BN

Extraction Method

Sep. Funnel ✓

Continuous

Other

COMMENTS

*repeat of QC 6602

HEXACHLOROPHENE STD

100 ug/ml 1.0 1.5

500 ug/ml 1.0 1.5

500 ug/ml 1.0 1.5

Extraction:

BN DER:

BN CONC:

ACID CONC:

Supervisor:

QC DOW QC SPIKE VOL. W. SAT. LL

FRACTION	SPIKE Amt (ml)	Conc. ug/ml	Lot #	SURROGATES Amt (ml)	Conc. ug/ml	Lot #
APS/BN 1	1.0	100/500	15,230			
APS/BN 2	1.0	500/1000	15,232			
APS/ACID	1.0	500/1000	15,237			
HCP/BN	1.0	100	15,344			
HCP/ACID	1.0	100	15,342			
Carry Over BNA				1.0	50/100	15,888

ETC FORM 8113

TC ENVIRONMENTAL TESTING and CERTIFICATION

ORATORY CHRONICLE: GC-M. epartment

ATE 87/13/5 SHIFT
RAC ON AP9PT/VOA
ST MENT C
JNE FILE APE201
EQUENCE FILE KBC
ETHOD FILE VOAC
) FILE CAP9PT
NALYST(S) K Bazh

UPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See Pg#1			
Pg 2 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
QC7052VS	PC2613	5ul	4		OK	See VOA blank	
S6607V	PC2614		1		NG	Sun	
S6608V	PC2615		2		OK		[illegible]
S6607V	PC2616		3		OK		10:23
S6606V	PC2617		4		OK		11:08
QC7052V	PC2618		2		OK		
S6607V	PC2619		2		OK		12:[illegible]

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE GC-MS Department

pg 1 of 2

DATE 87/13/5 SHIFT
FRACTION AP9HPT
INSTRUMENT E
TUNE FILE APEI02
SEQUENCE FILE
METHOD FILE AP9HPT
ID FILE EA9HPT
ANALYST(S) K Boykin [illegible]

SUPERVISOR [illegible]
BATCH #'s QV7054

(PLEASE INITIAL) CB9HPT

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	5/13/87
WIP		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15243	1
AP8 IS	25	16,024	10
SURR	25	15769	10
APPENDIX 8 DAI STD	500/100	14,657	2,4,10

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>E3117	1ul				OK	06:46
QC7054V	>E3118	5ml				Ok	07:2
QC7054VS	>E3119	5ml				2ul AP8 DAI STD	[illegible]
QC7054VS	>E3120	5ml				NG 4ul " "	[illegible]
QC7054VS	>E3121	5ml			CAUPD CALC	10ul " "	
QC7054VS	>E3122	5ml				4ul	11:55
P-BFB	>E3123	1ul				Ok	14:5
BA0106V	>E3124	5ml				NG S.B. ~~OK~~ Carry Over	15:46
BA0106VS	>E3125	5ml				NG 4ul AP8 DAI STD	
S6608V	>E3126	5ml				NG surrogate very low	
S6608VS	>E3127	5ml				NG 4ul AP8 DAI STD	
S6608V	>E3128	5ml				OK	20:21
S6607V	>E3129	5ml				NG Leaked	
S6606V	>E3130	5ml				Ok	22:[illegible]
S6607V	>E3131	5ml				Ok	23:[illegible]
BA0106VR	>E3132	5ml				NG	00:[illegible]
S6605V	>E3133	5ml				~~OK~~ NG Past CBCHK	1:17
BA0106V	>E3134	5ml				NG Past CBCHK	
QC7054VS	>E3136	5ml				NG 4ul ABC XVOA	
P-BFB	>E3135	1ul				NG	
P-BFB	>E3137	1ul				Ok >E3137	
QC7054VS	>E3138	5ml				4ul AP8 DAI STD	
QC7054VS	>E3139	5ml			S.B. [illegible]	~~10ul~~ 2ul	
QC7054VS	>E3140	5ml			NG	10ul	
QC7054V	>E3141	5ml			NG	2ul	

[illegible]
Acquire File: 3141-F
Unit: Code: 0E
Trail #: 0

Subsequence 1
Method: M8040:0E
Dialog-Prg Param-File
: :

#Usns #Pmps Stop
5 5 1

Ico Post-Stl# Post-Wsns#
0 0 1

Ex. G. Lab Chemicals
Fraction AIB/PEST/PCB
Supervisor [illegible]
Batch #s QG6904

Standard	Conc PPM	Lot No.
A 1260	0.5	15985
A 1260	1.0	15984
A 1260	5.0	15983
A 1016	0.5	15943
A 1221	0.5	15950
A 1232	0.5	15957
A 1242	0.5	15964
A 1248	0.5	15971
A 1254	0.5	15978

Samples

	Sample-Name	Stl#	P-File	F-File	%Oil-F	Std-Amt	Smp-Amt
1	HEXANE	1	RN3831	RN3831	100.0000	1.000000	1.000000
2	QC69046	2	RN3832	RN3832	100.0000	1.000000	1.000000
3	A1260 0.5	3	RN3833	RN3833	100.0000	1.000000	1.000000
4	A1260 1.0	4	RN3834	RN3834	100.0000	1.000000	1.000000
5	A1260 5.0	5	RN3835	RN3835	100.0000	1.000000	1.000000
6	QC69046B 4	6	RN3836	RN3836	100.0000	1.000000	1.000000
7	S6606G	7	RN3837	RN3837	100.0000	1.000000	1.000000
8	S6606GB 4	8	RN3838	RN3838	100.0000	1.000000	1.000000
9	S6605G	9	RN3839	RN3839	100.0000	1.000000	1.000000
	S6605GR	10	RN3840	RN3840	100.0000	1.000000	1.000000
	S6602G	11	RN3841	RN3841	100.0000	1.000000	1.000000
12	S6603G	12	RN3842	RN3842	100.0000	1.000000	1.000000
13	S6604G	13	RN3843	RN3843	100.0000	1.000000	1.000000
14	A1016 0.5	14	RN3844	RN3844	100.0000	1.000000	1.000000
15	A1221 0.5	15	RN3845	RN3845	100.0000	1.000000	1.000000
16	A1232 0.5	16	RN3846	RN3846	100.0000	1.000000	1.000000
17	A1242 0.5	17	RN3847	RN3847	100.0000	1.000000	1.000000
18	A1248 0.5	18	RN3848	RN3848	100.0000	1.000000	1.000000
19	A1254 0.5	19	RN3849	RN3849	100.0000	1.000000	1.000000
20	A1260 0.5	20	RN3850	RN3850	100.0000	1.000000	1.000000

KS 6/16/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 87/12/5 SHIFT
FRACTION AP9/PT VOA
INSTRUMENT C
TUNE FILE APEI01
SEQUENCE FILE KBC
METHOD FILE VOAC
ID FILE C AP9PT
ANALYST(S) K. [illegible]

SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL) CBA9PT

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	3/12/87
WIP		BY	[illegible]

STANDARD	CONC PPM	LOT NO	LOT VOL. (ml)
P-BFB	50	15243	1
AP8 INSTD	25	16,024	10
SURR	25	15719	10
ABC/KVOA	18	16028 2X	5,10,30
AP8 P+T	50	15,501	5,10,30

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>C2588	1ul				OK	
QC7052V	>C2589	5.0ml	1			NG	
QC7052VS	>C2590	↓	2			NG 5 uls ABC/KVOA + AP8 P+T	
QC7052VS	>C2591	↓	3			10 uls ↓ ↓	
QC7052VS	>C2592	↓	4			NG 30 uls ↓ ↓	
QC7052VS	>C2593		4			30 ul ABC/KVOA/AP9	
QC7052VS	>C2594		3			5ml	13:0
BFB	>C2595					OK	14:36
QC7052V	>C2596	5ml	2			ok	15:3
QC7052V	>C2597	↓	3			ok	
QC7052V	>C2598	↓	4			ok	
QC7052V	>C2599	↓	5			ok	
QC7052V	>C2600	↓	6			NG	
S6605VS	>C2601	5ml	1			OK S6605VS	
S6605V	>C2602	↓	2			OK S6605V	
S6604V	>C2603	↓	3			OK S6604V	
S6604VR	>C2604	↓	4			OK S6604VR	
S6603V	>C2605	↓	5			OK	
QC7052VS	>C2606	5ml	7			5 uls ABC/KVOA + AP8 P+T	
QC7052VS	>C2607	↓	8		CBUD	10 uls ↓ ↓	
QC7052VS	>C2608	↓	9		CBUD	30 uls ↓ ↓	
P-BFB	>C2609	1ul	—			RAN DEPOSE >C2607	
QC7052V8	>C2610	5ml	1			OK SPEC VOA BLANK	
QC7052V8	>C2611	↓	2			OK ↓	
QC7052V8	>C2612	↓	3			OK ↓	

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # C6602 TF 5/8/87

Sample Point W ~~6/7/5~~ 1215
Source Code Sample Point ID

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump B-ISCO C-Bladder Pump D-Dipper/Bottle E-Bailer F-Scoop/Shovel X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon B-Metal C-PVC D-Plastic X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon B-Tygon C-Polyethylene D-Silicon X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) [ ] Well Depth (ft) [ ]

Depth to Ground water (ft) [ ] Sample Depth (non-well) (ft) [ ]

Groundwater Elevation (ft msl) [ ]

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp [ ] (°C) Turbidity [ ] NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CL2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LABS.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST ~~BN~~	~~ACID~~	Comments
S6602	21065	530	10	5.0	
S6603		480	10	5.0	
S6604		620	10	5.0	
S6606	↓	580	10	5.0	
S6605	21084	540	1.0	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	10	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB

APG/PEST

APG/PEST (FI

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98 wt~~

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
S1 Ec Iso	0.1 ml	25/100 mg/ml	15616
S2 Ec Temp	0.1 ml	25/250 mg/ml	15993
S3 FPDI	0.2 ml	125/125 mg/ml	15602
S4 Arochlor 1200	0.1 ml	40 mg/ml	15997

oc DAW

SURROGATE Amt. (ml)	Conc.	Lot
	BN:	
	ACID:	

Set-up: J Jekinsh 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 6-8-87

PCB ~~BN~~ Conc.: [illegible] PEST ~~Acid~~ Conc.: [illegible] Spike/Surr. Verified: [illegible] 5-11-87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # S660Z TF 5/19/87

Sample Point W ~~GWZ1S~~ 1.2 11 .5
Source Code Sample Point

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: REC'D MAY 5 1987

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	pH		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: SCATTERED CLOUDS, ~55°F, WIND NE ~10-20 MPH.

Other: APP. 1X SAMPLED 4-30 (INSTEAD OF 4-29) DUE TO LATE ARRIVAL OF ETC SHUTTLES. REFER TO GCL CC2 WITH ETC #S2993 FOR FIELD PROCEDURES AND FIELD MEASUREMENTS

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WEIGHT (Print) Employer: GULF COAST LABS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 (Date) [signature] (Signature)

ORIGINAL

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56602

Sample Point W G Z I S

Source Code | Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD:

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

1st	ph (STD)	1st	spec. cond. um/cm at 25° C	(other parameter)	value	unit
2nd	ph (STD)	2nd	spec. cond. um/cm at 25°C	(other parameter)	value	
3rd	ph (STD)	3rd	spec. cond. um/cm at 25°C	(other parameter)	value	un
4th	ph (STD)	4th	spec. cond. um/cm at 25°C	(other parameter)	value	unit

Sample Temp (°C) Turbidity NTU

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LAB

I certify that sampling procedures were in accordance with applicable EPA state and corporate protoc

4-30-87 (Date) [signature] (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 4/27/87 By: M Tesse

Company: Chicago Incinerator Attn.: Bob Bartholmew

Facility/Site: 11700 S Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 121 S (Optional Sample Point Descriptions)

Sample Point: W-~~6121S~~ 1215 (Source Code (from below); Your Sample Point ID (left justify)) 870430 (Start Date (YY/MM/DD)) 1712 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

TF 5/18/87

Source Codes

Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other

Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	Observations	LAB Observations
5	E	1L	Boiled	Extbl.	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 79657 Time: 1204
   Signature: [signature] Seal #: 4-30-87 Intact: Yes

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1249
   Signature: [signature] Seal #: 79658 Intact: Yes

LAB USE ONLY Opened By: C. [signature] Date: 5/1/87 Time: 2:20 pm

SHUTTLE # 376 TEMP. °C 70 SEAL # 7968 COND. [signature]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. ~~000453~~ 777 ETC Job # S6602

Date Sealed 4/25/87 By: [illegible]

Company: WMI Attn.: Bob Bartholome

Facility/Site: Chicago Incinerator Phone: 312-646-5700

Address: Chicago, IL

REC'D MAY 5 1987

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 1215 PE (Optional Sample Point Descriptions)

Sample Point: ~~WI-G/2/1/5~~ 1215 | 870430 | 1020 | ___

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr clock) | Elapsed Hours (composite)

TF 5/12/87

Source Codes:

Well (W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys...(C) Other ...

Soil (S) River/Stream..(R) Generation Point...(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify

SHUTTLE CONTENTS

	BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	Observations	LAB Observations
	1	A	1gal	HNO3	Radioactivity	Y		
X	1	B	1L	Cool	General	Y		
				4 C				
	1	B	1L	6NNaOH	Cn	Y		
	1	B	1L	Zinc	Sulfide	Y		
				Acetate				
X	1	F	500ml	HNO3	Metals (dissolved)	Y		
	1	F	500ml	HNO3	Metals (total)	N		
	1	F	500ml	H2SO4	Nutrients	Y		
	1	I	100ml	Cool4C	Total Coliform	N		

CHAIN OF CUSTODY CHRONICLE

30 ~~RV-4-30~~

1. Shuttle Opened By: (print) Richard Weight Date: 4-27-87 Time: 07:5
   Signature: [signature] Seal #: ~~453-499~~ RW Intact: Yes

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Weight Date: 4-30-87 Time:
   Signature: [signature] Seal #: ~~454500~~ RW Intact: Yes

LAB USE ONLY Opened By: Lynn Gifford Lynn Gifford Date: 4/30/87 Time: 1730

SHUTTLE # ___ TEMP. °C ___ SEAL # 500 COND. ___

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 79659 ETC Job # 56602

Date Sealed 4/27/87 By: [illegible]

Company: Chicago Incinerator Attn.: Bob Bartholm

Facility/Site: 11700 S Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 1215 (Optional Sample Point Descriptions)

Sample Point: W ~~6121S~~ 1215 870430 1212

Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr clock) | Elapsed Hours (composite)

TF 5/18/87

Source Codes:
Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other
Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
5	E	1l	Baked	Extbl	N		✓
3	F	40ml	Baked	PFTVOA	N		✓
3	F	40ml	Baked	HPFTVOA	N		✓
1	TB	40ml	GC/MS	Trip blank	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 120
Signature: [signature] Seal #: 79659 Intact: Yes

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1[illegible]
Signature: [signature] Seal #: 79660 Intact: Yes

LAB USE ONLY Opened By: C. [illegible] Date: 4/1/87 Time: 2:20 p

SHUTTLE # 260 TEMP. °C 10 SEAL # 79660 COND. [illegible]

Subcontracted Analy...

-90 Facility: 705 (Facility Code) Sample Point: W - G1210 (Source Code, Sample Point D)

-8 1 Date Sampled: 870430 (Y Y M M D D) Time Sampled: 10:20 (H H M M)

	er	Table	Units Of Measure	Value	MDL	Comments
		QR 10	mg/l			
		QR 10	mg/l	2.6	0.1	
	as N	QR 10	mg/l			
	as SO4	QR 10	mg/l			
	lics, Total	QR 10	mg/l			
	Organic Halides (TOX)	QR 10	ug/l			
	Organic Halides (TOX)	QR 10	ug/l			
	Organic Halides (TOX)	QR 10	ug/l			
	l Organic Halides (TOX)	QR 10	ug/l			
	al Organic Carbon	QR 10	mg/l			
	al Organic Carbon	QR 10	mg/l			
	tal Organic Carbon	QR 10	mg/l			
	tal Organic Carbon	QR 10	mg/l			
	pecific Conductance (Lab)	QR 10	um/cm			
	pecific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	Coliform, Total	QR 10	C/100			
	Coliform, Fecal	QR 10	C/100			
	Gross Alpha	QR 10	PCi/l			
	Gross Beta	QR 10	pCi/l			
	Acidity as CaCO3		mg/l			
	Alkalinity as CaCO3		mg/l			
6	Ammonia as N		mg/l			
7	Bicarbonate as CaCO3		mg/l			
8	Biochemical Oxygen Demand		mg/l			
19	Carbonate as CaCO3		mg/l			
20	Chemical Oxygen Demand		mg/l			
21	Color, Apparent (Lab)		Pt/Co			
22	Cyanide, Total		mg/l	0.02	0.02	
23	Hardness as CaCO3		mg/l			
24	Nitrite as N		mg/l			
25	Nitrogen Total Kjeldahl (TKN)		mg/l			
26	Nitrogen, Total Organic		mg/l			
27	Odor (Lab)		TON			
28	Oil and Grease (grav, IR)		mg/l			
29	Phosphate, ortho		mg/l			
0	Phosphate, Total		mg/l			
	Solids, Total		mg/l			
32	Solids, Total Dissolved (ROE) 180°		mg/l			
33	Solids, Total Suspended		mg/l			
34	Sulfide as S		mg/l	1.4	0.1	
35	Surfactants (MBAS/LAS)		mg/l			
36	Turbidity (Lab)		NTU			

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

Lab ID: Gulf Coast Labs

Submitted by: G. Martinez

Date: 6-10-87

Facility: 705 (Facility Code)

Date Sampled: 870430 (Y Y M M D D)

Sample Point: W (Source Code) - G1215 (Sample Point ID)

Time Sampled: : (H H M M)

ETC Job # 56602

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Appendix D
Subcontractor's Data

1) A copy of the originating subcontractor's report is included for all data not generated within ETC's laboratory.

MS Data File: >14055::U7

Name: HCP/DEV 870609 #1 Operator: BH8334 Date/Time: 6/09/87 22:06
Misc: TEST MIX BTL# 5

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C >I4056	870609	22:44
	QC6902C(S)>I4057	870609	23:23
	S6605C >I4058	870610	00:01
	S6605C(S)>I4059	870610	00:39
	S6605C(R)>I4060	870610	01:17
	S6004C >I4061	870610	01:55
	S6008C >I4062	870610	02:33
	S6058C >I4063	870610	03:11
	S7732C >I4064	870610	03:49
	S6602C >I4065	870610	04:27
	S6603C >I4068	870610	06:21
	S6604C >I4069	870610	06:59
	S6606C >I4070	870610	07:37
	S2811C >I4071	870610	08:15
	S7733C >I4072	870610	08:54
	S6054C >I4073	870610	09:32

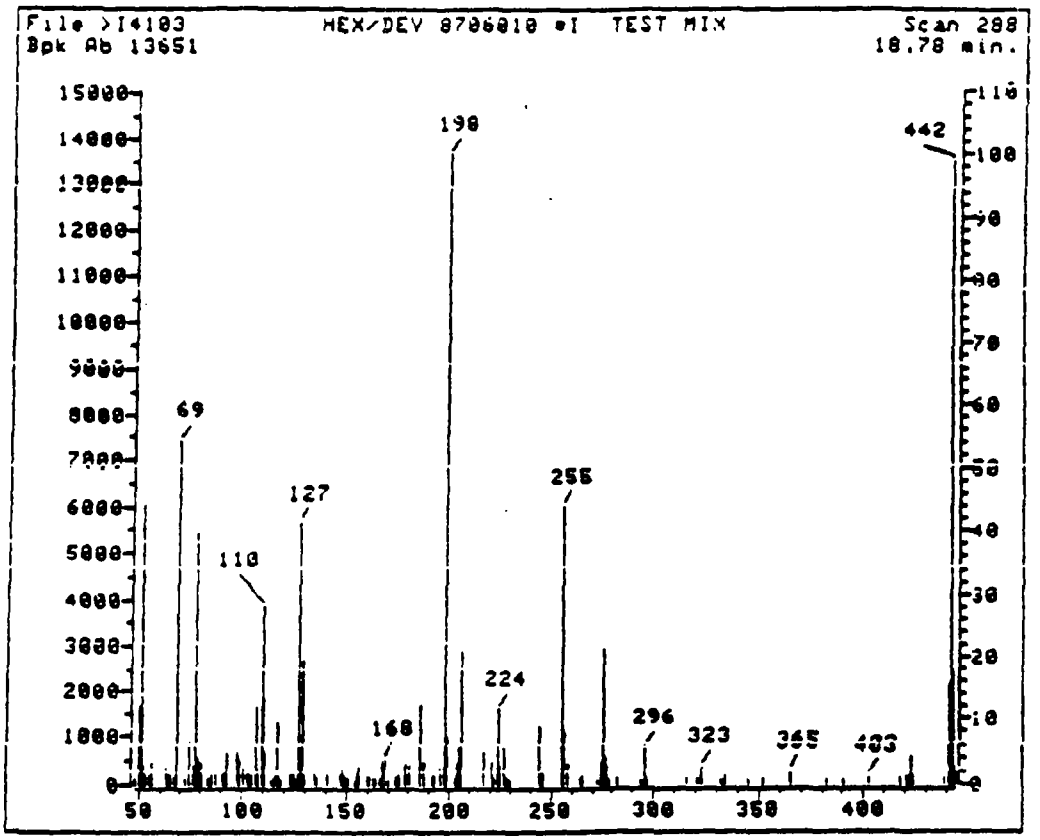

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	44.41	44.41	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	54.35	54.35	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	41.39	41.39	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.10	7.10	Ok
275	10-30% of mass 198	21.31	21.31	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	15.45	86.19	Ok
442	Greater than 40% of mass 198	99.04	99.04	Ok
443	17-23% of mass 442	17.93	18.10	Ok

Injection Date: 06/10/87 Analyst: [illegible]
Injection Time: 10:34 Processor: [illegible]
Run No: >I4103 QC Batch: QX 6403
Spectrum No: 288

ata File: >I4051::U5

: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 19:31
: TEST MIX BTL# 1

is performance tune applies to the following
mples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >I4052	870609	20:11
	STD. >I4053	870609	20:50
	STD. >I4054	870609	21:28

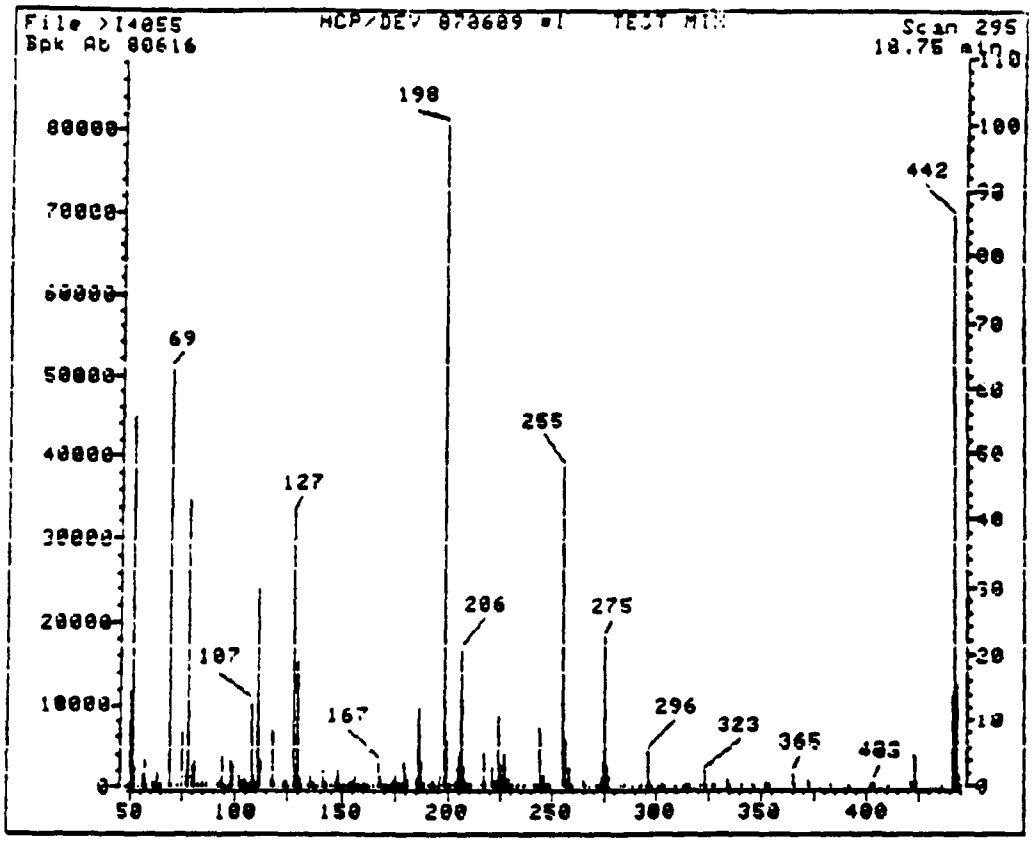

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Status
51	30-60% of mass 198	55.58	55.58	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.97	62.97	Ok
70	Less than 2% of mass 69	.31	.50	Ok
127	40-60% of mass 198	41.23	41.23	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.65	6.65	Ok
275	10-30% of mass 198	22.36	22.36	Ok
365	Greater than 1% of mass 198	2.03	2.03	Ok
441	0-100% of mass 443	13.59	88.02	Ok
442	Greater than 40% of mass 198	86.21	86.21	Ok
443	17-23% of mass 442	15.44	17.91	Ok

Injection Date: 06/09/87 Analyst: Brenda Hawkins
Injection Time: 22:06 Processor: [illegible]
Run No: >I4055 QC Batch: QC 6902
Spectrum No: 295 ENII

LAH

Data File: >J4755::U7

ame: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 17:57
isc: TEST MIX BTL#20

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4756	870607	18:44
	STD. >J4757	870607	19:46
	S2811C >J4758	870607	20:49
	S6058 >J4759	870607	23:26
	S6059 >J4760	870608	00:18
	S7733C >J4761	870608	01:10
	S6602C >J4762	870608	02:02
	S6604C >J4763	870608	02:58
	S6606C >J4764	870608	03:52

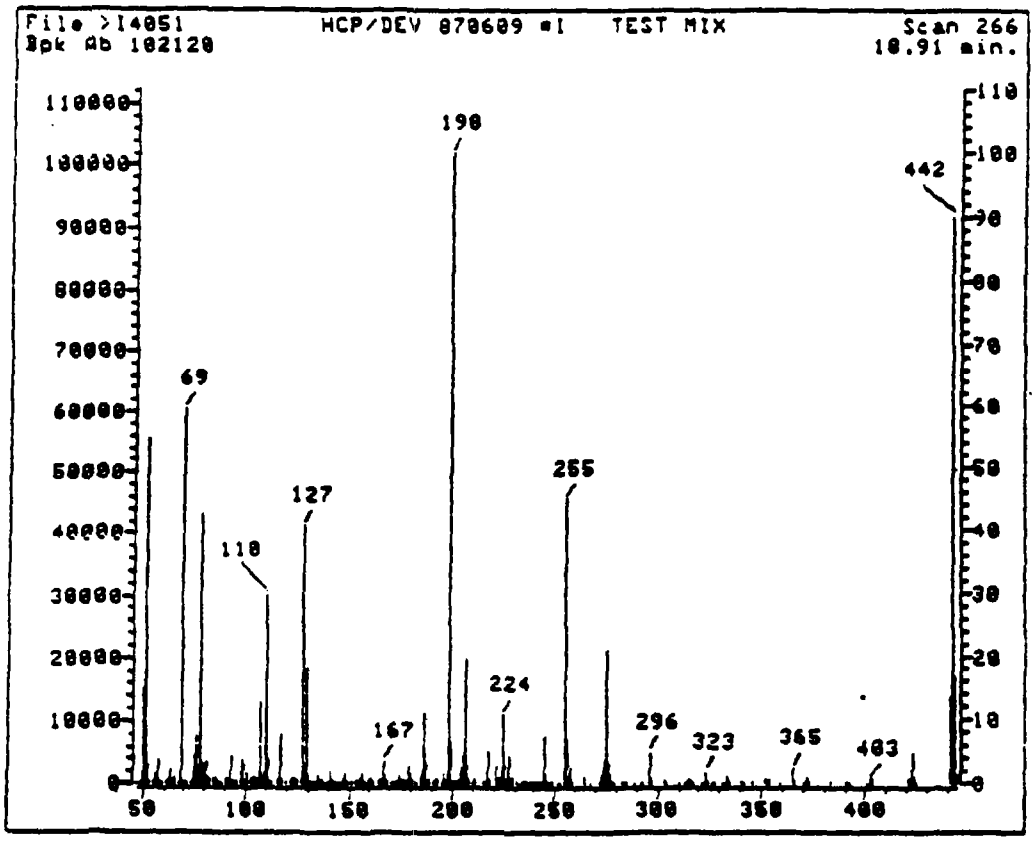

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	54.41	54.41	Ok
68	Less than 2% of mass 69	.99	1.67	Ok
69	(reference only)	59.43	59.43	Ok
70	Less than 2% of mass 69	.47	.78	Ok
127	40-60% of mass 198	40.51	40.51	Ok
197	Less than 1% of mass 198	.38	.38	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.56	6.56	Ok
275	10-30% of mass 198	20.99	20.99	Ok
365	Greater than 1% of mass 198	2.34	2.34	Ok
441	0-100% of mass 443	13.54	80.53	Ok
442	Greater than 40% of mass 198	90.15	90.15	Ok
443	17-23% of mass 442	16.81	18.65	Ok

Injection Date: 06/09/87 Analyst: MB for Brenda Hawkins
Injection Time: 19:31 Processor: [illegible]
Run No: >I4051 QC Batch: QC6962
Spectrum No: 266

L Hendel 6/20/87

MS Data File: >J4744::U6

Name: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 8:00
Misc: TEST MIX BTL# 9

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C >J4745	870607	08:39
	QC6902CS >J4746	870607	09:36
	S6605CS >J4747	870607	10:29
	S6605CR >J4748	870607	11:25
	S6603C >J4749	870607	12:17
	S6004C >J4750	870607	13:11
	S6005C >J4751	870607	14:04
	S6008C >J4752	870607	15:01
	S7731C >J4753	870607	15:59
	S7732C >J4754	870607	16:58

LAH

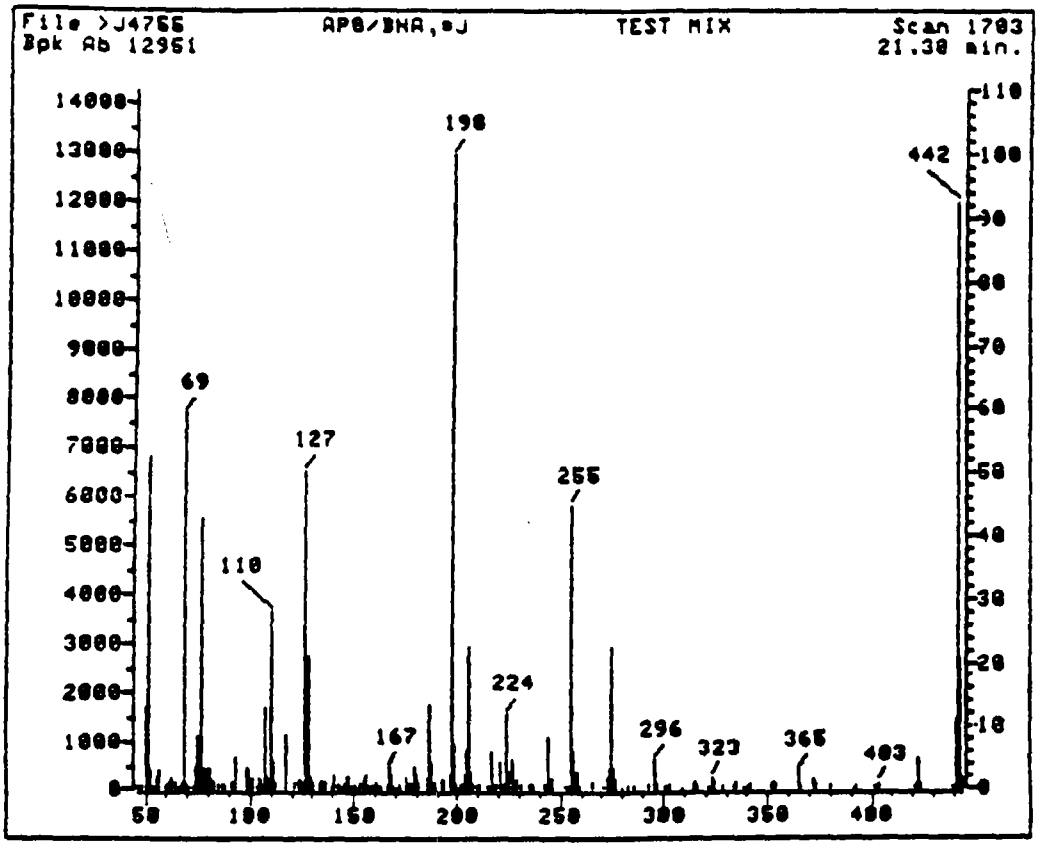

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	52.54	52.54	Ok
68	Less than 2% of mass 69	1.09	1.83	Ok
69	(reference only)	59.42	59.42	Ok
70	Less than 2% of mass 69	.69	1.16	Ok
127	40-60% of mass 198	50.29	50.29	Ok
197	Less than 1% of mass 198	.36	.36	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.03	7.03	Ok
275	10-30% of mass 198	22.58	22.58	Ok
365	Greater than 1% of mass 198	3.00	3.00	Ok
441	0-100% of mass 443	11.03	53.99	Ok
442	Greater than 40% of mass 198	92.52	92.52	Ok
443	17-23% of mass 442	20.44	22.09	Ok

Injection Date: 06/07/87 Analyst: [signature]
Injection Time: 17:57 Processor: [signature]
Run No: >J4755 QC Batch: QC6702
Spectrum No: 1703

LAH

MS Data File: >E3161::U4

Name: VOA 870515 E Operator: SB5883 Date/Time: 5/15/87 4:59
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6602V (>E3165)	870515	08:49

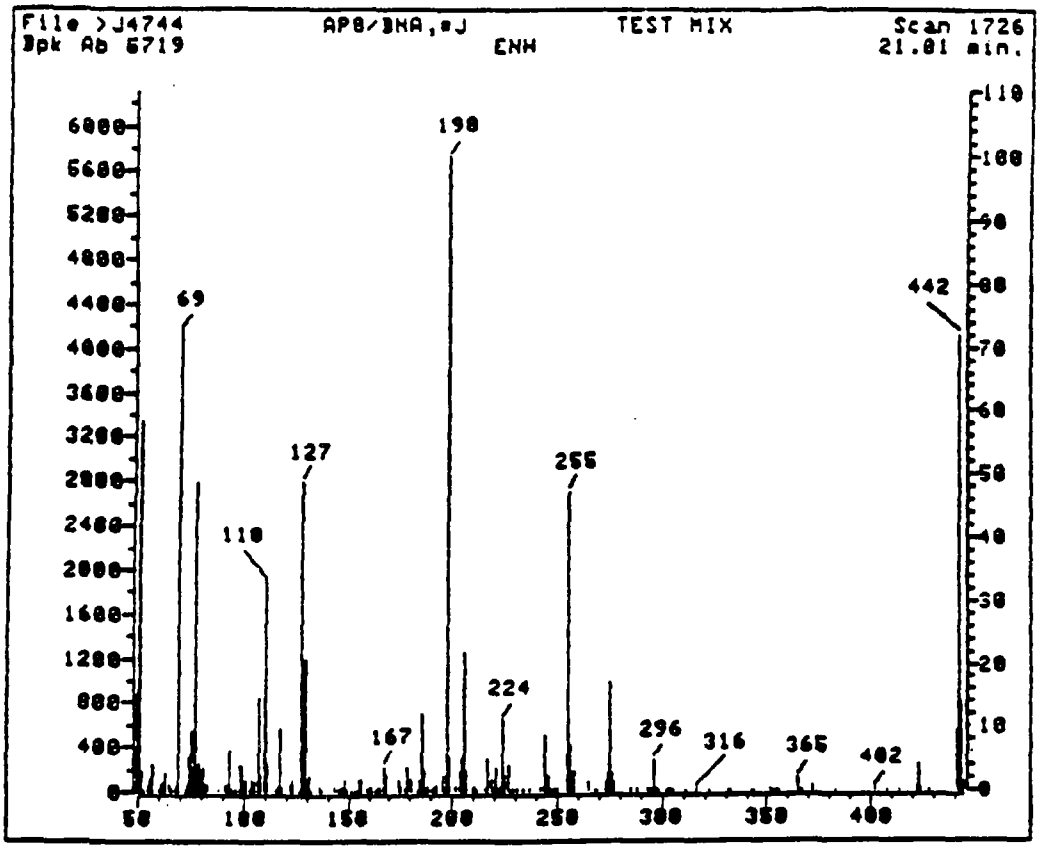

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neut Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Sta
51	30-60% of mass 198	58.59	58.59	O
68	Less than 2% of mass 69	.82	1.12	O
69	(reference only)	72.85	72.85	Ok
70	Less than 2% of mass 69	0.00	0.00	O'
127	40-60% of mass 198	48.77	48.77	O
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.52	5.52	O
275	10-30% of mass 198	17.16	17.16	O.
365	Greater than 1% of mass 198	2.02	2.02	Ok
441	0-100% of mass 443	9.28	66.01	O
442	Greater than 40% of mass 198	71.91	71.91	O
443	17-23% of mass 442	14.05	19.55	Ok

Injection Date: 06/07/87 Analyst: K Valk
Injection Time: 08:00 Processor: [illegible]
Run No: >J4744 QC Batch: QC6902
Spectrum No: 1726 and

MS Data File: >E3155::U4

Name: PP/UUA 8/0514 E Operator: MGRMS Date/Time: 5/14/87 16:14
Misc: P-8PB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6605VR (>E3149)	870514	16:52
	~~S6606V (>E3150)~~	~~870514~~	~~18:23~~ 5/17/87
	S6605V (>E3154)	870514	21:16
	S6604V (>E3155)	870514	22:01
	QC7054VS (>E3158)	870515	01:37
	QC7054VS (>E3159)	870515	02:41
	QC7054VS (>E3160)	870515	04:03

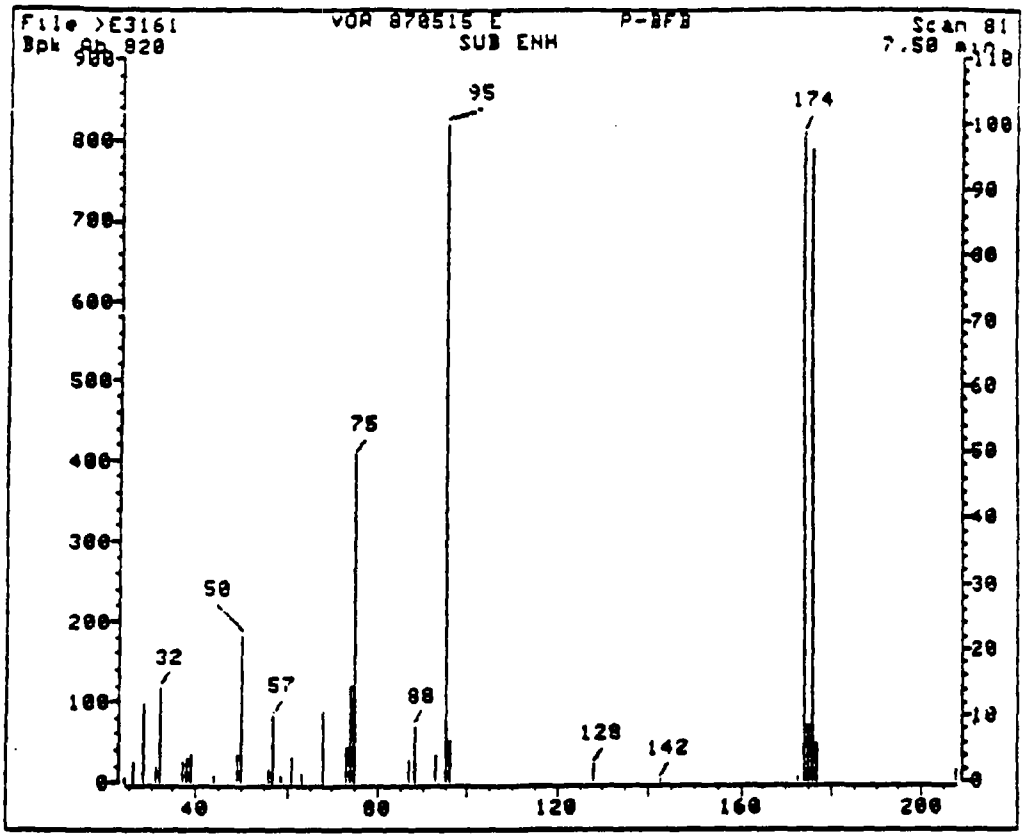

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Stat
50	15-40% of mass 95	22.24	22.24	O
75	30-60% of mass 95	49.59	49.59	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.03	6.03	O
173	Less than 1% of mass 95	.56	.56	O
174	Greater than 50% of mass 95	98.70	98.70	Ok
175	5-9% of mass 174	8.36	8.47	O
176	95-101% of mass 174	96.00	97.26	O
177	5-9% of mass 176	5.89	6.13	Ok

Injection Date: 05/15/87 Analyst: [signature]
Injection Time: 04:59 Processor: [signature]
Run No: >E3161 QC Batch: QV7054
Spectrum No: PS81, ENH, -3:4, PS91
SUB,T

5/20/87

File: \E3137::U4

OA 870514 E Operator: SB5893 Date-Time: 5-14-87 4:0[illegible]
-BFB

performance tune applies to the following
es, blanks and standards:

mple ID	Lab ID	Date of Analysis	Time of Analysis
	OC7054VS (>E3138)	870514	04:53
	OC7054VS (>E3142)	870514	09:03
	OC7054VS (>E3143)	870514	10:27
	OC7054V (>E3145)	870514	13:30
	S6603V (>E3146)	870514	14:33
	S6603VS (>E3147)	870514	15:21

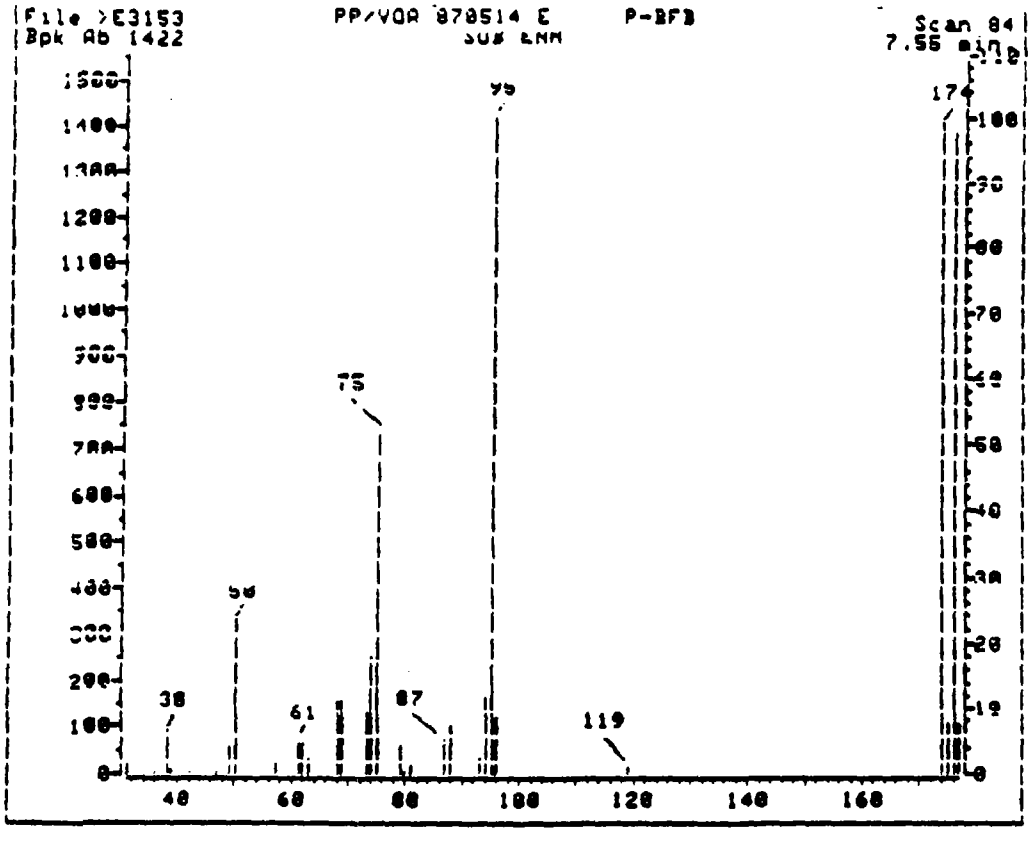

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Statu
50	15-40% of mass 95	23.30	23.30	Ok
75	30-60% of mass 95	52.04	52.04	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.52	8.52	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.25	99.25	Ok
175	5-9% of mass 174	7.83	7.89	Ok
176	95-101% of mass 174	98.00	98.74	Ok
177	5-9% of mass 176	7.51	7.66	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 16:14 Processor: [signature]
Run No: >E3153 WC Batch: QV7054
Spectrum No: PS84 (EVH) PS70
SUBT

[initials] 5/20/87

8:02 PM SAT., 13 JUNE, 1987
Sequence file: S161AI
Security Code: PZ
Channel #: 16

Subsequence 2
Method: M6903F;PZ

Dialog-Prg	Param-File
:	:

#Wshs	#Pmps	Stop
5	5	1

.so	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction AP9/Herb
Supervisor
Batch #s QC6903

Standard	Conc PPM	Lot No.
DW/Herb A	MIX	15786
DW/Herb B		15787
DW/Herb C		15787

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	24	PN4152	RN4152	100.0000	1.000000	1.000000
2	QC6903G	25	PN3523	RN3523	100.0000	1.000000	1.000000
3	DW HERBAA	26	PN3525	RN3525	100.0000	1.000000	1.000000
4	DW HERB A	27	PN3526	RN3526	100.0000	1.000000	1.000000
5	DW HERB B	28	PN3527	RN3527	100.0000	1.000000	1.000000
6	DW HERB C	29	PN3528	RN3528	100.0000	1.000000	1.000000
7	QC6903GS	30	PN3529	RN3529	100.0000	1.000000	1.000000
8	S6606G	31	PN3531	RN3531	100.0000	1.000000	1.000000
9	HEXANE	32	PN4153	RN4153	100.0000	1.000000	1.000000
	S6606GS	33	PN3532	RN3532	100.0000	1.000000	1.000000
	HEXANE	34	PN4154	RN4154	100.0000	1.000000	1.000000
12	S6605G	35	PN3535	RN3535	100.0000	1.000000	1.000000
13	S6605GR	36	PN3536	RN3536	100.0000	1.000000	1.000000
14	DW HERB A	37	PN3539	RN3539	100.0000	1.000000	1.000000
15	S6602G	38	PN3540	RN3540	100.0000	1.000000	1.000000
16	HEXANE	39	PN4155	RN4155	100.0000	1.000000	1.000000
17	S6603G	40	PN3541	RN3541	100.0000	1.000000	1.000000
18	S6604G	41	PN3542	RN3542	100.0000	1.000000	1.000000
19	HEXANE	42	PN4156	RN4156	100.0000	1.000000	1.000000
20	DW HERB C	43	PN3557	RN3557	100.0000	1.000000	1.000000

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
8A2901	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	
ETC Sample No.	*Company*	*Facility*	*Sample Point*	*Date*	*Time*	*Elapsed Hours*

John J. Fitzgerald

Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LODESTAR™ Data Management Software.

Comments on Specific Fraction

AP9/PCDX:

The high recoveries are a result of the difference in chlorination between the (native) compound and the internal standard used for quantitation. The samples results were unaffected because the respective compounds were not detected.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 25, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Total Polychlorinated Dibenzo Dioxins/Furans GC/MS Analysis Data (QR61)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
BA2901	WASTE MANAGEMENT, INC.	705	W121S	870430	1212	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ppt	MDL ppt	First ppt	Second ppt	Blank Data ppt	Concen. Added ppt	% Recov	Unspiked Sample ppt	Concen. Added ppt	% Recov
2,3,7,8-TCDD	ND	.65	ND	ND	ND	12.7	83	ND	10.0	100
TCDD	ND	.65a	ND	ND	ND	12.7	83	ND	10.0	100
PCDD	ND	7.26	ND	ND	ND	12.7	109	ND	10.0	124
HxCDD	ND	2.93	ND	ND	ND	12.7	69	ND	10.0	94
TCDF	ND	1.66	ND	ND	ND	12.7	75	ND	10.0	92
PCDF	ND	5.84	ND	ND	ND	12.7	326b	ND	10.0	150b
HxCDF	ND	2.19	ND	ND	ND	12.7	99	ND	10.0	366b

a Method Detection Limit for TCDD (total) is based on 2,3,7,8-TCDD specific isomer.

b See comments.

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: TCDD EXTRACTION

Sample Number	Log Link	Sample Amt. ml	%REC.	Comments formerly:
BA2901	21628	930		S6602
BA2902	↓	900		S6603
BA2903	↓	900		S6604
BA2904	↓	980		S6606
QT 0915 A		1000		
QT 0915 B		1000		
QT 0915 S		1000		
BA2902 S		790		
BA2903 R		880		

QT Batch # 0915

Analysis AP9/PCDX

Matrix WATER

Date 6/9–6/10/87

Supervisor S. D. G[illegible]

Extraction Team

B. C[illegible]

P. C[illegible]

M. V[illegible]

Cleanup A, B, 1D

Standard & Reagent	Conc PPM	Lot #
Internal Standard		16203
Surrogate		"
Recovery Standard		
Native		16204
Acid Alumina		
Basic Alumina		
Carbopack/Celite		

COMMENTS

UPD/Supervisor: [signature] 6-12-87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6/15/87- 6/16/87 SHIFT
FRACTION PCDx - AP9
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE JRH
METHOD FILE PCDXH9
ID FILE H9PCDX
ANALYST(S) J Hendell
SUPERVISOR J Hendell
BATCH #'s 0915

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
PC		C-051-03	2
CC2		16253	2
Recovery Std		15695	5

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS YN TIME
PC	>H0940	2ml			H-232		1808
CCII	H0941	↓					1913
QT0915AT	H0942						2011
QT0915BT	H0943						2129
QT0915TS	H0944						2222
BA2902TS	H0945						2350
PC	H0946						0043
CCII	H0947						0209
BA2901T	H0948						0300
BA2902T	H0949						0412
BA2903T	H0950						0526
BA2903TR	H0951						0633
BA2904T	H0952						0743
PC	H0953						0851
CCII	H0954	✓				Not Run	0956

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LA[redacted]RATORY CHRONICLE: GC-MS [redacted]epartment

DATE 870615 SHIFT
FRACTION MI-PCDX
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE
METHOD FILE PCDYH9
D FILE H9PCDX
ANALYST(S) Tom Rusowicz

SUPERVISOR Thomas Rusowicz
BATCH #'s INIT- CALIB

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
CQ		DATE	
WIP		BY	

STANDARD	CONC ~~PPM~~ ng/ml	LOT NO.	LOT VOL.
PC		C-091-03	
CC1	200	16252	
CC2	500	16253	
CC3	1000	16254	
CC4	2000	16255	
CC5	5000	16256	

NAME	DATA FILE ~~H~~	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	~~PLUS~~ ~~YIA~~ Time
PC	~~0920~~ 0919	2ul			H-233		1624
CC1	0921						2357
CC1	0922						0052
CC1	0923						0144
C2	0924						0255
CC2	0925						0406
CC2	0926						0458
CC3	0927						0604
CC3	0928						0738
CC3	0929						0848
CC4	0930						0952
CC4	0931						1146
CC4	0932						1244
PC	0933						1429
PC	0934						1847
CC5	0935						1941
CC5	0936						2057
CC5	0937						2212
CC2	0938						2313
PC	0939	✓					0107

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

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APPENDIX IX
GRAND TABLE

	COMPOUND NAME	FRACTION	TABLE
1	Acetonitrile	HTP&T	QR57
2	Acetophenone	A/B/N	QR59
4	2-Acetylaminofluorene	A/B/N	QR59
7	Acrolein	HTP&T	QR57
9	Acrylonitrile	HTP&T	QR57
11	Aldrin	PEST/HERB	QR56
12	Allyl alcohol	HTP&T	QR57
13A	Aluminum	METALS	QR60
14	4-Aminobiphenyl	A/B/N	QR59
18	Aniline	A/B/N	QR59
19A	Antimony	METALS	QR60
20	Aramite	A/B/N	QR59
21A	Arsenic	METALS	QR60
27A	Barium	METALS	QR60
30	Benzo(a)anthracene	A/B/N	QR59
31	Benzene	P&T	QR58
34	Benzenethiol	A/B/N	QR59
35	Benzidine	A/B/N	QR59
36	Benzo(b)fluoranthene	A/B/N	QR59
38	Benzo(a)pyrene	A/B/N	QR59
39	p-Benzoquinone	A/B/N	QR59
42A	Beryllium	METALS	QR60
43	bis(2-Chloroethoxy)methane	A/B/N	QR59
44	bis(2-Chloroethyl) ether	A/B/N	QR59
46	bis(2-Chloroisopropyl)ether	A/B/N	QR59
48	bis(2-ethylhexyl)phthalate	A/B/N	QR59
50	Methyl bromide	P&T	QR58
51	4-Bromophenyl phenyl ether	A/B/N	QR59
54	Butyl benzyl phthalate	A/B/N	QR59
55	2-sec-Butyl-4,6-dinitrophenol	A/B/N	QR59
56A	Cadmium	METALS	QR60
57A	Calcium	METALS	QR60
59	Carbon disulfide	P&T	QR58
63	Chlordane	PEST/HERB	QR56
65A	Chloroethane	P&T	QR58
71	p-Chloroaniline	A/B/N	QR59
72	Chlorobenzene	P&T	QR58
73	Chlorobenzilate	PEST/HERB	QR56
74	4-Chloro-m-cresol	A/B/N	QR59
76	2-Chloroethyl vinyl ether	P&T	QR58
77	Chloroform	P&T	QR58
78	Methyl chloride	P&T	QR58
80	2-Chloronaphthalene	A/B/N	QR59
81	2-Chlorophenol	A/B/N	QR59
83	3-Chloropropionitrile	A/B/N	QR59
84A	Chromium	METALS	QR60
85	Chrysene	A/B/N	QR59
87A	Acenapthene	A/B/N	QR59
87B	Acenaphthalene	A/B/N	QR59
87C	Anthracene	A/B/N	QR59
87D	Benzo(ghi)perylene	A/B/N	QR59
87E	Benzo(k)fluoranthene	A/B/N	QR59
87F	Fluorene	A/B/N	QR59
87G	Phenathrene	A/B/N	QR59
87H	Pyrene	A/B/N	QR59
88A	Copper	METALS	QR60
89B	2-Nitrophenol	A/B/N	QR59
90A	p-Cresol	A/B/N	QR59

90B	m-p-Cresols	A/B/N	QR59
92A	Cyanide, Total	METALS	QR60
100	4,4'-DDD	PEST/HERB	QR56
101	4,4'-DDE	PEST/HERB	QR56
102	4,4'-DDT	PEST/HERB	QR56
106	Dibenzo(a,h)anthracene	A/B/N	QR59
108	Dibenzo(a,e)pyrene	A/B/N	QR59
109	Dibenzo(a,h)pyrene	A/B/N	QR59
110	Dibenzo(a,i)pyrene	A/B/N	QR59
111	1,2-Dibromo-3-chloropropane	P&T	QR58
112	1,2-Dibromoethane	P&T	QR58
113	Dibromomethane	P&T	QR58
114	Di-n-butyl phthalate	A/B/N	QR59
115	1,2-Dichlorobenzene	A/B/N	QR59
116	1,3-Dichlorobenzene	A/B/N	QR59
117	1,4-Dichlorobenzene	A/B/N	QR59
119	3,3'-Dichlorobenzidine	A/B/N	QR59
120	1,4-Dichlor0-2-butene	P&T	QR58
121	Dichlorodifluoromethane	P&T	QR58
122	1,1-Dichloroethane	P&T	QR58
123	1,2-Dichloroethane	P&T	QR58
124	1,2-Trans-dichloroethylene	P&T	QR58
126	1,1-Dichloroethylene	P&T	QR58
127	Methylene chloride	P&T	QR58
128	2,4-Dichlorophenol	A/B/N	QR59
129	2,6-Dichlorophenol	A/B/N	QR59
130	2,4-D	PEST/HERB	QR56
133	1,2-Dichloropropane	P&T	QR58
136A	cis-1,3-Dichloropropylene	P&T	QR58
136B	trans-1,3-Dichloropropylene	P&T	QR58
137	Dieldrin	PEST/HERB	QR56
143	Diethyl phthalate	A/B/N	QR59
144	Thionazin	PEST/HERB	QR56
150	3,3'-Dimethoxybenzidine	A/B/N	QR59
151	p-Dimethylaminoazobenzene	A/B/N	QR59
152	7,12-Dimethylbenzol[a]anthracene	A/B/N	QR59
153	3,3'-Dimethylbenzidine	A/B/N	QR59
158	alpha-alpha-Dimethylphenethylamine	A/B/N	QR59
159	2,4-Dimethylphenol	A/B/N	QR59
160	Dimethyl phthalate	A/B/N	QR59
162A	m-Dinitrobenzene	A/B/N	QR59
163	4,6-Dinitro-o-cresol	A/B/N	QR59
164	2,4-Dinitrophenol	A/B/N	QR59
165	2,4-Dinitrotoluene	A/B/N	QR59
166	2,6-Dinitrotoluene	A/B/N	QR59
167	Di-n-octyl phthalate	A/B/N	QR59
168	1,4-Dioxane	HTP&T	QR57
169	Diphenylamine	A/B/N	QR59
170	1,2-Diphenylhydrazine	A/B/N	QR59
171	Di-n-propylnitrosamine	A/B/N	QR59
172	Disulfoton	PEST/HERB	QR56
174A	Endosulfan I	PEST/HERB	QR56
174B	Endosulfan II	PEST/HERB	QR56
175	Endrin	PEST/HERB	QR56
177	Ethyl cyanide	HTP&T	QR57
180	Ethylene oxide	HTP&T	QR57
182	Ethyl methacrylate	P&T	QR58
184	Fluoranthene	A/B/N	QR59
191A	Chlorodibromomethane	P&T	QR58
191B	Dichlorobromomethane	P&T	QR58
192	Heptachlor	PEST/HERB	QR56
193	Heptachlor epoxide	PEST/HERB	QR56
194	Hexachlorobenzene	A/B/N	QR59
195	Hexachlorobutadiene	A/B/N	QR59
196A	Alpha-BHC	PEST/HERB	QR56
196B	Beta-BHC	PEST/HERB	QR56
196C	Gamma-BHC	PEST/HERB	QR56

196D	Delta-BHC	PEST/HERB	QR56
197	Hexachlorocyclopentadiene	A/B/N	QR59
198	Hexachloroethane	A/B/N	QR59
199	Isodrin	A/B/N	QR59
200	Hexachlorophene	A/B/N	QR59
201	Hexachloropropene	A/B/N	QR59
208	Indeno(1,2,3-cd)pyrene	A/B/N	QR59
209	Iodomethane	P&T	QR58
210A	Iron	METALS	QR60
212	Isobutyl alcohol	HTP&T	QR57
213	Isosafrole	A/B/N	QR59
214	Kepone	PEST/HERB	QR56
216A	Lead	METALS	QR60
222	Malononitrile	A/B/N	QR59
225A	Mercury	METALS	QR60
226	Methacrylonitrile	HTP&T	QR57
228	Methapyrilene	A/B/N	QR59
230	Methoxychlor	PEST/HERB	QR56
232	3-Methylcholanthrene	A/B/N	QR59
234	4,4'-Methylenebis(2-chloroaniline)	A/B/N	QR59
235	Methyl ethyl ketone	P&T	QR58
238	Methyl methacrylate	P&T	QR58
239	Methyl methanesulfonate	A/B/N	QR59
242	Methyl parathion	PEST/HERB	QR56
245	Naphthalene	A/B/N	QR59
246	1,4-Naphthoquinone	A/B/N	QR59
247	1-Naphthylamine	A/B/N	QR59
248	2-Naphthylamine	A/B/N	QR59
250A	Nickel	METALS	QR60
255	p-Nitroaniline	A/B/N	QR59
256	Nitrobenzene	A/B/N	QR59
261	4-Nitrophenol	A/B/N	QR59
263A	N-Nitrosodiphenylamine	A/B/N	QR59
264	N-Nitrosodi-n-butylamine	A/B/N	QR59
266	N-Nitrosodiethylamine	A/B/N	QR59
267	N-Nitrosodimethylamine	A/B/N	QR59
269	N-Nitrosomethylethylamine	A/B/N	QR59
273	N-Nitrosomorpholine	A/B/N	QR59
275	N-Nitrosopiperidine	A/B/N	QR59
276	N-Nitrosopyrrolidine	HTP&T	QR57
278	5-Nitro-o-toluidine	A/B/N	QR59
280A	Osmium	METALS	QR60
283	Parathion	PEST/HERB	QR56
284	Pentachlorobenzene	A/B/N	QR59
285	Pentachloroethane	P&T	QR58
286	Pentachloronitrobenzene	A/B/N	QR59
287	Pentachlorophenol	A/B/N	QR59
288	Phenacetin	A/B/N	QR59
289	Phenol	A/B/N	QR59
295	Phorate	PEST/HERB	QR56
296	Famphur	PEST/HERB	QR56
299	2-Picoline	A/B/N	QR59
300A	Aroclor 1242	PCB/GC/EC	QR30
300B	Aroclor 1254	PCB/GC/EC	QR30
300C	Aroclor 1260	PCB/GC/EC	QR30
300D	Aroclor 1248	PCB/GC/EC	QR30
300E	Aroclor 1232	PCB/GC/EC	QR30
300F	Aroclor 1221	PCB/GC/EC	QR30
300G	Aroclor 1016	PCB/GC/EC	QR30
301A	Potassium	METAL	QR60
303	Pronamide	A/B/N	QR59
307	2-Propyn-1-ol	HTP&T	QR57
308	Pyridine	HTP&T	QR57
310	Resorcinol	A/B/N	QR59
312	Safrole	A/B/N	QR59
314A	Selenium	METALS	QR60
317A	Silver	METALS	QR60

319A	Sodium	METALS	QR60
323	1,2,4,5-Tetrachlorobenzene	A/B/N	QR28
324	2,3,7,8-TCDD	DIOXIN	QR61
326	1,1,1,2-Tetrachloroethane	P&T	QR58
327	1,1,2,2-Tetrachloroethane	P&T	QR56
328	Tetrachloroethylene	P&T	QR58
329	Carbon tetrachloride	P&T	QR58
330	2,3,4,6-Tetrachlorophenol	A/B/N	QR59
331	Tetraethyldithiopyrophosphate	A/B/N	QR59
335A	Thallium	METALS	QR60
347	Toluene	P&T	QR58
351	Toxaphene	PEST/HERB	QR56
352	Bromoform	P&T	QR58
353	1,2,4-Trichlorobenzene	A/B/N	QR59
354	1,1,1-Trichloroethane	P&T	QR58
355	1,1,2-Trichloroethane	P&T	QR58
356	Trichloroethylene	P&T	QR58
357	Trichloromethanethiol	P&T	QR58
358	Trichlorofluoromethane	P&T	QR58
359	2,4,5-Trichlorophenol	A/B/N	QR59
360	2,4,6-Trichlorophenols	A/B/N	QR59
361	2,4,5-T	PEST/HERB	QR56
362	2,4,5-TP (Silvex)	PEST/HERB	QR56
364	1,2,3-Trichloropropane	P&T	QR58
368	tris(2,3-Dibromopropyl) phosphate	A/B/N	QR59
372A	Vanadium	METALS	QR60
373	Vinyl chloride	P&T	QR58
374A	Zinc	METALS	QR60
	Endrin aldehyde	PEST/HERB	QR56
	2-Chloro-1,3-butadiene	P&T	QR58
	3-Chloropropene	P&T	QR58
	Acetone	P&T	QR58
	Ethylbenzene	P&T	QR58
	2-Hexanone	P&T	QR58
	Methyl-iso-butyl ketone	P&T	QR58
	Styrene	P&T	QR58
	Vinyl acetate	P&T	QR58
	m-Xylene	P&T	QR58
	o+p Xylenes	P&T	QR58
	Magnesium	METAL	QR60
	Manganese	METAL	QR60
	Tin	METAL	QR60
	Cobalt	METAL	QR60
	Sulfide as S	METAL	QR60
	Fluoride	METAL	QR60
	Benzoic acid	A/B/N	QR59
	Benzyl alcohol	A/B/N	QR59
	Dibenzofuran	A/B/N	QR59
	Isophorone	A/B/N	QR59
	2-Methylnaphthalene	A/B/N	QR59
	o-Nitroaniline	A/B/N	QR59
	m-Nitroaniline	A/B/N	QR59
	4-Chlorophenyl phenyl ether	A/B/N	QR59
	Hexachlorodibenzo-p-dioxins	DIOXIN	QR61
	Pentachlorodibenzodioxin	DIOXIN	QR61
	Tetrachlorodibenzodioxin	DIOXIN	QR61
	Hexachlorodibenzofurans	DIOXIN	QR61
	Pentachlorodibenzofuran	DIOXIN	QR61
	Tetrachlorodibenzofuran	DIOXIN	QR61

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9-Heated Purge and Trap Compounds-GC/MS Analysis Data (QR57)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1	Acetonitrile	ND	10	ND	ND	ND	100	102	ND	100	82
7	Acrolein	ND	100	ND	ND	ND	100	79	ND	100	105
9	Acrylonitrile	ND	100	ND	ND	ND	100	72	ND	100	74
12	Allyl alcohol	ND	8.0	ND	ND	ND	500	191	ND	500	47
168	1,4-Dioxane	ND	10	ND	ND	ND	500	160	57.2	500	36
177	Ethyl cyanide	ND	8.0	ND	ND	ND	500	95	ND	500	116
180	Ethylene oxide	ND		ND	ND	ND	0	-	ND	0	-
212	Isobutyl alcohol	ND	8.0	ND	ND	ND	500	108	ND	500	72
226	Methacrylonitrile	ND	40	ND	ND	ND	500	81	ND	500	103
276	N-Nitrosopyrrolidine	IND		IND	IND	IND	500	0	IND	500	0
307	2-Propyn-1-ol	IND		IND	IND	IND	500	0	IND	500	0
308	Pyridine	ND	80	ND	ND	ND	500	222a	ND	500	19a

a Recovery normally variable using established methodology.

* See Appendix table for complete compound name and specifications.
** MDL: established method detection limit.
* Specifies no standard or reference spectra available.
* Interferences, standard and/or peaks could not be detected at current method levels.
Result with neither "ND" nor "IND" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Purge & Trap Compounds – GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC	705	W123S	870430	1400	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
31 Benzene	6.40	4.4	6.40	6.34	ND	18.0	105	ND	18.0	100
50 Methyl bromide	ND	10	ND	ND	ND	18.0	128	ND	18.0	169
59 Carbon disulfide	ND	10	ND	ND	ND	18.0	32	ND	18.0	159
65A Chloroethane	ND	10	ND	ND	ND	18.0	94	ND	18.0	132
72 Chlorobenzene	ND	6.0	ND	ND	ND	18.0	99	ND	18.0	98
2-Chloro-1,3-butadiene	ND		ND	ND	ND	0	-	ND	0	-
76 2-Chloroethylvinyl ether	ND	10	ND	ND	ND	18.0	0a	ND	18.0	0a
77 Chloroform	ND	1.6	ND	ND	ND	18.0	98	ND	18.0	85
78 Methyl chloride	ND	10	ND	ND	ND	18.0	103	ND	18.0	153
3-chloropropene	ND		ND	ND	ND	0	-	ND	0	-
111 1,2-Dibromo-3-chloropropane	ND	10	ND	ND	ND	18.0	101	ND	18.0	103
112 1,2-Dibromoethane	ND	10	ND	ND	ND	50.0	106	ND	50.0	108
113 Dibromomethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	80
120 1,4-Dichloro-2-butene	ND	10	ND	ND	ND	50.0	93	ND	50.0	87
121 Dichlorodifluoromethane	ND	10	ND	ND	ND	18.0	102	ND	18.0	166
122 1,1-Dichloroethane	ND	4.7	ND	ND	ND	18.0	93	ND	18.0	92
123 1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	99	ND	18.0	90
124 1,2-Trans-dichloroethylene	ND	1.6	ND	ND	ND	18.0	89	ND	18.0	72
126 1,1-Dichloroethylene	18.5	2.8	18.5	15.4	ND	18.0	108	ND	18.0	98
127 Methylene chloride	5.27	2.8	5.27	9.68	ND	18.0	82	8.37	18.0	87
133 1,2-Dichloropropane	ND	6.0	ND	ND	ND	18.0	96	ND	18.0	90
136A cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18.0	104	ND	18.0	101
136B trans-1,3-Dichloropropylene	ND	10	ND	ND	ND	18.0	105	ND	18.0	90
191A Chlorodibromomethane	ND	3.1	ND	ND	ND	18.0	99	ND	18.0	109
191B Dichlorobromomethane	ND	2.2	ND	ND	ND	18.0	105	ND	18.0	100
182 Ethyl methacrylate	ND	10	ND	ND	ND	50.0	99	ND	50.0	99
209 Iodomethane	ND	10	ND	ND	ND	50.0	82	ND	50.0	99
235 Methyl ethyl ketone	ND	10	ND	ND	ND	18.0	94	ND	18.0	82
238 Methyl methacrylate	ND	10	ND	ND	ND	50.0	100	ND	50.0	98
285 Pentachloroethane	ND	10	ND	ND	ND	50.0	96	ND	50.0	66
326 1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	97
327 1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	96	ND	18.0	92

*This trend table for complete compound name and specifications.
**MDL/CRQL established method detection limit.
--specified no standard or reference spectra available.
--ND: Nondetectable. Standard and/or spikes could not be detected at current method levels.
Results with neither "MDL" nor "Comp.added" specified no standard available, compound not qualitatively searched for.

1 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 - Purge & Trap Compounds - GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
328	Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	98	ND	18.0	114
329	Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	108	ND	18.0	108
347	Toluene	BMDL	6.0	1.42	ND	ND	18.0	97	ND	18.0	97
352	Bromoform	ND	4.7	ND	ND	ND	18.0	102	ND	18.0	131
354	1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	109	ND	18.0	111
355	1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	100	ND	18.0	102
357	Trichloromethanethiol	-	-	-	-	-	-	-	-	-	-
356	Trichloroethylene	ND	1.9	ND	ND	ND	18.0	101	ND	18.0	101
358	Trichlorofluoromethane	ND	10	ND	ND	ND	18.0	98	ND	18.0	116
364	1,2,3-Trichloropropane	ND	10	ND	ND	ND	18.0	98	ND	18.0	105
373	Vinyl chloride	13.9	10	13.9	9.27	ND	18.0	99	ND	18.0	175
	Acetone	20.0	10	20.0	34.8	17.3	90.0	76	28.0	90.0	103
	Ethylbenzene	ND	7.2	ND	ND	ND	18.0	102	ND	18.0	103
	2-Hexanone	ND	10	ND	ND	ND	90.0	78	ND	[illegible]	78
	Methyl-iso-butyl ketone	ND	10	ND	ND	ND	90.0	96	ND	[illegible]	93
	Styrene	ND	10	ND	ND	ND	18.0	102	ND	[illegible]	104
	Vinyl acetate	ND	10	ND	ND	ND	90.0	88	ND	[illegible]	72
	m-Xylene	ND	10	ND	ND	ND	15.0	105	ND	15.0	110
	o+p-Xylenes	BMDL	10	2.66	2.54	ND	30.0	104	ND	30.0	110

* Recovery normally variable using established methodology.

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
86604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

Compound #	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2 Acetophenone	ND	10	110	123	ND	100	136	ND	103	107
4 2-Acetylaminofluorene	ND	10	142	197	ND	250	67	ND	256	55
14 4-Aminobiphenyl	ND	10	71.0	84.0	ND	250	55	ND	256	28
18 Aniline	ND	10	137	161	ND	150	103	ND	154	89
20 Aramite	ND	10	275	212	ND	250	98	ND	256	107
30 Benzo(a)anthracene	ND	8.0	85.1	97.9	ND	100	100	ND	103	83
34 Benzenethiol	IND		IND	IND	IND	300	0	IND	308	0
36 Benzo(b)fluoranthene	ND	10	173	198	ND	100	149	ND	103	169
38 Benzo(a)pyrene	ND	2.6	165	193	ND	100	165	ND	103	161
39 p-Benzoquinone	ND	10	ND	ND	ND	150	0	ND	154	0
35 Benzidine	ND	45	ND	ND	ND	100	0	ND	103	0
43 bis(2-Chloroethoxy)methane	ND	5.4	90.2	103	ND	100	103	ND	103	88
44 bis(2-Chloroethyl) ether	ND	5.8	107	107	ND	100	123	ND	103	104
46 bis(2-Chloroisopropyl)ether	ND	5.8	85.8	102	ND	100	102	ND	103	84
48 bis(2-Ethylhexyl)phthalate	ND	10	135	142	ND	100	164	ND	103	132
51 4-Bromophenyl phenyl ether	ND	1.9	108	111	ND	100	122	ND	103	105
54 Butyl benzyl phthalate	ND	10	78.0	80.3	ND	100	88	ND	103	76
55 2-sec-Butyl-4,6-dinitrophen	ND	10	225	258	ND	300	85	ND	308	73
71 p-Chloroaniline	ND	10	171	219	ND	150	147	ND	154	111
74 p-Chloro-m-cresol	ND	3.1	83.1	76.4	ND	100	91	ND	103	81
80 2-Chloronaphthalene	ND	1.9	113	136	ND	100	133	ND	103	110
81 2-Chlorophenol	ND	3.4	82.1	71.3	ND	100	114	ND	103	80
83 3-Chloropropionitrile	ND	10	105	ND	ND	250	69	ND	256	41
85 Chrysene	ND	2.6	89.7	92.3	ND	100	116	ND	103	87
87A Acenaphthene	ND	1.9	84.0	100	ND	100	103	ND	103	82
87B Acenaphthylene	ND	3.6	81.7	103	ND	100	101	ND	103	80
87C Anthracene	ND	1.9	95.8	111	ND	100	109	ND	103	93
87D Benzo(ghi)perylene	ND	4.2	ND	ND	ND	0	-	ND	0	-
87E Benzo(k)fluoranthene	ND	3.6	166	215	ND	100	219	ND	103	162
87F Fluorene	ND	1.9	76.7	94.2	ND	100	102	ND	103	75
87G Phenanthrene	ND	5.5	92.6	108	ND	100	106	ND	103	90
87H Pyrene	ND	1.9	67.9	73.4	ND	100	87	ND	103	66

*Listed limit for complete compound name and specifications.
**Lowest established method detection limit.
-specifies no standard or reference spectra available.
IND- Indeterminate. Standard and/or spikes could not be detected at current method levels.
Results with neither "ND" nor "Conc. added" specifies no standard available, compound not analytically searched for.

Jun 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
89B	2-Nitrophenol	ND	3.7	69.6	66.8	ND	100	100	ND	103	68
90A	o-Cresol	ND	10	81.1	87.7	ND	100	84	ND	103	79
90B	m+p-Cresols	ND	10	154	168	ND	200	80	ND	205	75
106	Dibenzo(a,h)anthracene	ND	10	ND	ND	ND	0	-	ND	0	-
108	Dibenzo(a,e)pyrene	ND		ND	ND	ND	0	-	ND	0	-
109	Dibenzo(a,h)pyrene	-	-	-	-	-	-	-	-	-	-
110	Dibenzo(a,i)pyrene	IND		IND	IND	IND	500	0	IND	513	0
114	Di-n-butyl phthalate	BMDL	10	112	131	ND	100	125	1.57	103	107
115	1,2-Dichlorobenzene	ND	1.9	87.1	96.5	ND	100	99	ND	103	85
116	1,3-Dichlorobenzene	ND	1.9	80.0	90.4	ND	100	87	ND	103	78
117	1,4-Dichlorobenzene	ND	4.5	74.8	89.0	ND	100	88	ND	103	73
119	3,3'-Dichlorobenzidine	ND	17	74.4	77.4	ND	100	102	ND	103	73
128	2,4-Dichlorophenol	ND	2.8	77.8	72.0	ND	100	106	ND	103	76
129	2,6-Dichlorophenol	ND	10	106	102	ND	100	112	ND	103	103
143	Diethyl phthalate	ND	10	70.3	94.4	ND	100	89	ND	103	69
150	3,3'-Dimethoxybenzidine	ND	10	ND	ND	ND	150	0	ND	154	0
151	p-Dimethylaminoazobenzene	ND	10	156	147	ND	150	117	ND	154	102
152	7,12-Dimethylbenzo(a)anthra	ND	10	122	157	ND	150	95	ND	154	79
153	3,3'-Dimethylbenzidine	ND	10	ND	ND	ND	150	29	ND	154	0
158	a-a-Dimethylphenethylamine	-	-	-	-	-	-	-	-	-	-
159	2,4-Dimethylphenol	ND	2.8	104	121	ND	100	111	ND	103	101
160	Dimethyl phthalate	ND	10	73.8	93.3	ND	100	93	ND	103	72
162A	m-Dinitrobenzene	ND	10	110	142	ND	150	92	ND	154	71
163	4,6-Dinitro-o-cresol	ND	25	67.8	91.9	ND	100	41	ND	103	66
164	2,4-Dinitrophenol	ND	43	83.6	124	ND	100	0	ND	103	81
165	2,4-Dinitrotoluene	ND	5.8	67.7	92.8	ND	100	79	ND	103	66
166	2,6-Dinitrotoluene	ND	1.9	83.2	102	ND	100	101	ND	103	81
167	Di-n-octyl phthalate	ND	10	137	176	ND	100	154	ND	103	133
169	Diphenylamine	ND	10	216	242	ND	150	173	ND	154	141
170	1,2-Diphenylhydrazine	ND	10	92.0	108	ND	100	121	ND	103	90
171	N-Nitrosodi-n-propylamine	ND	10	89.8	97.1	ND	100	105	ND	103	88
184	Fluoranthene	ND	2.3	74.5	84.7	ND	100	96	ND	103	73

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
194	Hexachlorobenzene	ND	1.9	98.1	105	ND	100	105	ND	103	96
195	Hexachlorobutadiene	ND	.92	66.5	79.6	ND	100	82	ND	103	65
197	Hexachlorocyclopentadiene	ND	10	ND	ND	ND	0	-	ND	0	-
198	Hexachloroethane	ND	1.6	72.8	85.7	ND	100	79	ND	103	71
199	Isodrin	ND	6.1	132	166	ND	150	105	ND	154	86
200	Hexachlorophene	ND	10	ND	ND	ND	300	0	ND	308	0
201	Hexachloropropene	ND	10	43.4	23.5	ND	150	20	ND	154	28
208	Indeno(1,2,3-cd)pyrene	ND	10	ND	ND	ND	0	-	ND	0	-
213	Isosafrole	ND	10	43.2	55.9	ND	150	24	ND	154	28
222	Malononitrile	IND		IND	IND	IND	500	0	IND	513	0
228	Methapyrilene	IND		IND	IND	IND	500	0	IND	513	0
232	3-Methylcholanthrene	ND	10	82.2	112	ND	150	68	ND	154	53
234	4,4'-Methylenebis(2-chloroa	ND	10	57.8	33.8	ND	150	63	ND	154	38
239	Methyl methanesulfonate	ND	10	63.9	68.0	ND	150	71	ND	154	42
245	Naphthalene	ND	1.6	92.7	100	ND	100	100	ND	103	90
246	1,4-Naphthoquinone	ND	10	7.00	14.3	ND	150	79	ND	154	5
247	1-Naphthylamine	ND	10	94.8	160	ND	150	108	ND	154	62
248	2-Naphthylamine	ND	10	57.4	69.6	ND	150	57	ND	154	37
255	p-Nitroaniline	ND	10	75.8	80.3	ND	100	91	ND	103	74
256	Nitrobenzene	ND	1.9	93.0	98.9	ND	100	108	ND	103	91
261	4-Nitrophenol	ND	2.5	ND	ND	ND	100	0	ND	103	0
263A	N-Nitrosodiphenylamine	ND	1.9	182	240	ND	100	251	ND	103	177
264	N-Nitrosodi-n-butylamine	ND	10	141	163	ND	100	164	ND	103	138
266	N-Nitrosodiethylamine	ND	10	95.7	ND	ND	150	83	ND	154	62
267	N-Nitrosodimethylamine	ND	10	ND	ND	ND	100	0	ND	103	0
269	N-Nitrosomethylethylamine	ND	10	186	196	ND	500	41	ND	513	36
273	N-Nitrosomorpholine	ND	10	118	138	ND	150	85	ND	154	77
275	N-Nitrosopiperidine	ND	10	138	144	ND	150	105	ND	154	90
278	5-Nitro-o-toluidine	ND	10	367	447	ND	250	171	ND	256	143
284	Pentachlorobenzene	ND	10	133	151	ND	150	107	ND	154	87
286	Pentachloronitrobenzene	ND	10	223	274	ND	250	97	ND	256	87
287	Pentachlorophenol	ND	3.7	98.8	107	ND	100	65	ND	103	96

[illegible]

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETG Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

	Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
288	Phenacetin	ND	10	98.2	100	ND	150	77	ND	154	64
289	Phenol	ND	1.5	91.5	75.2	ND	100	105	ND	103	89
299	2-Picoline	ND	10	86.6	91.5	ND	150	104	ND	154	56
303	Pronamide	ND	10	115	137	ND	150	90	ND	154	75
310	Resorcinol	ND	10	ND	ND	ND	300	0	ND	308	0
312	Safrole	ND	10	131	157	ND	150	101	ND	154	85
323	1,2,4,5-Tetrachlorobenzene	ND	10	121	145	ND	150	101	ND	154	79
330	2,3,4,6-Tetrachlorophenol	ND	10	111	128	ND	200	66	ND	206	54
331	Tetraethyldithiopyrophospha	ND		ND	ND	ND	0	-	ND	0	-
353	1,2,4-Trichlorobenzene	ND	1.9	81.9	83.1	ND	100	88	ND	103	80
359	2,4,5-Trichlorophenol	ND	10	79.1	81.8	ND	100	80	ND	103	77
360	2,4,6-Trichlorophenol	ND	2.8	75.9	79.1	ND	100	98	ND	103	74
368	tris(2,3-Dibromopropyl)phos	IND		IND	IND	IND	500	0	IND	513	0
	Benzoic acid	ND	10	ND	75.1	ND	100	87	ND	103	0
	Benzyl alcohol	ND	10	127	141	ND	150	91	ND	154	83
	Dibenzofuran	ND	10	122	151	ND	150	102	ND	154	79
	Isophorone	ND	2.3	87.8	97.9	ND	100	95	ND	103	86
	2-Methylnaphthalene	ND	10	128	157	ND	150	104	ND	154	83
	o-Nitroaniline	ND	10	101	139	ND	150	90	ND	154	66
	m-Nitroaniline	ND	10	79.1	186	ND	150	75	ND	154	51
	4-Chlorophenyl phenyl ether	ND	4.3	80.8	96.2	ND	100	103	ND	103	79

*See fixed table for complete compound name and specifications.
[illegible]
[illegible] specifies no standard or reference sample available.
[illegible] Standard solution could not be [illegible] at target range levels.
Results with neither "MDL" nor "Conc. added" specifies no standard available, compound was qualitatively searched for.

Comments on Specific Fraction

B/N/A:

The QC Blank Spike and QC Matrix Spike yielded variable recoveries. All recoveries were manually verified.

The following compounds yielded 0% recoveries for both spikes but were detected in the calibration standards used for this analysis:

3,3'-Dimethoxybenzidine

Hexachlorophene

Resorcinol

The following compounds yielded low/no recoveries but are considered normally variable:

3,3'-Dimethylbenzidine

2,4-Dinitrophenol

4-Nitrophenol

Hexachloropropene

Isosafrole

1,4-Naphthoquinone

N-Nitroso methylethylamine

Benzoic Acid

. 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Pest & Herb Compounds – GC Analysis Data (QR56)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

Compound #	Results: Sample Concen. ug/l a	Results: MDL** ug/l	QC Replicate: First ug/l a	QC Replicate: Second ug/l a	QC Blank and Spiked Blank: Blank Data ug/l a	QC Blank and Spiked Blank: Concen. Added ug/l	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/l a	QC Matrix Spike: Concen. Added ug/l	QC Matrix Spike: % Recov
11 Aldrin	ND	.08	ND	ND	ND	.481	129	ND	.463	108
63 Chlordane	ND	.81	ND	ND	ND	5.00	74	ND	4.81	96
73 Chlorobenzilate	ND	2.0	ND	ND	ND	0	-	ND	0	-
100 4,4'-DDD	ND	.081	ND	ND	ND	.962	96	ND	.926	77
101 4,4'-DDE	BMDL	.08	.117	.259	ND	.481	172	.254	.463	93
102 4,4'-DDT	.334	.081	.509	.701	.366	.481	307	.737	.463	99
130 2,4-D	ND	7.4	ND	ND	ND	50.0	0	ND	45.5	134
137 Dieldrin	ND	.081	ND	ND	ND	.481	162	ND	.463	130
144 Thionazin	ND	.81	ND	ND	ND	4.55	175	ND	4.10	151
172 Disulfoton	ND	4.0	ND	ND	ND	22.7	175	ND	20.5	162
174A Endosulfan I	ND	.081	ND	ND	ND	.481	141	ND	.463	134
174B Endosulfan II	ND	.081	ND	ND	ND	.481	97	ND	.463	80
175 Endrin	ND	.081	.0400	.0400	ND	.962	96	ND	.926	77
Endrin aldehyde	ND	.08	ND	ND	ND	.481	146	ND	.463	110
192 Heptachlor	ND	.081	ND	ND	ND	.481	146	ND	.463	119
193 Heptachlor epoxide	ND	.081	ND	ND	ND	.481	164	ND	.463	132
196A Alpha-BHC	ND	.081	ND	ND	ND	.481	109	ND	463	103
196B Beta-BHC	ND	.081	ND	ND	ND	.481	115	ND	.463	103
196C Gamma-BHC	ND	.081	ND	ND	ND	.481	138	ND	.463	116
196D Delta-BHC	ND	.081	ND	ND	ND	.481	153	ND	.463	140
214 Kepone	ND	.81	ND	ND	ND	5.00	122	ND	4.81	105
230 Methoxychlor	ND	8.1	ND	ND	ND	48.1	191	ND	46.3	152
242 Methyl parathion	ND	.81	ND	ND	ND	4.55	192	ND	4.10	173
283 Parathion	ND	.81	ND	ND	ND	4.55	194	ND	4.10	168
295 Phorate	ND	.81	ND	ND	ND	4.55	15	ND	4.10	13
296 Famphur	ND	8.1	ND	ND	ND	45.5	190	ND	41.0	172
351 Toxaphene	ND	2.0	ND	ND	ND	20.0	152	ND	19.2	66
361 2,4,5-T	ND	.74	ND	ND	ND	5.00	0	ND	4.55	112
362 2,4,5-TP (Silvex)	ND	.74	ND	ND	ND	5.00	0	ND	4.55	99

a Refer to comment sheet.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-*specifies no standard available.
IND *indeterminate. Standard and/or spikes could not be detected at current method levels.

Comments on Specific Fractions

Pesticide and Herbicide

The presence of 4,4'-DDT detected in the QC Blank would normally warrant repeat preparation of this QC batch. However, it was determined that this original data would be qualified, and is here reported.

Because 4,4-DDT was found in the QC Blank at a reportable level and 4,4'-DDE was also found in the QC Blank, although at a level considered to be not detected, the reported presence of 4,4-DDT/4,4'-DDD in this sample should be considered suspect.

The identification of all compounds here reported as present has been confirmed by second column analysis.

The QC Spiked Blank recoveries for the herbicide compounds 2,4-D, 2,4,5-T and 2,4,5-TP have been manually verified. The QC Spiked Blank may have inadvertantly not been spiked for these compounds. The QC Matrix Spike recoveries are within acceptable limits.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA - Aroclors -GC Analysis Data (QR30)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
300A Aroclor 1242	ND	.81	ND	ND	ND	0	-	ND	0	-
300B Aroclor 1254	ND	.81	ND	ND	ND	0	-	ND	0	-
300C Aroclor 1260	ND	.81	ND	ND	ND	2.00	82	ND	1.64	75
300D Aroclor 1248	ND	.81	ND	ND	ND	0	-	ND	0	-
300E Aroclor 1232	ND	.81	ND	ND	ND	0	-	ND	0	-
300F Aroclor 1221	ND	.81	ND	ND	ND	0	-	ND	0	-
300G Aroclor 1016	ND	.81	ND	ND	ND	0	-	ND	0	-

*See Grand Table for complete compound name and specifications.
**MDL calculated for each sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 26, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals – Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

NPDES Number	Compound		Results: Sample Concen.	Results: MDL
	Aluminum, Total	ug/l	437	30
	Antimony, Total	ug/l	<500	500
	Arsenic, Total	ug/l	<4.00	4.0
	Barium, Total	ug/l	282	50
	Beryllium, Total	ug/l	<1.00	1.0
	Cadmium, Total	ug/l	<3.00	3.0
	Calcium, Total	ug/l	76100	100
	Chromium, Total	ug/l	<20.0	20
	Cobalt, Total	ug/l	<20.0	20
	Copper, Total	ug/l	<20.0	20
	Iron, Total	ug/l	828	30
	Lead, Total	ug/l	20.0	4.0
	Magnesium, Total	ug/l	154000	200
	Manganese, Total	ug/l	120	10
	Mercury, Total	ug/l	<.500	.50
	Nickel, Total	ug/l	25.0	20
	Osmium, Total	mg/l	ND [a]	
	Selenium, Total	ug/l	<2.00	2.0
	Silver, Total	ug/l	<30.0	30
	Sodium, Total	ug/l	730000	50
	Thallium, Total	ug/l	<300	300
	Tin, Total	ug/l	<1000	1000
	Vanadium, Total	ug/l	<10.0	10
	Zinc, Total	ug/l	<20.0	20
	Potassium, Total	ug/l	290000	50
	Cyanide, Total	mg/l	<.02	.02
	Sulfide as S	mg/l	1.8	.1

[a] Qualitative analysis.

Jc.. 19, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Conventional Analysis Data (QR10)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6604	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

NPDES Number	Results									
	Sample Concen. mg/l	MDL mg/l								
Fluoride	.42	.1								

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 23, 1987

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery - Aqueous Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

S6604

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits * Lower	Control Limits * Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	96	88	110
p-Bromofluorobenzene	.250	107	86	115
1,2-Dichloroethane-D4	.250	115***	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	100	89	10	94
2-Fluorophenol	100	63	21	100
2,4,6-Tribromophenol	100	28	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	50	120***	35	114
2-Fluorobiphenyl	50	84	43	116
Terphenyl-D14	50	90	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	-	-	24**	154**

* WPB EPA Control Limits.
** Advisory Limits Only.
*** Recovery manually verified.

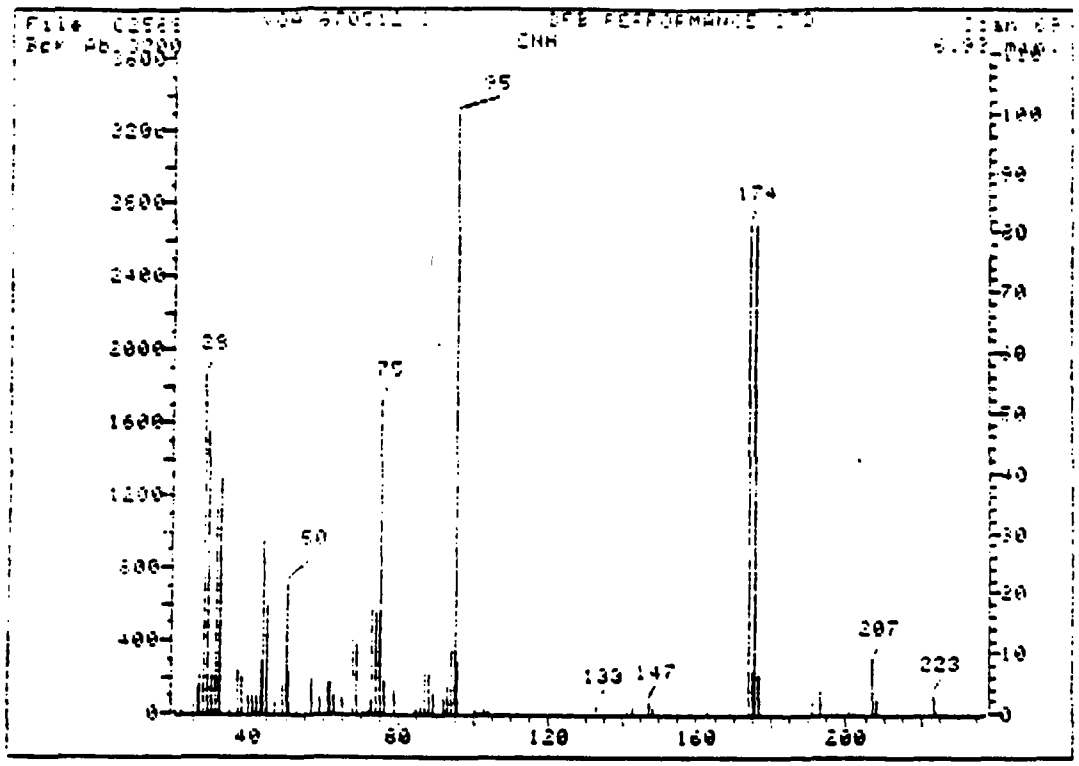

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.23	52.23	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.38	8.38	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	81.41	81.41	Ok
175	5-9% of mass 174	7.01	8.61	Ok
176	95-101% of mass 174	81.22	99.76	Ok
177	5-9% of mass 176	6.44	7.93	Ok

Injection Date: 05/12/87 Analyst: K. Boykin
Injection Time: 07:05 Processor: Sharon Maslock
Run No: >C2588 QC Batch: QJ7052
Spectrum No: 69(ENH)

KS
5/21/87

MS Data File: C2588::U3

Name: VOA 870512 C Operator: KB6656 Date/Time: 5/12/87 7:05
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052VS (?C2591)	870512	09:12
	OC7052VS (?C2593)	870512	11:24
	OC7052VS (?C2594	870512	13:02

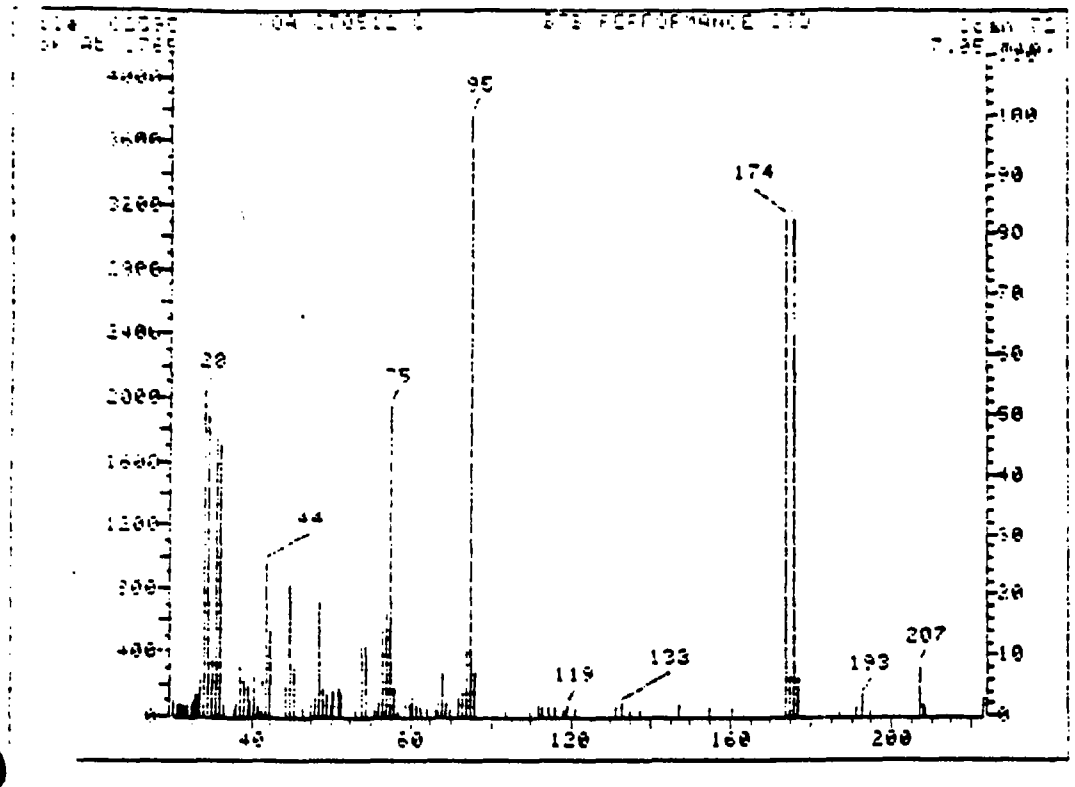

TABLE 3: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.46	21.46	OK
75	30-60% of mass 95	51.79	51.79	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	7.09	7.09	OK
173	Less than 1% of mass 95	0.00	0.00	OK
174	Greater than 50% of mass 95	82.66	82.66	OK
175	5-9% of mass 174	6.67	8.07	OK
176	95-101% of mass 174	82.59	99.90	OK
177	5-9% of mass 176	6.00	7.27	OK

Injection Date: 05/12/87 Analyst: [signature]
Injection Time: 14:36 Processor: [signature]
Run No: >C2595 QC Batch: QV7052
Spectrum No: 72

KJ
5/21/87

MS Data File: >C2595::U1

Name: VOA 870512 C Operator: LA2639 Date/Time: 5/12/87 14:3[illegible]
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052V (>C2596)	870512	15:33
	OC7052V (>C2597)	870512	16:17
	OC7052V (>C2598)	870512	17:02
	OC7052V (>C2599)	870512	17:48
	S6605VS (>C2601)	870512	19:44
	S6605V (>C2602)	870512	20:30
	S6604V (>C2603)	870512	21:46
	S6604VR (>C2604)	870512	22:06
	S6603V (>C2605)	870512	22:52
	OC7052VS (>C2606)	870513	01:01

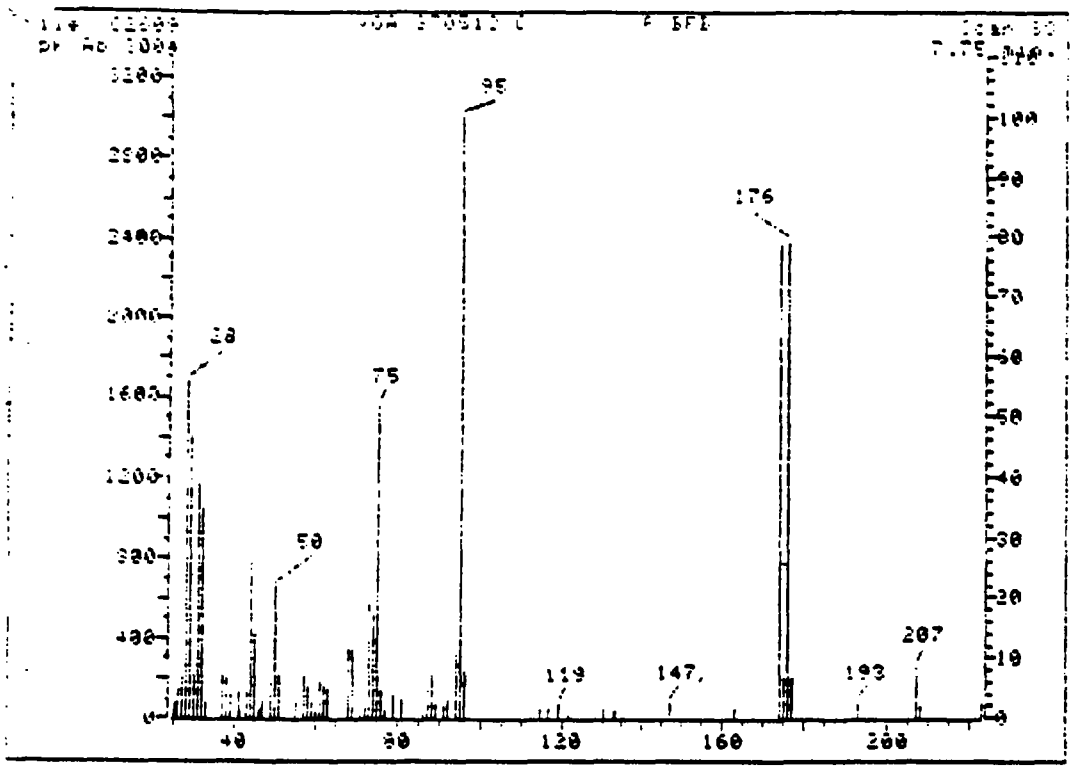

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

#	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.87	21.87	Ok
2	30-60% of mass 95	51.83	51.83	Ok
3	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.59	7.59	Ok
3	Less than 1% of mass 95	0.00	0.00	Ok
4	Greater than 50% of mass 95	78.73	78.73	Ok
75	5-9% of mass 174	6.79	8.63	Ok
76	95-101% of mass 174	79.26	100.68	Ok
7	5-9% of mass 176	6.49	9.19	Ok

Injection Date: 05/13/87 Analyst: K. Bogh
Injection Time: 02:00 Processor: Sharon Matlock
Run No: >C2609 QC Batch: QU7052
Spectrum No: BB (UNa Hered)

5/21/87

MS Data File: :C2609::U1

Name: VOA 870513 C Operator: KB6656 Date/Time: 5/13/87 2:00
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7052VS (>C2607)	870513	02:22
	QC7052VS (>C2608)	870513	03:02
	QC7052V (>C2611)	870513	05:25
	QC7052V (>C2612)	870513	06:10
	QC7052V (>C2613)	870513	06:57
	S6608V (>C2615)	870513	09:38
	S6602V (>C2616)	870513	10:23
	S6606V (>C2617)	870513	11:08
	QC7052V (>C2618)	870513	11:55
	S6607V (>C2619)	870513	12:44

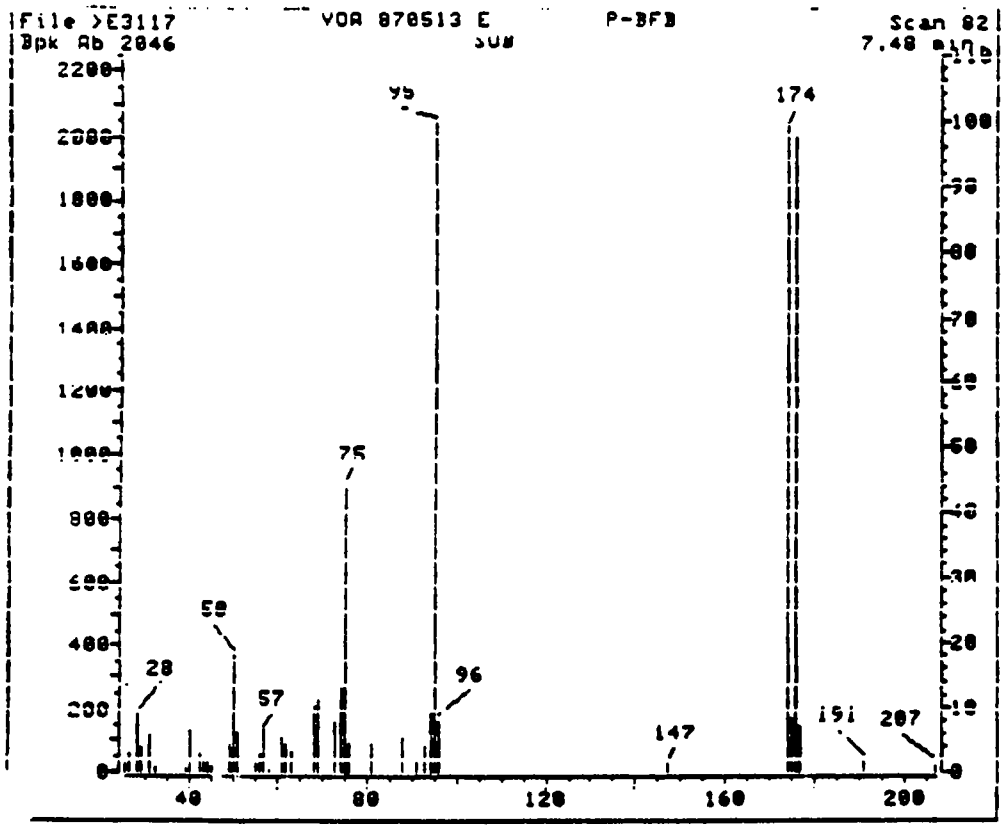

TABLE 2: METHOD PERFORMANCE DATA (WR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.13	18.13	Ok
75	30-60% of mass 95	44.43	44.43	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.11	8.11	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.32	99.32	Ok
175	5-9% of mass 174	8.26	8.32	Ok
176	95-101% of mass 174	98.09	98.77	Ok
177	5-9% of mass 176	7.04	7.17	Ok

Injection Date: 05/13/87 Analyst: K Boyle
Injection Time: 06:46 Processor: Sharon Marlock
Run No: >E3117 WC Batch: QV 7054
Spectrum No: 82-69

KJ
5/20/87

You're already on LU: 87

MS Data File: >E3117::U5

Name: VOA 87U513 E Operator: KB6656 Date/Time: 5/13/87 6:46
Misc: P-8F8

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7054V (>E3118)	870513	07:27
	QC7054VSB(>E3119)	870513	08:12
	QC7054VSB(>E3121)	870513	10:30
	QC7054VS(>E3122)	870513	11:50

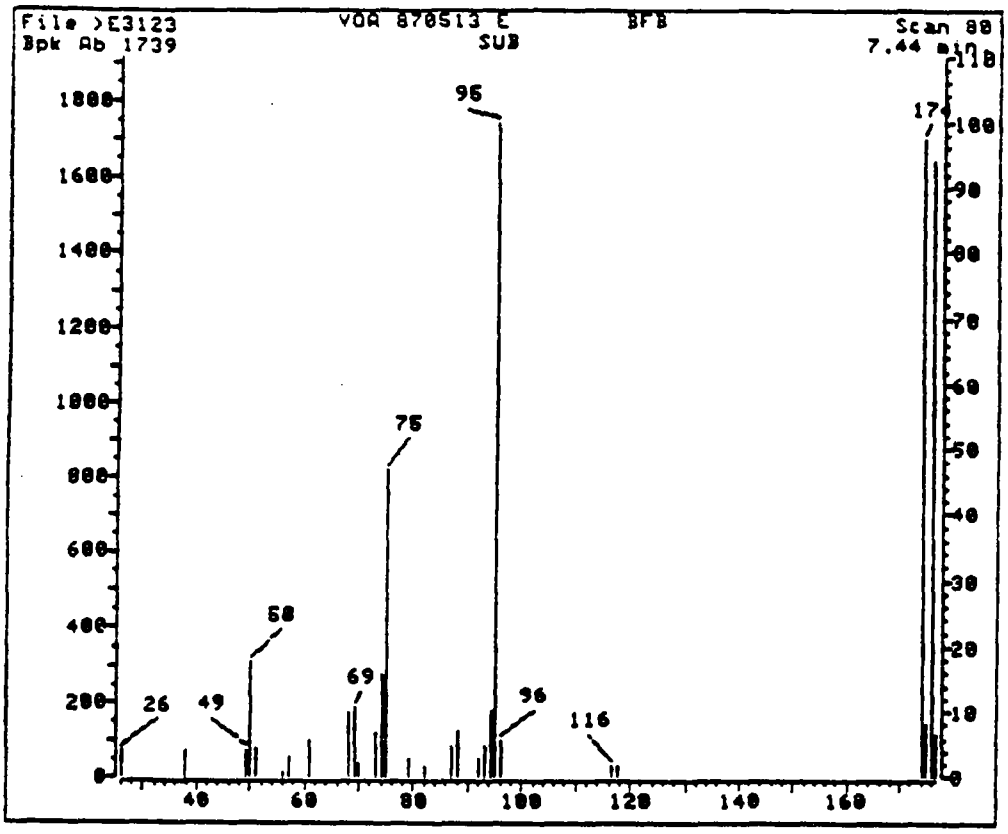

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	17.94	17.94	Ok
75	30-60% of mass 95	47.10	47.10	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	5.69	5.69	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	97.53	97.53	Ok
175	5-9% of mass 174	8.17	8.37	Ok
176	95-101% of mass 174	94.36	96.76	Ok
177	5-9% of mass 176	6.44	6.83	Ok

Injection Date: 05/13/87 Analyst: [illegible]
Injection Time: 14:52 Processor: [illegible]
Run No: >E3123 QC Batch: QV7054
Spectrum No: 80 -20

[illegible] 6/87

MS Data File: >E3123::U4

Name: UOA 870513 E Operator: LR5235 Date/Time: 5/13/87 14:52
Misc: BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6608V (>E3128)	870513	20:21
	S6606V (>E3130)	870513	22:21
	S6607V (>E3131)	870513	23:06

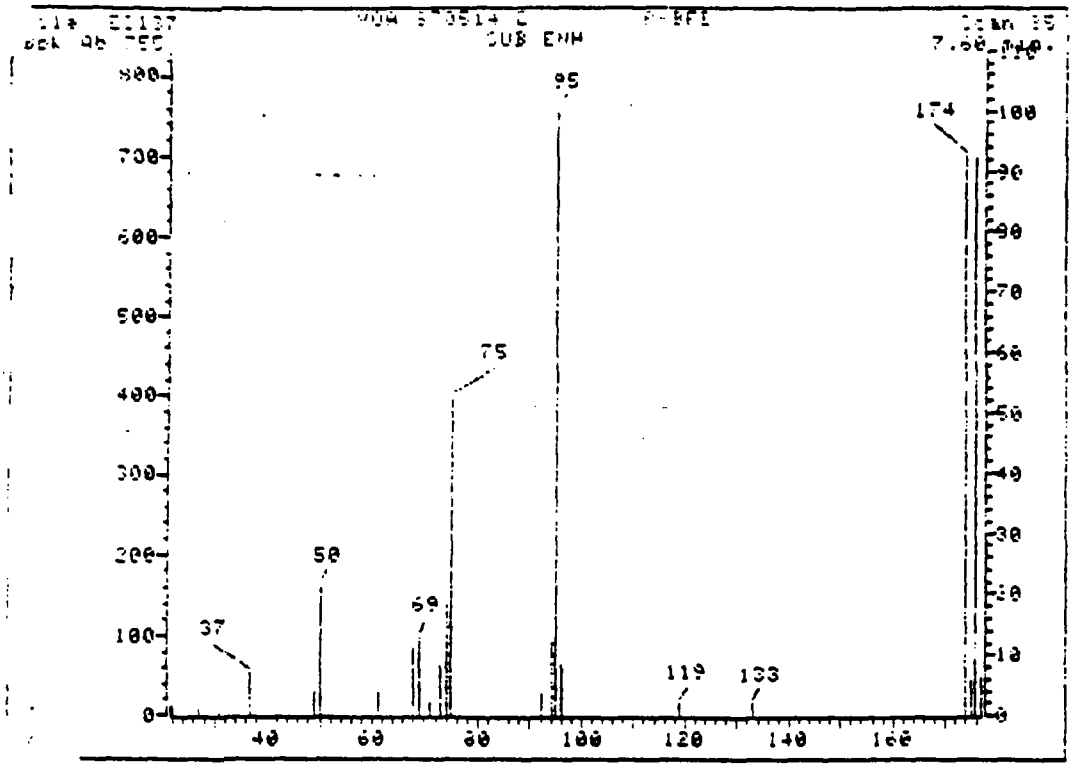

TABLE 2: METHOD PERFORMANCE DATA (QP21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.48	52.48	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.42	8.42	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	92.53	92.53	Ok
175	5-9% of mass 174	6.07	6.56	Ok
176	95-101% of mass 174	92.40	99.86	Ok
177	5-9% of mass 176	6.12	6.62	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 04:08 Processor: [signature]
Run No: >E3137 QC Batch: QV7054
Spectrum No: (85-71) ENH

[signature] 6/10/87

'B Data File: >E7137::U4

Name: U04 870514 E Operator: SB5883 Date/Time: 5/14/87 4:09
Disc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC7054VS (>E3138)	870514	04:53
	QC7054VS (>E3142)	870514	09:03
	QC7054VS (>E3143)	870514	10:27
	QC7054V (>E3145)	870514	13:30
	S6603V (>E3146)	870514	14:33
	S6603VS (>E3147)	870514	15:21

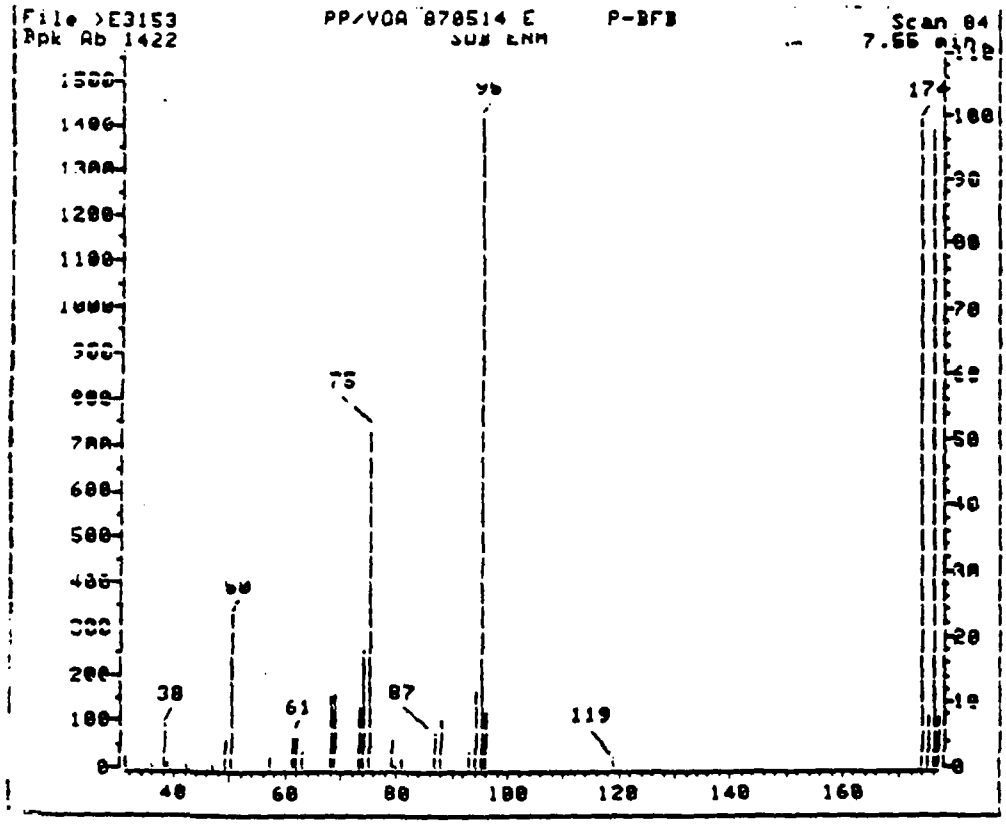

TABLE 2: METHOD PERFORMANCE DATA (WR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	23.30	23.30	Ok
75	30-60% of mass 95	52.04	52.04	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.52	8.52	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.25	99.25	Ok
175	5-9% of mass 174	7.83	7.89	Ok
176	95-101% of mass 174	98.00	98.74	Ok
177	5-9% of mass 176	7.51	7.66	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 16:14 Processor: [signature]
Run No: >E3153 WC Batch: QV7054
Spectrum No: PS84 (EVH) PS 70
SUBT

[initials] 5/20/87

MS Data File: >E3153::04

Name: PP/VOA 8/0514 E Operator: MGRMS Date/Time: 5/14/87 16:14
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6605VR (>E3149)	870514	16:52
	~~[illegible]~~	~~870514~~	~~18:23~~ 5/17/87
	S6605V (>E3154)	870514	21:16
	S6604V (>E3155)	870514	22:01
	QC7054VS (>E3158)	870515	01:37
	QC7054VS (>E3159	870515	02:41
	QC7054VS (>E3160)	870515	04:03

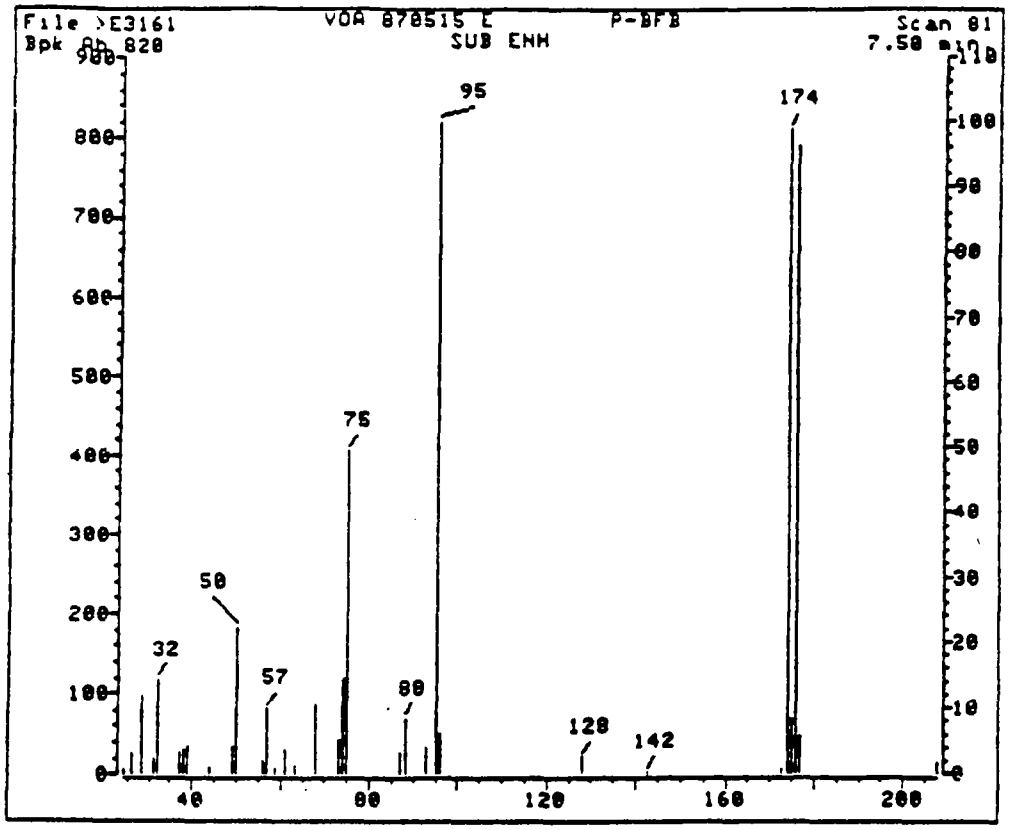

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.24	22.24	Ok
75	30-60% of mass 95	49.59	49.59	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.03	6.03	Ok
173	Less than 1% of mass 95	.56	.56	Ok
174	Greater than 50% of mass 95	98.70	98.70	Ok
175	5-9% of mass 174	8.36	8.47	Ok
176	95-101% of mass 174	96.00	97.26	Ok
177	5-9% of mass 176	5.89	6.13	Ok

Injection Date: 05/15/87 Analyst: Stephen Blage
Injection Time: 04:59 Processor: Sharon Manlock
Run No: >E3161 QC Batch: QV7054
Spectrum No: PS81, ENH, -3:4, PS91
SUB,T

B 1/20/87

MS Data File: >E3161::U4

Name: VOA 870515 E Operator: SB5883 Date/Time: 5/15/87 4:59
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6602V (>E3165)	870515	05:49

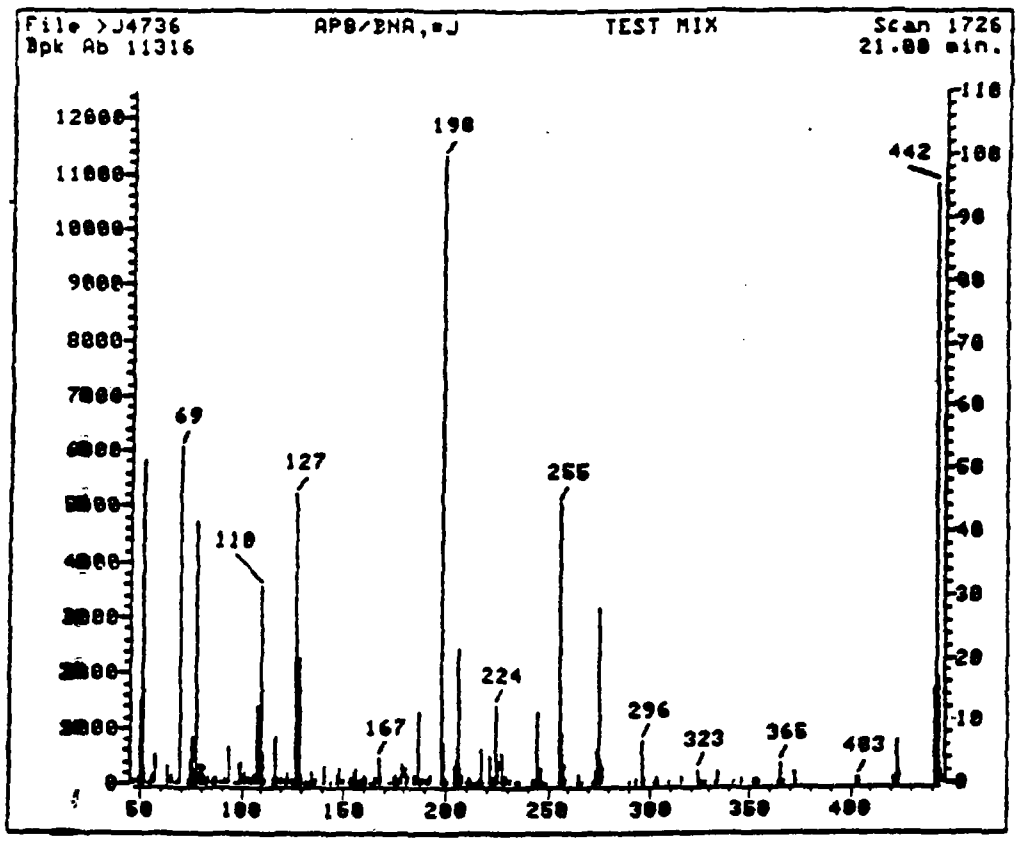

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	51.51	51.51	Ok
68	Less than 2% of mass 69	.60	1.12	Ok
69	(reference only)	53.68	53.68	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	46.31	46.31	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.48	6.48	Ok
275	10-30% of mass 198	27.79	27.79	Ok
365	Greater than 1% of mass 198	3.11	3.11	Ok
441	0-100% of mass 443	15.25	91.23	Ok
442	Greater than 40% of mass 198	95.42	95.42	Ok
443	17-23% of mass 442	16.72	17.52	Ok

Injection Date: 06/07/87 Analyst: K Valuti
Injection Time: 01:06 Processor: Mirta Blakley
Run No: >J4736 QC Batch: QC6902
Spectrum No: 1726 (A)

LAHendel 6/20/87

MS Data File: >J4736::U5

Name: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 1:06
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4737	870607	01:44
	STD. >J4738	870607	02:37
	STD. >J4739	870607	03:31
	STD. >J4740	870607	04:26
	STD. >J4741	870607	05:18
	STD. >J4742	870607	06:11
	STD. >J4743	870607	07:03

LAH

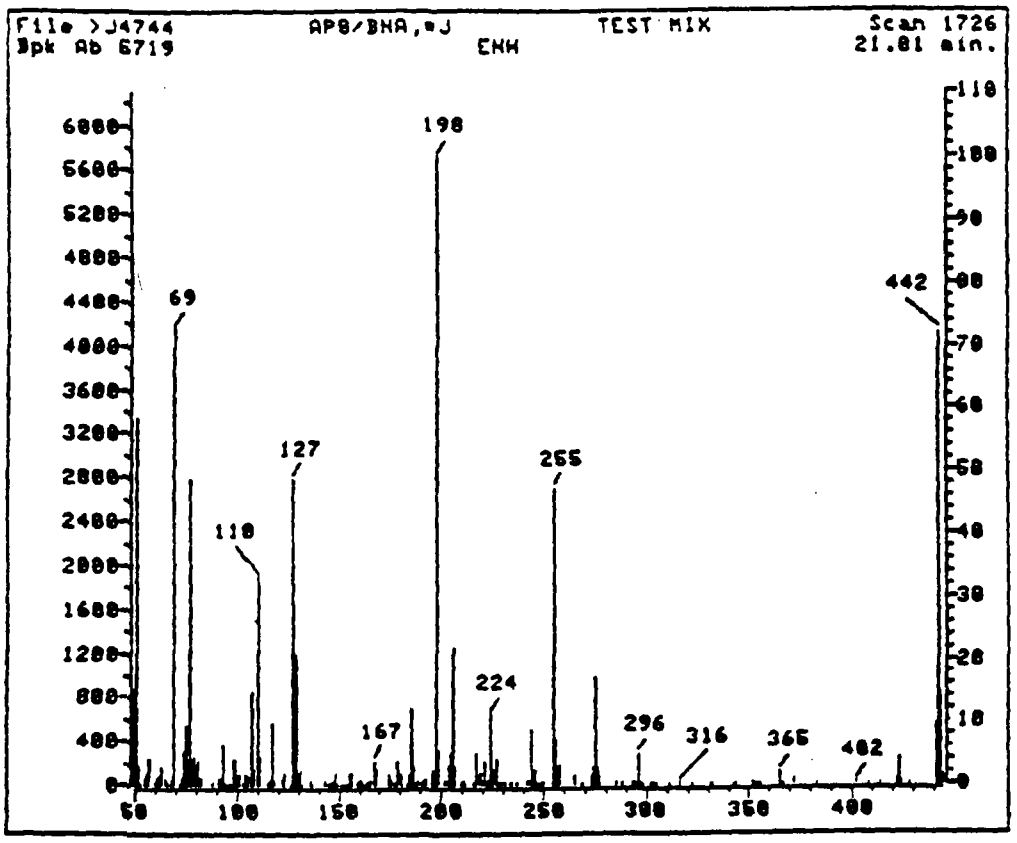

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.59	58.59	Ok
68	Less than 2% of mass 69	.82	1.12	Ok
69	(reference only)	72.85	72.85	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	48.77	48.77	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.52	5.52	Ok
275	10-30% of mass 198	17.16	17.16	Ok
365	Greater than 1% of mass 198	2.02	2.02	Ok
441	0-100% of mass 443	9.28	66.01	Ok
442	Greater than 40% of mass 198	71.91	71.91	Ok
443	17-23% of mass 442	14.05	19.55	Ok

Injection Date: 06/07/87 Analyst: K Valuta
Injection Time: 08:00 Processor: [illegible]
Run No: >J4744 QC Batch: QC 6902
Spectrum No: 1726 enh

[illegible]

MS Data File: >J4744::U6

Name: APB/BNA,$J Operator: JQ6275 Date/Time: 6/07/87 8:00
Misc: TEST MIX BTL# 9

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C >J4744	870607	08:39
	QC6902CS >J4746	870607	09:36
	S6605CS >J4747	870607	10:29
	S6605CR >J4748	870607	11:25
	S6603C >J4749	870607	12:17
	S6004C >J4750	870607	13:11
	S6005C >J4751	870607	14:04
	S6008C >J4752	870607	15:01
	S7731C >J4753	870607	15:59
	S7732C >J4754	870607	16:58

LAH

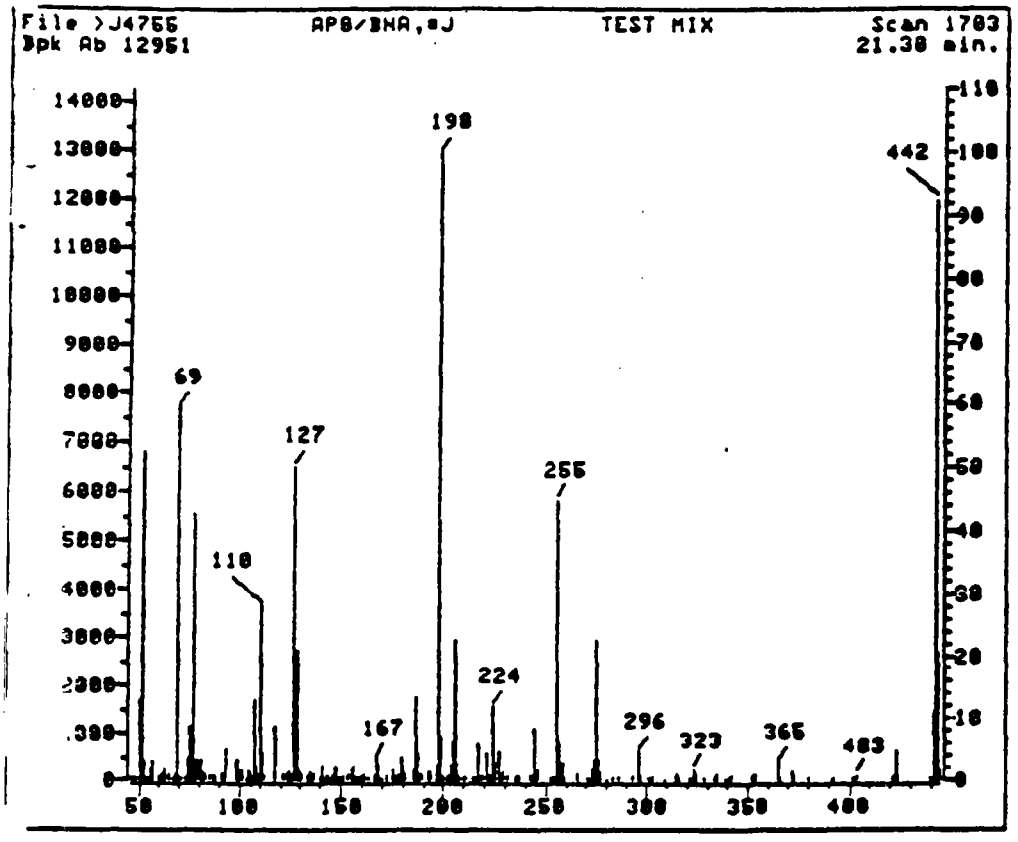

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	52.54	52.54	Ok
68	Less than 2% of mass 69	1.09	1.83	Ok
69	(reference only)	59.42	59.42	Ok
70	Less than 2% of mass 69	.69	1.16	Ok
127	40-60% of mass 198	50.29	50.29	Ok
197	Less than 1% of mass 198	.36	.36	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.03	7.03	Ok
275	10-30% of mass 198	22.58	22.58	Ok
365	Greater than 1% of mass 198	3.00	3.00	Ok
441	0-100% of mass 443	11.03	53.99	Ok
442	Greater than 40% of mass 198	92.52	92.52	Ok
	17-23% of mass 442	20.44	22.09	Ok

Injection Date: 06/07/87 Analyst: [illegible]
Injection Time: 17:57 Processor: [illegible]
Run No: >J4755 QC Batch: QC6702
Spectrum No: 1703

LAH

MS Data File: >J4755::U7

Name: APB/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 17:57
Misc: TEST MIX BTL#20

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4756	870607	18:44
	STD. >J4757	870607	19:46
	S281C >J4758	870607	20:49
	S6058 >J4759	870607	23:26
	S6059 >J4760	870608	00:18
	S7733C >J4761	870608	01:10
	S6602C >J4762	870608	02:02
	S6604C >J4763	870608	02:58
	S6606C >J4764	870608	03:53

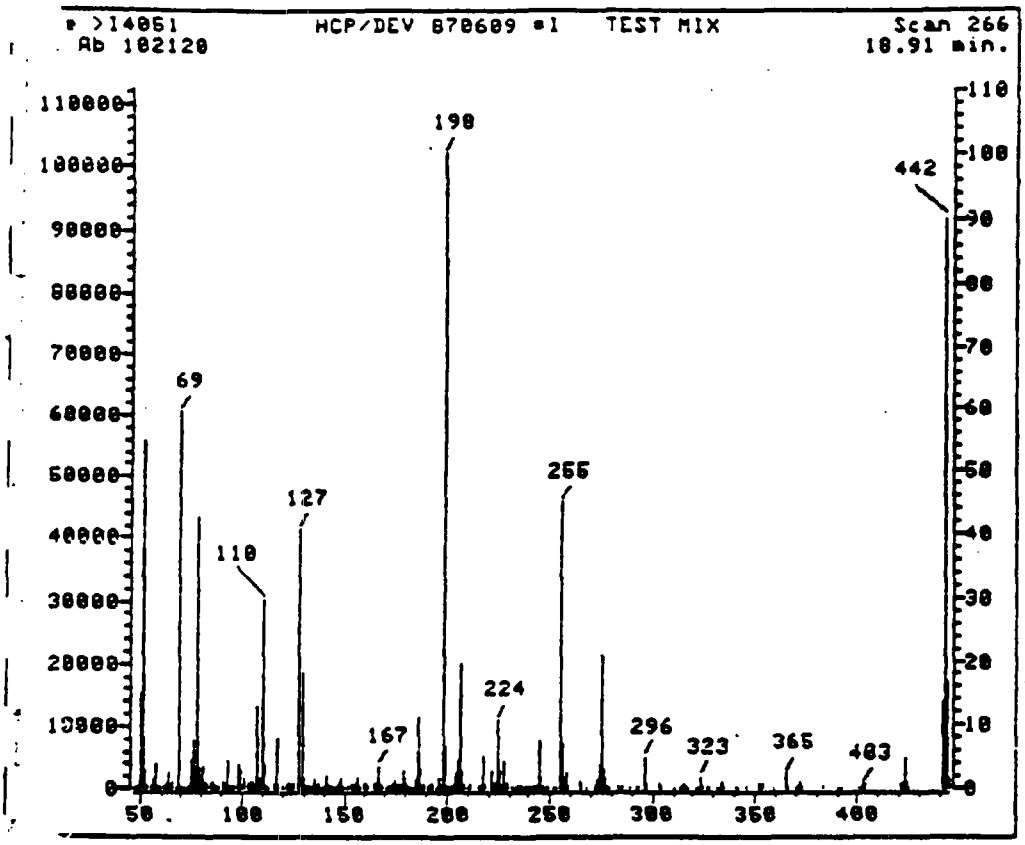

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	54.41	54.41	Ok
68	Less than 2% of mass 69	.99	1.67	Ok
69	(reference only)	59.43	59.43	Ok
70	Less than 2% of mass 69	.47	.78	Ok
127	40-60% of mass 198	40.51	40.51	Ok
197	Less than 1% of mass 198	.38	.38	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.56	6.56	Ok
275	10-30% of mass 198	20.99	20.99	Ok
365	Greater than 1% of mass 198	2.34	2.34	Ok
441	0-100% of mass 443	13.54	80.53	Ok
442	Greater than 40% of mass 198	90.15	90.15	Ok
443	17-23% of mass 442	16.81	18.65	Ok

Injection Date: 06/09/87 Analyst: MB for Brenda Hawkins
Injection Time: 19:31 Processor: M. [illegible]
Run No: >14051 QC Batch: QC6765
Spectrum No: 266

L Herdel 6/20/87

MS Data File: >I4051::U5

Name: HCP/DEV 870609 #1 Operator: BH8334 Date/Time: 6/09/87 19:31
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >I4052	870609	20:11
	STD. >I4053	870609	20:50
	STD. >I4054	870609	21:28

LAN

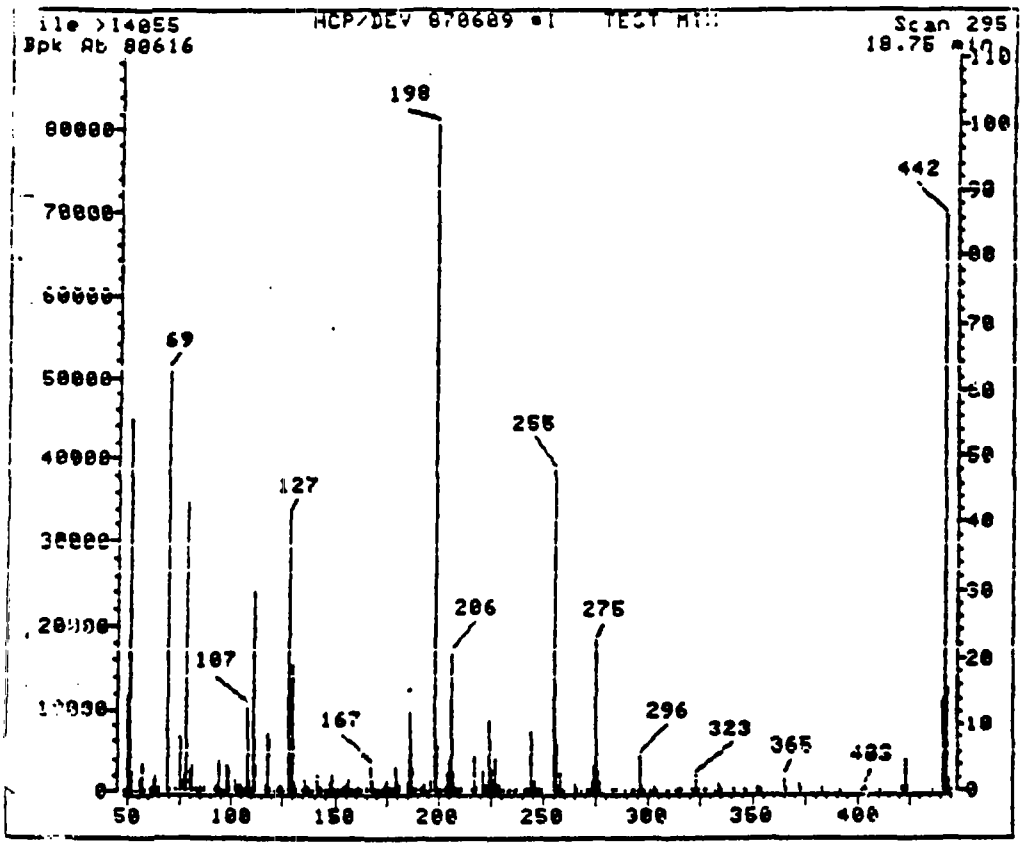

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphosphine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Status
51	30-60% of mass 198	55.58	55.58	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.97	62.97	Ok
70	Less than 2% of mass 69	.31	.50	Ok
127	40-60% of mass 198	41.23	41.23	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.65	6.65	Ok
275	10-30% of mass 198	22.36	22.36	Ok
365	Greater than 1% of mass 198	2.03	2.03	Ok
441	0-100% of mass 443	13.59	88.02	Ok
442	Greater than 40% of mass 198	86.21	86.21	Ok
443	17-23% of mass 442	15.44	17.91	Ok

Injection Date: 06/09/87 Analyst: Brenda Hawkins
Injection Time: 22:06 Processor: [illegible]
Run No: >14055 QC Batch: QC 6907
Spectrum No: 295 ENII

LAH

MS Data File: >14055::U7

Name: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 22:06
Misc: TEST MIX BTL# 5

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C>I4056	870609	22:44
	QC6902C(S)>I4057	870609	23:23
	S6605C>I4058	870610	00:01
	S6605C(S)>I4059	870610	00:39
	S6605C(R)>I4060	870610	01:17
	S6004C>I4061	870610	01:55
	S6008C>I4062	870610	02:33
	S6058C>I4063	870610	03:11
	S7732C>I4064	870610	03:49
	S6602C>I4065	870610	04:27
	S6603C>I4068	870610	06:21
	S6604C>I4069	870610	06:59
	S6606C>I4070	870610	07:37
	S2811C>I4071	870610	08:15
	S7733C>I4072	870610	08:54
	S6054C>I4073	870610	09:32

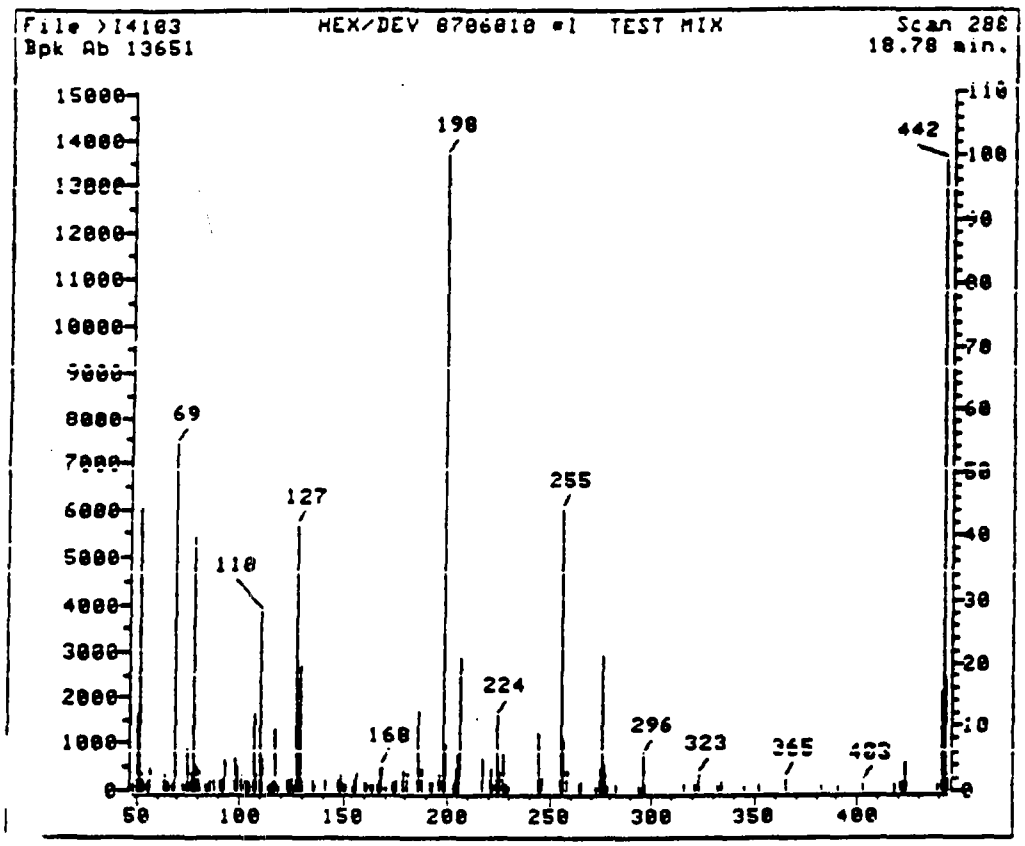

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	44.41	44.41	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	54.35	54.35	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	41.39	41.39	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.10	7.10	Ok
275	10-30% of mass 198	21.31	21.31	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	15.45	86.19	Ok
442	Greater than 40% of mass 198	99.04	99.04	Ok
443	17-23% of mass 442	17.93	18.10	Ok

Injection Date: 06/10/87 Analyst: [illegible]
Injection Time: 10:34 Processor: [illegible]
Run No: >I4103 QC Batch: QC 6403
Spectrum No: 288

MS Data File: >I4103::U5

Name: HEX/DEV 8706010 #I Operator: BH8334 Date/Time: 6/10/87 10:34
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S7731C >I4074	870610	11:58

Appendix D
Subcontractor's Data

1) A copy of the originating subcontractor's report is included for all data not generated within ETC's laboratory.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

REV

ETC Job # 86604

Lab ID: GCL 104593

Submitted by: Jane Lukowski

Date: 5-15-87

Facility: 705 (Facility Code)

Sample Point: W — G1238 (Source Code / Sample Point ID)

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: 09:10 (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
CONVENTIONALS						
1	Chloride	QR 10	mg/l			
2	Fluoride	QR 10	mg/l	0.42	0.1	
3	Nitrate as N	QR 10	mg/l			
4	Sulfate as SO4	QR 10	mg/l			
5	Phenolics, Total	QR 10	mg/l			
6	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
7	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
8	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
9	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
10	Coliform, Total	QR 10	C/100			
11	Coliform, Fecal	QR 10	C/100			
12	Gross Alpha	QR 10	PCi/l			
13	Gross Beta	QR 10	pCi/l			
14	Acidity as CaCO3		mg/l			
15	Alkalinity as CaCO3		mg/l			
16	Ammonia as N		mg/l			
17	Bicarbonate as CaCO3		mg/l			
18	Biochemical Oxygen Demand		mg/l			
19	Carbonate as CaCO3		mg/l			
20	Chemical Oxygen Demand		mg/l			
21	Color, Apparent (Lab)		Pt/Co			
22	Cyanide, Total		mg/l	<0.02	0.02	
23	Hardness as CaCO3		mg/l			
24	Nitrite as N		mg/l			
25	Nitrogen Total Kjeldahl (TKN)		mg/l			
26	Nitrogen, Total Organic		mg/l			
27	Odor (Lab)		TON			
28	Oil and Grease (grav, IR)		mg/l			
29	Phosphate, ortho		mg/l			
30	Phosphate, Total		mg/l			
31	Solids, Total		mg/l			
32	Solids, Total Dissolved (ROE) 180°		mg/l			
33	Solids, Total Suspended		mg/l			
34	Sulfide as S		mg/l	1.8	0.1	
35	Surfactants (MBAS/LAS)		mg/l			
36	Turbidity (Lab)		NTU			

TC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

REV. 4 JW

ETC Job # S66051

ID: H Coast Lab

Rec'd by: G Martinez

e: 6-10-87

Facility: 705 (Facility Code)

Sample Point: W (Source Code) – G1235 (Sample Point ID)

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: : (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l	290000	50	
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

VIRONMENTAL
STING and CERTIFICATION
OF CUSTODY FORM (CC1)

Seal No. 79704 ETC Job # [illegible]

Date Sealed 4/27/87 By: M Yoane

ny: Chicago Incinerator Attn.: Bob Bartholmew

ite: 11700 S. Stoney Island Phone:

ess: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility/Site Code: 705 | (Optional Sample Point Descriptions): 1235

Point: W-~~61238~~ 1235 | 870430 | 1400 |

Source Code (from below) | Your Sample Point ID (left justify) TF 5/18/87 | Start Date (YY/MM/DD) | Start Time (2400 hr. clock) | Elapsed Hours (composite)

Codes:
W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ..... (X)
(S) River/Stream..(R) Generation Point....(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify

SHUTTLE CONTENTS

BOTTLE			ANALYSIS	SAMPLER		LAB
pe	Size	Preserv.		Fill (Y/N)	Observations	Observations
[illegible]	1 L	baked	EXtbl	N		✓
F	40ml	baked	HPTVOA	N		✓
F	40ml	baked	HP+TVOA	N		✓
	40ml	GC/MS	Trip Blank	N		✓

CHAIN OF CUSTODY CHRONICLE

Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 1358
Signature: [signature] Seal #: 79709 Intact: YES

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1430
Signature: [signature] Seal #: 79710 Intact: YES

USE ONLY Opened By: C. McCala Date: 5/1/87 Time: 3:00
TEMP °C 10° SEAL # 79710 COND. Intact

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 79707 ETC Job # 56604

Date Sealed 4/27/87 By: [illegible]

Company: Chicago Incinerator Attn.: [illegible]

Facility/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 123S (Optional Sample Point Descriptions)

Sample Point: W ~~6123S~~ 123S (Source Code (from below) / Your Sample Point ID (left justify)) TF 5/18/87 | 870430 (Start Date (YY/MM/DD)) | 1400 (Start Time (2400 hr. clock)) | (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ..... (X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
5	E	1l	baked	Ext Bl	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 1359
   Signature: [signature] Seal #: 79707 Intact: Yes

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1420
   Signature: [signature] Seal #: 79708 Intact: Yes

LAB USE ONLY Opened By: C. [illegible] Date: 5/1/87 Time: 2:40 pm

NVIRONMENTAL
ESTING and CERTIFICATION
ORIGINAL
OF CUSTODY FORM (CC1)

Seal No. 441 ETC Job # [illegible]

Date Sealed 4/28/87 By: Km

any: WMI Attn.: Bob Bartholomew

Site: Chicago Incinerator Phone: 312-646-5700

ress: Chicago, IL

REC'D MAY 5 1987

SAMPLE IDENTIFICATION

Facility/Site Code	(Optional Sample Point Description)
7 0 5	1235 PE

Point:

Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr clock)	Elapsed Hours (composite)
W	~~G1235~~ 1235 TF 5/18/87	870430	0910	

Codes:
(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ..... (X)
(S) River/Stream...(R) Generation Point....(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify

SHUTTLE CONTENTS

BOTTLE			ANALYSIS	SAMPLER		LAB
ype	Size	Preserv.		FILL (Y/N)	Observations	Observations
A	1gal	HNO3	Radioactivity	Y		
B	1L	Cool	General	Y		
		4 C				
	1L	6NNaOH	Cn	Y		
B	1L	Zinc	Sulfide	Y		
		Acetate				
F	500ml	HNO3	Metals (dissolved)	Y		
F	500ml	HNO3	Metals (total)	N		
F	500ml	H2SO4	Nutrients	Y		
I	100ml	Cool4C	Total Coliform	N		

CHAIN OF CUSTODY CHRONICLE

Shuttle Opened By: (print) Richard Weight Date: 4-30-87 Time: 0800
Signature: [signature] Seal #: 497 Intact: Yes

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

I have received these materials in good condition from the above person.
Name: Signature:
ate: Time: Remarks:

Shuttle Sealed By: (print) Richard Weight Date: 4-30-87 Time: 1440
Signature: [signature] Seal #: 498 Intact: Yes

USE ONLY Opened By: Lynn Gifford [signature] Date: 4/30/87 Time: 1730
TEMP SEAL # 498 COND

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # S6604

Sample Point W 123S (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

REC'D MAY - 5 1987

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____

Depth to Ground water (ft) _____

Groundwater Elevation (ft msl) _____

Well Depth (ft) _____

Sample Depth (non-well) (ft) _____

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25°C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: SCATTERED CLOUDS, ~55°F, WIND NE ~10 MPH.

Other: AP. IX SAMPLED 4-30 DUE TO LATE SHIPMENT OF ETC SHUTTLES. REFER TO GCL CC2 WITH ETC #S2941 FOR FIELD PROCEDURES AND FIELD MEASUREMENTS.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WEIGHT (Print) Employer: GULF COAST LABS.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 (Date) Richard Weight (Signature)

ORIGINAL

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56604 TF 5/18/87

Sample Point W ~~G1Z35~~ 1235
Source Code — Sample Point I.D

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC7

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LABS.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56604 TF 5/18/87

Sample Point W ~~6123S~~ 1 2 3 S
Source Code — Sample Point I.D

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LABS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

LABORATORY PERSONNEL ... Preparation ...

Sample Number	Log Link	Sample Vol. (ml)	Vol. (ml) BN	Vol. (ml) ACID	Comments
S6602	21065	530	10	5.0	
S6603	↓	480	10	5.0	
S6604	↓	620	10	5.0	
S6606	↓	580	10	5.0	
S6605	21084	540	10	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	10	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB (EC
APG/PEST (EC
APG/PEST (FPD

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98 wI 1~~

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
EC Iso	0.1 ml	25/100 mg/ml	15616
EC Temp	0.1 ml	25/250 mg/ml	15993
FPDI	0.2 ml	125/125 mg/ml	15602
Arochlor 1260	0.1 ml	10 mg/ml	15997

oe DAW

SURROGATE Amt. (ml)	Conc.	Lot #
	BN:	
	ACID:	

Set-up: [signature] 5/6/87 [signature] 5/6/87 UPD/Supervisor: [signature] 6-8-87

~~BN~~ Conc.: [signature] ~~Acid~~ PEST Conc.: [signature] Spike/Surr. Verified: [signature]

4:[illegible] [illegible] 12 [illegible]

Sequence File: S163AF
Security Code: QE
Channel #: 0

ETC GC Lab Chronicle
Fraction APB/PEST/PCB
Supervisor [illegible]
Batch #s QC6904

Standard	Conc PPM	Lot No.
A 1260	0.5	15985
A 1260	1.0	15984
A 1260	5.0	15983
A 1016	0.5	15943
A 1221	0.5	15950
A 1232	0.5	15957
A 1242	0.5	15964
A 1248	0.5	15971
A 1254	0.5	15978

Subsequence 1
Method: M6904P:QE
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	[illegible]	1

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN3831	RN3831	100.0000	1.000000	1.000000
2	QC6904G	2	PN3832	RN3832	100.0000	1.000000	1.000000
3	A1260 0.5	3	PN3833	RN3833	100.0000	1.000000	1.000000
4	A1260 1.0	4	PN3834	RN3834	100.0000	1.000000	1.000000
5	A1260 5.0	5	PN3835	RN3835	100.0000	1.000000	1.000000
6	QC6904GS 4	6	PN3836	RN3836	100.0000	1.000000	1.000000
7	S6606G	7	PN3837	RN3837	100.0000	1.000000	1.000000
8	S6606GS 4	8	PN3838	RN3838	100.0000	1.000000	1.000000
9	S6605G	9	PN3839	RN3839	100.0000	1.000000	1.000000
10	S6605GR	10	PN3840	RN3840	100.0000	1.000000	1.000000
11	S6602G	11	PN3841	RN3841	100.0000	1.000000	1.000000
12	S6603G	12	PN3842	RN3842	100.0000	1.000000	1.000000
13	S6604G	13	PN3843	RN3843	100.0000	1.000000	1.000000
14	A1016 0.5	14	PN3844	RN3844	100.0000	1.000000	1.000000
15	A1221 0.5	15	PN3845	RN3845	100.0000	1.000000	1.000000
16	A1232 0.5	16	PN3846	RN3846	100.0000	1.000000	1.000000
17	A1242 0.5	17	PN3847	RN3847	100.0000	1.000000	1.000000
18	A1248 0.5	18	PN3848	RN3848	100.0000	1.000000	1.000000
19	A1254 0.5	19	PN3849	RN3849	100.0000	1.000000	1.000000
20	A1260 0.5	20	PN3850	RN3850	100.0000	1.000000	1.000000

KS 6/16/87

TC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 87/12/5 SHIFT
ACTION APA/PT NOA
INSTRUMENT C
FILE APE001
SEQUENCE FILE KBC
METHOD FILE VOAC
FILE C APAPT
ANALYST(S) K Bazan

SUPERVISOR W. W. L.
BATCH #'s QV7052

(PLEASE INITIAL) CB AA PT

CURRENT CS05 STATUS		STANDARDS UPDATED	
		DATE	3/12/87
		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL (ml)
P-BFB	50	15243	1
APB INS-D	25	16,024	10
SURR	25	15719	10
ABC/NOA	15	16028 ex	5 10 30
APB P+T	50	15501	5 10 30

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N	
P-BFB	>C2588	1ml				OK		7:05
QC7052V	>C2589	5.0ml	1			NG		
QC 7052VS	>C2590		2			NG 5ul ABC/NOA + APB P+T		
QC 7052VS	>C2591		3			10 ul		9:42
QC 7052VS	>C2592		4			(RE 30 ul		
QC7052VS	>C2593		4			30 ul ABC/NOA/APB		1:5
QC7052VS	>C2594		3			5ul	13:02	13:
BFB	>C2595					OK	14:36	
QC7052V	>C2596	5ml	2			α	15:33	
QC7052V	>C2597		3			α		16:1
QC7052V	>C2598		4			α		17:
QC7052V	>C2599		5			α		17:
QC7052V	>C2600		6			NG		
SC6605VS	>C2601	5ml	1			OK SC6605VS		19:4
SC6605V	>C2602		2			OK SC6605V		20:3
SC6604V	>C2603		3			OK SC6604V		21:4
SC6604VR	>C2604		4			OK SC6604VR		22
SC6603V	>C2605		5			OK		22:5
QC7052VS	>C2606	5ml	7			5ml ABC/NOA + APB P+T		1:0
QC7052VS	>C2607		8		CBUPD	3 ml		2:2
QC7052VS	>C2608		9		CBUPD	30 ml		3:0
P-BFB	>C2609	1ml	—			RAN BEFORE >C2607		20
QC7052V8	>C2610	5ml	1			OK SPEC NOA BLANK		4:3
QC7052V8	>C2611		2			OK		5:2
QC 7052V8	>C2612		3			OK		6:1

ETC ENVIRONMENTAL TESTING and CERTIFICATION

ORATORY CHRONICLE: GC-M. epartment

DATE 87/13/5 SHIFT
FRACTION AP9PT/VOA
INSTRUMENT C
TUNE FILE APE201
SEQUENCE FILE KBC
METHOD FILE VOAC
ID FILE CAP9PT
ANALYST(S) K. Boyd
SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See Pg#1			
Pg 2 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
QC7052VS	PC2613	Sul	4		OK	See VOA blank	
S6607V	PC2614		1		NG	Sum.	
S6608V	PC2615		2		ok		[illegible]
S6607V	PC2616		3		ok		10:[illegible]
S6606V	PC2617		4		ok		11:08
QC7052V	PC2618		2		ok		
(R) S6607V	PC2619		2		ok		12:44

E C ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE GC-MS Department

pg 1 of 2

DATE 87/13/5 SHIFT
FRACTION AP9HPT
INSTRUMENT E
FILE APEI02
SEQUENCE FILE
METHOD FILE AP9HPT
ID FILE EA9HPT
ANALYST(S) K Bogin [illegible]
SUPERVISOR [illegible]
BATCH #'s QV7054

(PLEASE INITIAL) CB9HPT

CURRENT CS05 STATUS		STANDARDS UPDATED	
		DATE	5/13/87
		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15243	1
APB IS	25	16,024	10
SURR	25	15,719	10
APPENDIX B DAI STD	500/100	14,657	24,10

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>E3117	1ml				OK	06:44
QC7054V	>E3118	5ml				Ok	07:27
QC7054VS	>E3119	5ml				2ml APB DAI STD	08:12
QC7054VS	>E3120	5ml				NG 4ml " "	
QC7054VS	>E3121	5ml			CB UPD CBCAL	10ml " "	10:30
QC7054VS	>E3122	5ml				4ml	11:55
P-BFB	>E3123	1ml				Ok	14:52
BA0106V	>E3124	5ml				NG S.B. ~~OK~~ Carry Over	15:46
BA0106VS	>E3125	5ml				NG 4ml APB DAI Std	
S6608V	>E3126	5ml				NG surrogate very low	
S6608VS	>E3127	5ml				NG 4ml APB DAI Std	
S6608V	>E3128	5ml				OK	20:21
S6607V	>E3129	5ml				NG Leaked	
S6606V	>E3130	5ml				Ok	22:21
S6607V	>E3131	5ml				Ok	23:06
BA0106VR	>E3132	5ml				NG	00:18
S6605V	>E3133	5ml				~~OK~~ NG Past CBCHK	1:10
BA0106V	>E3134	5ml				NG Past CBCHK	
QC7054VS	>E3136	5ml				NG 4ml ABC NVOA	
P-BFB	>E3135	1ml				NG	
P-BFB	>E3137	1ml				Ok >E3137	04:08
QC7054VS	>E3138	5ml				4ml APB DAI Std	04:53
QC7054VS	>E3139	5ml			S.B. [illegible]	~~10ml~~ 2ml	
QC7054VS	>E3140	5ml			NG	10ml	
QC7054V	>E3141	5ml			NG	5ml	

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

Pg 2 of 2

DATE 5/14/87 SHIFT
FRACTION HPTVOA
INSTRUMENT E
TUNE FILE APCF01
SEQUENCE FILE
METHOD FILE AP9 HPT
ID FILE EA9 HPT
ANALYST(S) Steph Blaze

SUPERVISOR [illegible]
BATCH #'s QV 7054

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

See PS

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
✓ QC 7054VS	E3142	5ml			CBUPD	10ul AP8/DAT	9:03
✓ QC 7054VS	E3143				CBCAL	2ul ↓	10:27
QC 7054V	E3144					NG	
✓ QC7054V	E3145					OK	13:3
✓ S6603V	E3146					OK	14:33
✓ S6603VS	E3147					OK	15:21
(R) S6605V	E3148					NG	
✓ S6605VR	E3149					OK	16:52
S6604V	E3150					NG Sure out	
(R) BH0106V	E3151	↓			NG	~~OK~~ 5/17/87 wrong analysis	18:23
S6602V	E3152	.05ml		1:100		Re-un Straight	
-BFB	E3153	1ul				inject before → E3149	
(R) S6605V	E3154	5ml				OK	21:16
(R) S6604V	E3155					OK	22:01
(R) S6602V	E3156					NG	
QC7054VS	E3157				NG	4ul AP8/DAT	
✓ QC7054VS	E3158					2ul	
✓ QC7054VS	E3159				CBCAL CBUPD	10ul	
✓ QC7054VS	E3160	↓				4ul AP8/DAT	
P-BFB	E3161	1ul			OK	PS.81 ENH-3:4, PS91	4:5
QC7054V	E3162	5ml				NG	
QC7054V	E3163					NG	
QC7054V	E3164					OK	07:42
(R) S6602V	E3165	↓				OK	08:49

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) Acid	BN	DER BN	Comments
S6602	21065	965	1.0	1.0	1.0	APG / T
S6603		965	1.0	1.0	1.0	
S6604		975	1.0	1.0	1.0	
S6606		970	1.0	1.0	1.0	
S6605	21084	980	1.0	1.0	1.0	
S6058	21177	1005	1.0	1.0	1.0	APS/BN, ACID, DER
S6059		1005	1.0	1.0	1.0	
~~S6226~~	21204	910	1.0	1.0	1.0	CNID
~~S6227~~		930	1.0	1.0	1.0	
~~S6057~~	21236					
S6004	21252	1005	1.0	1.0	1.0	
S6008		985	1.0	1.0	1.0	
S7731	21331	995	1.0	1.0	1.0	APG / T
S7732		955	1.0	1.0	1.0	
S7733		980	1.0	1.0	1.0	
~~S5843~~	~~21336~~	~~945~~	~~1.0~~			~~APS/ACID~~
S1023	20281					APG/BN ACID ICP
S1025						
~~S0513~~	~~20230~~					
S2511	20331	1005	1.0	1.0	1.0	
QC6902		1000	1.0	1.0	1.0	
QC6902S		1000	1.0	1.0	1.0	
S6605-MS		975	1.0	1.0	1.0	
S6605-MSD		980	1.0	1.0	1.0	

QC Batch # 6702

Analysis APG/BN, APS/C, APS/(ACID) APS/A, APG/HCl APS/A

Matrix H2O

Turnaround NCEPI

Date Start 5/13/97

Neutral

Base

Acid

Derivitized BN

Extraction Method:

Sep. Funnel ✓

Continuous

Other

COMMENTS

*repeat of QC 6654

HEXACHLORPHENE STD.

100 ug/ml	1.0	15,823
300 ug/ml	1.0	15,827
500 ug/ml	1.0	15,826

Extraction:

BN DER:

BN CONC:

ACID CONC:

Supervisor:

QC DEW QC SPIKE VEC. W. Set. 1.11 5/13/

FRACTION	SPIKE Amt (ml)	Conc. ug/ml	Lot #	SURROGATES Amt (ml)	Conc. ug/ml	Lot #
ABN/ACID	1.0	100/500	15,230			
ABN/ACID	1.0	300/1500	15,232			
ABN/ACID	1.0	500/100	15,237			
ABN/ACID	1.0	100	15,344			
ABN/ACID	1.0	100	15,342			
Semi Vol. DNA	~~1.0~~			1.0	50/100	15,888

ETC FORM #113

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 870606 SHIFT
FRACTION AP8/BNA
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE SWJ2
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) S. Willms

SUPERVISOR Sylvia Cordova
BATCH #'s QC6902 QC6976

OBJ8EX
(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	June 7th 1987
WIP		BY	KV

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Tot std	400	15561	
Test Mix			
ACID STD III, II, I	300, 100, 60	15819, 15818, 15817	
BN STD III, II, I	200, 100, 60	16079, 16078, 16077	
AP8 BN (II)	300, 500	15231	
AP8 ACID STD III, II, I	400/50 100/100 60/100	15236, 15235, 15234	
AP8/BN STD III, II, I	300/50 150/120 60/100	15227, 15228, 15229	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test Mix	>J4736		1			OK 01:06	
BNA STD III	>J4737		2			JBNA8	
II	>J4738		3				
I	>J4739		4				
AP8/BN(II)	>J4740		5			JAP8B2	
AP8/BNA III	>J4741		6			JAP8AB	
II	>J4742		7				
I	>J4743		8				
Test Mix	>J4744		9			OK, A 08:00	
QC6902E	>J4745		10				
QC6902CS	>J4746		11				
S6605CS	>J4747		12				
S6605CR	>J4748		13				
S6603C	>J4749		14				
S6004C	>J4750		15				
S6605C	>J4751		16				
S6008C	>J4752		17				
S7731C	>J4753		18				
S7732C	>J4754		19				
Test Mix	>J4755		20		OK	17:57	
BNA STD II	>J4756		21				
AP8/BNA STD II	>J4757		22				
S2811S	>J4758		23				
S6058S	>J4759		24				
[illegible]	[illegible]		[illegible]				

C ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

E 6-8-87 SHIFT
[illegible] AP8/BNA
T[illegible]ENT J
IE FILE MTJ001
QUENCE FILE
THOD FILE BNPJ
FILE JAP8EX
ALYST(S) C. to

PERVISOR Sonia Cordova
TCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CS05 STATUS	STANDARDS UPDATED	
	DATE	
	BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See page			
		page 2	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
S7733C	>J4761		26				
S6602B	>J4762		27				
S6604C	>J4763		28				
S6606C	>J4764		29				
S6226C	>J4765		30				
S6227C	>J4766		31				
Test Mix	>J4767		32				
BNA II	>J4768		33			See page 3	
AP8/BNA II	>J4769		34				
S5843C	>J4770		35				
QC6976C	>J4771		36				
QC6976CS	>J4772		37				
S6252CS	>J4773		38				
S6253C	>J4774		39				
S6253CR	>J4775		40				
S6002C	>J4776		41				
S6003C	>J4777		42				
S6006C	>J4778		43				
Test Mix	>J4779		44				
BNA STD II	>J4780		45				
AP8/BNA II	>J4781		46				
S6007C	>J4782		47				
S6009C	>J4783		48				
S6005C	>J4784		49				
R7859C	>J4785		50				

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 60987 SHIFT
FRACTION HCP OEV
INSTRUMENT mTI001
TUNE FILE I
SEQUENCE FILE BHI
METHOD FILE BHCP
ID FILE IHCP
ANALYST(S) Brenda Hawkins

SUPERVISOR [illegible]
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	BH

STANDARD	CONC PPM	LOT NO.	LOT VOL
HCP std III	500		
II	300		
I	100		
Test mix			
internal std	400		

NAME	DATA FILE >	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test mix	I4051		1		OK		19:31
HCP std III	I4052		2				
II	I4053		3				
I	I4054		4				21:23
Test mix	I4055		5		OK		22:04
QC6902C	I4056		6				
QC6902CS	I4057		7				
S6605C	I4058		8				
S6605CS	I4059		9				
S6605CR	I4060		10				
S6004C	I4061		11				
S6008C	I4062		12				
S6058C	I4063		13				
S7732C	I4064		14				
S6602C	I4065		15				
Test mix	I4066		16		OK		5:05
S6603C	I4068		18				
S6604C	I4069		19				
S6606C	I4070		20				
S2811C	I4071		21				
S7733C	I4072		22				
S6059C	I4073		23				9:32
Test mix	I4103		1		OK		10:34
Hex std II	I4104		2		OK		11:12

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departm

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST ~~BN~~	~~ACID~~	Comments
S6602	21065	530	10	5.0	
S6603	↓	480	10	5.0	
S6604	↓	620	10	5.0	
S6606	↓	580	10	5.0	
S6605	21084	540	1.0	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	1.0	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB (...
APG/PEST (...
APG/PEST (FPD

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on shelf 98 WI~~

	FRACTION	SPIKE Amt (ml)	Conc.	Lot #
S1	Ec Iso	0.1 ml	25/100 mg/ml	15616
S2	Ec Temp	0.1 ml	25/250 mg/ml	15993
S3	FPDI	0.2 ml	125/125 mg/ml	15602
S4	Arochlor 1260	0.1 ml	40 mg/ml	15997

OC DAN

SURROGATE Amt. (ml)	Conc.	Lot #
	BN:	
	ACID:	

Set-up: J. Jekinski 5/6/87 K. W. [illegible] 5/6/87 UPD/Supervisor: [illegible] 6-8-87

PCB ~~BN~~ Conc.: [illegible] PEST ~~Acid~~ Conc.: [illegible] Spike/Surr. Verified: [illegible] 5-6-87

6/13/87

8:10 PM SAT., 13 JUNE, 1987
Sequence file: S164AA
Security Code: QA
Channel #: 13

ETC GC Lab Chronicle
Fraction APB/A PEST (EC)
Supervisor JSW
Batch #s QC 6904

Standard	Conc PPM	Lot No.
APB/PEST TEMPA	0.01, 1.0	16265
APB/PEST TEMPB	0.05, 5.0	16264
APB/PEST TEMPC	0.1, 10	16263
APB/PEST ISO CAL IA	0.1, 0.25	16268
APB/PEST ISO CAL IB	0.5, 0.5, 1	16267
APB/PEST ISO CAL IC	1.0, 1.0, 2.5	16266
APB/PEST ISO CAL IIA	0.25	16271
APB/PEST ISO CAL IIB	1.0	16270
APB/PEST ISO CAL IIC	2.5	16269
INDIV. A	0.05	2377
INDIV B	0.05	2361

Subsequence 1
Method: M6904T:QA
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN4051	RN4051	100.0000	1.000000	1.000000
2	QC6904G	2	PN4052	RN4052	100.0000	1.000000	1.000000
3	TEMP A	3	PN4053	RN4053	100.0000	1.000000	1.000000
4	TEMP B	4	PN4054	RN4054	100.0000	1.000000	1.000000
5	TEMP C	5	PN4055	RN4055	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN4056	RN4056	100.0000	1.000000	1.000000
7	S6603G	7	PN4057	RN4057	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN4058	RN4058	100.0000	1.000000	1.000000
9	ISO 1A	9	PN4059	RN4059	100.0000	1.000000	1.000000
10	HEXANE	10	PN4060	RN4060	100.0000	1.000000	1.000000
11	ISO 1B	11	PN4061	RN4061	100.0000	1.000000	1.000000
12	HEXANE	12	PN4062	RN4062	100.0000	1.000000	1.000000
13	ISO 1C	13	PN4063	RN4063	100.0000	1.000000	1.000000
14	HEXANE	14	PN4064	RN4064	100.0000	1.000000	1.000000
15	TEMP B	15	PN4065	RN4065	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN4066	RN4066	100.0000	1.000000	1.000000
17	S6602G	17	PN4067	RN4067	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN4068	RN4068	100.0000	1.000000	1.000000
19	ISO 2A	19	PN4069	RN4069	100.0000	1.000000	1.000000
20	ISO 2B	20	PN4070	RN4070	100.0000	1.000000	1.000000
21	S6604G	21	PN4071	RN4071	100.0000	1.000000	1.000000
22	S6605G	22	PN4072	RN4072	100.0000	1.000000	1.000000
23	S6605GR	23	PN4073	RN4073	100.0000	1.000000	1.000000
24	S6606G	24	PN4074	RN4074	100.0000	1.000000	1.000000
25	TEMP B	25	PN4075	RN4075	100.0000	1.000000	1.000000
26	ISO 2C	26	PN4076	RN4076	100.0000	1.000000	1.000000
27	ISO 1B	27	PN4077	RN4077	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN4078	RN4078	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN4079	RN4079	100.0000	1.000000	1.000000

Pruning

:17 PM FRI., 19 JUNE, 1987
Sequence file: S170AB
Security Code: QZ
Channel #: 17

JS 6/19/87

Subsequence 1
Method: M6904C:QZ
Dialog-Prg Param-File
: :

Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction AP9 PEST (EC)
Supervisor
Batch #s QC 6904

Standard	Conc PPM	Lot No.
TEMP A	MIX	16265
" B	MIX	16264
" C	MIX	16263
ISO IA		16268
" IB		16267
" IC		16266
ISO 1A		16271
" 2B		16270
" 2C		16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN5391	RN5391	100.0000	1.000000	1.000000
2	QC6904G	2	PN5392	RN5392	100.0000	1.000000	1.000000
3	TEMP A	3	PN5393	RN5393	100.0000	1.000000	1.000000
4	TEMP B	4	PN5394	RN5394	100.0000	1.000000	1.000000
5	TEMP C	5	PN5395	RN5395	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN5396	RN5396	100.0000	1.000000	1.000000
7	S6603G	7	PN5397	RN5397	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN5398	RN5398	100.0000	1.000000	1.000000
	ISO 1A	9	PN5399	RN5399	100.0000	1.000000	1.000000
10	HEXANE	10	PN5400	RN5400	100.0000	1.000000	1.000000
11	ISO 1B	11	PN5401	RN5401	100.0000	1.000000	1.000000
12	HEXANE	12	PN5402	RN5402	100.0000	1.000000	1.000000
13	ISO 1C	13	PN5403	RN5403	100.0000	1.000000	1.000000
14	HEXANE	14	PN5404	RN5404	100.0000	1.000000	1.000000
15	TEMP B	15	PN5405	RN5405	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN5406	RN5406	100.0000	1.000000	1.000000
17	S6602G	17	PN5407	RN5407	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN5408	RN5408	100.0000	1.000000	1.000000
19	ISO 2A	19	PN5409	RN5409	100.0000	1.000000	1.000000
20	ISO 2B	20	PN5410	RN5410	100.0000	1.000000	1.000000
21	S6604G	21	PN5411	RN5411	100.0000	1.000000	1.000000
22	S6605G	22	PN5412	RN5412	100.0000	1.000000	1.000000
23	S6605GR	23	PN5413	RN5413	100.0000	1.000000	1.000000
24	S6606G	24	PN5414	RN5414	100.0000	1.000000	1.000000
25	TEMP B	25	PN5415	RN5415	100.0000	1.000000	1.000000
26	ISO 2C	26	PN5416	RN5416	100.0000	1.000000	1.000000
27	ISO 1B	27	PN5417	RN5417	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN5418	RN5418	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN5419	RN5419	100.0000	1.000000	1.000000

CONFIRMATION

2:58 PM FRI., 12 JUNE, 1987
Sequence file: S160AC
Security Code: PQ
Channel #: 3

BN 6/12/87

ETC GC Lab Chronicle
Fraction APB/PST (FPB)
Supervisor RH
Batch #s QC6904

Standard	Conc PPM	Lot No.
APB IA	0.1	15,605
IB	0.5	15,604
IC	1.0	15,603
APB IIA	0.1	15609
IIB	0.5	15,608
IIC	1.0	15,607

Subsequence 1
Method: M6904F:PQ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Wmt	Smp-Wmt
1	HEXANE	1	PN2946	RN2946	100.0000	1.000000	1.000000
2	QC6904G	2	PN2947	RN2947	100.0000	1.000000	1.000000
3	APB I 0.1	3	PN2948	RN2948	100.0000	1.000000	1.000000
4	APB I 0.5	4	PN2949	RN2949	100.0000	1.000000	1.000000
5	APB I 1.0	5	PN2950	RN2950	100.0000	1.000000	1.000000
6	APB II 0.1	6	PN2951	RN2951	100.0000	1.000000	1.000000
7	APB II 0.5	7	PN2952	RN2952	100.0000	1.000000	1.000000
8	APB II 1.0	8	PN2953	RN2953	100.0000	1.000000	1.000000
9	QC6904GS 3	9	PN2954	RN2954	100.0000	1.000000	1.000000
10	S6604G	10	PN2955	RN2955	100.0000	1.000000	1.000000
11	S6604GS 3	11	PN2956	RN2956	100.0000	1.000000	1.000000
12	S6605G	12	PN2957	RN2957	100.0000	1.000000	1.000000
13	S6605GR	13	PN2958	RN2958	100.0000	1.000000	1.000000
14	S6602G	14	PN2959	RN2959	100.0000	1.000000	1.000000
15	S6603G	15	PN2960	RN2960	100.0000	1.000000	1.000000
16	S6606G	16	PN2961	RN2961	100.0000	1.000000	1.000000
17	APB I 0.5	17	PN2962	RN2962	100.0000	1.000000	1.000000
18	APB II 0.5	18	PN2963	RN2963	100.0000	1.000000	1.000000

KS 6/25/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departi

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml)		Comments
S6602	21065	620	5.0		
S6603	↓	640	5.0		
S6604	↓	680	5.0		
S6606	↓	610	5.0		
S6605	21084	500	5.0		
QC 6903		500	5.0		
QC 6903	S	500	5.0		
S6606	S	550	5.0		
S6605	R	570	5.0		

QC Batch # 6903

Analysis AP9/HERB (E

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on sheet 98~~

FRACTION	SPIKE		
	Amt (ml)	Conc.	Lot #
DW/[illegible]/APP5/Herb	1.0	250µS/25	15,783

QC Dan

SURROGATE		
Amt. (ml)	Conc.	Lot #

Set-up: [illegible] 5/6/87 [illegible] 5/6/87 UPD/Supervisor: [illegible] 5/6/87

VIR(ENT,
TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
288 Phenacetin	ND	11	98.2	100	ND	150	77	ND	154	64
289 Phenol	ND	1.6	91.5	75.2	ND	100	105	ND	103	89
299 2-Picoline	ND	11	86.6	91.5	ND	150	104	ND	154	56
303 Pronamide	ND	11	115	137	ND	150	90	ND	154	75
310 Resorcinol	ND	11	ND	ND	ND	300	0	ND	308	0
312 Safrole	ND	11	131	157	ND	150	101	ND	154	85
323 1,2,4,5-Tetrachlorobenzene	ND	11	121	145	ND	150	101	ND	154	79
330 2,3,4,6-Tetrachlorophenol	ND	11	111	128	ND	200	66	ND	206	54
331 Tetraethyldithiopyrophospha	ND		ND	ND	ND	0	-	ND	0	-
353 1,2,4-Trichlorobenzene	ND	2.1	81.9	83.1	ND	100	88	ND	103	80
359 2,4,5-Trichlorophenol	ND	11	79.1	81.8	ND	100	80	ND	103	77
360 2,4,6-Trichlorophenol	ND	2.9	75.9	79.1	ND	100	98	ND	103	74
368 tris(2,3-Dibromopropyl)phos	IND		IND	IND	IND	500	0	IND	513	0
Benzoic acid	ND	11	ND	75.1	ND	100	87	ND	103	0
Benzyl alcohol	ND	11	127	141	ND	150	91	ND	154	83
Dibenzofuran	ND	11	122	151	ND	150	102	ND	154	79
Isophorone	ND	2.4	87.8	97.9	ND	100	95	ND	103	86
2-Methylnaphthalene	ND	11	128	157	ND	150	104	ND	154	83
o-Nitroaniline	ND	11	101	139	ND	150	90	ND	154	66
m-Nitroaniline	ND	11	79.1	186	ND	150	75	ND	154	51
4-Chlorophenyl phenyl ether	ND	4.5	80.8	96.2	ND	100	103	ND	103	79

*See Grand Table for complete compound name and specifications.
**SAMPLE established method detection limit.
*-specifies no standard or reference spectra available.
"IND" indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

Comments on Specific Fraction

B/N/A:

The QC Blank Spike and QC Matrix Spike yielded variable recoveries. All recoveries were manually verified.

The following compounds yielded 0% recoveries for both spikes but were detected in the calibration standards used for this analysis:

3,3'-Dimethoxybenzidine

Hexachlorophene

Resorcinol

The following compounds yielded low/no recoveries but are considered normally variable:

3,3'-Dimethylbenzidine

2,4-Dinitrophenol

4-Nitrophenol

Hexachloropropene

Isosafrole

1,4-Naphthoquinone

N-Nitroso methylethylamine

Benzoic Acid

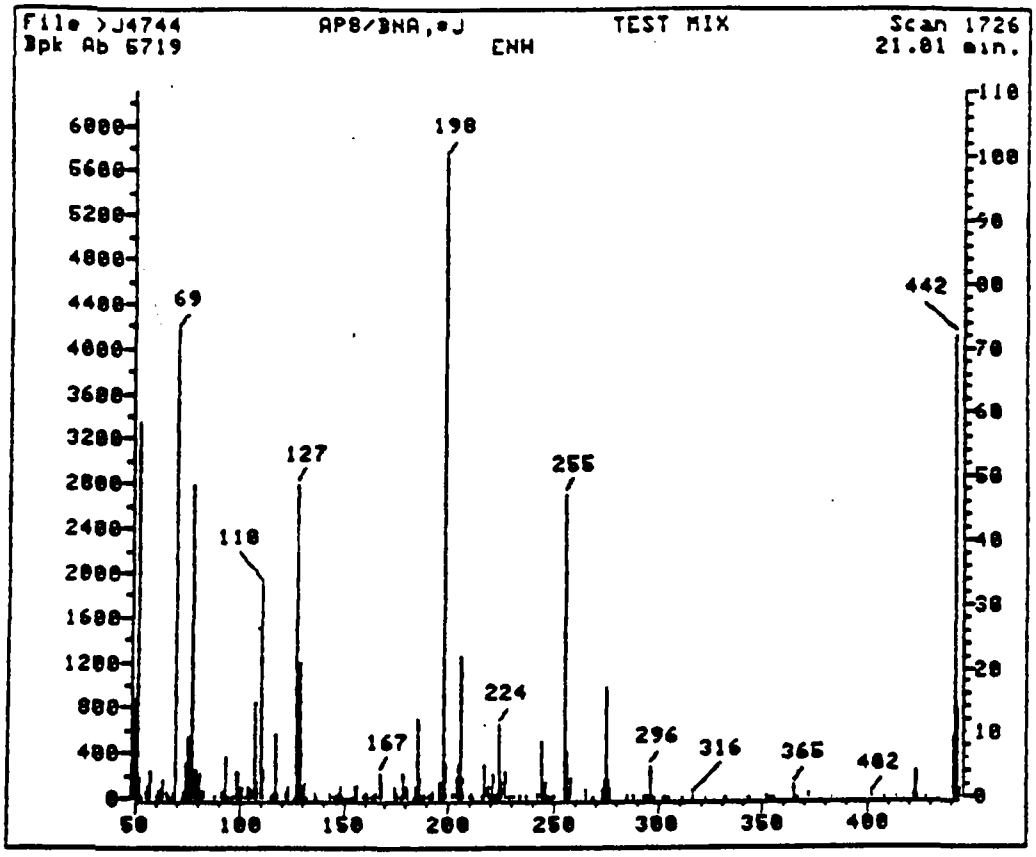

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.59	58.59	Ok
68	Less than 2% of mass 69	.82	1.12	Ok
69	(reference only)	72.85	72.85	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	48.77	48.77	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.52	5.52	Ok
275	10-30% of mass 198	17.16	17.16	Ok
365	Greater than 1% of mass 198	2.02	2.02	Ok
441	0-100% of mass 443	9.28	66.01	Ok
442	Greater than 40% of mass 198	71.91	71.91	Ok
443	17-23% of mass 442	14.05	19.55	Ok

Injection Date: 06/07/87 Analyst: K Valentine
Injection Time: 08:00 Processor: [illegible]
Run No: >J4744 QC Batch: QC6902
Spectrum No: 1726 and

MS Data File: >J4744::U6

Name: AP8/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 8:00
Misc: TEST MIX BTL# 9

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C >J4745	870607	08:39
	QC6902CS>J4746	870607	09:36
	S6605CS>J4747	870607	10:29
	S6605CR>J4748	870607	11:25
	S6603C >J4749	870607	12:17
	S6004C>J4750	870607	13:11
	S6005C>J4751	870607	14:04
	S6008C>J4752	870607	15:01
	S7731C>J4753	870607	15:59
	S7732C>J4754	870607	16:58

LAH

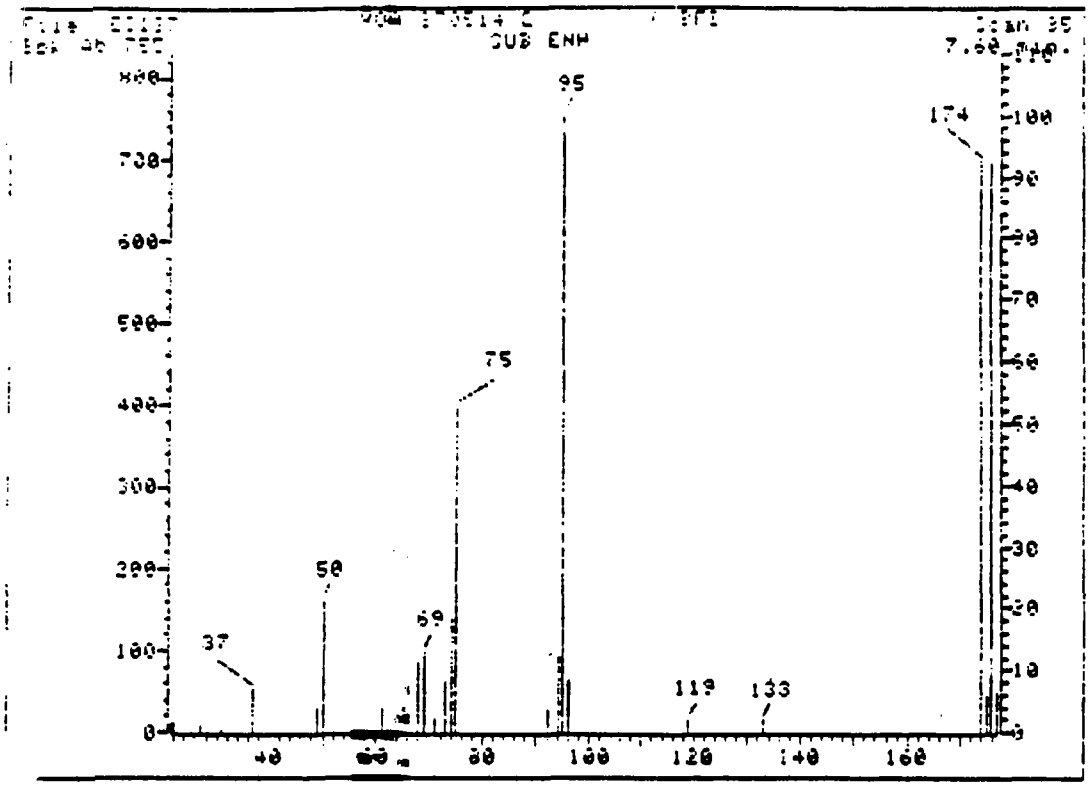

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.48	52.48	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.42	8.42	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	92.53	92.53	Ok
175	5-9% of mass 174	6.07	6.56	Ok
176	95-101% of mass 174	92.40	99.86	Ok
177	5-9% of mass 176	6.12	6.62	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 04:08 Processor: [signature]
Run No: >E3137 QC Batch: QV7034
Spectrum No: (85-71) ENH

[signature] 6/20/87

GC/MS Data File: >E3137:U4

Name: U04 870514 E Operator: SB5883 Date/Time: 5/14/87 4:09
Disc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	0E7054VS (>E3138)	870514	04:53
	0E7054VS (>E3140)	870514	09:03
	0E7054VS (>E3141)	870514	10:27
	0E7054V (>E3145)	870514	13:30
	S6603V (>E3146)	870514	14:33
	S6603VS (>E3147)	870514	15:21

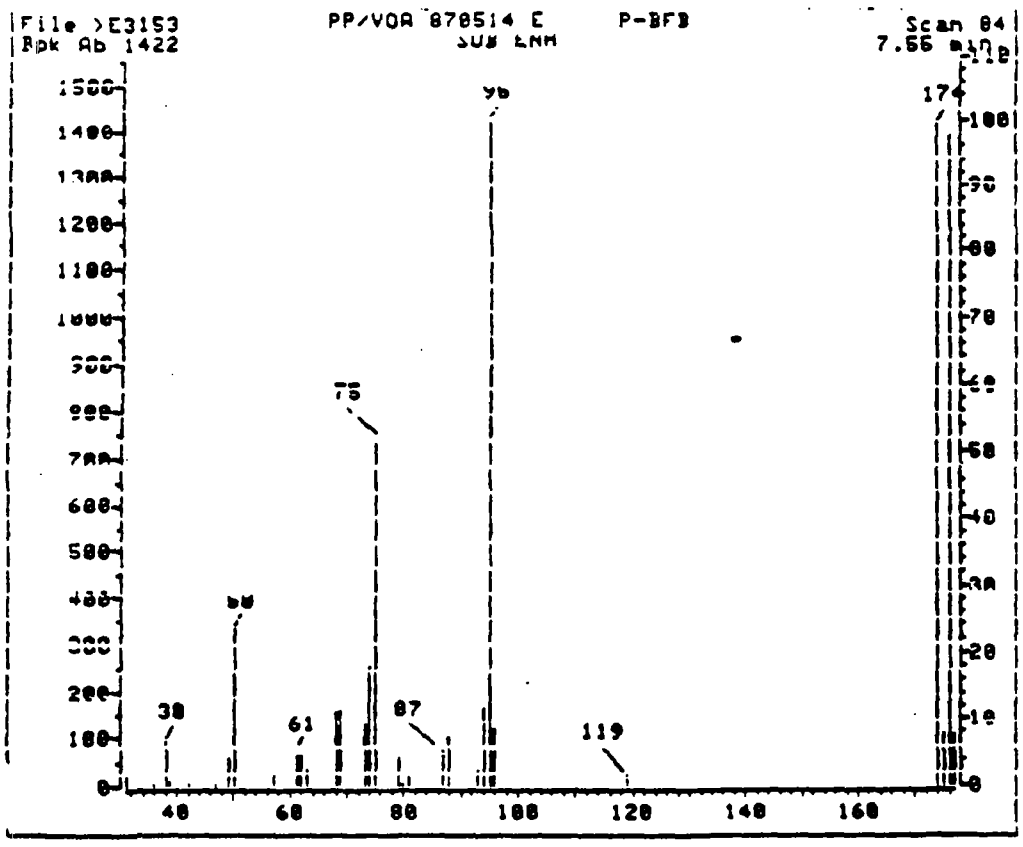

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	23.30	23.30	Ok
75	30-60% of mass 95	52.04	52.04	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.52	8.52	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.25	99.25	Ok
175	5-9% of mass 174	7.83	7.89	Ok
176	95-101% of mass 174	98.00	98.74	Ok
177	5-9% of mass 176	7.51	7.66	Ok

Injection Date: 05/14/87 Analyst: [signature]
Injection Time: 16:14 Processor: [signature]
Run No: >E3153 WC Batch: QU7054
Spectrum No: PS84 (EVH) PS70
SUBT

[initials] 5/20/87

MS Data File: >E3153::04

Name: PP/VOA 8/0514 E Operator: MGRMS Date/Time: 5/14/87 16:14
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6605VR (>E3149)	870514	16:52
	~~[illegible]~~	~~870514~~	~~18:23~~ 5/17/87
	S6605V (>E3154)	870514	21:16
	S6604V (>E3155)	870514	22:01
	OC7054VS (>E3158)	870515	01:37
	OC7054VS (>E3159	870515	02:41
	OC7054VS (>E3160)	870515	04:03

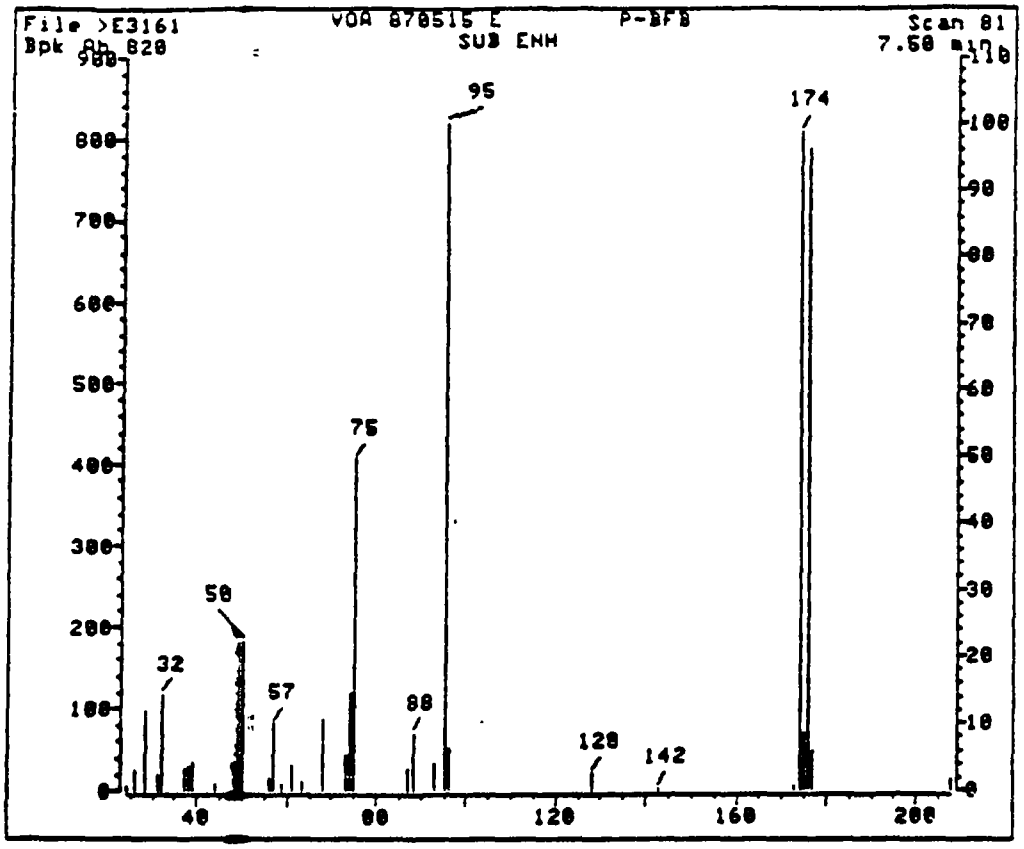

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.24	22.24	Ok
75	30-60% of mass 95	49.59	49.59	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.03	6.03	Ok
173	Less than 1% of mass 95	.56	.56	Ok
174	Greater than 50% of mass 95	98.70	98.70	Ok
175	5-9% of mass 174	8.36	8.47	Ok
176	95-101% of mass 174	96.00	97.26	Ok
177	5-9% of mass 176	5.89	6.13	Ok

Injection Date: 05/15/87 Analyst: [signature]
Injection Time: 04:59 Processor: [signature]
Run No: >E3161 QC Batch: QV7059
Spectrum No: PS81, ENH, -3:4, PS91
SUB,T

[illegible] 5/21/87

MS Data File: >E3161::U4

Name: VOA 870515 E Operator: SB5883 Date/Time: 5/15/87 4:59
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6602V (>E3165)	870515	08:49

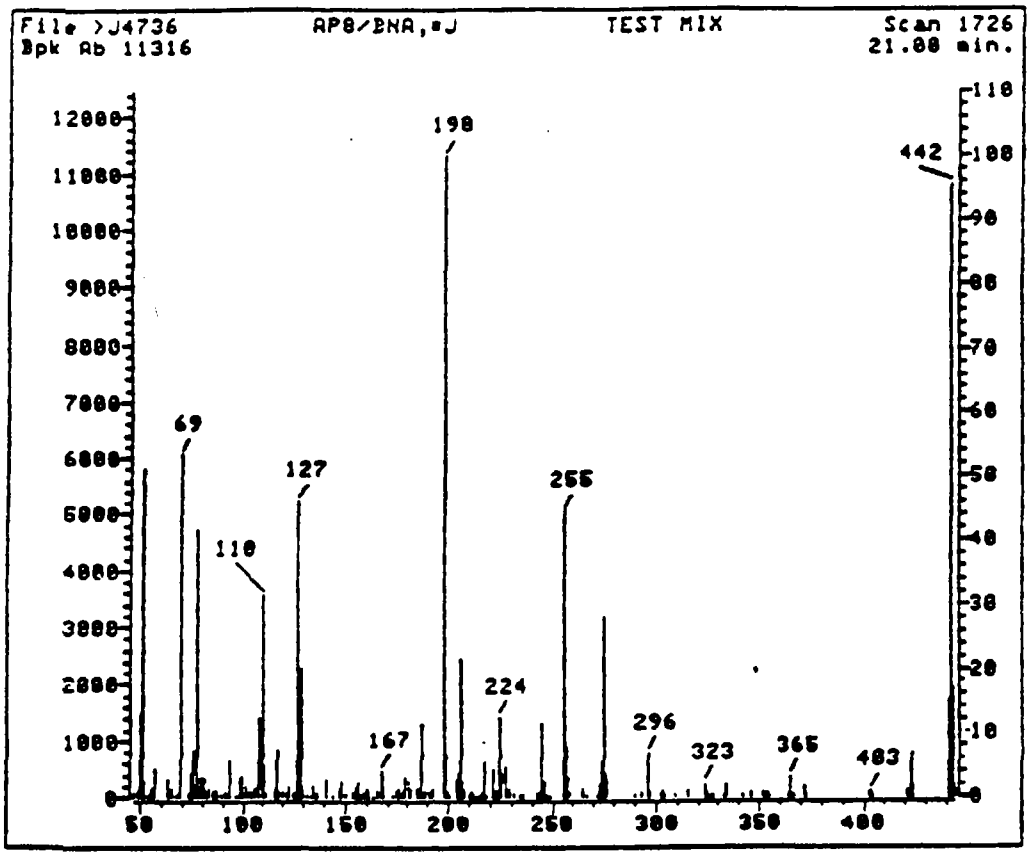

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	51.51	51.51	Ok
68	Less than 2% of mass 69	.60	1.12	Ok
69	(reference only)	53.68	53.68	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	46.31	46.31	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.48	6.48	Ok
275	10-30% of mass 198	27.79	27.79	Ok
365	Greater than 1% of mass 198	3.11	3.11	Ok
441	0-100% of mass 443	15.25	91.23	Ok
442	Greater than 40% of mass 198	95.42	95.42	Ok
443	17-23% of mass 442	16.72	17.52	Ok

Injection Date: 06/07/87 Analyst: K Valuti
Injection Time: 01:06 Processor: Mistie Blakley
Run No: >J4736 QC Batch: QC6902
Spectrum No: 1726 (A)

LAHendel 6/20/87

MS Data File: >J4736::U5

Name: APB/BNA,#J Operator: JQ6275 Date/Time: 6/07/87 1:06
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4737	870607	01:44
	STD. >J4738	870607	02:37
	STD. >J4739	870607	03:31
	STD. >J4740	870607	04:26
	STD. >J4741	870607	05:18
	STD. >J4742	870607	06:11
	STD. >J4743	870607	07:03

LAH

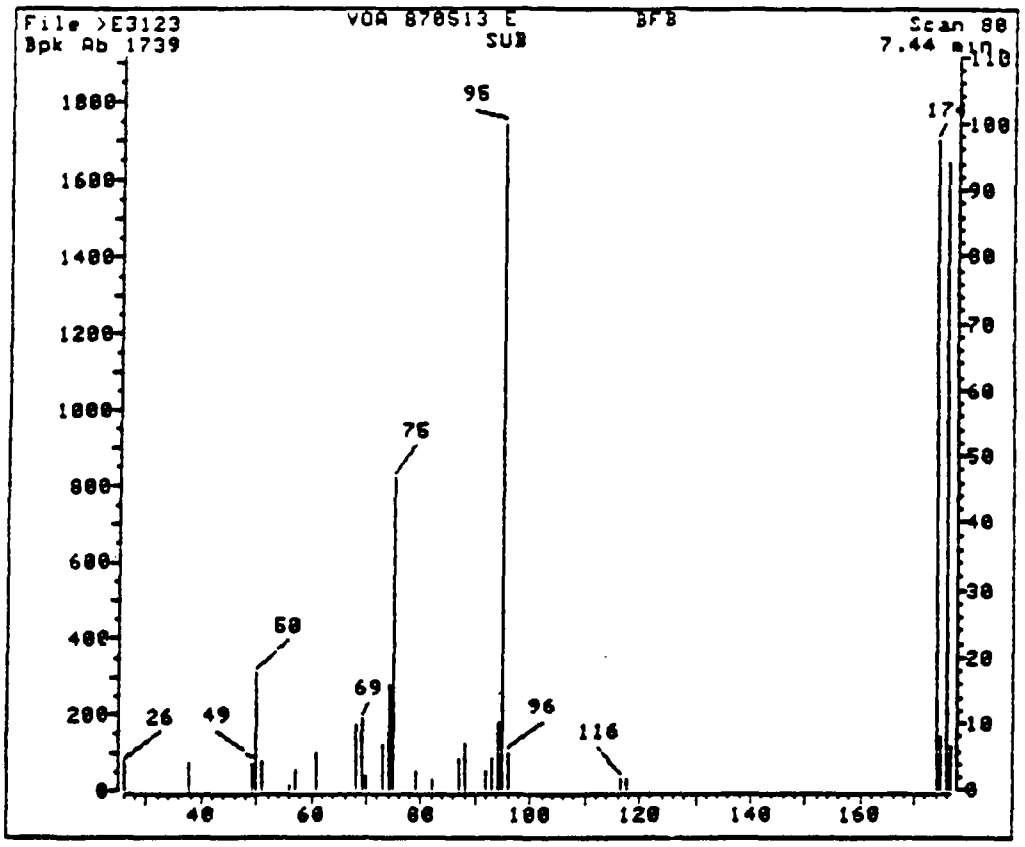

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	17.94	17.94	Ok
75	30-60% of mass 95	47.10	47.10	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	5.69	5.69	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	97.53	97.53	Ok
175	5-9% of mass 174	8.17	8.37	Ok
176	95-101% of mass 174	94.36	96.76	Ok
177	5-9% of mass 176	6.44	6.83	Ok

Injection Date: 05/13/87 Analyst: [illegible]
Injection Time: 14:52 Processor: [illegible]
Run No: >E3123 QC Batch: QV7057
Spectrum No: 50 -20

20/87

MS Data File: >E3123::U4

Name: VOA 870513 E Operator: LR5235 Date/Time: 5/13/87 14:
Misc: BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S6608V (>E3128)	870513	20:21
	S6606V (>E3130)	870513	22:21
	S6607V (>E3131)	870513	23:06

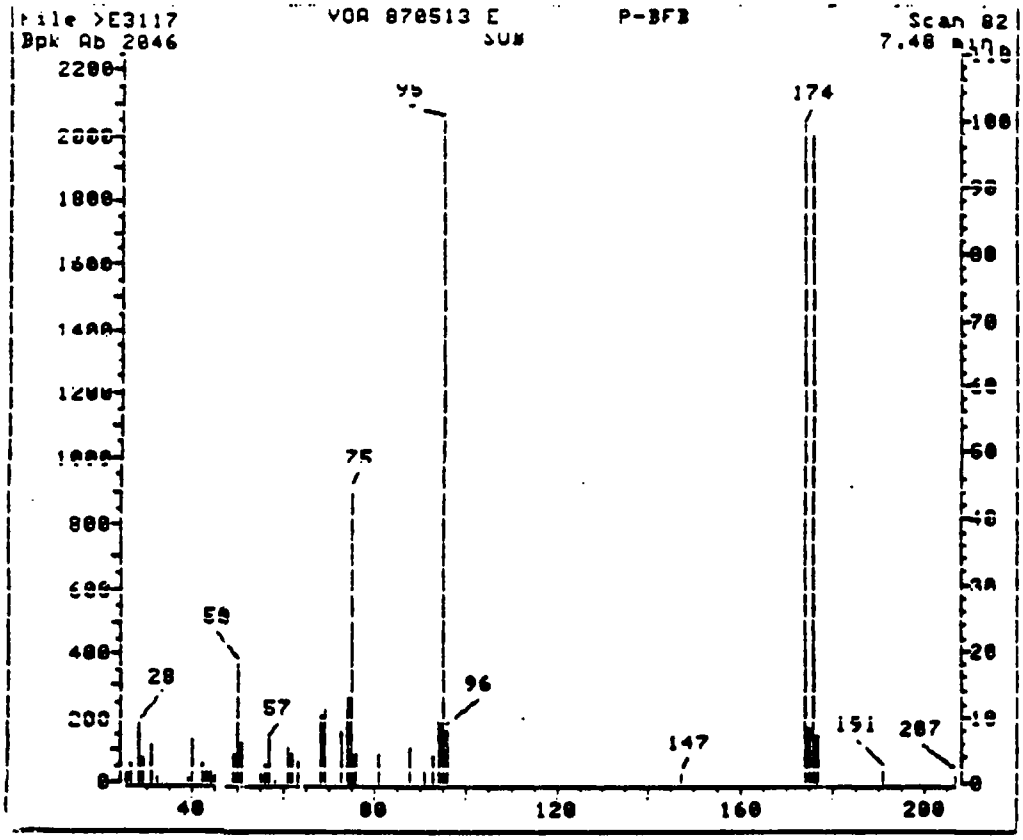

TABLE 2: METHOD PERFORMANCE DATA (WK21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	18.13	18.13	Ok
75	30-60% of mass 95	44.43	44.43	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.11	8.11	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	99.32	99.32	Ok
175	5-9% of mass 174	8.26	8.32	Ok
176	95-101% of mass 174	98.09	98.77	Ok
177	5-9% of mass 176	7.04	7.17	Ok

Injection Date: 05/13/87 Analyst: K Boyle
Injection Time: 06:46 Processor: [illegible]
Run No: >E3117 WC Batch: QV 7054
Spectrum No: B2-69

KJ
5/21/87

You're already on LU: 87

MS Data File: >E3117::U5

Name: VUA 87/0513 E Operator: KB6656 Date/Time: 5/13/87 6
Misc: P-8H8

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC705HV (>E3118)	870513	07:27
	QC705HVS (>E3119)	870513	08:12
	QC705HVS (>E3121)	870513	10:30
	QC705HVS (>E3122)	870513	11:50

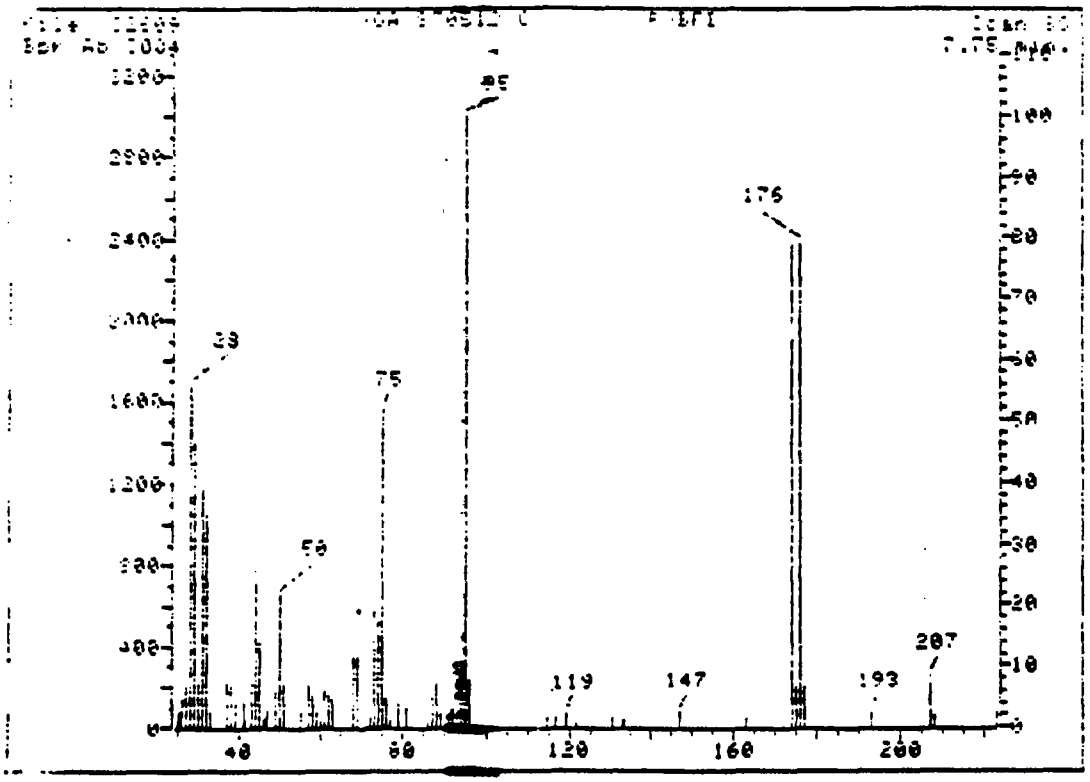

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.87	21.87	Ok
75	30-60% of mass 95	51.83	51.83	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.59	7.59	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	78.73	78.73	Ok
175	5-9% of mass 174	6.79	8.63	Ok
176	95-101% of mass 174	79.26	100.68	Ok
177	5-9% of mass 176	6.49	9.19	Ok

Injection Date: 05/13/87 Analyst: K. Bodi
Injection Time: 12:00 Processor: Sharon Mallock
Run No: 12609 QC Batch: QV7052
Spectrum No: 88 (UNaHered)

WS 2/87

ME Data File: >C2609::U1

Name: UOA 870513 C Operator: KB66F6 Date/Time: 5/13/87 2:00
Misc: P-BFB

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	0C70520VS (>C2607)	870513	02:22
	0C70520VS (>C2608)	870513	03:02
	0C70520V (>C2611)	870513	05:25
	0C70520V (>C2612)	870513	06:10
	0C70520V (>C2613)	870513	06:57
	966080V (>C2615)	870513	09:38
	966020V (>C2616)	870513	10:23
	966060V (>C2617)	870513	11:08
	0C70520V (>C2618)	870513	11:55
	966070V (>C2619)	870513	12:44

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 26, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals - Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
86603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

NPDES Number	Compound		Results: Sample Concen.	Results: MDL
	Aluminum, Total	ug/l	<30.0	30
	Antimony, Total	ug/l	<500	500
	Arsenic, Total	ug/l	<4.00	4.0
	Barium, Total	ug/l	99.0	50
	Beryllium, Total	ug/l	<1.00	1.0
	Cadmium, Total	ug/l	<3.00	3.0
	Calcium, Total	ug/l	374000	100
	Chromium, Total	ug/l	<20.0	20
	Cobalt, Total	ug/l	<20.0	20
	Copper, Total	ug/l	<20.0	20
	Iron, Total	ug/l	280	30
	Lead, Total	ug/l	56.0	4.0
	Manganese, Total	ug/l	1590	10
	Mercury, Total	ug/l	<.500	.50
	Nickel, Total	ug/l	21.0	20
	Osmium, Total	mg/l	ND *	
	Selenium, Total	ug/l	<2.00	2.0
	Silver, Total	ug/l	<30.0	30
	Sodium, Total	ug/l	192000	50
	Thallium, Total	ug/l	<300	300
	Tin, Total	ug/l	<1000	1000
	Vanadium, Total	ug/l	<10.0	10
	Zinc, Total	ug/l	<20.0	20
	Potassium, Total	ug/l	57000	50
	Cyanide, Total	mg/l	<.02	.02
	Sulfide as S	mg/l	<.1	.1
	Magnesium, Total	ug/l	61900	200

* Qualitative analysis.

JUN 20, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA - Aroclors -GC Analysis Data (QR30)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
300A Aroclor 1242	ND	1.0	ND	ND	ND	0	-	ND	0	-
300B Aroclor 1254	ND	1.0	ND	ND	ND	0	-	ND	0	-
300C Aroclor 1260	ND	1.0	ND	ND	ND	2.00	82	ND	1.64	75
300D Aroclor 1248	ND	1.0	ND	ND	ND	0	-	ND	0	-
300E Aroclor 1232	ND	1.0	ND	ND	ND	0	-	ND	0	-
300F Aroclor 1221	ND	1.0	ND	ND	ND	0	-	ND	0	-
300G Aroclor 1016	ND	1.0	ND	ND	ND	0	-	ND	0	-

*See Grand Table for complete compound name and specifications.
**MDL calculated for each sample matrix.

JUN 29, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Pest & Herb Compounds – GC Analysis Data (QR56)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound #	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l a	MDL** ug/l	First* ug/l a	Second ug/l a	Blank Data ug/l a	Concen. Added ug/l	% Recov	Unspiked Sample ug/l a	Concen. Added ug/l	% Recov
11 Aldrin	ND	.10	ND	ND	ND	.481	129	ND	.463	108
63 Chlordane	ND	1.0	ND	ND	ND	5.00	74	ND	4.81	96
73 Chlorobenzilate	ND	2.6	ND	ND	ND	0	-	ND	0	-
100 4,4'-DDD	ND	.10	ND	ND	ND	.962	96	ND	.926	77
101 4,4'-DDE	.256	.10	.117	.259	ND	.481	172	.254	.463	93
102 4,4'-DDT	.737	.10	.509	.701	.366	.481	307	.737	.463	99
130 2,4-D	ND	7.8	ND	ND	ND	50.0	0	ND	45.5	134
137 Dieldrin	ND	.10	ND	ND	ND	.481	162	ND	.463	130
144 Thionazin	ND	1.0	ND	ND	ND	4.55	175	ND	4.10	151
172 Disulfoton	ND	5.2	ND	ND	ND	22.7	175	ND	20.5	162
174A Endosulfan I	ND	.10	ND	ND	ND	.481	141	ND	.463	134
174B Endosulfan II	ND	.10	ND	ND	ND	.481	97	ND	.463	80
175 Endrin	ND	.10	.0400	.0400	ND	.962	96	ND	.926	77
Endrin aldehyde	ND	.10	ND	ND	ND	.481	146	ND	.463	110
192 Heptachlor	ND	.10	ND	ND	ND	.481	146	ND	463	119
193 Heptachlor epoxide	ND	.10	ND	ND	ND	.481	164	ND	.463	132
196A Alpha-BHC	ND	.10	ND	ND	ND	.481	109	ND	.463	103
196B Beta-BHC	ND	.10	ND	ND	ND	.481	115	ND	.463	103
196C Gamma-BHC	ND	.10	ND	ND	ND	.481	138	ND	.463	116
196D Delta-BHC	ND	.10	ND	ND	ND	.481	153	ND	.463	140
214 Kepone	ND	1.0	ND	ND	ND	5.00	122	ND	4.81	105
230 Methoxychlor	ND	10	ND	ND	ND	48.1	191	ND	46.3	152
242 Methyl parathion	ND	1.0	ND	ND	ND	4.55	192	ND	4.10	173
283 Parathion	ND	1.0	ND	ND	ND	4.55	194	ND	4.10	168
295 Phorate	ND	1.0	ND	ND	ND	4.55	15	ND	4.10	13
296 Famphur	ND	10	ND	ND	ND	45.5	190	ND	41.0	172
351 Toxaphene	ND	2.6	ND	ND	ND	20.0	152	ND	19.2	66
361 2,4,5-T	ND	.78	ND	ND	ND	5.00	0	ND	4.55	112
362 2,4,5-TP (Silvex)	ND	.78	ND	ND	ND	5.00	0	ND	4.55	99

a Refer to comment sheet.

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-*specifies no standard available.
ND indeterminate. Standard and/or spikes could not be detected at current method levels.

Comments on Specific Fractions

Pesticide and Herbicide

The presence of 4,4'-DDT detected in the QC Blank would normally warrant repeat preparation of this QC batch. However, it was determined that this original data would be qualified, and is here reported.

Because 4,4-DDT was found in the QC Blank at a reportable level and 4,4'-DDE was also found in the QC Blank, although at a level considered to be not detected, the reported presence of 4,4-DDT/4,4'-DDD in this sample should be considered suspect.

The identification of all compounds here reported as present has been confirmed by second column analysis.

The QC Spiked Blank recoveries for the herbicide compounds 2,4-D, 2,4,5-T and 2,4,5-TP have been manually verified. The QC Spiked Blank may have inadvertantly not been spiked for these compounds. The QC Matrix Spike recoveries are within acceptable limits.

8:02 PM SAT., 13 JUNE, 1987
Sequence file: S161AI
Security Code: PZ.
Channel #: 16

Subsequence 2
Method: M6903F:PZ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshr#
0	0	1

ETC GC Lab Chronicle
Fraction AP9/Herb
Supervisor
Batch #s QC6903

Standard	Conc PPM	Lot No.
DW/Herb A	MX	15786
DW/Herb B	↓	15787
DW/Herb C	↓	15,787

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Sap-Amt
1	HEXANE	24	PN4152	RN4152	100.0000	1.000000	1.000000
2	QC6903G	25	PN3523	RN3523	100.0000	1.000000	1.000000
3	DW HERBAA	26	PN3525	RN3525	100.0000	1.000000	1.000000
4	DW HERB A	27	PN3526	RN3526	100.0000	1.000000	1.000000
5	DW HERB B	28	PN3527	RN3527	100.0000	1.000000	1.000000
6	DW HERB C	29	PN3528	RN3528	100.0000	1.000000	1.000000
7	QC6903GS	30	PN3529	RN3529	100.0000	1.000000	1.000000
8	S6606G	31	PN3531	RN3531	100.0000	1.000000	1.000000
9	HEXANE	32	PN4153	RN4153	100.0000	1.000000	1.000000
0	S6606GS	33	PN3532	RN3532	100.0000	1.000000	1.000000
11	HEXANE	34	PN4154	RN4154	100.0000	1.000000	1.000000
12	S6605G	35	PN3535	RN3535	100.0000	1.000000	1.000000
13	S6605GR	36	PN3536	RN3536	100.0000	1.000000	1.000000
14	DW HERB A	37	PN3539	RN3539	100.0000	1.000000	1.000000
15	S6602G	38	PN3540	RN3540	100.0000	1.000000	1.000000
16	HEXANE	39	PN4155	RN4155	100.0000	1.000000	1.000000
17	S6603G	40	PN3541	RN3541	100.0000	1.000000	1.000000
18	S6604G	41	PN3542	RN3542	100.0000	1.000000	1.000000
19	HEXANE	42	PN4156	RN4156	100.0000	1.000000	1.000000
20	DW HERB C	43	PN3557	RN3557	100.0000	1.000000	1.000000

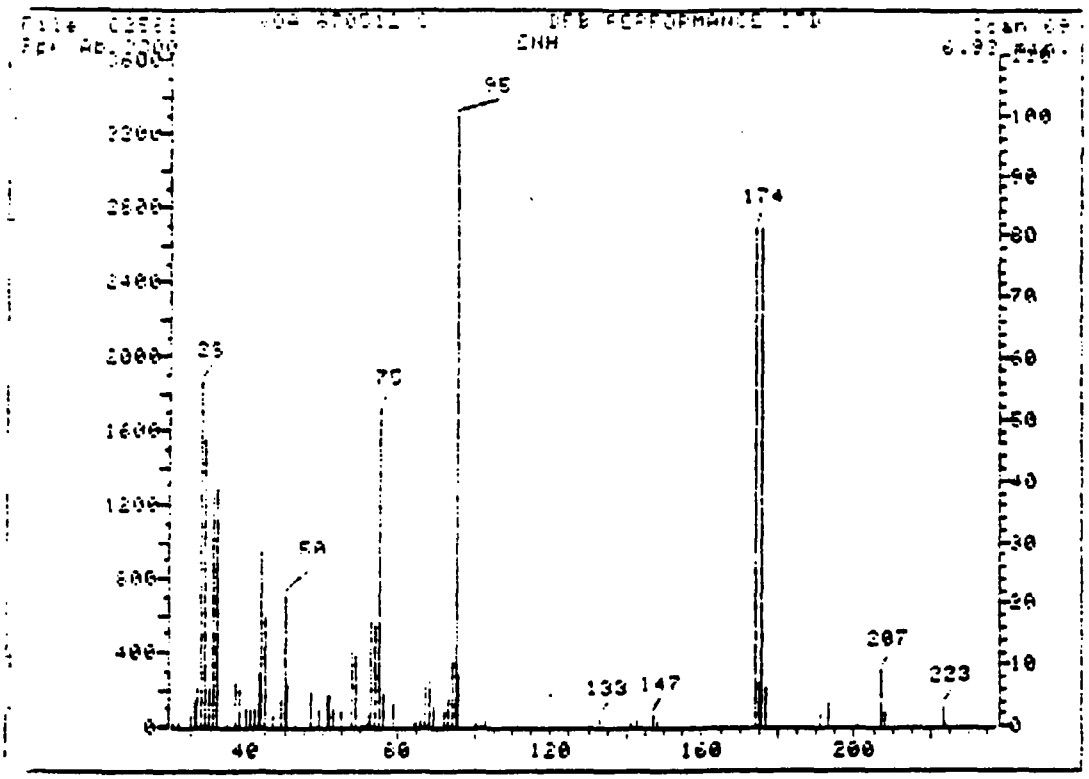

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Status
50	15-40% of mass 95	21.32	21.32	Ok
75	30-60% of mass 95	52.23	52.23	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	8.38	8.38	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	81.41	81.41	Ok
175	5-9% of mass 174	7.01	8.61	Ok
176	95-101% of mass 174	81.22	99.76	Ok
177	5-9% of mass 176	6.44	7.93	Ok

Injection Date: 05/12/87 Analyst: K. Boykin
Injection Time: 07:05 Processor: Shanta Morris
Run No: >C2588 QC Batch: QJ7052
Spectrum No: 69 (ENH)

KS
5/21/87

MS Data File: C2588::U3

Name: VOA 870512 C Operator: KB6656 Date/Time: 5/12/87 7:05
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC[illegible]052VS (>C2591)	870512	09:12
	OC[illegible]052VS (>C2593)	870512	11:24
	OC[illegible]052VS (>C2594	870512	13:02

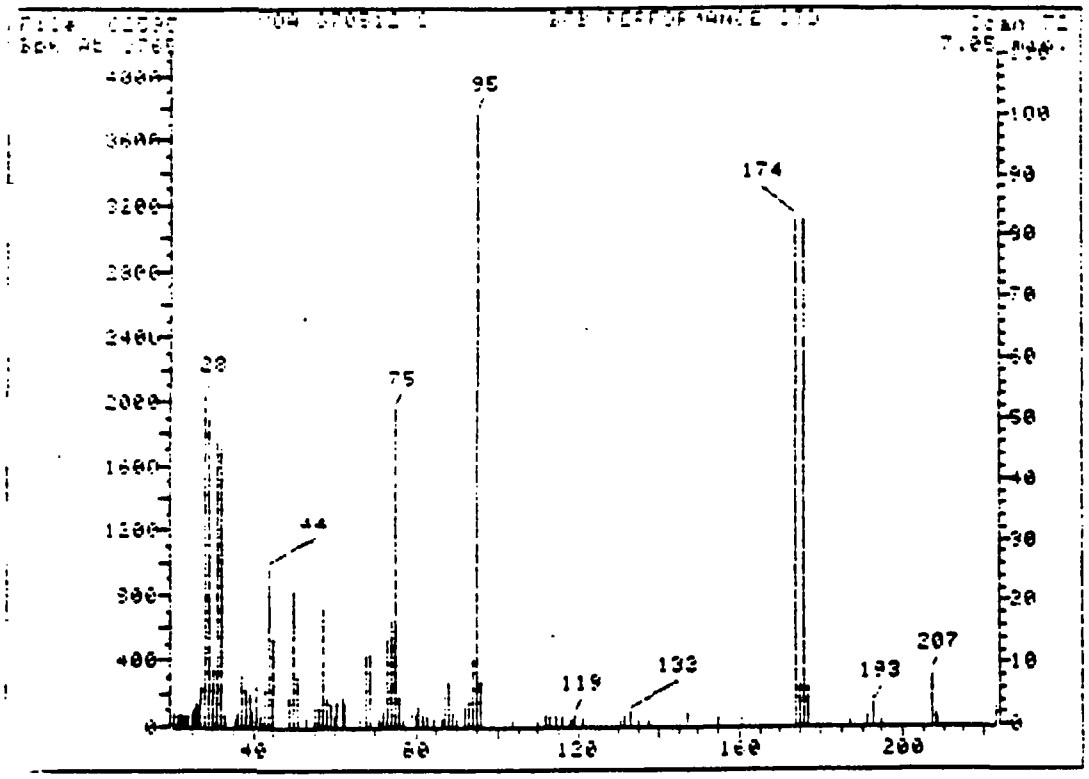

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.46	21.46	Ok
75	30-60% of mass 95	51.79	51.79	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.09	7.09	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	82.66	82.66	Ok
175	5-9% of mass 174	6.67	8.07	Ok
176	95-101% of mass 174	82.59	99.90	Ok
177	5-9% of mass 176	6.00	7.27	Ok

Injection Date: 05/12/97 Analyst: [signature]
Injection Time: 14:36 Processor: [signature]
Run No: VC2595 QC Batch: QV7052
Spectrum No: 72

KJ
5/21/97

MS Data File: C2595::U1

Name: VOA 870512 C Operator: LA2639 Date/Time: 5/12/87 14:3:
Misc: BFB PERFORMANCE STD

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	OC7052V (>C2596)	870512	15:33
	OC7052V (>C2597)	870512	16:17
	OC7052V (>C2598)	870512	17:02
	OC7052V (>C2599)	870512	17:48
	S6605VS (>C2601)	870512	19:44
	S6605V (>C2602)	870512	20:30
	S6604V (>C2603)	870512	21:46
	S6604VR (>C2604)	870512	22:06
	S6603V (>C2605)	870512	22:52
	OC7052VS (>C2606)	870513	01:01

JUN 19, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Conventional Analysis Data (QR10)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

NPDES Number	Results									
	Sample Concen. mg/l	MDL mg/l								
Fluoride	.48	.1								

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 23, 1987

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery - Aqueous Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

86603

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits * Lower	Control Limits * Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	93	88	110
p-Bromofluorobenzene	.250	108	86	115
1,2-Dichloroethane-D4	.250	125***	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	100	77	10	94
2-Fluorophenol	100	115***	21	[illegible]
2,4,6-Tribromophenol	100	94	10	[illegible]
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	50	131***	35	114
2-Fluorobiphenyl	50	93	43	116
Terphenyl-D14	50	83	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	-	-	24**	154**

* WB EPA Control Limits.
** Advisory Limits Only.
*** Recovery manually verified.

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
BA2903	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LODESTAR™ Data Management Software.

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: TCDD EXTRACTION

Sample Number	Log Link	Sample Amt. ml	%REC.	Comments formerly:
BA2901	21628	930		56602
BA2902	↓	900		56603
BA2903	↓	900		56604
BA2904	↓	980		56606
QT 0915	A	1000		
QT 0915	B	1000		
QT 0915	S	1000		
BA2902	S	790		
BA2903	R	880		

QT Batch # 0915

Analysis AP9/PCL

Matrix WATER

Date 6/9 – 6/10/87

Supervisor S. D. G.

Extraction Team

B. C...
P. C...
M. V...

Cleanup A, B, ...

Standard & Reagent	Conc PPM	Lot #
Internal Standard		1620
Surrogate		"
Recovery Standard		
Native		1620
Acid Alumina	/////	
Basic Alumina	/////	
Carbopack/Celite	/////	

COMMENTS

UPD/Supervisor: [signature] 6-12-87

Comments on Specific Fraction

AP9/PCDX:

The high recoveries are a result of the difference in chlorination between the (native) compound and the internal standard used for quantitation. The samples results were unaffected because the respective compounds were not detected.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 25, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Total Polychlorinated Dibenzo Dioxins/Furans GC/MS Analysis Data (QR61)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
BA2903	WASTE MANAGEMENT, INC.	705	W123S	870430	1400	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ppt	MDL ppt	First ppt	Second ppt	Blank Data ppt	Concen. Added ppt	% Recov	Unspiked Sample ppt	Concen. Added ppt	% Recov
2,3,7,8-TCDD	ND	.17	ND	ND	ND	12.7	83	ND	10.0	100
TCDD	ND	.17[a]	ND	ND	ND	12.7	83	ND	10.0	100
PCDD	ND	1.62	ND	ND	ND	12.7	109	ND	10.0	124
HxCDD	ND	1.48	ND	ND	ND	12.7	69	ND	10.0	94
TCDF	ND	1.25	ND	ND	ND	12.7	75	ND	10.0	92
PCDF	ND	1.17	ND	ND	ND	12.7	326.[b]	ND	10.0	150.[b]
HxCDF	ND	3.17	ND	ND	ND	12.7	99	ND	10.0	366.[b]

[a] Method Detection Limit for TCDD (total) is based on 2,3,7,8-TCDD specific limmer.

[b] See comments.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6/15/87- 6/16/87 SHIFT
FRACTION PCDX - AH9
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE JRH
METHOD FILE PCDXH9
ID FILE H9PCDX
ANALYST(S) J Hendell
SUPERVISOR J Hendell
BATCH #'s QT0915

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
PC		C-051-03	2
CC2		16253	2
Recovery Std		15695	5

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N TIME
PC	>H0940	2ul			H-232		1808
CCII	H0941	↓					1913
QT0915AT	H0942						2011
QT0915BT	H0943						2129
QT0915TS	H0944						2222
BA2902TS	H0945						2350
PC	H0946						0043
CCII	H0947						0209
BA2901T	H0948						0300
BA2902T	H0949						0412
BA2903T	H0950						0526
BA2903TR	H0951						0633
BA2904T	H0952						0743
PC	H0953						0851
CCII	H0954	✓				Not Run	0956

ETC ENVIRONMENTAL TESTING AND CLARIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 870615 SHIFT
FRACTION MI-PCDX
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE
METHOD FILE PCDYH9
ID FILE H9PCDX
ANALYST(S) Tom Rusowicz

SUPERVISOR Thomas Rusowicz
BATCH #'s INIT- CALIB

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC ~~PPM~~ ng/ml	LOT NO.	LOT VOL.
PC		C-091-03	
CC1	200	16252	
CC2	500	16253	
CC3	1000	16254	
CC4	2000	16255	
CC5	5000	16256	

NAME	DATA FILE H	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	~~PLUS~~ YIN Time
PC	~~0920~~ 0919	2ul			H-233		1624
CC1	0921						235
CC1	0922						005
CC1	0923						0144
CC2	0924						0255
CC2	0925						0406
CC2	0926						0458
CC3	0927						0604
CC3	0928						0738
CC3	0929						0848
CC4	0930						0950
CC4	0931						1146
CC4	0932						1244
PC	0933						1429
PC	0934						1847
CC5	0935						1941
CC5	0936						2057
CC5	0937						2212
CC2	0938						2313
PC	0939						0107

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

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APPENDIX IX
GRAND TABLE

	COMPOUND NAME	FRACTION	TABLE
1	Acetonitrile	HTP&T	QR57
2	Acetophenone	A/B/N	QR59
4	2-Acetylaminofluorene	A/B/N	QR59
7	Acrolein	HTP&T	QR57
9	Acrylonitrile	HTP&T	QR57
11	Aldrin	PEST/HERB	QR56
12	Allyl alcohol	HTP&T	QR57
13A	Aluminum	METALS	QR60
14	4-Aminobiphenyl	A/B/N	QR59
18	Aniline	A/B/N	QR59
19A	Antimony	METALS	QR60
20	Aramite	A/B/N	QR59
21A	Arsenic	METALS	QR60
27A	Barium	METALS	QR60
30	Benzo(a)anthracene	A/B/N	QR59
31	Benzene	P&T	QR58
34	Benzenethiol	A/B/N	QR59
35	Benzidine	A/B/N	QR59
36	Benzo(b)fluoranthene	A/B/N	QR59
38	Benzo(a)pyrene	A/B/N	QR59
39	p-Benzoquinone	A/B/N	QR59
42A	Beryllium	METALS	QR60
43	bis(2-Chloroethoxy)methane	A/B/N	QR59
44	bis(2-Chloroethyl) ether	A/B/N	QR59
46	bis(2-Chloroisopropyl)ether	A/B/N	QR59
48	bis(2-ethylhexyl)phthalate	A/B/N	QR59
50	Methyl bromide	P&T	QR58
51	4-Bromophenyl phenyl ether	A/B/N	QR59
54	Butyl benzyl phthalate	A/B/N	QR59
55	2-sec-Butyl-4,6-dinitrophenol	A/B/N	QR59
56A	Cadmium	METALS	QR60
57A	Calcium	METALS	QR60
59	Carbon disulfide	P&T	QR58
63	Chlordane	PEST/HERB	QR56
65A	Chloroethane	P&T	QR58
71	p-Chloroaniline	A/B/N	QR59
72	Chlorobenzene	P&T	QR58
73	Chlorobenzilate	PEST/HERB	QR56
74	p-Chloro-m-cresol	A/B/N	QR59
76	2-Chloroethyl vinyl ether	P&T	QR58
77	Chloroform	P&T	QR58
78	Methyl chloride	P&T	QR58
80	2-Chloronaphthalene	A/B/N	QR59
81	2-Chlorophenol	A/B/N	QR59
83	3-Chloropropionitrile	A/B/N	QR59
84A	Chromium	METALS	QR60
85	Chrysene	A/B/N	QR59
87A	Acenapthene	A/B/N	QR59
87B	Acenaphthalene	A/B/N	QR59
87C	Anthracene	A/B/N	QR59
87D	Benzo(ghi)perylene	A/B/N	QR59
87E	Benzo(k)fluoranthene	A/B/N	QR59
87F	Fluorene	A/B/N	QR59
87G	Phenathrene	A/B/N	QR59
87H	Pyrene	A/B/N	QR59
88A	Copper	METALS	QR60
89B	2-Nitrophenol	A/B/N	QR59
90A	o-Cresol	A/B/N	QR59

90B	m-p-Cresols	A/B/N	QR59
92A	Cyanide, Total	METALS	QR60
100	4,4'-DDD	PEST/HERB	QR56
101	4,4'-DDE	PEST/HERB	QR56
102	4,4'-DDT	PEST/HERB	QR56
106	Dibenzo(a,h)anthracene	A/B/N	QR59
108	Dibenzo(a,e)pyrene	A/B/N	QR59
109	Dibenzo(a,h)pyrene	A/B/N	QR59
110	Dibenzo(a,i)pyrene	A/B/N	QR59
111	1,2-Dibromo-3-chloropropane	P&T	QR58
112	1,2-Dibromoethane	P&T	QR58
113	Dibromomethane	P&T	QR58
114	Di-n-butyl phthalate	A/B/N	QR59
115	1,2-Dichlorobenzene	A/B/N	QR59
116	1,3-Dichlorobenzene	A/B/N	QR59
117	1,4-Dichlorobenzene	A/B/N	QR59
119	3,3'-Dichlorobenzidine	A/B/N	QR59
120	1,4-Dichlor0-2-butene	P&T	QR58
121	Dichlorodifluoromethane	P&T	QR58
122	1,1-Dichloroethane	P&T	QR58
123	1,2-Dichloroethane	P&T	QR58
124	1,2-Trans-dichloroethylene	P&T	QR58
126	1,1-Dichloroethylene	P&T	QR58
127	Methylene chloride	P&T	QR58
128	2,4-Dichlorophenol	A/B/N	QR59
129	2,6-Dichlorophenol	A/B/N	QR59
130	2,4-D	PEST/HERB	QR56
133	1,2-Dichloropropane	P&T	QR58
136A	cis-1,3-Dichloropropylene	P&T	QR58
136B	trans-1,3-Dichloropropylene	P&T	QR58
137	Dieldrin	PEST/HERB	QR56
143	Diethyl phthalate	A/B/N	QR59
144	Thionazin	PEST/HERB	QR56
150	3,3'-Dimethoxybenzidine	A/B/N	QR59
151	p-Dimethylaminoazobenzene	A/B/N	QR59
152	7,12-Dimethylbenzol[a]anthracene	A/B/N	QR59
153	3,3'-Dimethylbenzidine	A/B/N	QR59
158	alpha-alpha-Dimethylphenethylamine	A/B/N	QR59
159	2,4-Dimethylphenol	A/B/N	QR59
160	Dimethyl phthalate	A/B/N	QR59
162A	m-Dinitrobenzene	A/B/N	QR59
163	4,6-Dinitro-o-cresol	A/B/N	QR59
164	2,4-Dinitrophenol	A/B/N	QR59
165	2,4-Dinitrotoluene	A/B/N	QR59
166	2,6-Dinitrotoluene	A/B/N	QR59
167	Di-n-octyl phthalate	A/B/N	QR59
168	1,4-Dioxane	HTP&T	QR57
169	Diphenylamine	A/B/N	QR59
170	1,2-Diphenylhydrazine	A/B/N	QR59
171	Di-n-propylnitrosamine	A/B/N	QR59
172	Disulfoton	PEST/HERB	QR56
174A	Endosulfan I	PEST/HERB	QR56
174B	Endosulfan II	PEST/HERB	QR56
175	Endrin	PEST/HERB	QR56
177	Ethyl cyanide	HTP&T	QR57
180	Ethylene oxide	HTP&T	QR57
182	Ethyl methacrylate	P&T	QR58
184	Fluoranthene	A/B/N	QR59
191A	Chlorodibromomethane	P&T	QR58
191B	Dichlorobromomethane	P&T	QR58
192	Heptachlor	PEST/HERB	QR56
193	Heptachlor epoxide	PEST/HERB	QR56
194	Hexachlorobenzene	A/B/N	QR59
195	Hexachlorobutadiene	A/B/N	QR59
196A	Alpha-BHC	PEST/HERB	QR56
196B	Beta-BHC	PEST/HERB	QR56
196C	Gamma-BHC	PEST/HERB	QR56

196D	Delta-BHC	PEST/HERB	QR56
197	Hexachlorocyclopentadiene	A/B/N	QR59
198	Hexachloroethane	A/B/N	QR59
199	Isodrin	A/B/N	QR59
200	Hexachlorophene	A/B/N	QR59
201	Hexachloropropene	A/B/N	QR59
208	Indeno(1,2,3-cd)pyrene	A/B/N	QR59
209	Iodomethane	P&T	QR58
210A	Iron	METALS	QR60
212	Isobutyl alcohol	HTP&T	QR57
213	Isosafrole	A/B/N	QR59
214	Kepone	PEST/HERB	QR56
216A	Lead	METALS	QR60
222	Malononitrile	A/B/N	QR59
225A	Mercury	METALS	QR60
226	Methacrylonitrile	HTP&T	QR57
228	Methapyrilene	A/B/N	QR59
230	Methoxychlor	PEST/HERB	QR56
232	3-Methylcholanthrene	A/B/N	QR59
234	4,4'-Methylenebis(2-chloroaniline)	A/B/N	QR59
235	Methyl ethyl ketone	P&T	QR58
238	Methyl methacrylate	P&T	QR58
239	Methyl methanesulfonate	A/B/N	QR59
242	Methyl parathion	PEST/HERB	QR56
245	Naphthalene	A/B/N	QR59
246	1,4-Naphthoquinone	A/B/N	QR59
247	1-Naphthylamine	A/B/N	QR59
248	2-Naphthylamine	A/B/N	QR59
250A	Nickel	METALS	QR60
255	p-Nitroaniline	A/B/N	QR59
256	Nitrobenzene	A/B/N	QR59
261	4-Nitrophenol	A/B/N	QR59
263A	N-Nitrosodiphenylamine	A/B/N	QR59
264	N-Nitrosodi-n-butylamine	A/B/N	QR59
266	N-Nitrosodiethylamine	A/B/N	QR59
267	N-Nitrosodimethylamine	A/B/N	QR59
269	N-Nitrosomethylethylamine	A/B/N	QR59
273	N-Nitrosomorpholine	A/B/N	QR59
275	N-Nitrosopiperidine	A/B/N	QR59
276	N-Nitrosopyrrolidine	HTP&T	QR57
278	5-Nitro-o-toluidine	A/B/N	QR59
280A	Osmium	METALS	QR60
283	Parathion	PEST/HERB	QR56
284	Pentachlorobenzene	A/B/N	QR59
285	Pentachloroethane	P&T	QR58
286	Pentachloronitrobenzene	A/B/N	QR59
287	Pentachlorophenol	A/B/N	QR59
288	Phenacetin	A/B/N	QR59
289	Phenol	A/B/N	QR59
295	Phorate	PEST/HERB	QR56
296	Famphur	PEST/HERB	QR56
299	2-Picoline	A/B/N	QR59
300A	Aroclor 1242	PCB/GC/EC	QR30
300B	Aroclor 1254	PCB/GC/EC	QR30
300C	Aroclor 1260	PCB/GC/EC	QR30
300D	Aroclor 1248	PCB/GC/EC	QR30
300E	Aroclor 1232	PCB/GC/EC	QR30
300F	Aroclor 1221	PCB/GC/EC	QR30
300G	Aroclor 1016	PCB/GC/EC	QR30
301A	Potassium	METAL	QR60
303	Pronamide	A/B/N	QR59
307	2-Propyn-1-ol	HTP&T	QR57
308	Pyridine	HTP&T	QR57
310	Resorcinol	A/B/N	QR59
312	Safrole	A/B/N	QR59
314A	Selenium	METALS	QR60
317A	Silver	METALS	QR60

319A	Sodium	METALS	QR60
323	1,2,4,5-Tetrachlorobenzene	A/B/N	QR28
324	2,3,7,8-TCDD	DIOXIN	QR61
326	1,1,1,2-Tetrachloroethane	P&T	QR58
327	1,1,2,2-Tetrachloroethane	P&T	QR58
328	Tetrachloroethylene	P&T	QR58
329	Carbon tetrachloride	P&T	QR58
330	2,3,4,6-Tetrachlorophenol	A/B/N	QR59
331	Tetraethyldithiopyrophosphate	A/B/N	QR59
335A	Thallium	METALS	QR60
347	Toluene	P&T	QR58
351	Toxaphene	PEST/HERB	QR56
352	Bromoform	P&T	QR58
353	1,2,4-Trichlorobenzene	A/B/N	QR59
354	1,1,1-Trichloroethane	P&T	QR58
355	1,1,2-Trichloroethane	P&T	QR58
356	Trichloroethylene	P&T	QR58
357	Trichloromethanethiol	P&T	QR58
358	Trichlorofluoromethane	P&T	QR58
359	2,4,5-Trichlorophenol	A/B/N	QR59
360	2,4,6-Trichlorophenols	A/B/N	QR59
361	2,4,5-T	PEST/HERB	QR56
362	2,4,5-TP (Silvex)	PEST/HERB	QR56
364	1,2,3-Trichloropropane	P&T	QR58
368	tris(2,3-Dibromopropyl) phosphate	A/B/N	QR59
372A	Vanadium	METALS	QR60
373	Vinyl chloride	P&T	QR58
374A	Zinc	METALS	QR60
	Endrin aldehyde	PEST/HERB	QR56
	2-Chloro-1,3-butadiene	P&T	QR58
	3-Chloropropene	P&T	QR58
	Acetone	P&T	QR58
	Ethylbenzene	P&T	QR58
	2-Hexanone	P&T	QR58
	Methyl-iso-butyl ketone	P&T	QR58
	Styrene	P&T	QR58
	Vinyl acetate	P&T	QR58
	m-Xylene	P&T	QR58
	o+p Xylenes	P&T	QR58
	Magnesium	METAL	QR60
	Manganese	METAL	QR60
	Tin	METAL	QR60
	Cobalt	METAL	QR60
	Sulfide as S	METAL	QR60
	Fluoride	METAL	QR60
	Benzoic acid	A/B/N	QR59
	Benzyl alcohol	A/B/N	QR59
	Dibenzofuran	A/B/N	QR59
	Isophorone	A/B/N	QR59
	2-Methylnaphthalene	A/B/N	QR59
	o-Nitroaniline	A/B/N	QR59
	m-Nitroaniline	A/B/N	QR59
	4-Chlorophenyl phenyl ether	A/B/N	QR59
	Hexachlorodibenzo-p-dioxins	DIOXIN	QR61
	Pentachlorodibenzodioxin	DIOXIN	QR61
	Tetrachlorodibenzodioxin	DIOXIN	QR61
	Hexachlorodibenzofurans	DIOXIN	QR61
	Pentachlorodibenzofuran	DIOXIN	QR61
	Tetrachlorodibenzofuran	DIOXIN	QR61

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Purge & Trap Compounds – GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
31 Benzene	ND	4.4	6.40	6.34	ND	18.0	105	ND	18.0	100
50 Methyl bromide	ND	10	ND	ND	ND	18.0	128	ND	18.0	169
59 Carbon disulfide	ND	10	ND	ND	ND	18.0	32	ND	18.0	159
65A Chloroethane	ND	10	ND	ND	ND	18.0	94	ND	18.0	132
72 Chlorobenzene	ND	6.0	ND	ND	ND	18.0	99	ND	18.0	98
2-Chloro-1,3-butadiene	ND		ND	ND	ND	0	-	ND	0	-
76 2-Chloroethylvinyl ether	ND	10	ND	ND	ND	18.0	0.	ND	18.0	0.
77 Chloroform	ND	1.6	ND	ND	ND	18.0	98	ND	18.0	85
78 Methyl chloride	ND	10	ND	ND	ND	18.0	103	ND	18.0	153
3-chloropropene	ND		ND	ND	ND	0	-	ND	0	-
111 1,2-Dibromo-3-chloropropane	ND	10	ND	ND	ND	18.0	101	ND	18.0	103
112 1,2-Dibromoethane	ND	10	ND	ND	ND	50.0	106	ND	50.0	108
113 Dibromomethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	80
120 1,4-Dichloro-2-butene	ND	10	ND	ND	ND	50.0	93	ND	50.0	87
121 Dichlorodifluoromethane	ND	10	ND	ND	ND	18.0	102	ND	18.0	166
122 1,1-Dichloroethane	ND	4.7	ND	ND	ND	18.0	93	ND	18.0	92
123 1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	99	ND	18.0	90
124 1,2-Trans-dichloroethylene	ND	1.6	ND	ND	ND	18.0	89	ND	18.0	72
126 1,1-Dichloroethylene	ND	2.8	18.5	15.4	ND	18.0	108	ND	18.0	98
127 Methylene chloride	ND	2.8	5.27	9.68	ND	18.0	82	8.37	18.0	87
133 1,2-Dichloropropane	ND	6.0	ND	ND	ND	18.0	96	ND	18.0	90
136A cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18.0	104	ND	18.0	101
136B trans-1,3-Dichloropropylene	ND	10	ND	ND	ND	18.0	105	ND	18.0	90
191A Chlorodibromomethane	ND	3.1	ND	ND	ND	18.0	99	ND	18.0	109
191B Dichlorobromomethane	ND	2.2	ND	ND	ND	18.0	105	ND	18.0	100
182 Ethyl methacrylate	ND	10	ND	ND	ND	50.0	99	ND	50.0	99
209 Iodomethane	ND	10	ND	ND	ND	50.0	82	ND	50.0	99
235 Methyl ethyl ketone	ND	10	ND	ND	ND	18.0	94	ND	18.0	82
238 Methyl methacrylate	ND	10	ND	ND	ND	50.0	100	ND	50.0	98
285 Pentachloroethane	ND	10	ND	ND	ND	50.0	96	ND	50.0	66
326 1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	98	ND	50.0	97
327 1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	96	ND	18.0	92

*See Grand Table for complete compound name and specifications.
**EPA/ETC established method detection limit.
*-Specifies no standard or reference spectra available.
ND Indeterminate. Standard and/or spikes could not be detected at current method levels.
Results with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ENVIRONMENTAL TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9-Heated Purge and Trap Compounds-GC/MS Analysis Data (QR57)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1 Acetonitrile	ND	10	ND	ND	ND	100	102	ND	100	82
7 Acrolein	ND	100	ND	ND	ND	100	79	ND	100	105
9 Acrylonitrile	ND	100	ND	ND	ND	100	72	ND	100	74
12 Allyl alcohol	ND	8.0	ND	ND	ND	500	191	ND	500	47
168 1,4-Dioxane	ND	10	ND	ND	ND	500	160	57.2	500	36
177 Ethyl cyanide	ND	8.0	ND	ND	ND	500	95	ND	500	116
180 Ethylene oxide	ND		ND	ND	ND	0	-	ND	0	-
212 Isobutyl alcohol	ND	8.0	ND	ND	ND	500	108	ND	500	72
226 Methacrylonitrile	ND	40	ND	ND	ND	500	81	ND	500	103
276 N-Nitrosopyrrolidine	IND		IND	IND	IND	500	0	IND	500	0
307 2-Propyn-1-ol	IND		IND	IND	IND	500	0	IND	500	0
308 Pyridine	ND	80	ND	ND	ND	500	222a	ND	500	19a

a Recovery normally variable using established methodology.

*See Grand Table for complete compound name and specifications.
**CFA/ETC established method detection limit.
*-*specifies no standard or reference spectra available.
IND *indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ENVIRONMENTAL
TESTING and CERTIFICATION

MAY 31, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Purge & Trap Compounds – GC/MS Analysis Data (QR58)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
328 Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	98	ND	18.0	114
329 Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	108	ND	18.0	108
347 Toluene	ND	6.0	1.42	ND	ND	18.0	97	ND	18.0	97
352 Bromoform	ND	4.7	ND	ND	ND	18.0	102	ND	18.0	131
354 1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	109	ND	18.0	111
355 1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	100	ND	18.0	102
357 Trichloromethanethiol	-	-	-	-	-	-	-	-	-	-
356 Trichloroethylene	ND	1.9	ND	ND	ND	18.0	101	ND	18.0	101
358 Trichlorofluoromethane	ND	10	ND	ND	ND	18.0	98	ND	18.0	116
364 1,2,3-Trichloropropane	ND	10	ND	ND	ND	18.0	98	ND	18.0	105
373 Vinyl chloride	ND	10	13.9	9.27	ND	18.0	99	ND	18.0	175
Acetone	18.0	10	20.0	34.8	17.3	90.0	76	28.0	90.0	103
Ethylbenzene	ND	7.2	ND	ND	ND	18.0	102	ND	18.0	103
2-Hexanone	ND	10	ND	ND	ND	90.0	78	ND	90.0	78
Methyl-iso-butyl ketone	ND	10	ND	ND	ND	90.0	96	ND	90.0	93
Styrene	ND	10	ND	ND	ND	18.0	102	ND	18.0	104
Vinyl acetate	ND	10	ND	ND	ND	90.0	88	ND	90.0	72
m-Xylene	ND	10	ND	ND	ND	15.0	105	ND	15.0	110
o+p-Xylenes	ND	10	2.66	2.54	ND	30.0	104	ND	30.0	110

* Recovery normally variable using established methodology.

*See Grand Table for complete compound name and specifications.
**Specific established method detection limit.
***Specifies no standard or reference sample available.
****Interferents. Standard and/or spikes could not be spiked at current method levels.
Spike either "NA" nor "Spec" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2 Acetophenone	ND	11	110	123	ND	100	136	ND	103	107
4 2-Acetylaminofluorene	ND	11	142	197	ND	250	67	ND	256	55
14 4-Aminobiphenyl	ND	11	71.0	84.0	ND	250	55	ND	256	28
18 Aniline	ND	11	137	161	ND	150	103	ND	154	89
20 Aramite	ND	11	275	212	ND	250	98	ND	256	107
30 Benzo(a)anthracene	ND	8.4	85.1	97.9	ND	100	100	ND	103	83
34 Benzenethiol	IND		IND	IND	IND	300	0	IND	308	0
36 Benzo(b)fluoranthene	ND	11	173	198	ND	100	149	ND	103	169
38 Benzo(a)pyrene	ND	2.7	165	193	ND	100	165	ND	103	161
39 p-Benzoquinone	ND	11	ND	ND	ND	150	0	ND	154	0
35 Benzidine	ND	48	ND	ND	ND	100	0	ND	103	0
43 bis(2-Chloroethoxy)methane	ND	5.7	90.2	103	ND	100	103	ND	103	88
44 bis(2-Chloroethyl) ether	ND	6.2	107	107	ND	100	123	ND	103	104
46 bis(2-Chloroisopropyl)ether	ND	6.2	85.8	102	ND	100	102	ND	103	84
48 bis(2-Ethylhexyl)phthalate	ND	11	135	142	ND	100	164	ND	103	132
51 4-Bromophenyl phenyl ether	ND	2.1	108	111	ND	100	122	ND	103	105
54 Butyl benzyl phthalate	ND	11	78.0	80.3	ND	100	88	ND	103	76
55 2-sec-Butyl-4,6-dinitrophen	ND	11	225	258	ND	300	85	ND	308	73
71 p-Chloroaniline	ND	11	171	219	ND	150	147	ND	154	111
74 p-Chloro-m-cresol	ND	3.2	83.1	76.4	ND	100	91	ND	103	81
80 2-Chloronaphthalene	ND	2.1	113	136	ND	100	133	ND	103	110
81 2-Chlorophenol	ND	3.6	82.1	71.3	ND	100	114	ND	103	80
83 3-Chloropropionitrile	ND	11	105	ND	ND	250	69	ND	256	41
85 Chrysene	ND	2.7	89.7	92.3	ND	100	116	ND	103	87
87A Acenaphthene	ND	2.1	84.0	100	ND	100	103	ND	103	82
87B Acenaphthylene	ND	3.8	81.7	103	ND	100	101	ND	103	80
87C Anthracene	ND	2.1	95.8	111	ND	100	109	ND	103	93
87D Benzo(ghi)perylene	ND	4.4	ND	ND	ND	0	-	ND	0	-
87E Benzo(k)fluoranthene	ND	3.8	166	215	ND	100	219	ND	103	162
87F Fluorene	ND	2.1	76.7	94.2	ND	100	102	ND	103	75
87G Phenanthrene	ND	5.8	92.6	108	ND	100	106	ND	103	90
87H Pyrene	ND	2.1	67.9	73.4	ND	100	87	ND	103	66

*See Grand Table for complete compound name and specifications.
**ERA/ETC established method detection limit.
*-specifies no standard or reference spectra available.
"IND" indeterminate. Standard and/or spikes could not be detected at current method levels.
Result with neither "MDL" nor "Conc.added" specifies no standard available, compound was qualitatively searched for.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 23, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
194	Hexachlorobenzene	ND	2.1	98.1	105	ND	100	105	ND	103	96
195	Hexachlorobutadiene	ND	.97	66.5	79.6	ND	100	82	ND	103	65
197	Hexachlorocyclopentadiene	ND	11	ND	ND	ND	0	-	ND	0	-
198	Hexachloroethane	ND	1.7	72.8	85.7	ND	100	79	ND	103	71
199	Isodrin	ND	6.4	132	166	ND	150	105	ND	154	86
200	Hexachlorophene	ND	11	ND	ND	ND	300	0	ND	308	0
201	Hexachloropropene	ND	11	43.4	23.5	ND	150	20	ND	154	28
208	Indeno(1,2,3-cd)pyrene	ND	11	ND	ND	ND	0	-	ND	0	-
213	Isosafrole	ND	11	43.2	55.9	ND	150	24	ND	154	28
222	Malononitrile	IND		IND	IND	IND	500	0	IND	513	0
228	Methapyrilene	IND		IND	IND	IND	500	0	IND	513	0
232	3-Methylcholanthrene	ND	11	82.2	112	ND	150	68	ND	154	53
234	4,4'-Methylenebis(2-chloroa	ND	11	57.8	33.8	ND	150	63	ND	154	38
239	Methyl methanesulfonate	ND	11	63.9	68.0	ND	150	71	ND	154	42
245	Naphthalene	ND	1.7	92.7	100	ND	100	100	ND	103	90
246	1,4-Naphthoquinone	ND	11	7.00	14.3	ND	150	79	ND	154	5
247	1-Naphthylamine	ND	11	94.8	160	ND	150	108	ND	154	62
248	2-Naphthylamine	ND	11	57.4	69.6	ND	150	57	ND	154	37
255	p-Nitroaniline	ND	11	75.8	80.3	ND	100	91	ND	103	74
256	Nitrobenzene	ND	2.1	93.0	98.9	ND	100	108	ND	103	91
261	4-Nitrophenol	ND	2.6	ND	ND	ND	100	0	ND	103	0
263A	N-Nitrosodiphenylamine	ND	2.1	182	240	ND	100	251	ND	103	177
264	N-Nitrosodi-n-butylamine	ND	11	141	163	ND	100	164	ND	103	138
266	N-Nitrosodiethylamine	ND	11	95.7	ND	ND	150	83	ND	154	62
267	N-Nitrosodimethylamine	ND	11	ND	ND	ND	100	0	ND	103	0
269	N-Nitrosomethylethylamine	ND	11	186	196	ND	500	41	ND	513	36
273	N-Nitrosomorpholine	ND	11	118	138	ND	150	85	ND	154	77
275	N-Nitrosopiperidine	ND	11	138	144	ND	150	105	ND	154	90
278	5-Nitro-o-toluidine	ND	11	367	447	ND	250	171	ND	256	143
284	Pentachlorobenzene	ND	11	133	151	ND	150	107	ND	154	87
286	Pentachloronitrobenzene	ND	11	223	274	ND	250	97	ND	256	87
287	Pentachlorophenol	ND	3.9	98.8	107	ND	100	65	ND	103	96

[illegible]

JUN 24, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 -Acid/B/N/Pest Compounds- GC/MS Analysis Data (QR59)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
S6603	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound *	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL** ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen Added ug/l	% Recov
89B 2-Nitrophenol	ND	3.9	69.6	66.8	ND	100	100	ND	103	68
90A o-Cresol	ND	11	81.1	87.7	ND	100	84	ND	103	79
90B m+p-Cresols	ND	11	154	168	ND	200	80	ND	205	75
106 Dibenzo(a,h)anthracene	ND	11	ND	ND	ND	0	-	ND	0	-
108 Dibenzo(a,e)pyrene	ND		ND	ND	ND	0	-	ND	0	-
109 Dibenzo(a,h)pyrene	-	-	-	-	-	-	-	-	-	-
110 Dibenzo(a,i)pyrene	IND		IND	IND	IND	500	0	IND	513	0
114 Di-n-butyl phthalate	BMDL	11	112	131	ND	100	125	1.57	103	107
115 1,2-Dichlorobenzene	ND	2.1	87.1	96.5	ND	100	99	ND	103	85
116 1,3-Dichlorobenzene	ND	2.1	80.0	90.4	ND	100	87	ND	103	78
117 1,4-Dichlorobenzene	ND	4.8	74.8	89.0	ND	100	88	ND	103	73
119 3,3'-Dichlorobenzidine	ND	18	74.4	77.4	ND	100	102	ND	103	73
128 2,4-Dichlorophenol	ND	2.9	77.8	72.0	ND	100	106	ND	103	76
129 2,6-Dichlorophenol	ND	11	106	102	ND	100	112	ND	103	103
143 Diethyl phthalate	ND	11	70.3	94.4	ND	100	89	ND	103	69
150 3,3'-Dimethoxybenzidine	ND	11	ND	ND	ND	150	0	ND	154	0
151 p-Dimethylaminoazobenzene	ND	11	156	147	ND	150	117	ND	154	102
152 7,12-Dimethylbenzo(a)anthra	ND	11	122	157	ND	150	95	ND	154	79
153 3,3'-Dimethylbenzidine	ND	11	ND	ND	ND	150	29	ND	154	0
158 a-a-Dimethylphenethylamine	-	-	-	-	-	-	-	-	-	-
159 2,4-Dimethylphenol	ND	2.9	104	121	ND	100	111	ND	103	101
160 Dimethyl phthalate	ND	11	73.8	93.3	ND	100	93	ND	103	72
162A m-Dinitrobenzene	ND	11	110	142	ND	150	92	ND	154	71
163 4,6-Dinitro-o-cresol	ND	26	67.8	91.9	ND	100	41	ND	103	66
164 2,4-Dinitrophenol	ND	45	83.6	124	ND	100	0	ND	103	81
165 2,4-Dinitrotoluene	ND	6.2	67.7	92.8	ND	100	79	ND	103	66
166 2,6-Dinitrotoluene	ND	2.1	83.2	102	ND	100	101	ND	103	81
167 Di-n-octyl phthalate	ND	11	137	176	ND	100	154	ND	103	133
169 Diphenylamine	ND	11	216	242	ND	150	173	ND	154	141
170 1,2-Diphenylhydrazine	ND	11	92.0	108	ND	100	121	ND	103	90
171 N-Nitrosodi-n-propylamine	ND	11	89.8	97.1	ND	100	105	ND	103	88
184 Fluoranthene	ND	2.4	74.5	84.7	ND	100	96	ND	103	73

[illegible]

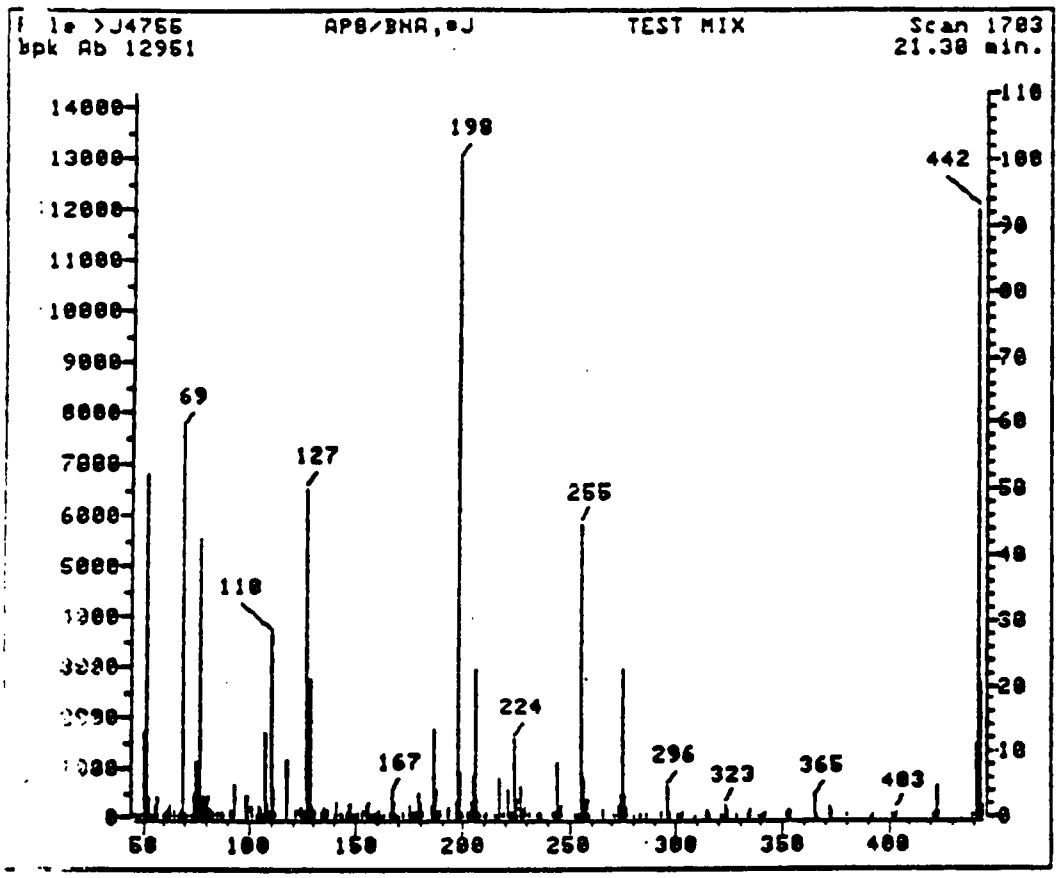

TABLE 2: METHOD PERFORMANCE DATA (QR23)

LC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	52.54	52.54	Ok
68	Less than 2% of mass 69	1.09	1.83	Ok
69	(reference only)	59.42	59.42	Ok
70	Less than 2% of mass 69	.69	1.16	Ok
127	40-60% of mass 198	50.29	50.29	Ok
197	Less than 1% of mass 198	.36	.36	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.03	7.03	Ok
275	10-30% of mass 198	22.58	22.58	Ok
365	Greater than 1% of mass 198	3.00	3.00	Ok
441	0-100% of mass 443	11.03	53.99	Ok
442	Greater than 40% of mass 198	92.52	92.52	Ok
443	17-23% of mass 442	20.44	22.09	Ok

Injection Date: 06/07/87 Analyst: [signature]
Injection Time: 17:57 Processor: [signature]
Run No: >J4755 QC Batch: QC6702
Spectrum No: 1703

MS Data File: >J4755::U7

Name: APB/BNA,#J
Misc: TEST MIX

Operator: JQ6275

Date/Time: 6/07/87 17:57
BTL#20

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >J4756	870607	18:44
	STD. >J4757	870607	19:46
	S2815 >J4758	870607	20:44
	S6058 >J4759	870607	23:26
	S6059 >J4760	870608	00:18
	S77336 >J4761	870608	01:10
	S66035 >J4762	870608	02:02
	S66047 >J4763	870608	02:58
	S66067 >J4764	870608	03:52

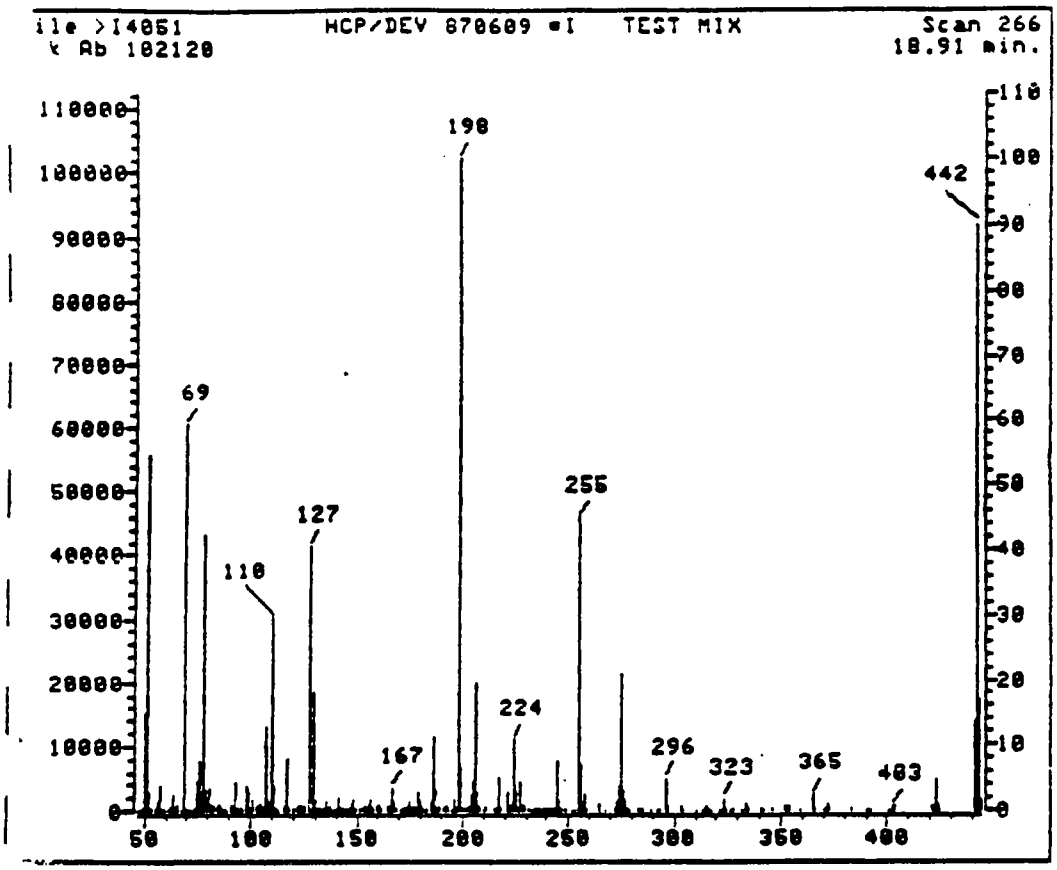

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	54.41	54.41	Ok
68	Less than 2% of mass 69	.99	1.67	Ok
69	(reference only)	59.43	59.43	Ok
70	Less than 2% of mass 69	.47	.78	Ok
127	40-60% of mass 198	40.51	40.51	Ok
197	Less than 1% of mass 198	.38	.38	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.56	6.56	Ok
275	10-30% of mass 198	20.99	20.99	Ok
365	Greater than 1% of mass 198	2.34	2.34	Ok
441	0-100% of mass 443	13.54	80.53	Ok
442	Greater than 40% of mass 198	90.15	90.15	Ok
443	17-23% of mass 442	16.81	18.65	Ok

Injection Date: 06/09/87 Analyst: MB for Brenda Hawkins
Injection Time: 19:31 Processor: [illegible]
Run No: >I4051 QC Batch: QC6767
Spectrum No: 266

LHendel 6/20/87

MS Data File: >I4051::U5

Name: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 19:31
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	STD. >I4052	870609	20:11
	STD. >I4053	870609	20:50
	STD. >I4054	870609	21:28

LAN

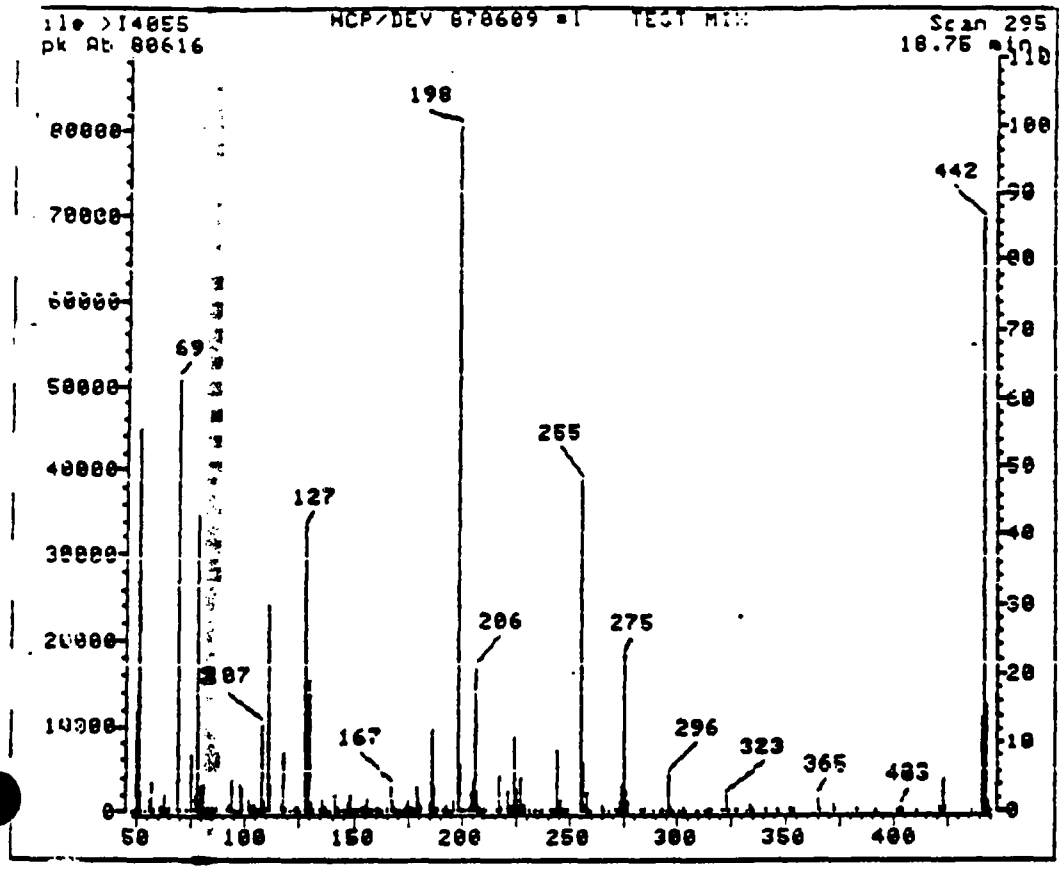

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	55.58	55.58	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.97	62.97	Ok
70	Less than 2% of mass 69	.31	.50	Ok
127	40-60% of mass 198	41.23	41.23	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.65	6.65	Ok
275	10-30% of mass 198	22.36	22.36	Ok
365	Greater than 1% of mass 198	2.03	2.03	Ok
441	0-100% of mass 443	13.59	88.02	Ok
442	Greater than 40% of mass 198	86.21	86.21	Ok
	17-23% of mass 442	15.44	17.91	Ok

Injection Date: 06/09/97 Analyst: Brenda Hawkins
Injection Time: 22:06 Processor: [illegible]
Run No: >I4055 QC Batch: QC 6902
Spectrum No: 295 ENII

BAH

MS Data File: >14055::U7

Name: HCP/DEV 870609 #I Operator: BH8334 Date/Time: 6/09/87 22:06
Misc: TEST MIX BTL# 5

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	QC6902C>I4056	870609	22:44
	QC6902C>I4057	870609	23:23
	S6605C>I4058	870610	00:01
	S6605CS>I4059	870610	00:39
	S6605CR>I4060	870610	01:17
	S6004C>I4061	870610	01:55
	S6008C>I4062	870610	02:33
	S6058C>I4063	870610	03:11
	S7732C>I4064	870610	03:49
	S6602C>I4065	870610	04:27
	S6603C>I4068	870610	06:21
	S6604C>I4069	870610	06:59
	S6606C>I4070	870610	07:37
	S2811C>I4071	870610	08:15
	S7733C>I4072	870610	08:54
	S6054C>I4073	870610	09:32

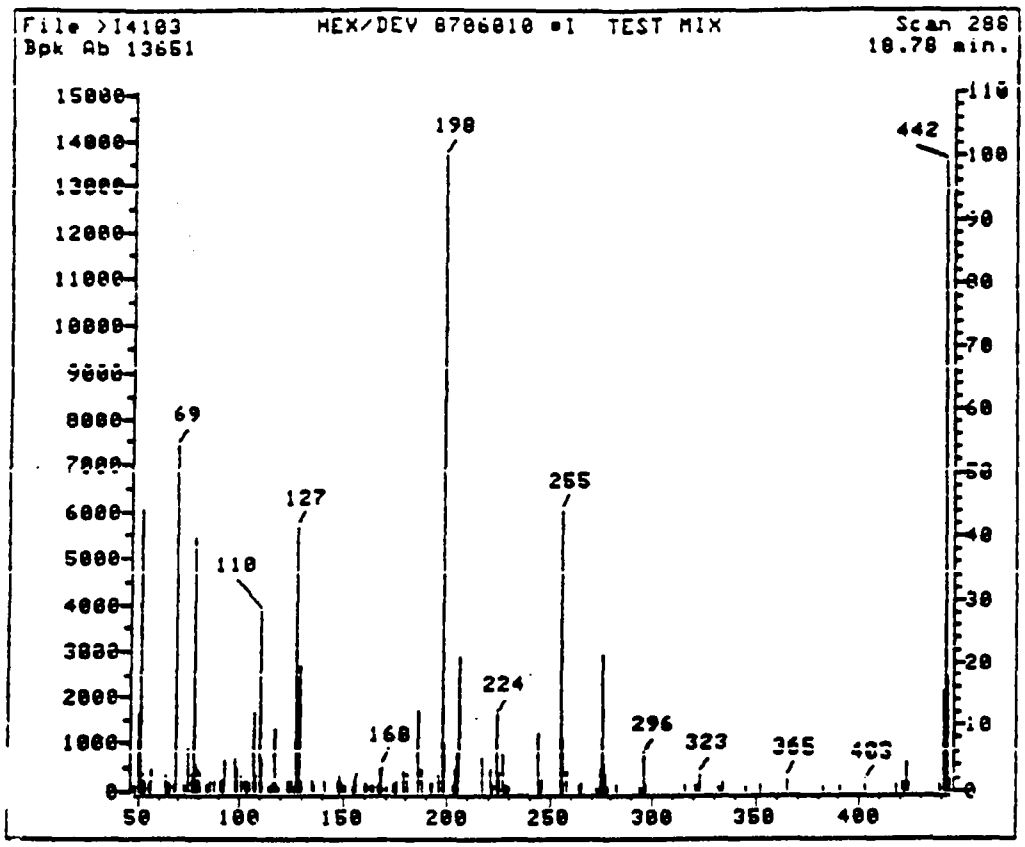

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	44.41	44.41	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	54.35	54.35	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	41.39	41.39	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.10	7.10	Ok
275	10-30% of mass 198	21.31	21.31	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	15.45	86.19	Ok
442	Greater than 40% of mass 198	99.04	99.04	Ok
443	17-23% of mass 442	17.93	18.10	Ok

Injection Date: 06/10/87 Analyst: [illegible]
Injection Time: 10:34 Processor: [illegible]
Run No: >I4103 QC Batch: QX 6407
Spectrum No: 277

MS Data File: >I4103::U5

Name: HEX/DEV 8706010 #I Operator: BH8334 Date/Time: 6/10/87 10:34
Misc: TEST MIX BTL# 1

This performance tune applies to the following samples, blanks and standards:

Sample ID	Lab ID	Date of Analysis	Time of Analysis
	S7731C >I4074	870610	11:58

Appendix D
Subcontractor's Data

1) A copy of the originating subcontractor's report is included for all data not generated within ETC's laboratory.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

RE

ETC Job # 161613

Lab ID: GCL104591

Facility: 701ST (Facility Code)

Sample Point: W — G1/G2/4/8 (Source Code / Sample Point #)

Submitted by: Jane Lukowski

Date: 5-15-87

Date Sampled: 87 04 30 (Y Y M M D D)

Time Sampled: 10:50 (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
CONVENTIONALS						
1	Chloride	QR 10	mg/l			
2	Fluoride	QR 10	mg/l	0.48	0.1	
3	Nitrate as N	QR 10	mg/l			
4	Sulfate as SO4	QR 10	mg/l			
5	Phenolics, Total	QR 10	mg/l			
6	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
	Total Organic Halides (TOX)	QR 10	ug/l			
7	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
	Total Organic Carbon	QR 10	mg/l			
8	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
	Specific Conductance (Lab)	QR 10	um/cm			
9	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
	pH (Lab)	QR 10	std			
10	Coliform, Total	QR 10	C/100			
11	Coliform, Fecal	QR 10	C/100			
12	Gross Alpha	QR 10	PCi/l			
13	Gross Beta	QR 10	pCi/l			
14	Acidity as CaCO3		mg/l			
15	Alkalinity as CaCO3		mg/l			
16	Ammonia as N		mg/l			
17	Bicarbonate as CaCO3		mg/l			
18	Biochemical Oxygen Demand		mg/l			
19	Carbonate as CaCO3		mg/l			
20	Chemical Oxygen Demand		mg/l			
21	Color, Apparent (Lab)		Pt/Co			
22	Cyanide, Total		mg/l	<0.02	0.02	
23	Hardness as CaCO3		mg/l			
24	Nitrite as N		mg/l			
25	Nitrogen Total Kjeldahl (TKN)		mg/l			
26	Nitrogen, Total Organic		mg/l			
27	Odor (Lab)		TON			
28	Oil and Grease (grav, IR)		mg/l			
29	Phosphate, ortho		mg/l			
30	Phosphate, Total		mg/l			
31	Solids, Total		mg/l			
32	Solids, Total Dissolved (ROE) 180°		mg/l			
33	Solids, Total Suspended		mg/l			
34	Sulfide as S		mg/l	<0.1	0.1	
35	Surfactants (MBAS/LAS)		mg/l			
36	Turbidity (Lab)		NTU			

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Subcontracted Analytical Results

REV.

ETC Job # 56603

Lab ID: Gulf Coast Labs

Submitted by: G Martinez

6-10-87

Facility: 705 (Facility Code)

Sample Point: W (Source Code) – G1245 (Sample Point ID)

Date Sampled: 870430 (Y Y M M D D)

Time Sampled: : (H H M M)

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
19	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l	57000	50	
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 79703 ETC Job # 56603

Date Sealed 4/27/87 By: [illegible]

Company: Chicago Incinerator Attn.: Bob Bartholmew

Facility/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 1245 (Optional Sample Point Descriptions)

Sample Point: W-~~61245~~ 1245 (Source Code (from below) / Your Sample Point ID (left justify)) 870430 (Start Date (YY/MM/DD)) 1259 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

TF 5/18/87

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ..... (X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	E	tl	pulled	Extl	N		Rec'd bottle - full
					FILLED ONLY 1		
					EXTR. BOTTLE FOR		
					4 TOTAL OF G.		
					NOTIFIED P. McKenzie		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 1258
Signature: Richard Wright Seal #: 79703 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1620
Signature: Richard Wright Seal #: 79704 Intact: YES

LAB USE ONLY Opened By: C. Alcala Date: 5/1/87 Time: 2:50 pm

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 79701 ETC Job # 36603

Date Sealed 4/27/87 By: [illegible]

Company: Chicago Incinerator Attn.: Bob Barkholmer

Facility/Site: 11700 S. Stoney Island Phone:

Address: Chicago Ill 60617

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 1245 (Optional Sample Point Descriptions)

Sample Point: W ~~G1245~~ 1245 (Source Code (from below) / Your Sample Point ID (left justify)) TF 5/18/87 | 870430 (Start Date (YY/MM/DD)) | 1259 (Start Time (2400 hr. clock)) | (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
5	E	1L	Baked	EXTOL	N		✓
3	F	40ml	Baked	P+T VOA	N		✓
3	F	40ml	Baked	HP+TVOA	N		✓
1	TB	40ml	GL/VOA	trip Blank	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Wright Date: 4-30-87 Time: 1257
   Signature: [signature] Seal #: 79701 Intact:

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Wright Date: 4-30-87 Time: 1515
   Signature: [signature] Seal #: 79702 Intact: YES

LAB USE ONLY Opened By: C. Alcalor Date: 5/1/87 Time: [illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. ~~[illegible]~~ 457 ETC Job # S6603

Date Sealed 4/25/87 By: [illegible]

Company: WMI Attn.: Bob Bartholomew

Facility/Site: Chicago Incinerator Phone: 312-646-5700

Address: Chicago, IL

REC'D MAY 5 1987

SAMPLE IDENTIFICATION

Facility: 705 (Facility/Site Code) 124S PE (Optional Sample Point Descriptions)

Sample Point: W-~~G1 25 S~~ ~~G1 24 S~~ 870430 1050

Source Code (from below) | Your Sample Point ID (left justify) 124S TF 5/18/87 | Start Date (YY/MM/DD) | Start Time (2400 hr clock) | Elapsed Hours (composite)

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
	A	1gal	HNO3	Radioactivity	Y		
1	B	1L	Cool	General	Y		
			4 C				
	B	1L	6NNaOH	Cn	Y		
1	B	1L	Zinc	Sulfide	Y		
			Acetate				
1	F	500ml	HNO3	Metals (dissolved)	Y		
1	F	500ml	HNO3	Metals (total)	N		
1	F	500ml	H2SO4	Nutrients	Y		
1	I	100ml	Cool4C	Total Coliform	N		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Richard Weight Date: 4-~~29~~ 30-87 Time: ~~0818~~ 0749 EW 4-30
Signature: [signature] Seal #: ~~455~~ 499 Intact: Yes

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Richard Weight Date: 4-30-87 Time:
Signature: [signature] Seal #: 500 Intact: Yes.

LAB USE ONLY Opened By: Lynn Gifford Lynn Gifford Date: 4/30/87 Time: 1730

SHUTTLE # TEMP. °C SEAL # 500 COND.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # S6603 TF 5/18/87

Sample Point W ~~6124S~~ 1245
Source Code — Sample Point I D

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (2400 Hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD:

REC'D MAY 5 1987

Sampler Type: A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other (SPECIFY OTHER)

Sampler Material: A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other (SPECIFY OTHER)

Tubing Material: A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other (SPECIFY OTHER)

Sample Composited Y/N — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) | Well Depth (ft)

Depth to Ground water (ft) | Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp (°C) | Turbidity NTU

FIELD COMMENTS

Sample Appearance:

Weather Conditions: SCATTERED CLOUDS, ~55°F, WIND NE ~10-20 MPH.

Other:

APP. IX SAMPLED 4-30 (INSTEAD OF 4-29) DUE TO LATE ARRIVAL OF ETC SHUTTLES. REFER TO GCL CC2 WITH ETC # S2944 FOR FIELD PROCEDURES AND FIELD MEASUREMENTS

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: RICHARD WRIGHT (Print) Employer: GULF COAST LABS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56603 TC 5'9'

Sample Point W ~~G/ZAS~~ 1 2 4 5

Source Code — Sample Point I.D

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____

Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____

Groundwater Elevation (ft msl) _____

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp _____ (°C) Turbidity _____ NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Richard Weicht (Print) Employer: Gulf Coast Lab.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 (Date) [signature] (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # 56603 TF 5/18/87

Sample Point W ~~G1Z4S~~ 1245
Source Code Sample Point I.D

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: _____

Sampler Type [ ] A-Submersible Pump B-ISCO C-Bladder Pump D-Dipper/Bottle E-Bailer F-Scoop/Shovel X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon B-Metal C-PVC D-Plastic X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon B-Tygon C-Polyethylene D-Silicon X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) [ ] Well Depth (ft) [ ]

Depth to Ground water (ft) [ ] Sample Depth (non-well) (ft) [ ]

Groundwater Elevation (ft msl) [ ]

	ph		spec. cond.		(other parameter)	value	units
1st		(STD)		um/cm at 25° C			
2nd		(STD)		um/cm at 25°C			
3rd		(STD)		um/cm at 25°C			
4th		(STD)		um/cm at 25°C			

Sample Temp [ ] (°C) Turbidity [ ] NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

SEE GCL CC2

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Richard Wright (Print) Employer: Gulf Coast Labs

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4-30-87 [signature]
(Date) (Signature)

Sample Number	Log Link	Sample Vol. (ml)	AB Vol. (ml) PEST ~~BN~~	~~ACID~~	Comments
S6602	21065	530	10	5.0	
S6603	↓	480	10	5.0	
S6604		620	10	5.0	
S6606	↓	580	10	5.0	
S6605	21084	540	10	5.0	
S6602	S1	520	10	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	10	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	10	5.0	
QC 6904	S1	500	10	5.0	
QC 6904	S2	520	10	5.0	
QC 6904	S3	510	10	5.0	
QC 6904	S4	550	10	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB (EC
APG/PEST (EC
APG/PEST (FPD

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98 WI 1~~

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
Ec Iso	0.1 ml	25/100 mg/ml	15616
Ec Temp	0.1 ml	25/250 mg/ml	15993
FPDI	0.2 ml	25/125 mg/ml	15602
Trochlor 1260	0.1 ml	10 mg/ml	15997

OC DAW

SURROGATE Amt. (ml)	Conc.	Lot #
	BN:	
	ACID:	

Set-up: [signature] 5/6/87 [signature] 5/6/87 UPD/Supervisor: [signature] 6-8-87

~~BN~~ Conc.: [signature] PEST Conc.: [signature] Spec/Surr. [signature]

4:12 PM FRI., 2 JUNE, 1987
Sequence file: S163HF
Security Code: QE
Channel #: 0

ETC GC Lab Chronicle
Fraction AIG/PEST/PCB
Supervisor [illegible]
Batch #s RG6904

Subsequence 1
Method: M6904P:QE
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Standard	Conc PPM	Lot No.
A 1260	0.5	15985
A 1260	1.0	15984
A 1260	5.0	15983
A 1016	0.5	15943
A 1221	0.5	15950
A 1232	0.5	15957
A 1242	0.5	15964
A 1248	0.5	15971
A 1254	0.5	15978

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	METHANE	1	PN3831	RN3831	100.0000	1.000000	1.000000
2	QC6904G	2	PN3832	RN3832	100.0000	1.000000	1.000000
3	A1260 0.5	3	PN3833	RN3833	100.0000	1.000000	1.000000
4	A1260 1.0	4	PN3834	RN3834	100.0000	1.000000	1.000000
5	A1260 5.0	5	PN3835	RN3835	100.0000	1.000000	1.000000
6	QC6904GS 4	6	PN3836	RN3836	100.0000	1.000000	1.000000
7	S6606G	6 7	PN3837	RN3837	100.0000	1.000000	1.000000
8	S6606GS 4	8	PN3838	RN3838	100.0000	1.000000	1.000000
9	S6605G	9	PN3839	RN3839	100.0000	1.000000	1.000000
10	S6605GR	10	PN3840	RN3840	100.0000	1.000000	1.000000
11	S6602G	11	PN3841	RN3841	100.0000	1.000000	1.000000
12	S6603G	12	PN3842	RN3842	100.0000	1.000000	1.000000
13	S6604G	13	PN3843	RN3843	100.0000	1.000000	1.000000
14	A1016 0.5	14	PN3844	RN3844	100.0000	1.000000	1.000000
15	A1221 0.5	15	PN3845	RN3845	100.0000	1.000000	1.000000
16	A1232 0.5	16	PN3846	RN3846	100.0000	1.000000	1.000000
17	A1242 0.5	17	PN3847	RN3847	100.0000	1.000000	1.000000
18	A1248 0.5	18	PN3848	RN3848	100.0000	1.000000	1.000000
19	A1254 0.5	19	PN3849	RN3849	100.0000	1.000000	1.000000
20	A1260 0.5	20	PN3850	RN3850	100.0000	1.000000	1.000000

KS 6/16/87

TTC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 87/12/5 SHIFT
FUNCTION AP9/PT VOA
INSTRUMENT C
LINE FILE APEI01
SEQUENCE FILE KBC
METHOD FILE VOAC
TD FILE C AP9PT
ANALYST(S) K. [illegible]

SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL) CBA9PT

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	5/12/[illegible]
		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15243	1
AP8 INS-TD	25	16,024	10
SCRR	25	15719	10
ABC/XVOA	18	16028 2X	5 10 30
AP8 P+T	50	15,501	5 10 30

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N	
P-BFB	>C2588	1ml				OK		7:05
QC7052V	>C2589	5.0ml	1			NG		
QC7052VS	>C2590	↓	2			NG 5 uls ABC/XVOA + AP8 P+T		
QC7052VS	>C2591	↓	3			10 uls ↓ ↓		9:12
QC7052VS	>C2592	↓	4			NG 30 uls ↓ ↓		
QC7052VS	>C2593		4			30 ml ABC/XVOA/AP9		11:5
QC7052VS	>C2594		3			5ml	13:02	13:
BFB	>C2595					OK	14:36	
QC7052V	>C2596	5ml	2			ok	15:33	
QC7052V	>C2597	↓	3			ok		16:1
QC7052V	>C2598	↓	4			ok		17:
QC7052V	>C2599	↓	5			ok		17:
QC7052V	>C2600	↓	6			NG		
S6605VS	>C2601	5ml	1			OK S6605VS		19:4
S6605V	>C2602	↓	2			OK S6605V		20:3
S6604V	>C2603	↓	3			OK S6604V		21:4
S6604VR	>C2604	↓	4			OK S6604VR		22:
S6603V	>C2605	↓	5			OK		22:5
QC7052VS	>C2606	5ml	7			5 uls ABC/XVOA + AP8 P+T		1:0
QC7052VS	>C2607	↓	8		CBUD	10 uls ↓ ↓		2:2
QC7052VS	>C2608	↓	9		CBUD	30 uls ↓ ↓		3:0
P-BFB	>C2609	1ml	—			RAN DODGE >C2607		20:
QC7052V8	>C2610	5ml	1			OK SPEC VOA BLANK		4:3
QC7052V8	>C2611	↓	2			OK ↓		5:2
QC7052V8	>C2612	↓	3			OK ↓		1:1

ETC ENVIRONMENTAL TESTING and CERTIFICATION

ORATORY CHRONICLE: GC-M. epartment 72/2

DATE 87/13/5 SHIFT
FRACTION AP9PT/VOA
INSTRUMENT C
TUNE FILE APE201
SEQUENCE FILE KBC
METHOD FILE VOAC
ID FILE CAP9PT
ANALYST(S) K. Brazh

SUPERVISOR [illegible]
BATCH #'s QV7052

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL
See Pg#1			
Pg 2 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
QC7052VS	PC2613	Sul	4		ok	See VOA blank	
S6607V	PC2614		1		No	Sum.	
S6608V	PC2615		2		ok		[illegible]
S6607V	PC2616		3		ok		
S6606V	PC2617		4		ok		11 D
QC7052V	PC2618		2		ok		
(R) S6607V	PC2619		2		ok		12.4

ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE :: GC-MS Department

ATE 07/13/5 SHIFT
R CTION APGHPT
RUMENT E
. FILE APE1.C
E UENCE FILE
IE HOD FILE APGHPT
D FILE E APGHPT
N LYST(S) K Bagin
UPERVISOR W.W.C.C.
ATCH #'s QU7054

(PLEASE INITIAL) CB9HPT

CURRENT CSOS STATUS		STANDARDS UPDATED	
CF		DATE	5/13/92
IP		BY	WW

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
P-BFB	50	15293	1
APB IS	25	16,024	10
SUR	25	15,769	10
APPENDIX 8 DAT STD	500/100	14,657	24,10

NAME	DATA FILE	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
P-BFB	>E3117	1ul				OK	06:42
QU7054V	>E3118	5ul				OK	07:27
QC7054VS	>E3119	5ul				2ul APB DAT STD	08:12
QC7054VS	>E3120	5ul				NG 4ul " "	
QC7054VS	>E3121	5ul			CAUS Orbit	10ul " "	10:30
QC7054VS	>E3122	5ul				4ul	11:50
P-BFB	>E3123	1ul				OK	14:52
BA0106V	>E3124	5ul				NG S.B. OK Carry Over	15:46
BA0106VS	>E3125	5ul				NG 4ul APB DAT STD	
S6608V	>E3126	5ul				NG surrogate very low	
S6608VS	>E3127	5ul				NG 4ul APB DAT STD	
S6608V	>E3128	5ul				OK	20:21
S6607V	>E3129	5ul				NG Leaked	
S6606V	>E3130	5ul				OK	22:21
S6607V	>E3131	5ul				OK	23:02
BA0106VR	>E3132	5ul				NG	00:18
S6605V	>E3133	5ul				OK NG Post CBCHK	1:10
BA0106V	>E3134	5ul				NG Post CBCHK	
QC7054VS	>E3136	5ul				NG 4ul ABC XDA	
P-BFB	>E3135	1ul				NG	
P-BFB	>E3137	1ul				OK >E3137	04:08
QC7054VS	>E3138	5ul				2ul APB DAT STD	04:53
QC7054VS	>E3139	5ul			CB SPIKED	2ul	
QC7054VS	>E3140	5ul			NG	10ul	
QC7054V	>E3141	5ul			NG	2ul	

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 5/14/87 SHIFT
FRACTION HPTVOA
INSTRUMENT E
TUNE FILE APT01
SEQUENCE FILE
METHOD FILE APTHPT
ID FILE EAPTHPT
ANALYST(S) Steve Blye
SUPERVISOR
BATCH #'s QV7054

STANDARD	CONC PPM	LOT NO.	

See Pg 4

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACG		DATE	
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLU Y/N
✓ QC 7054VS	E3142	5ul			CBUPD	10ul APS/DAT	9:0
✓ QC 7054VS	E3143				CBCAL	2ul ↓	10:
QC 7054V	E3144					NG	
✓ QC7054V	E3145					OK	13:
✓ S16603V	E3146					OK	14:3
✓ S16603VS	E3147					OK	15:
(R) S16605V	E3148					NG	
✓ S16605VR	E3149					OK	16:5
S16604V	E3150					NG Sure out	
(R) ✓ BH0106V	E3151	↓			NG	OK 5/17/87 wrong analysis	18:
S16602V	E3152	.05ul		1:100		Re-run Straight	
BFB	E3153	1ul				inject before → E314	
(R) S16605V	E3154	5ul				OK	21:
(R) S16604V	E3155					OK	22:
(R) S16602V	E3156					NG	
✓ QC7054VS	E3157				NG	4ul APS/DAT	
✓ QC7054VS	E3158				CBCAL COUPD	2ul	
✓ QC7054VS	E3159					10ul	
✓ QC7054VS	E3160	↓				4ul APS/DAT	
BFB	E3161	1ul			OK	PS.81 FIN-3:4, 8591	
QC7054V	E3162	5ul				NG	
✓ QC7054V	E3163					NG	
QC7054V	E3164					OK	07:
(R) S16602V	E3165	↓				OK	08:4

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) Acid	BN	DER BN	Comments
S6602	21063	965	1.0	1.0	1.0	APS / T
S6603	↓	975	1.0	1.0	1.0	↓
S6604	↓	975	1.0	1.0	1.0	↓
S6606	↓	970	1.0	1.0	1.0	↓
S6605	21084	980	1.0	1.0	1.0	✓
S6058	21177	1005	1.0	1.0	1.0	APS/BN, ACID, HCP
S6059	↓	1000	1.0	1.0	1.0	↓
~~S6226~~	21204	910	1.0	1.0	1.0	CNID
~~S6227~~	↓	930	1.0	1.0	1.0	↓
~~S6234~~	21236					
S6004	21252	1005	1.0	1.0	1.0	↓
S6008	↓	985	1.0	1.0	1.0	✓
S7731	21331	995	1.0	1.0	1.0	APS / T
S7732	↓	850	1.0	1.0	1.0	↓
S7733	↓	980	1.0	1.0	1.0	✓
~~S5843~~	~~21236~~	~~945~~	~~1.0~~			~~APS/ACID~~
* S1023	20231					APS/BN, ACID, HCP
S1025	↓					↓
* ~~S0513~~	~~20230~~					
S2511	20331	1005	1.0	1.0	1.0	✓
QC6902		1000	1.0	1.0	1.0	
QC6902S		1000	1.0	1.0	1.0	
S6606-MS		975	1.0	1.0	1.0	
S6605-MSD		980	1.0	1.0	1.0	

QC Batch # 6702

Analysis APS/BN, APS/C; APS/ACID APS/A; APS/HCP APS/H

Matrix H2O

Turnaround NCEPA

Date Start 5/13/97

Neutral

Base

Acid

Derivitized BN

Extraction Method:

Sep. Funnel ✓

Continuous

Other

COMMENTS

*repeat of QC 6684

HEXAchlorophene STD.

100 mg/ml	1.0	15,823
500 mg/ml	1.0	15,827
500 mg/ml	1.0	15,826

Extraction:

BN DER:

BN CONC:

ACID CONC:

Supervisor:

QC Pow QC Spike Ver. W. Sel. Lot Slip

FRACTION	SPIKE Amt (ml)	Conc. ug/ml	Lot #	SURROGATES Amt (ml)	Conc. ug/ml	Lot #
ABN/ACID	1.0	100/500	15,230			
ABN/ACID	1.0	500/100	15,232			
ABN/ACID	1.0	500/100	15,237			
ABN/ACID	1.0	100	15,344			
ABN/ACID	1.0	100	15,342			
Cont. Ver.	N/A			1.0	50/100	15,826

ETC FORM #113

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 970606 SHIFT
FRACTION AP8/BNA
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE SWJ2
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) S Willms

SUPERVISOR Sonia Cordova
BATCH #'s QC6902 QC6976

OBJ8EX
(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	June 7 PM 1487
WIP		BY	KV

STANDARD	CONC PPM	LOT NO.	LOT VOL
Int std	400	15561	
Test Mix			
ACID STD III, II, I	300, 100, 60	15819, 15818, 15817	
BN STD III, II, I	200, 100, 60	16079, 16078, 16077	
AP8 BN (II)	300, 500	15231	
AP8 ACID STD III, II, I	300/500, 100/200, 60/100	15236, 15235, 15234	
AP8/BN STD III, II, I	300/500, 100/200, 60/100	15227, 15228, 15229	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test Mix	>J4736		1			OK 01:06	
BNA STD III	>J4737		2				
II	>J4738		3			JBNA8	
I	>J4739		4				
AP8/BN(II)	>J4740		5			JAP8B2	
AP8/BNA III	>J4741		6				
II	>J4742		7			JAP8A8	
I	>J4743		8				
Test Mix	>J4744		9			OK, A 08:00	
QC6902 E	>J4745		10				
QC6902CS	>J4746		11				
S6605CS	>J4747		12				
S6605CR	>J4748		13				
S6603C	>J4749		14				
S6604C	>J4750		15				
S6605C	>J4751		16				
S6008C	>J4752		17				
S7731C	>J4753		18				
S7732C	>J4754		19				
Test Mix	>J4755		20		OK	17:57	
BNA STD II	>J4756		21				
AP8/BNA STD II	>J4757		22				
S2811 E	>J4758		23				
S6058 E	>J4759		24				

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 6-8-87 SHIFT
FRACTION AP8/BNA
INSTRUMENT J
DATA FILE MTJ001
SEQUENCE FILE
METHOD FILE BNPJ
ID FILE JAP8EX
ANALYST(S) C. to
SUPERVISOR Steve Cordova
BATCH #'s QC6902, QC6976

STANDARD	CONC PPM	LOT NO.	LOT VOL
	See page		
		page 2	

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
P		BY	

NAME	DATA FILE	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
S77336	>J4761		26				
S66028	>J4762		27				
S66045	>J4763		28				
S66065	>J4764		29				
S62265	>J4765		30				
S62275	>J4766		31				
Test Mix	>J4767		32				
BNA II	>J4768		33			See page 3	
AP8/BNA II	>J4769		34				
S58436	>J4770		35				
QC6976C	>J4771		36				
QC6976CS	>J4772		37				
S62528CS	>J4773		38				
S62538C	>J4774		39				
S62538CR	>J4775		40				
S60032C	>J4776		41				
S60036C	>J4777		42				
S60060C	>J4778		43				
Test Mix	>J4779		44				
BNA STD II	>J4780		45				
AP8/BNA II	>J4781		46				
S60070C	>J4782		47				
S60090C	>J4783		48				
S60050C	>J4784		49				
R78590C	>J4785		50				

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 60987 SHIFT
FRACTION HCP OEV
INSTRUMENT mT1001
TUNE FILE I
SEQUENCE FILE BHI
METHOD FILE BHCP
ID FILE IHCP
ANALYST(S) Brenda Hawkins

SUPERVISOR [illegible]
BATCH #'s QC6902, QC6976

(PLEASE INITIAL)

CURRENT CSDS STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	[illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL
HCP std III	500		
II	300		
I	100		
Test mix			
internal std	400		

NAME	DATA FILE	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
Test mix	I4051		1		OK		19:31
Hex std III	I4052		2				
II	I4053		3				
I	I4054		4				21:23
Test mix	I4055		5		OK		22:04
QC6902C	I4056		6				
QC6902CS	I4057		7				
S6605C	I4058		8				
S6605CS	I4059		9				
S6605CR	I4060		10				
S6604C	I4061		11				
S6008C	I4062		12				
S6058C	I4063		13				
S7732C	I4064		14				
S6602C	I4065		15				
Test mix	I4066		16		OK		5:05
S6603C	I4068		18				
S6604C	I4069		19				
S6606C	I4070		20				
S2811C	I4071		21				
S7733C	I4072		22				
S6059C	I4073		23				9:32
Test mix	I4103		1		OK		10:34
Hex std II	I4104		2		OK		11:12

7:17 PM FRI., 19 JUNE, 1987
Sequence file: S170AB
Security Code: QZ
Channel #: 17

JS 6/19/87

Subsequence 1
Method: M6904C:QZ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction AP9 POST (Ec)
Supervisor
Batch #s QC 6904

Standard	Conc PPM	Lot No.
TEMP A	MIX	16265
" B	MIX	16264
" C	MIX	16263
ISO IA		16268
" IB		16267
" IC		16266
ISO 1A		16271
" 2B		16270
" 2C		16269
INDIV A	0.05	2377
INDIV B	0.05	2361

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN5391	RN5391	100.0000	1.000000	1.000000
2	QC6904C	2	PN5392	RN5392	100.0000	1.000000	1.000000
3	TEMP A	3	PN5393	RN5393	100.0000	1.000000	1.000000
4	TEMP B	4	PN5394	RN5394	100.0000	1.000000	1.000000
5	TEMP C	5	PN5395	RN5395	100.0000	1.000000	1.000000
6	QC6904CS 2	6	PN5396	RN5396	100.0000	1.000000	1.000000
7	S6603G	7	PN5397	RN5397	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN5398	RN5398	100.0000	1.000000	1.000000
9	ISO 1A	9	PN5399	RN5399	100.0000	1.000000	1.000000
10	HEXANE	10	PN5400	RN5400	100.0000	1.000000	1.000000
11	ISO 1B	11	PN5401	RN5401	100.0000	1.000000	1.000000
12	HEXANE	12	PN5402	RN5402	100.0000	1.000000	1.000000
13	ISO 1C	13	PN5403	RN5403	100.0000	1.000000	1.000000
14	HEXANE	14	PN5404	RN5404	100.0000	1.000000	1.000000
15	TEMP B	15	PN5405	RN5405	100.0000	1.000000	1.000000
16	QC6904CS 1	16	PN5406	RN5406	100.0000	1.000000	1.000000
17	S6602G	17	PN5407	RN5407	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN5408	RN5408	100.0000	1.000000	1.000000
19	ISO 2A	19	PN5409	RN5409	100.0000	1.000000	1.000000
20	ISO 2B	20	PN5410	RN5410	100.0000	1.000000	1.000000
21	S6604G	21	PN5411	RN5411	100.0000	1.000000	1.000000
22	S6605G	22	PN5412	RN5412	100.0000	1.000000	1.000000
23	S6605GR	23	PN5413	RN5413	100.0000	1.000000	1.000000
24	S6606G	24	PN5414	RN5414	100.0000	1.000000	1.000000
25	TEMP B	25	PN5415	RN5415	100.0000	1.000000	1.000000
26	ISO 2C	26	PN5416	RN5416	100.0000	1.000000	1.000000
27	ISO 1B	27	PN5417	RN5417	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN5418	RN5418	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN5419	RN5419	100.0000	1.000000	1.000000

CONFIRMATION

2:58 PM FRI., 12 JUNE, 1987
Sequence file: S160AC
Security Code: PQ
Channel #: 3

BN 6/12/87

ETC GC Lab Chronicle
Fraction APB/PST (FPB)
Supervisor RH
Batch #s QC 6904

Subsequence 1
Method: M6904F:PQ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Standard	Conc PPM	Lot No.
APB IA	0.1	15,605
IB	0.5	15,604
IC	1.0	15,603
APB IIA	0.1	15609
IIB	0.5	15608
IIC	1.0	15,607

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN2946	RN2946	100.0000	1.000000	1.000000
2	QC6904G	2	PN2947	RN2947	100.0000	1.000000	1.000000
3	APB I 0.1	3	PN2948	RN2948	100.0000	1.000000	1.000000
4	APB I 0.5	4	PN2949	RN2949	100.0000	1.000000	1.000000
5	APB I 1.0	5	PN2950	RN2950	100.0000	1.000000	1.000000
6	APB II 0.1	6	PN2951	RN2951	100.0000	1.000000	1.000000
7	APB II 0.5	7	PN2952	RN2952	100.0000	1.000000	1.000000
8	APB II 1.0	8	PN2953	RN2953	100.0000	1.000000	1.000000
9	QC6904GS 3	9	PN2954	RN2954	100.0000	1.000000	1.000000
10	S6604G	10	PN2955	RN2955	100.0000	1.000000	1.000[illegible]
11	S6604GS 3	11	PN2956	RN2956	100.0000	1.000000	1.000[illegible]
12	S6605G	12	PN2957	RN2957	100.0000	1.000000	1.000000
13	S6605GR	13	PN2958	RN2958	100.0000	1.000000	1.000000
14	S6602G	14	PN2959	RN2959	100.0000	1.000000	1.000000
15	S6603G	15	PN2960	RN2960	100.0000	1.000000	1.000000
16	S6606G	16	PN2961	RN2961	100.0000	1.000000	1.000000
17	APB I 0.5	17	PN2962	RN2962	100.0000	1.000000	1.000000
18	APB II 0.5	18	PN2963	RN2963	100.0000	1.000000	1.000000

KS 6/25/87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departm

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml) PEST BN	ACID	Comments
S6602	21065	530	10	5.0	
S6603	↓	480	1.0	5.0	
S6604	↓	620	1.0	5.0	
S6606	✓	580	1.0	5.0	
S6605	21084	540	1.0	5.0	
S6602	S1	520	1.0	5.0	
S6603	S2	540	1.0	5.0	
S6604	S3	600	1.0	5.0	
S6606	S4	610	1.0	5.0	
QC 6904		480	1.0	5.0	
QC 6904	S1	500	1.0	5.0	
QC 6904	S2	520	1.0	5.0	
QC 6904	S3	510	1.0	5.0	
QC 6904	S4	550	1.0	5.0	
S6605	R	520	1.0	5.0	

QC Batch # 6904

Analysis APG/PCB (
APG/PEST (
APG/PEST (FPD

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~extracts on shelf 98 wt~~

FRACTION		SPIKE Amt (ml)	Conc.	Lot #
S1	EC Iso	0.1 ml	25/100 mg/L	15616
S2	EC Temp	0.1 ml	25/250 g/L	15993
S3	EPDI	0.2 ml	125/125 g/L	15602
S4	Aroclor 1260	0.1 ml	40 g/L	15997

oc DOV

SURROGATE	Amt. (ml)	Conc.	Lot #
		BN:	
		ACID:	

Set-up: J. Zeknich 5/6/87 X.J. 5/6/87 UPD/Supervisor: 6-8-87

PCB ~~BN~~ Conc.: Alcohol ~~Acid~~ Conc.: Alcohol Spike/Surr. Verified: 5-6-87

6/13/8

8:10 PM SAT., 13 JUNE, 1987
Sequence file: S164AA
Security Code: QA
Channel #: 13

ETC GC Lab Chronicle
Fraction APA PEST (EC)
Supervisor JSW
Batch #s QC 6904

Standard	Conc PPM	Lot No.
APB/PEST TEMPA	0.01, 1.0	16265
APB/PEST TEMPB	0.05, 5.0	16264
APB/PEST TEMPC	0.1, 10	16263
APB/PEST ISO CALIA	0.1, 0.1, 0.25	16268
APB/PEST ISO CALI IB	0.5, 0.5, 1	16267
APB/PEST ISO CALI IC	1.0, 1.0, 2.5	16266
APB/PEST ISO CALI IIA	0.25	16271
APB/PEST ISO CALI IIB	1.0	16270
APB/PEST ISO CALI IIC	2.5	16269
INDIV. A	0.05	2377
INDIV B	0.05	2361

Subsequence 1
Method: M6904T:QA
Dialog-Prg Param-File
: :

#Wshs	#Paps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Smp-Amt
1	HEXANE	1	PN4051	RN4051	100.0000	1.000000	1.000000
2	QC6904G	2	PN4052	RN4052	100.0000	1.000000	1.000000
3	TEMP A	3	PN4053	RN4053	100.0000	1.000000	1.000000
4	TEMP B	4	PN4054	RN4054	100.0000	1.000000	1.000000
5	TEMP C	5	PN4055	RN4055	100.0000	1.000000	1.000000
6	QC6904GS 2	6	PN4056	RN4056	100.0000	1.000000	1.000000
7	S6603G	7	PN4057	RN4057	100.0000	1.000000	1.000000
8	S6603GS 2	8	PN4058	RN4058	100.0000	1.000000	1.000000
9	ISO 1A	9	PN4059	RN4059	100.0000	1.000000	1.000000
10	HEXANE	10	PN4060	RN4060	100.0000	1.000000	1.000000
11	ISO 1B	11	PN4061	RN4061	100.0000	1.000000	1.000000
12	HEXANE	12	PN4062	RN4062	100.0000	1.000000	1.000000
13	ISO 1C	13	PN4063	RN4063	100.0000	1.000000	1.000000
14	HEXANE	14	PN4064	RN4064	100.0000	1.000000	1.000000
15	TEMP B	15	PN4065	RN4065	100.0000	1.000000	1.000000
16	QC6904GS 1	16	PN4066	RN4066	100.0000	1.000000	1.000000
17	S6602G	17	PN4067	RN4067	100.0000	1.000000	1.000000
18	S6602GS 1	18	PN4068	RN4068	100.0000	1.000000	1.000000
19	ISO 2A	19	PN4069	RN4069	100.0000	1.000000	1.000000
20	ISO 2B	20	PN4070	RN4070	100.0000	1.000000	1.000000
21	S6604G	21	PN4071	RN4071	100.0000	1.000000	1.000000
22	S6605G	22	PN4072	RN4072	100.0000	1.000000	1.000000
23	S6605GR	23	PN4073	RN4073	100.0000	1.000000	1.000000
24	S6606G	24	PN4074	RN4074	100.0000	1.000000	1.000000
25	TEMP B	25	PN4075	RN4075	100.0000	1.000000	1.000000
26	ISO 2C	26	PN4076	RN4076	100.0000	1.000000	1.000000
27	ISO 1B	27	PN4077	RN4077	100.0000	1.000000	1.000000
28	INDIVA-.05	28	PN4078	RN4078	100.0000	1.000000	1.000000
29	INDIVB-.05	29	PN4079	RN4079	100.0000	1.000000	1.000000

Pleming

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample

Sample Number	Log Link	Sample Vol. (ml)	Extract Vol. (ml)		Comments
56602	21065	620	5.0		
56603	↓	640	5.0		
56604	↓	680	5.0		
56606	↓	610	5.0		
56605	21084	500	5.0		
QC 6903		500	5.0		
QC 6903	S	500	5.0		
56606	S	550	5.0		
56605	R	570	5.0		

QC Batch # 6903 ✓

Analysis AP9/HERB (E

Matrix H_2O

Turnaround NORM

Date 5/6/87

Extraction Method:

Sep. Funnel ✓

Continuous

Soxhlet

Other

COMMENTS

~~Extracts on sheet 98~~

FRACTION	SPIKE		
	Amt (ml)	Conc.	Lot #
DW/[illegible]/APP9/Herb	1.0	250µS/25	15,783

OC DAW

SURROGATE		
Amt. (ml)	Conc.	Lot #

Set-up: [illegible] 5/6/87 J. Schroth 5/6/87

UPD/Supervisor: Andre [illegible] 5/

Spike/Surr. Verified: [illegible] 5/6/8.

8:02 PM SAT., 13 JUNE, 1987
Sequence file: S161AI
Security Code: PZ.
Channel #: 16

Subsequence 2
Method: M6903F:PZ
Dialog-Prg Param-File
: :

#Wshs	#Pmps	Stop
5	5	1

Iso	Post-Btl#	Post-Wshs#
0	0	1

ETC GC Lab Chronicle
Fraction DP9/Herb
Supervisor
Batch #s RC6903

Standard	Conc PPM	Lot No.
DW/Herb A	MIX	15786
DW/Herb B	↓	15787
DW/Herb C	↓	15787

Samples

	Sample-Name	Btl#	P-File	R-File	%Dil-F	Std-Amt	Sap-Amt
1	HEXANE	24	PN4152	RN4152	100.0000	1.000000	1.000000
2	QC6903G	25	PN3523	RN3523	100.0000	1.000000	1.000000
3	DW HERBAA	26	PN3525	RN3525	100.0000	1.000000	1.000000
4	DW HERB A	27	PN3526	RN3526	100.0000	1.000000	1.000000
5	DW HERB B	28	PN3527	RN3527	100.0000	1.000000	1.000000
6	DW HERB C	29	PN3528	RN3528	100.0000	1.000000	1.000000
7	QC6903GS	30	PN3529	RN3529	100.0000	1.000000	1.000000
8	S6606G	31	PN3531	RN3531	100.0000	1.000000	1.000000
9	HEXANE	32	PN4153	RN4153	100.0000	1.000000	1.000000
10	S6606GS	33	PN3532	RN3532	100.0000	1.000000	1.000000
11	HEXANE	34	PN4154	RN4154	100.0000	1.000000	1.000000
12	S6605G	35	PN3535	RN3535*	100.0000	1.000000	1.000000
13	S6605GR	36	PN3536	RN3536	100.0000	1.000000	1.000000
14	DW HERB A	37	PN3539	RN3539	100.0000	1.000000	1.000000
15	S6602G	38	PN3540	RN3540	100.0000	1.000000	1.000000
16	HEXANE	39	PN4155	RN4155	100.0000	1.000000	1.000000
17	S6603G	40	PN3541	RN3541	100.0000	1.000000	1.000000
18	S6604G	41	PN3542	RN3542	100.0000	1.000000	1.000000
19	HEXANE	42	PN4156	RN4156	100.0000	1.000000	1.000000
20	DW HERB C	43	PN3557	RN3557	100.0000	1.000000	1.000000

Technical Report

for

WASTE MANAGEMENT, INC.

Chain of Custody Data Required for ETC Data Management Summary Reports						
BA2902	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald

Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LOESTAR™ Data Management Software.

Comments on Specific Fraction

AP9/PCDX:

The high recoveries are a result of the difference in chlorination between the (native) compound and the internal standard used for quantitation. The samples results were unaffected because the respective compounds were not detected.

ETC TESTING and CERTIFICATION

JUN 25, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Total Polychlorinated Dibenzo Dioxins/Furans GC/MS Analysis Data (QR61)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
BA2902	WASTE MANAGEMENT, INC.	705	W124S	870430	1259	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ppt	MDL ppt	First ppt	Second ppt	Blank Data ppt	Concen. Added ppt	% Recov	Unspiked Sample ppt	Concen. Added ppt	% Recov
2,3,7,8-TCDD	ND	1.11	ND	ND	ND	12.7	83	ND	10.0	100
TCDD	ND	1.11a	ND	ND	ND	12.7	83	ND	10.0	100
PCDD	ND	3.92	ND	ND	ND	12.7	109	ND	10.0	124
HxCDD	ND	8.38	ND	ND	ND	12.7	69	ND	10.0	94
TCDF	ND	1.37	ND	ND	ND	12.7	75	ND	10.0	92
PCDF	ND	2.50	ND	ND	ND	12.7	326b	ND	10.0	150b
HxCDF	ND	8.57	ND	ND	ND	12.7	99	ND	10.0	366b

a Method Detection Limit for TCDD (total) is based on 2,3,7,8-TCDD specific isomer.

b See comments.

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: TCDD EXTRACTION

Sample Number	Log Link	Sample Amt. ml	%REC.	Comments formerly:
BA2901	21628	930		S6602
BA2902		900		S6603
BA2903		900		S6604
BA2904		980		S6606
QT 0915	A	1000		
QT 0915	B	1000		
QT 0915	S	1000		
BA2902	S	790		
BA2903	R	880		

QT Batch # 0915

Analysis AP9/PCDX

Matrix WATER

Date 6/9 - 6/10/87

Supervisor [signature]

Extraction Team,

B. Cade

P. Cooper

M. Vajda

Cleanup A, B, 1/2

Standard & Reagent	Conc PPM	Lot #
Internal Standard		16203
Surrogate		"
Recovery Standard		
Native		16204
Acid Alumina		
Basic Alumina		
Carbopack/Celite		

COMMENTS

UPD/Supervisor: [signature] 6-12-87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

6/15/87 - 6/16/87 SHIFT
TION PCDx - AP9
INSTRUMENT H
TUNE FILE MTH103
SEQUENCE FILE JRH
METHOD FILE PCDYH9
ID FILE H9PCDx
ANALYST(S) J Hendell
SUPERVISOR J Hendell
BATCH #'s 0915

STANDARD	CONC PPM	LOT NO.	LOT VOL. (ml)
PC		C-051-03	2
CC2		16253	2
Recovery Std		15695	5

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N TIME
PC	>H0940	2ul			H-232		1808
CCII	H0941	↓					A13
QT0915AT	H0942						2011
QT0915BT	H0943						2129
QT0915TS	H0944						2222
BA2902TS	H0945						2350
PC	H0946						0043
CCII	H0947						0209
BA2901T	H0948						0300
BA2902T	H0949						0412
BA2903T	H0950						0526
BA2903TR	H0951						0633
BA2904T	H0952						0743
PC	H0953						0851
CCII	H0954	✓				Not Run	0956

ETC Testing & Consultation LABORATORY CHRONICLE: GC/MS Department

DATE 870615 SHIFT
FRACTION MI-PCDX
INSTRUMENT H
TUNE FILE MT4103
SEQUENCE FILE
METHOD FILE PCDYH9
ID FILE H9PCDX
ANALYST(S) Tom Rusowicz

SUPERVISOR Thomas Rusowicz
BATCH #'s INIT- CALIB

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC ~~ppm~~ ng/ml	LOT NO.	LOT VOL.
PC		C-091-03	
CC1	200	16252	
CC2	500	16253	
CC3	1000	16254	
CC4	2000	16255	
CC5	5000	16256	

NAME	DATA FILE ~~H~~	UL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	~~PLUS YIN~~ Time
PC	~~0919~~ ~~0930~~	2ul			H-233		1624
CC1	0921	|					2357
CC1	0922	|					0052
CC1	0923	|					0144
CC2	0924	|					0255
CC2	0925	|					0406
CC2	0926	|					0458
CC3	0927	|					0604
CC3	0928	|					0738
CC3	0929	|					0848
CC4	0930	|					0952
CC4	0931	|					1146
CC4	0932	|					1244
PC	0933	|					1429
PC	0934	|					1847
CC5	0935	|					1941
CC5	0936	|					2057
CC5	0937	|					2212
CC2	0938	|					2313
PC	0939	✓					0107

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 2, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Metals and Conventionals – Analysis Data (QR60)

13A Aluminum	<30	30								
19A Antimony	<500	500								
21A Arsenic	4	4								
27A Barium	253	50								
42A Beryllium	<1	1								
56A Cadmium	<3	3								
57A Calcium	32700	100								
84A Chromium	<20	20								
88A Copper	<20	20								
210 Iron	69	30								
216A Lead	5	4								
225A Mercury	<.5	.5								
250A Nickel	24	20								
280A Osmium	ND									
301A Potassium	220000	50								
314A Selenium	<4	4								
317A Silver	<30	30								
319A Sodium	695000	50								
335A Thallium	<300	300								
372A Vanadium	<10	10								
374A Zinc	303000	10								
Magnesium	169000	200								
Manganese	93	10								
Tin	<1000	1000								
Cobalt	<20	20								

* Qualitative analysis for Osmium.

*See Grand Table for complete compound name and specifications.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 2, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Metals and Conventionals – Analysis Data (QR60)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13A Aluminum	<30	30									
19A Antimony	<500	500									
21A Arsenic	16	4									
27A Barium	203	50									
42A Beryllium	<1	1									
56A Cadmium	<3	3									
57A Calcium	15000	100									
84A Chromium	<20	20									
88A Copper	<20	20									
210 Iron	140	30									
216A Lead	6	4									
226A Mercury	<.5	.5									
250A Nickel	<20	20									
280A Osmium	ND										
301A Potassium	280000	50									
314A Selenium	<4	4									
317A Silver	<30	30									
319A Sodium	5340000	50									
335A Thallium	<300	300									
372A Vanadium	<10	10									
374A Zinc	837	10									
Magnesium	2890	200									
Manganese	697	10									
Tin	<1000	1000									
Cobalt	<20	20									

* Qualitative analysis for [illegible].

[illegible] Grand Table for [illegible] compound [illegible] and specifications.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 2, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Metals and Conventionals – Analysis Data (QR60)

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13A Aluminum	<30	30								
19A Antimony	<500	500								
21A Arsenic	50	4								
27A Barium	781	50								
42A Beryllium	<1	1								
56A Cadmium	<3	3								
57A Calcium	110000	100								
84A Chromium	<20	20								
88A Copper	<20	20								
210 Iron	15500	30								
216A Lead	<4	4								
226A Mercury	<.5	.5								
250A Nickel	<20	20								
280A Osmium	ND									
301A Potassium	32000	50								
314A Selenium	<4	4								
317A Silver	<30	30								
319A Sodium	115000	50								
335A Thallium	<300	300								
372A Vanadium	<10	10								
374A Zinc	107000	10								
Magnesium	253000	200								
Manganese	338	10								
Tin	<1000	1000								
Cobalt	<20	20								

[redacted]

[redacted]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 2, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

RCRA Appendix 9 – Metals and Conventionals – Analysis Data (QR60)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13A Aluminum	<20	30									
19A Antimony	<500	500									
21A Arsenic	<4	4									
27A Barium	80	60									
42A Beryllium	<1	1									
66A Cadmium	<3	3									
57A Calcium	39200	100									
84A Chromium	<20	20									
88A Copper	<20	20									
210 Iron	37	30									
216A Lead	<4	4									
225A Mercury	<.5	.5									
250A Nickel	32	20									
280A Osmium	ND										
301A Potassium	36000	50									
314A Selenium	<4	4									
317A Silver	<30	30									
319A Sodium	169000	60									
335A Thallium	<300	300									
372A Vanadium	<10	10									
374A Zinc	234000	10									
Magnesium	160000	200									
Manganese	1380	10									
Tin	<1000	1000									
Cobalt	<20	20									

[illegible] analysis for Osmium.

[illegible] for complete compound class and specification.

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

VOLUME III
GROUND-WATER ASSESSMENT REPORT
SCA CHICAGO INCINERATOR FACILITY
CHICAGO, ILLINOIS
FOR
SCA CHEMICAL SERVICES, INC.

(VOLUME III - APPENDICES G THROUGH L)

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August 1987

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PRACTICAL METHOD DETECTION LIMITS

August 1987

873-2096

Golder Associates

ANALYTICAL METHODOLOGIES AND DETECTION LIMITS
SCA CHICAGO INCINERATOR GROUND-WATER ASSESSMENT

The Appendix IX parameters have been divided into three distinct categories in order to establish the methods that will be utilized to generate action levels.

1. The first and major category of the Appendix IX parameters are those that are normally expected to be absent in ground water or are reported above the detection level infrequently, i.e., less than 10% of the time. Since these parameters have not been detected in the SCA Chicago Incinerator ground water, no site specific data base is available. For this group of parameters, we are proposing to utilize a Practical Method Detection Level (PMDL) to define the action level. PMDL's will be calculated utilizing information from 40 CFR Part 136, Appendices A and B, "Guidelines Establishing Test Procedures for the Analysis of Pollutants."

2. The second category consists of Appendix IX parameters that have been detected in the ground water at the SCA Chicago Incinerator more than 10% of the time. For this category of parameters, an action level or Prediction Interval (PI) based on the Student's 't' statistic has been calculated. If one of these parameters is found in the ground water at a concentration above the calculated Prediction Interval, additional steps will be taken to confirm that the concentration above the PI is a valid analytical results. If the analytical result is valid, further steps are required to determine the rate, extent and source of the constituent.

3. The final category of Appendix IX parameters includes those parameters for which no analytical results can be obtained. We are proposing that this small group of parameters be deleted from the ground-water assessment as discussed below.

PRACTICAL METHOD DETECTION LIMITS (PMDL)

The method detection limit (MDL) is defined in 40 CFR Part 136 Appendix B as:

> "The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte."

This is the definition of an "ideal" method detection limit (IMDL), as it is based upon carefully controlled laboratory conditions in which a single analyst using a single instrument is examining a solution of a known constituent at a fixed concentration. The analyst, therefore, knows exactly what he is looking for, at what concentration it exists, and in what matrix. This non-blind, ideal condition results in an extremely low method detection limit. In normal practice, however, multiple analysts, machines, laboratories, and variable sample matrices exist. The analysts have no prior knowledge regarding which compounds are or are not present, or at what concentrations. To account for these variations, 40 CFR Part 136 Appendix A includes "practical" standard deviations which are to be used to determine a "final" method detection limit. Using this along with the recommended "Upper Confidence Levels," as defined in that Appendix, a "final" Method Detection Level can be calculated. We have termed this concentration to be the Practical Method Detection Level (PMDL). The PMDL is calculated from an estimate of the Student's 't' value appropriate for a 99% confidence level; this value being 3.14. A confidence interval of 95% is utilized to calculate the upper concentration at which the MDL may occur. The upper confidence limit (UCL) is defined in Appendix B as:

$$UCL = 2.20 \times MDL$$

where $$MDL = 3.14 \times s$$

and s is the "limit" standard deviation as identified in 40 CFR Part 136. Therefore, the PMDL = UCL = 2.20 x (3.14 x s) = 6.91 x s.

The PMDL's included on Table I were calculated for the Appendix IX parameters utilizing the "Limit Standard Deviation" as noted in the Appendix, where data is available. For constituents for which the standard deviation is not available in the EPA information, we have utilized supplemental information from our laboratory consultant to calculate the PMDL's. These procedures listed in order of preference are:

A. If 40 CFR Part 136 includes EPA published values for the limit standard deviation, then the PMDL is calculated using the formula derived above (PMDL = 6.91 x s, where s = the limit standard deviation as published in Part 136 Appendix A).

B. If the EPA limit standard deviation is not available, information from our laboratory consultant (ETC) is used to supplement the information. Using EPA available data for each group of constituents, including volatiles, base neutrals, acids, and pesticides, a s:IMDL ratio for each parameter in the group is calculated. The average ratio is multiplied by an ETC IMDL, where necessary, to obtain

a limit standard deviation. The PMDL for these parameters is then calculated as 6.91 x the limit standard deviation.

C. If neither EPA or ETC information is available and an average EPA s:/IMDL ratio cannot be calculated (as in the case of cyanide, sulfide and metals), the most conservative EPA s:/IMDL ratio (2.02) is utilized to calculate a limit standard deviation. The PMDL will then be calculated as described above.

The EPA published IMDL and s values for each group of parameters were taken from tables from 40 CFR 136 and SW 846 as noted below, and the results are presented in Table I:

	IMDL	LIMIT STANDARD DEVIATION
Volatiles (Method 624)	Table 1	Table 5
Acids (Method 625)	Table 5	Table 6
Base/Neutrals (Method 625)	Table 4	Table 6
Pesticides (Method 608)	Table 1	Table 3
PCB's (Method 608)	Table 1	Table 3
Herbicides (SW 846 Method 8150)	Table 1	Table 3

PREDICTION INTERVALS

Sufficient site specific background data exists to establish site specific statistical limit values for the following Appendix IX parameters: iron and magnesium. For these parameters, a prediction interval (PI) based on the Students 't' distribution has been calculated. This Prediction Interval predicts with 99% confidence, that the range of values of the constituents in the downgradient well will not exceed the upgradient conditions during a sampling event. A complete derivation of the Prediction Interval method is presented in Appendix H.

Several additional constituents are anticipated to be normally present in the upgradient and downgradient wells, but there is insufficient site specific data to calculate the PI. These constituents are outlined on Table III. For these constituents, it is proposed to develop the PI after additional analyses are available.

In summary, the Prediction Interval is based upon a Student's 't' statistic which will predict the concentration at which a constituent may vary, but remains within a statistically predicted range, i.e., no significant change.

MISCELLANEOUS PARAMETERS

No analytical results can be obtained for 16 Appendix IX parameters due to the lack of appropriate laboratory protocols. The specific reasons for the inappropriateness of the analysis are noted below:

PARAMETERS	LABORATORY RESULTS
2 - Chloro -1, 3 - butadiene	ND
3 - Chloropropene	ND
Ethylene oxide	ND
N - Nitrosopyrrolidine	IND
2 - Propyn - 1 - ol	IND
Trichloromethanethiol	PNA
Benzenethiol	IND
Dibenzo (a,e) pyrene	PNA
Dibenzo (a,h) pyrene	PNA
Dibenzo (a,i) pyrene	IND
tris (2, 3 - Dibromopropyl) phosphate	IND
alpha-alpha Dimethylphenethylamine	PNA
Malonoitrile	IND
Methapyrilene	IND
Tetrethyldithiopyrophosphate	ND
Osmium	ND

ND: Indicates that no standard is available.

IND: Indicates that standard and/or spikes could not be detected.

PNA: Indicates that the parameter cannot be analyzed as no standard or reference spectra is available.

Due to the above stated reasons, action levels cannot be calculated for these 16 parameters. These parameters have been deleted from the proposed assessment plan.

CONCLUSIONS

Based on the foregoing discussions, the calculated PMDL's and PI's for the Appendix IX parameters are indicated in Table I & II. These values represent action levels which, if found in a sample from SCA Chicago Incinerator ground-water assessment wells, will trigger further investigations. As the site specific data base increases, the action levels will be periodically re-calculated and adjusted upwards or downwards if appropriate.

A review of these action levels indicate that many of the resultant concentrations are considerably higher than the IMDL's. This is due to the large standard deviations which are indicative of the difficulty of analysis at extremely low concentrations. Further demonstration of this is the fact that the ETC instrument

detection levels are significantly greater than the EPA ideal levels. In addition, the SCA Chicago Incinerator data base for numerous Appendix IX compounds does not exist since these parameters have not been previously analyzed. Therefore, the following approach is recommended to obtain reasonable action levels. The proposed action levels are presented in Table III.

PARAMETER	ACTION LEVEL METHODOLOGY
Priority pollutant and miscellaneous volatiles, acids, and base/neutrals.	The PMDL's will be utilized if the concentration is less than 0.5 mg/l. In instances where the PMDL is greater than 0.5 mg/l, SCA Chicago Incinerator standard deviation will be calculated on a case by case basis when the value is confirmed upon resample.
Pesticides/Herbicides	Same as above.
PCB's	Use calculated PMDL's
Conventionals/metals	The PMDL's will be utilized if the concentration is less than 0.5 mg/l. A PI will be utilized if the parameter is detected in the upgradient wells. In instances where the PMDL is greater than 0.5 mg/l, SCA Chicago Incinerator standard deviation will be calculated on a case by case basis when the value is confirmed upon resample.

SCA CHICAGO INCINERATOR G .NDWATER MONITORING PROGRAM
TABLES I AND II
ABBREVIATIONS, COMMENTS AND FOOTNOTES

ABBREVIATIONS

nd - not determined
N/A - Not Available
NS - No standard available, compound qualitatively searched for
IND - Indeterminate: Standard and/or spikes could not be detected
PNA - Parameter Not Analyzed: No standard or reference spectra available
S - Standard Deviation
IMDL - "Ideal" Method Detection Limit
PMDL - "Practical" Method Detection Limit
PI - Prediction Interval
IDL - Instrument Detection Limit

COMMENTS

Table I PMDLs have been calculated for all Appendix IX parameters which will normally present analytical results greater than the detection limit less than 10 percent of the time, and for those parameters where previous site-specific data is not available.

Table II presents calculated Prediction Interval (PI) values for all Appendix IX parameters which will normally present analytical results greater than the detection limit more than 10 percent of the time.

FOOTNOTES

1. Analytical Methods utilized from: EPA Manual SW846, "Test Methods for Evaluating Solid Waste" (four digit numbers); EPA manual 600, "Methods for Chemical Analysis of Water and Wastes" (200, 300, and 600 series numbers); and the 16th Edition of "Standard Methods "(Herbicide values in parentheses). The initial method listed is that reported by the laboratory. The second method, in parentheses, is the comparable method to the SW846 Method. The SW846 methods have been utilized due to the lack of EPA-600 methods for analysis of all of the compounds in Appendix IX.

2. Published EPA Method Detection Limits (MDLs) by method. See footnote 1 for these references. Published EPA MDLs (IMDL) for methods 608, 624, and 625 (8080, 8240 and 8270) may also be found in 40CFR Part 136, Appendix A. The tables which contain these values have been detailed in the preceding text.

3. EPA Limits for Standard Deviation(S) as published by method. See footnote 1 for these references. Published EPA Practical Standard deviations for methods 608, 624, and 625 (8080, 8240 and 8270) may also be found in 40CFR Part 136, Appendix A. The tables which contain these values have been detailed in the preceding text.

4. IDL's reported by ETC (a CLP lab) for the April sampling event. IDL's are ETC established Instrument Detection Limits.

5. ETC Limits for Standard deviation have been calculated for all parameters where a published EPA Limit for Standard deviation is not available. The method for calculating these values is presented in footnote 7.

6. The PMDLs have been calculated by multiplying the EPA or ETC Limits for standard deviation(S), by 3.14, and by an upper confidence limit multiplier of 2.20 (40CFR Part 136, Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit") Therefore, PMDL = S X 3.14 X 2.20

7. The number listed in the comments column represents the method used to calculate the PMDL value. Each of these methods has been described below.

   1) An EPA published Limit for standard deviation(s) is available. The PMDL has been calculated as follows: PMDL = S X 3.14 X 2.20, with S being the EPA Limit for S value.

      Eg. Benzene S = 6.9 ug/L
      PMDL = 6.9 X 3.14 X 2.20 = 47.7 ug/L

   2) An EPA published Limit for standard deviation is not available, and an ETC instrument detection limit (IDL) is available. An ETC Limit for Standard deviation and a PMDL are calculated as follows:

      a) Identify the parameter group for the missing "S" value (i.e. Volatiles, Acids, Base/Neutrals, Acid/Base/Neutrals or Pesticides)

      b) Determine a "S"/MDL Ratio for the identified parameter group, by taking each individual EPA Limit for standard deviation and dividing by the corresponding published EPA MDL (IMDL). The sum of these individual Ratios should then be divided by the number of ratios used. This will provide the "Average EPA "S"/IMDL Ratio" for the identified parameter group as noted on the bottom of each page. (Both an EPA IMDL and an "S" value must be available for these numbers to be used in the Ratio calculations).

      c) Multiply the ETC IDL by the Ratio for the identified parameter group, to obtain the calculated ETC Limit for standard deviation.

      d) The PMDL should then be calculated as follows: PMDL = S X 3.14 X 2.20, with S being the calculated ETC Limit for standard deviation.

      Eg. a. Dichlorodifluoromethane (Volatile)
      Published EPA MDL (IMDL) = N/A
      EPA Limits for "S" = N/A
      ETC IDL = 10 ug/L

b.

6.9/4.4	=	1.57	1
5.4/4.7	=	1.15	2
5.2/2.8	=	1.86	3
.		.	.
.		.	.
.		.	.
5.5/5.0	=	1.10	20
6.6/1.9	=	3.47	21
		42.37	

42.37/21 = 2.02 = Average EPA "S"/IMDL Volatile Ratio

c. 10 X 2.02 = 20.2 = Calculated ETC Limit for "S"

d. 20.2 X 3.14 X 2.2 = 140 ug/L = PMDL

3) An EPA Limit for "S" value is not available and a parameter group Ratio is also not available. The most conservative parameter group ratio is used to calculate an ETC Limit for Standard deviation as in 2c above. The PMDL is calculated as in 2d.

Eg. Cyanide
ETC IDL = 0.02 mg/L
Volatiles Ratio = 2.02 (most conservative ratio)

0.02 X 2.02 = 0.04 = Calculated ETC Limit for "S"

0.04 X 3.14 X 2.20 = 0.28 mg/L = PMDL

<u>Parameter Group Ratios</u>

Volatiles	2.02
Acids	10.5
Base/Neutrals	13.57
Acid/Base/Neutrals	12.88
Pesticides	295

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Priority Pollutant Volatiles (ug/l)							
Benzene	5030/8240/624	4.4	6.9			47.7	1
Bromoform	5030/8240/624	4.7	5.4			37.3	1
Carbon tetrachloride	5030/8240/624	2.8	5.2			35.9	1
Chlorobenzene	5030/8240/624	6.0	6.3			43.5	1
Chlorodibromomethane	5030/8240/624	3.1	6.1			42.2	1
Chloroethane	5030/8240/624	nd	11.4	10	-	78.8	1
2-Chloroethylvinyl ether	5030/8240/624	nd	25.9	10	-	179	1
Chloroform	5030/8240/624	1.6	6.1			42.2	1
Dichlorobromomethane	5030/8240/624	2.2	6.4			44.2	1
Dichlorodifluoromethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
1,1-Dichloroethane	5030/8240/624	4.7	5.1			35.2	1
1,2-Dichloroethane	5030/8240/624	2.8	6.0			41.5	1
1,1-Dichloroethylene	5030/8240/624	2.8	9.1			62.9	1
1,2-Dichloropropane	5030/8240/624	6.0	13.8			95.4	1
cis-1,3-Dichloropropylene	5030/8240/624	5.0	15.8			109	1
trans-1,3-Dichloropropylene	5030/8240/624	nd	10.4	10	-	71.9	1
Ethylbenzene	5030/8240/624	7.2	7.5			51.8	1
Methyl bromide	5030/8240/624	nd	17.9	10	-	124	1
Methyl chloride	5030/8240/624	nd	19.8	10	-	137	1
Methylene chloride	5030/8240/624	2.8	7.4			51.1	1
1,1,2,2-Tetrachloroethane	5030/8240/624	6.9	7.4			51.1	1
Tetrachloroethylene	5030/8240/624	4.1	5.0			34.6	1
Toluene	5030/8240/624	6.0	4.8			33.2	1
1,2-Trans-dichloroethylene	5030/8240/624	1.6	5.7			39.4	1
1,1,1-Trichloroethane	5030/8240/624	3.8	4.6			31.8	1
1,1,2-Trichloroethane	5030/8240/624	5.0	5.5			38.0	1
Trichloroethylene	5030/8240/624	1.9	6.6			45.6	1
Trichlorofluoromethane	5030/8240/624	nd	10.0	10	-	69.1	1
Vinyl chloride	5030/8240/624	nd	20.0	10	-	138	1
Acrolein	MOD8240(624)	N/A	N/A	100	202	1400	2
Acrylonitrile	MOD8240(624)	N/A	N/A	100	202	1400	2

Average EPA "S"/IMDL Volatile Ratio = 2.02

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Priority Pollutant Acids (ug/l)							
2-Chlorophenol	3510/8270/625	3.3	28.7			198	1
2,4-Dichlorophenol	3510/8270/625	2.7	26.4			182	1
2,4-Dimethylphenol	3510/8270/625	2.7	26.1			180	1
2-Methyl-4,6-dinitrophenol	3510/8270/625	24	93.2			644	1
2,4-Dinitrophenol	3510/8270/625	42	49.8			344	1
2-Nitrophenol	3510/8270/625	3.6	35.2			243	1
4-Nitrophenol	3510/8270/625	2.4	47.2			326	1
4-Chloro-3-methylphenol	3510/8270/625	3.0	37.2			257	1
Pentachlorophenol	3510/8270/625	3.6	48.9			338	1
Phenol	3510/8270/625	1.5	22.6			156	1
2,4,6-Trichlorophenol	3510/8270/625	2.7	31.7			219	1

Average EPA "S"/IMDL Acid Ratio = 10.5

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Priority Pollutant Base/Neutrals (ug/l)							
Acenaphthene	3510/8270/625	1.9	27.6			191	1
Acenaphthylene	3510/8270/625	3.5	40.2			278	1
Anthracene	3510/8270/625	1.9	32.0			221	1
Benzidine	3510/8270/625	44	N/A	48	651	4500	2
Benzo(a)anthracene	3510/8270/625	7.8	27.6			191	1
Benzo(a)pyrene	3510/8270/625	2.5	39.0			269	1
Benzo(b)fluoranthene	3510/8270/625	4.8	38.8			268	1
Benzo(ghi)perylene	3510/8270/625	4.1	58.9			407	1
Benzo(k)fluoranthene	3510/8270/625	2.5	32.3			223	1
bis(2-Chloroethoxy)methane	3510/8270/625	5.3	34.5			238	1
bis(2-Chloroethyl)ether	3510/8270/625	5.7	55.0			380	1
bis(2-Chloroisopropyl)ether	3510/8270/625	5.7	46.3			320	1
bis(2-Ethylhexyl)phthalate	3510/8270/625	2.5	41.1			284	1
4-Bromophenyl phenyl ether	3510/8270/625	1.9	23.0			159	1
Butyl benzyl phthalate	3510/8270/625	2.5	23.4			162	1
2-Chloronaphthalene	3510/8270/625	1.9	13.0			89.8	1
4-Chlorophenyl phenyl ether	3510/8270/625	4.2	33.4			231	1
Chrysene	3510/8270/625	2.5	48.3			334	1
Dibenzo(a,h)anthracene	3510/8270/625	2.5	70.0			484	1
1,2-Dichlorobenzene	3510/8270/625	1.9	30.9			214	1
1,3-Dichlorobenzene	3510/8270/625	1.9	41.7			288	1
1,4-Dichlorobenzene	3510/8270/625	4.4	32.1			222	1
3,3'-Dichlorobenzidine	3510/8270/625	16.5	71.4			493	1
Diethyl phthalate	3510/8270/625	1.9	26.5			183	1
Dimethyl phthalate	3510/8270/625	1.6	23.2			160	1
Di-n-butyl phthalate	3510/8270/625	N/A	16.7	11	-	115	1
2,4-Dinitrotoluene	3510/8270/625	5.7	21.8			151	1
2,6-Dinitrotoluene	3510/8270/625	1.9	29.6			205	1
Di-n-octyl phthalate	3510/8270/625	2.5	31.4			217	1
1,2-Diphenylhydrazine	3510/8270(625)	N/A	N/A	11	149	1030	2
Fluoranthene	3510/8270/625	2.2	32.8			227	1
Fluorene	3510/8270/625	1.9	20.7			143	1

Average EPA "S"/IMDL Base/Neutral Ratio = 13.57

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated PMDL	Comments[7]
Hexachlorobenzene	3510/8270/625	1.9	24.9			172	1
Hexachlorobutadiene	3510/8270/625	0.9	26.3			182	1
Hexachlorocyclopentadiene	3510/8270(625)	N/A	N/A	11	149	1030	2
Hexachloroethane	3510/8270/625	1.6	24.5			169	1
Isophorone	3510/8270/625	2.2	63.3			437	1
Naphthalene	3510/8270/625	1.6	30.1			208	1
Nitrobenzene	3510/8270/625	1.9	39.3			272	1
N-Nitrosodimethylamine	3510/8270(625)	N/A	N/A	11	149	1030	2
N-Nitrosodiphenylamine	3510/8270/625	1.9	N/A	2.1	28.5	197	2
N-Nitrosodi-n-propylamine	3510/8270/625	N/A	55.4	11	-	383	1
Phenanthrene	3510/8270/625	5.4	20.6			142	1
Pyrene	3510/8270/625	1.9	25.2			174	1
1,2,4-Trichlorobenzene	3510/8270/625	1.9	28.1			194	1

Average EPA "S"/IMDL Base/Neutral Ratio = 13.57

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Miscellaneous Volatiles (ug/l)							
Acetone	5030/8240(624)	N/A	N/A	10	20.2	140	2
Acetonitrile	MOD8240(624)	N/A	N/A	10	20.2	140	2
Allyl Alcohol	MOD8240(624)	N/A	N/A	8	16.2	112	2
Carbon disulfide	5030/8240(624)	N/A	N/A	10	20.2	140	2
2-Chloro-1,3-butadiene	5030/8240(624)	N/A	N/A	NS	-	-	-
3-Chloropropene	5030/8240(624)	N/A	N/A	NS	-	-	-
1,2-Dibromo-3-chloropropane	5030/8240(624)	N/A	N/A	10	20.2	140	2
1,2-Dibromoethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
Dibromomethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
1,4-Dichloro-2-butene	5030/8240(624)	N/A	N/A	10	20.2	140	2
1,4-Dioxane	MOD8240(624)	N/A	N/A	10	20.2	140	2
Ethyl cyanide	MOD8240(624)	N/A	N/A	8	16.2	112	2
Ethyl methacrylate	5030/8240(624)	N/A	N/A	10	20.2	140	2
Ethylene oxide	MOD8240(624)	N/A	N/A	NS	-	-	-
2-Hexanone	5030/8240(624)	N/A	N/A	10	20.2	140	2
Iodomethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
Isobutyl alcohol	MOD8240(624)	N/A	N/A	8	16.2	112	2
Methacrylonitrile	MOD8240(624)	N/A	N/A	40	80.8	558	2
Methyl ethyl ketone	5030/8240(624)	N/A	N/A	10	20.2	140	2
Methyl methacrylate	5030/8240(624)	N/A	N/A	10	20.2	140	2
Methyl-iso-butyl ketone	5030/8240(624)	N/A	N/A	10	20.2	140	2
N-Nitrosopyrrolidine	MOD8240(624)	N/A	N/A	IND	-	-	-
Pentachloroethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
2-Propyn-1-ol	MOD8240(624)	N/A	N/A	IND	-	-	-
Pyridine	MOD8240(624)	N/A	N/A	80	162	1120	2
Styrene	5030/8240(624)	N/A	N/A	10	20.2	140	2
1,1,1,2-Tetrachloroethane	5030/8240(624)	N/A	N/A	10	20.2	140	2
Trichloromethanethiol	5030/8240(624)	N/A	N/A	PNA	-	-	-
1,2,3-Trichloropropane	5030/8240(624)	N/A	N/A	10	20.2	140	2
m-Xylene	5030/8240(624)	N/A	N/A	10	20.2	140	2
o + p-Xylenes	5030/8240(624)	N/A	N/A	10	20.2	140	2
Vinyl acetate	5030/8240(624)	N/A	N/A	10	20.2	140	2

Average EPA "S"/IMDL Volatile Ratio = 2.02

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit f . "S"	Calculat[6] IMDL	Comments[7]
Miscellaneous Acid/Base/Neutrals (ug/l)							
Acetophenone	3510/8270(625)	N/A	N/A	11	142	981	2
2-Acetylaminofluorene	3510/8270(625)	N/A	N/A	11	142	981	2
4-Aminobiphenyl	3510/8270(625)	N/A	N/A	11	142	981	2
Aniline	3510/8270(625)	N/A	N/A	11	142	981	2
Aramite	3510/8270(625)	N/A	N/A	11	142	981	2
Benzenethiol	3510/8270(625)	N/A	N/A	IND	-	-	-
Benzoic acid	3510/8270(625)	N/A	N/A	11	142	981	2
p-Benzoquinone	3510/8270(625)	N/A	N/A	11	142	981	2
Benzyl alcohol	3510/8270(625)	N/A	N/A	11	142	981	2
2-sec-Butyl-4,6-dinitrophenol	3510/8270(625)	N/A	N/A	11	142	981	2
p-Chloroaniline	3510/8270(625)	N/A	N/A	11	142	981	2
3-Chloropropionitrile	3510/8270(625)	N/A	N/A	11	142	981	2
o-Cresol	3510/8270(625)	N/A	N/A	11	142	981	2
m + p-Cresols	3510/8270(625)	N/A	N/A	11	142	981	2
Dibenzo(a,e)pyrene	3510/8270(625)	N/A	N/A	NS	-	-	-
Dibenzo(a,h)pyrene	3510/8270(625)	N/A	N/A	PNA	-	-	-
Dibenzo(a,i)pyrene	3510/8270(625)	N/A	N/A	IND	-	-	-
tris(2,3-Dibromopropyl)phosphate	3510/8270(625)	N/A	N/A	IND	-	-	-
2,6-Dichlorophenol	3510/8270(625)	N/A	N/A	11	142	981	2
3,3'-Dimethoxybenzidine	3510/8270(625)	N/A	N/A	11	142	981	2
p-Dimethylaminoazobenzene	3510/8270(625)	N/A	N/A	11	142	981	2
3,3'-Dimethylbenzidine	3510/8270(625)	N/A	N/A	11	142	981	2
7,12-Dimethylbenzo(a)anthracene	3510/8270(625)	N/A	N/A	11	142	981	2
alpha-alpha-Dimethylphenethylamine	3510/8270(625)	N/A	N/A	PNA	-	-	-
m-Dinitrobenzene	3510/8270(625)	N/A	N/A	11	142	981	2
Diphenylamine	3510/8270(625)	N/A	N/A	11	142	981	2
Hexachlorophene	3510/8270(625)	N/A	N/A	11	142	981	2
Hexachloropropene	3510/8270(625)	N/A	N/A	11	142	981	2

Average EPA "S"/IMDL Acid/Base/Neutral Ratio = 12.88

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Indeno(1,2,3-cd)pyrene	3510/8270(625)	3.7	44.6			308	1
Isodrin	3510/8270(625)	N/A	N/A	6.5	83.7	578	2
Isosafrole	3510/8270(625)	N/A	N/A	11	142	981	2
Malononitrile	3510/8270(625)	N/A	N/A	IND	-	-	-
Methapyrilene	3510/8270(625)	N/A	N/A	IND	-	-	-
3-Methylcholanthrene	3510/8270(625)	N/A	N/A	11	142	981	2
4,4'-Methylenebis(2-chloroaniline)	3510/8270(625)	N/A	N/A	11	142	981	2
Methyl methanesulfonate	3510/8270(625)	N/A	N/A	11	142	981	2
2-Methylnaphthalene	3510/8270(625)	N/A	N/A	11	142	981	2
1,4-Naphthoquinone	3510/8270(625)	N/A	N/A	11	142	981	2
1-Naphthylamine	3510/8270(625)	N/A	N/A	11	142	981	2
2-Naphthylamine	3510/8270(625)	N/A	N/A	11	142	981	2
m-Nitroaniline	3510/8270(625)	N/A	N/A	11	142	981	2
o-Nitroaniline	3510/8270(625)	N/A	N/A	11	142	981	2
p-Nitroaniline	3510/8270(625)	N/A	N/A	11	142	981	2
N-Nitrosodi-n-butylamine	3510/8270(625)	N/A	N/A	11	142	981	2
N-Nitrosodiethylamine	3510/8270(625)	N/A	N/A	11	142	981	2
N-Nitrosomethylethylamine	3510/8270(625)	N/A	N/A	11	142	981	2
N-Nitrosomorpholine	3510/8270(625)	N/A	N/A	11	142	981	2
N-Nitrosopiperidine	3510/8270(625)	N/A	N/A	11	142	981	2
5-Nitro-o-toluidine	3510/8270(625)	N/A	N/A	11	142	981	2
Pentachlorobenzene	3510/8270(625)	N/A	N/A	11	142	981	2
Pentachloronitrobenzene	3510/8270(625)	N/A	N/A	11	142	981	2
Phenacetin	3510/8270(625)	N/A	N/A	11	142	981	2
2-Picoline	3510/8270(625)	N/A	N/A	11	142	981	2
Pronamide	3510/8270(625)	N/A	N/A	11	142	981	2
Resorcinol	3510/8270(625)	N/A	N/A	11	142	981	2
Safrole	3510/8270(625)	N/A	N/A	11	142	981	2
1,2,4,5-Tetrachlorobenzene	3510/8270(625)	N/A	N/A	11	142	981	2
2,3,4,6-Tetrachlorophenol	3510/8270(625)	N/A	N/A	11	142	981	2
Tetraethyldithiopyrophosphate	3510/8270(625)	N/A	N/A	NS	-	-	-
2,4,5-Trichlorophenol	3510/8270(625)	N/A	N/A	11	142	981	2

Average EPA "S"/IMDL Acid/Base/Neutral Ratio = 12.88

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated PMDL	Comments[7]
Pesticides (ug/l)							
Aldrin	8080/608	0.004	0.42			2.90	1
Alpha-BHC	8080/608	0.003	0.48			3.32	1
Beta-BHC	8080/608	0.006	0.64			4.42	1
Delta-BHC	8080/608	0.009	0.72			4.98	1
Chlordane	8080/608	0.014	10.0			69.1	1
Chlorobenzilate	8140	N/A	N/A	2.6	767	5300	2
4,4'-DDD	8080/608	0.011	2.8			19.3	1
4,4'-DDE	8080/608	0.004	0.55			3.80	1
4,4'-DDT	8080/608	0.012	3.6			24.9	1
Dieldrin	8080/608	0.002	0.76			5.25	1
Disulfoton	8140	0.20	N/A	5.2	1530	10600	2
Endosulfan I	8080/608	0.014	0.49			3.39	1
Endosulfan II	8080/608	0.004	6.1			42.2	1
Endrin	8080/608	0.006	3.7			25.6	1
Endrin aldehyde	8080/608	0.023	N/A	0.1	29.5	204	2
Famphur	8150	N/A	N/A	10	2950	20400	2
Heptachlor	8080/608	0.003	0.40			2.76	1
Heptachlor epoxide	8080/608	0.083	0.41			2.83	1
Kepone	8080(608)	N/A	N/A	1.0	295	2040	2
Lindane	8080/608	0.004	0.46			3.18	1
Methoxychlor	8080(608)	N/A	N/A	10	2950	20400	2
Methyl parathion	8150	N/A	N/A	1.0	295	2040	2
Parathion	8150	N/A	N/A	1.0	295	2040	2
Phorate	8150	N/A	N/A	1.0	295	2040	2
Thionazin	8140	N/A	N/A	1.0	295	2040	2
Toxaphene	8080/608	0.24	12.7			87.8	1

Average EPA "S"/IMDL Pesticide Ratio = 295

CHICAGO INCINERATOR - GROUNDWATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4] IDL	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
PCB's (ug/l)							
Aroclor 1242	8080/608	0.065	12.2	1.0	-	84.3	1
Aroclor 1254	8080/608	nd	13.8	1.0	-	95.4	1
Aroclor 1260	8080/608	nd	10.4	1.0	-	71.9	1
Aroclor 1248	8080/608	nd	15.9	1.0	-	110	1
Aroclor 1232	8080/608	nd	17.9	1.0	-	124	1
Aroclor 1221	8080/608	nd	24.4	1.0	-	169	1
Aroclor 1016	8080/608	nd	10.0	1.0	-	69.1	1
Herbicides (ug/l)							
2,4-D	8150(509 B)	1.2		10	20.2	140	3
2,4,5-T	8150(509 B)	0.20		1.0	2.02	14.0	3
2,4,5-TP (Silvex)	8150(509 B)	0.17		1.0	2.02	14.0	3
Dioxins and Furans (ppb)				(A)			
Hexachlorodibenzo-p-dioxins	8280			.00838	0.1156	0.799	2
Pentachlorodibenzodioxin	8280			.00726	0.1002	0.692	2
Tetrachlorodibenzodioxin	8280			.00111	0.0153	0.106	2
Hexachlorodibenzofurans	8280			.01768	0.2440	1.69	2
Pentachlorodibenzofuran	8280			.00704	0.0972	0.671	2
Tetrachlorodibenzofuran	8280			.00404	0.0558	0.385	2
2,3,7,8-TCDD	8280	.002*	.0276*	.00111		.191	1

* From EPA Method 613

Average EPA "s"/IMDL Dioxins and Furans Ratio = 13.8

(A) Highest IMDL, per parameter used

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE I - PMDL CALCULATIONS
APPENDIX IX

PARAMETER	Method[1]	Published[2] EPA MDL (IMDL)	EPA[3] Limit for "S"	ETC[4]	Calculated[5] ETC Limit for "S"	Calculated[6] PMDL	Comments[7]
Conventionals (mg/l)							
Cyanide	9010(335.2)	0.02		.02	0.04	0.28	3
Sulfide	376.1	1.0		0.1	0.20	1.38	3
Fluoride	340.2	0.1		0.1	0.20	1.38	3
Metals (mg/l)							
Aluminum	6010/200.7	.045		.03	.061	.422	3
Antimony	6010/200.7	.032		0.5	1.01	6.98	3
Arsenic	7060(206.2)	.053		.02	.04	.276	3
Barium	6010/200.7	.002		.05	.101	.698	3
Beryllium	6010/200.7	.0003		.001	.002	.014	3
Cadmium	6010/200.7	.004		.003	.006	.042	3
Calcium	6010/200.7	.01		.1	.2	1.38	3
Chromium	6010/200.7	.007		.02	.04	.276	3
Cobalt	6010/200.7	.007		.02	.04	.276	3
Copper	6010/200.7	.006		.02	.04	.276	3
Iron	6010/200.7	.007		.03	.014	.098	3
Lead	7420(239.2)	.042		.01	.02	.138	3
Magnesium	6010/200.7	.03		.2	.404	2.76	3
Manganese	6010/200.7	.002		.010	.004	.028	3
Mercury	7470(245.1)	.0002		.0005	.001	.007	3
Nickel	6010/200.7	.015		.02	.04	.276	3
Osmium	6010/200.7	N/A		NS	-	-	-
Potassium	258.1	.01		.05	.101	.698	3
Selenium	7740(270.2)	.002		.004	.008	.056	3
Silver	6010/200.7	.007		.03	.061	.422	3
Sodium	6010/200.7	.029		.050	.059	.405	3
Thallium	200.7	.04		.3	.606	4.19	3
Tin	6010(282.2)	N/A		1.0	2.02	14.0	3
Vanadium	6010/200.7	.008		.01	.02	.013	3
Zinc	6010/200.7	.002		.02	.04	.276	3

Use IMDL/S Ratio = 2.02
Lowest Ratio (Same as Volatiles)

(A) Estimated instrumental

CHICAGO INCINERATOR - GROUNDWATER MONITORING PROGRAM
TABLE II - PREDICTION INTERVAL CALCULATIONS
APPENDIX IX

PARAMETER	Method	Prediction Interval (PI)	Comments
Metals (mg/l)			
Iron	6010/200.7	0.340	Well #G-123S
Manganese	6010/200.7	0.178	
Sodium	6010/200.7	1260	
Iron	6010/200.7	**	Well #G-121S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	
Iron	6010/200.7	**	Well #G-125S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	
Iron	6010/200.7	**	Well #G-120S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	

TABLE III - PROP ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	Comments
Priority Pollutant Volatiles (ug/l)			
Benzene	5030/8240/624	**	PI
Bromoform	5030/8240/624	35	
Carbon tetrachloride	5030/8240/624	35	
Chlorobenzene	5030/8240/624	**	PI
Chlorodibromomethane	5030/8240/624	40	
Chloroethane	5030/8240/624	80	
2-Chloroethylvinyl ether	5030/8240/624	180	
Chloroform	5030/8240/624	40	
Dichlorobromomethane	5030/8240/624	45	
Dichlorodifluoromethane	5030/8240(624)	140	
1,1-Dichloroethane	5030/8240/624	35	
1,2-Dichloroethane	5030/8240/624	40	
1,1-Dichloroethylene	5030/8240/624	**	PI
1,2-Dichloropropane	5030/8240/624	95	
cis-1,3-Dichloropropylene	5030/8240/624	110	
trans-1,3-Dichloropropylene	5030/8240/624	70	
Ethylbenzene	5030/8240/624	50	
Methyl bromide	5030/8240/624	120	
Methyl chloride	5030/8240/624	140	
Methylene chloride	5030/8240/624	**	Special (Lab artifact)
1,1,2,2-Tetrachloroethane	5030/8240/624	50	
Tetrachloroethylene	5030/8240/624	35	
Toluene	5030/8240/624	**	PI
1,2-Trans-dichloroethylene	5030/8240/624	40	
1,1,1-Trichloroethane	5030/8240/624	30	
1,1,2-Trichloroethane	5030/8240/624	40	
Trichloroethylene	5030/8240/624	45	
Trichlorofluoromethane	5030/8240/624	70	
Vinyl chloride	5030/8240/624	140	
Acrolein	MOD8240(624)	*	
Acrylonitrile	MOD8240(624)	*	

* To be determined on a case by case basis
** To be calculated when sufficient data is available

This information will be used to evaluate in greater detail the impact of past land use on the pier and confirm adequacy of current monitoring locations or be used as a basis for development of a revised monitoring program, if needed.

INTRODUCTION

Location of Study Area

The SCA Chemical Services, Inc. Chicago incinerator facility is located at 11700 South Stony Island Avenue on the southeast side of Chicago adjacent to Lake Calumet.

Purpose and Scope

The purpose of this report is to provide an assessment of the hydrologic setting and water quality in the vicinity of the Chicago incinerator facility, Chicago, Illinois, and a compilation of the data used in this assessment.

The hydrologic assessment is the basis for determining if the facility has impacted the chemical composition of the ground water of the area.

Phase One (completed in March 1985) consisted of a review for applicability of the Student's t significance test and evaluation of appropriate alternatives significance testing. Phase Two, a hydrogeologic assessment directed at describing the geology and hydrology of the site in order to accurately determine and assess the characteristics and quality of the ground water at the site.

GROUND-WATER MONITORING SYSTEM

Ground-water monitoring data for this report were from fifteen (15) G-series and two (2) TF-series monitor wells, while surface-water monitoring data were from three (3) Lake Calumet and two impoundment sampling points at the Chicago incinerator facility. The locations of the monitor wells and surface-water sampling points are shown on Plate 1. The G-series wells were installed by Testing Service Corporation (TSC) during the period of November 1981 to November 1982. The TF-series wells were installed by Soil Testing Services in December 1984 as part of an independent evaluation of the site. Lithologic descriptions and boring data are provided in Appendix A.

According to TSC, the G-series wells were constructed with 2-inch flush joint PVC pipe and completed with a 5-foot section of slotted plastic screen (0.010 slot size) at the bottom of each well. Well graded sand was used as packing around the screen with a bentonite seal installed above the sand pack. Native spoil material was used as back-fill from the bentonite seal to land surface.

In accordance with U.S. EPA and IEPA detection monitoring requirements, the waste management area (i.e., the existing surface impoundments) is monitored by one (1) upgradient well, G-112B, and three (3) downgradient wells, G-110, G-111A, and G-113A, that are in immediate proximity to the basins. The hydraulic designations of upgradient and downgradient were made prior to this study.

SUMMARY OF MONITORING DATA

Analytical results were provided by SCA for the G-series wells, TF-series wells, and surface-water sampling locations. Data included indicator parameters (pH, specific conductance, total organic carbon, and total organic halides) and other parameters (chloride, iron, manganese, phenols, sodium, and sulfate) listed in CFR 40, Part 265.92 (b) (2) and in 35 IAC, Part 725.92 (b) (2), as specified for monitoring of ground-water quality. These data covered sampling intervals through May 1985. Monitoring data from 1982 through May 1985 are provided in Appendix B.

STATISTICAL ANALYSES OF INDICATOR PARAMETER DATA

Review of Statistical Procedures

Quarterly replicate values for the four (4) indicator parameters were tabulated and their statistical distribution checked for normality using the rankits method. Using this method, a generally non-normal distribution was noted. Transformation techniques were therefore performed on all indicator parameter data in an attempt to manipulate the data to meet normal distribution assumptions.

Because the State of Illinois regulations for interim status facilities (35 IAC 725) require the use of the Student's t-test for evaluation of significant changes in ground-water indicator parameters (Appendix C) and the U.S. Environmental Protection Agency (U.S. EPA) guidance document (PB 83-209445), provided in Appendix D, recommends the Cochran's approximation to the Behran-Fischer solution of the comparison of two (2) independent samples (Appendix E), these tests were completed for the results of analyses available at the Chicago incinerator facility. Background water quality data from the designated upgradient well G-112B was compared to the water quality of three (3) designated downgradient wells G-110, G-111A, and G-113A.

Since the data reflect a non-normal distribution, two (2) non-parametric tests were performed to more effectively assess statistical significance. These tests were the Mann-Whitney U test and the Wilcoxon matched-pairs signed-ranks test (Appendices F and G).

Determination of Normality of Distribution

To properly determine the appropriate statistical test applicable for the evaluation of a significant change in ground-water quality, the data must be assessed for normality of distribution. Normality is a statistical model for the frequency distributions of random variables. A normal distribution curve is bell shaped, and distributed symmetrically around its mean. The method of ranked normal deviates rankits is a graphic procedure commonly used to determine if small populations (n <50) are normally distributed. The variables are arrayed in increasing order of magnitude and plotted against corresponding rankits. When rankits are plotted against a ranked array of normally distributed data on ordinary graph paper, the points will lie in a straight line (Appendix H). As is clear from review of data plots, data are generally non-normally distributed.

Transformation Methods

If the plot of rankits values indicates that the assumption of normality can not be maintained, manipulation of the data can be performed in an attempt to meet normal assumptions. Two (2) of the most common transformation methods are the square root and logarithm.

The square root transformation consists of converting original data to the square root and plotting against the corresponding rankits. In a normal distribution of data, the mean and variable will be independent of each other. In non-normal distributions the mean and variance occasionally will be equal. By transforming the variates to their square roots, the means and the variance will become independent.

The logarithmic transformation consists of converting the data to the logarithmic value and plotting it against corresponding rankits values. Rankits plots which are skewed to the right are often made more symmetrical by transformation to logarithmic scale (Appendices H and I).

Parametric Tests

State of Illinois regulations for Interim Status facilities (35 IAC 725) require use of the Student's t-test for evaluation of significant changes in ground-water indicator parameters. Reference to the statistical procedure, 35 IAC, Part 725.193, is contained in the Code of Federal Regulations 40 (CFR 40), Part 265, Appendix IV. While Appendix IV refers only to "introductory statistical texts," a specific procedure is re nmended by the U.S. EPA in a guidance document (PB 83-2094425). The Cochran's approximation to the Behran-Fischer solution of the comparison of two (2) independent samples with unequal population variances (Cochran's approximation) is the recommended procedure, though it is noted that the Student's t-test also may be appropriate. The Cochran's approximation differs principally from the Student's t-test in that it accounts for different variances between the populations being compared.

Non-Parametric Statistical Procedures

Neither the Student's t-test nor Cochran's approximation provide adequate statistical tests for the assessment of ground-water contamination. These tests have been criticized by the Chemical Manufacturers

Association (November 23, 1982) because of the probability of their indicating "false positives," i.e., statistically significant increases (or decrease, with respect to pH) where no contamination exists. Specific criticisms were evaluated in detail in "Comments of the Chemical Manufacturers Association on EPA's Interim Final Rule for Permitting of Land Disposal of Hazardous Waste." The tests are flawed in several respects, including:

A. The procedures assume normally distributed data, which is not applicable since the data have been shown to be non-normally distributed. In addition this assumption is particularly fallacious with respect to total organic carbon.

B. The Student's t-test procedure pools unrelated variances in measurement and sampling, invalidating the basic assumption of independent data points.

C. The procedures do not account for seasonal variations in ground-water quality unrelated to any contamination.

D. Only data from the first year are considered for background. The procedure does not provide sufficient independent data points for valid statistical comparisons and may "lock in" unrepresentative or anomalous background data.

Since the data are non-normally distributed, PELA chose the Mann-Whitney U test and the Wilcoxon matched-pairs signed-ranks test for statistical comparisons. These tests eliminate the problem of testing non-normally distributed data and also alleviate the problem of anomalous background data since all data collected are used in the comparison.

Results of Statistical Analyses

Student's T-Test

Statistical analyses were performed using the Student's t-test comparing indicator parameters for the first quarter of 1985, resample of April 1985, and second quarter of 1985 against background data. Background data were obtained from analyses performed during the first year for which data were reported. Where the first year's data set was incomplete, background data were taken to be the first four quarters for which data were reported. Data from each well were compared to the individual well's background data. The results of he Student's t-test are summarized in Table 1.

Analyses of data for February 21, 1985, indicate eight (8) positives in which seven (7) are for pH and/or specific conductance. Results of analyses of data for April 1985 indicate no positives. However, only total organic carbon and total organic halides were analyzed. No positives were indicated for the May 15, 1985, analyses. Only total organic carbon and total organic halides have had comparison tests run. No significant changes were indicated. Computer printouts for these runs are included in Appendix J.

Cochran's Approximation T-Test

Statistical comparisons were performed using the Cochran's approximation comparing data for indicator parameters for February 1985, April 1985, and May 1985 against background data. Background data were based on analyses performed during the first year for which data

Table 1. Results of statistical comparison for significant changes of water quality data using the Student's t-test at 0.01 level of significance.

Sampling Date:		2/21/85		4/9/85		5/15/85	
Comparison Points:		Itself	G-112B	Itself	G-112B	Itself	G-112B
Well Number	Parameter						
G-110	pH	No 1/	Yes 2/	Not sampled	Not sampled	No replicates	No replicates
	Specific conductance (SC)	No	No	Not sampled	Not sampled	No replicates	No replicates
	Total organic carbon (TOC)	No	No	Not sampled	Not sampled	No	No
	Total organic halogen (TOX)	Yes	No	Not sampled	Not sampled	No	No
G-111A	pH	No	Yes	Not sampled	Not sampled	Not sampled	Not sampled
	Specific conductance (SC)	Yes	Yes	Not sampled	Not sampled	Not sampled	Not sampled
	Total organic carbon (TOC)	No	No	Not sampled	Not sampled	Not sampled	Not sampled
	Total organic halogen (TOX)	No	No	Not sampled	Not sampled	Not sampled	Not sampled
G-112B	pH	Yes	--	No replicates	--	No replicates	--
	Specific conductance (SC)	Yes	--	No replicates	--	No replicates	--
	Total organic carbon (TOC)	No	--	No	--	No	--
	Total orgnaic halogen (TOX)	No	--	No	--	No	--
G-113A	pH	No	Yes	No replicates	No replicates	No replicates	No replicates
	Specific conductance (SC)	No	No	No replicates	No replicates	No replicates	No replicates
	Total organic carbon (TOC)	No	No	No	No	No	No
	Total organic halogen (TOX)	No	No	No	No	No	No

1/ No - No significant change in water quality indicated.

2/ Yes - A significant change in water quality indicated.

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were reported. Where the first year's data set was incomplete, background data were based on the first four quarters for which data were reported. Data from each well were compared to the individual well's background data.

The results of the Cochran's approximation are summarized in Table 2. This table shows that for February 21, 1985, there are eleven (11) positives (or findings with statistically significant change). Ten (10) of the positives indicated are for pH or specific conductance. Two (2) wells, G-112B and G-113A, were resampled April 1985 for total organic carbon and total organic halides. Analyses for April 1985 were limited to total organic carbon and total organic halides. No significant change was indicated for either parameter at either well. For the three (3) dates for which analyses are available, a total of eleven (11) positives were indicated, of which all but one (1) were for pH and specific conductance. The computer printouts for these runs are contained in Appendix K.

Mann-Whitney U Test

Statistical analyses were performed using the Mann-Whitney U test at a 0.05 level of significance. This test is based on comparing the ranks of sums of monitoring data for the background well against that of the three (3) designated downgradient wells. The results of the Mann-Whitney U test are shown in Table 3. Indicated are five (5) positives, three (3) for total organic carbon (G-110, G-111A, and G-112B) and two (2) for specific conductance (G-111A and G-113A). The individual calculations are included in Appendix L.

Table 2. Results of statistical comparison for significant changes of water quality data using the Cochran's approximation at 0.05 level of significance.

Sampling Date:		2/21/85		4/10/85		5/15/85	
Comparison Points:		Itself	G-112B	Itself	G-112B	Itself	G-112B
Well Number	Parameter						
G-110	pH	Yes 1/	Yes	Not sampled	Not sampled	No replicates	No replicates
	Specific conductance (SC)	No 2/	No	Not sampled	Not sampled	No replicates	No replicates
	Total organic carbon (TOC)	Yes	No	Not sampled	Not sampled	No	No
	Total organic halogen (TOX)	No	No	Not sampled	Not sampled	No	No
G-111A	pH	Yes	Yes	Not sampled	Not sampled	Not sampled	Not sampled
	Specific conductance (SC)	Yes	Yes	Not sampled	Not sampled	Not sampled	Not sampled
	Total organic carbon (TOC)	No	No	Not sampled	Not sampled	Not sampled	Not sampled
	Total organic halogen (TOX)	No	No	Not sampled	Not sampled	Not sampled	Not sampled
G-112B	pH	Yes	--	No replicates	--	No replicates	--
	Specific conductance (SC)	Yes	--	No replicates	--	No replicates	--
	Total organic carbon (TOC)	No	--	No	--	No	--
	Total orgnaic halogen (TOX)	No	--	No	--	No	--
G-113A	pH	Yes	Yes	No replicates	No replicates	No replicates	No replicates
	Specific conductance (SC)	No	No	No replicates	No replicates	No replicates	No replicates
	Total organic carbon (TOC)	No	No	No	No	No	No
	Total organic halogen (TOX)	No	No	No	No	No	No

1/ Yes - A significant change in water quality indicated.

2/ No - No significant change in water quality indicated.

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Table 3. Results of statistical comparison for significant changes of water quality data using the Mann-Whitney U test.

Well	Parameter	Comparison Point G-112B
G-110	pH	No [1]
	Specific conductance (SC)	No
	Total organic carbon (TOC)	Yes [2]
	Total organic halogen (TOX)	No
G-111A	pH	No
	Specific conductance (SC)	Yes
	Total organic carbon (TOC)	Yes
	Total organic halogen (TOX)	No
G-113A	pH	No
	Specific conductance (SC)	Yes
	Total organic carbon (TOC)	Yes
	Total organic halogen (TOX)	No

[1] No - No significant change in water quality indicated.

[2] Yes - A significant change in water quality indicated.

Wilcoxon Matched-Pairs Signed-Ranks Test

Results of the Wilcoxon tests (at 0.05 level of significance) indicate significant changes in total organic carbon in one (1) well, G-110, and specific conductance and total organic halides in one (1) well, G-111A. The Wilcoxon test has shown the least amount of significant readings compared to all other tests performed. The results of the Wilcoxon tests are shown in Table 4. The calculations are included in Appendix M.

Summary

In summary, the results of the statistical significance tests reveal that specific conductance in well G-111A is the only parameter correlative throughout all four (4) tests (Student's t, Cochran's approximation, Mann-Whitney, and Wilcoxon matched-pairs). The inconsistency of the test results makes this statistical assessment meaningless and the application of methods inappropriate.

Table 4. Results of statistical comparison for significant changes of water quality data using the Wilcoxon matched-pairs signed-ranks test.

Well	Parameter	Comparison Point G-112B
G-110	pH	No [1]
	Specific conductance (SC)	No
	Total organic carbon (TOC)	Yes [2]
	Total organic halogen (TOX)	No
G-111A	pH	No
	Specific conductance (SC)	Yes
	Total organic carbon (TOC)	No
	Total organic halogen (TOX)	Yes
G-113A	pH	No
	Specific conductance (SC)	No
	Total organic carbon (TOC)	No
	Total organic halogen (TOX)	No

[1] No - No significant change in water quality indicated.

[2] Yes - A significant change in water quality indicated.

GEOLOGY

Regional

The SCA Chemical Services, Inc. Chicago incinerator facility site is situated in the Chicago Lake Plain subdivision of the Great Lakes section of the Central Lowland physiographic province (Willman, 1971).

The topography of the Chicago Lake Plain is flat covering an area of approximately 450 square miles bounded on the west by the Tinley Moraine and on the east by Lake Michigan. The Chicago Lake Plain formed the floor of Lake Chicago, a glacial lake created by the damming of meltwater by crescentic moraines. Approximately ninety percent (90%) of the Chicago Lake Plain has been covered by man-made materials during urbanization (Willman, 1971).

Sediments of Holocene and Pleistocene age underlie the urbanized areas. The Holocene deposits consist of marsh sediments of limited areal extent. Pleistocene deposits of the Equality Formation consist of lacustrine sand, silt, gravel, and clay that are generally less than 30 feet thick (Willman, 1971).

Underlying the lacustrine deposits are the glacial clay, silt, sand, and gravel of the Wedron Formation. The average thickness of the Wedron Formation is about 100 feet, but in some buried valleys and larger moraines the thicknesses may be as much as 300 feet. North and west of the Chicago Lake Plain, the Wedron Formation, where present, overlies the Robein Silt which consists of peat and organic silt deposits. In areas where the Robein Silt is absent, the Wedron Formation overlies the glacial drift of the Winnebago Formation. In the Chicago Lake

Plain, especially in southern areas, the Winnebago Formation and Robein Silt are absent and the Wedron Formation unconformably overlies the Silurian dolomite of the Niagaran Series (Willman, 1971).

Niagaran Series Dolomite forms the bedrock of the Chicago area. The configuration of bedrock topography is the result of erosion by paleodrainage systems. Valleys as much as 150 feet deep have been formed on the bedrock surface (U.S. Environmental Protection Agency, 1984; Suter, 1959). Although covered by unconsolidated materials, paleotopographic highs may be expressed at the surface as topographic highs resulting from differential erosion along resistant patch reefs (Horberg, 1950). Although the bedrock topography has little influence on present drainage patterns, it had a considerable effect on the deposition of glacial and lacustrine material. The entire Silurian section (Niagaran and underlying Alexandrian) is approximately 230 to 500 feet thick (U.S. Environmental Protection Agency, 1984).

The Silurian rocks are underlain by 700 to 1,100 feet of Ordovician dolomite and sandstone and up to 4,000 feet of Cambrian dolomite, siltstone, and sandstone. Granitic rocks comprise the Precambrian basement at a depth of approximately 4,500 feet below land surface (U.S. Environmental Protection Agency, 1984; Suter, 1959).

Geologic structural activity of the area has played an important role in controlling deposition, especially during Paleozoic time. The Kankakee Arch is a structural high separating the Illinois and Michigan Basins. As a result of this structural high, Paleozoic rocks in the Chicago area dip gently (10 to 15 feet per mile) to the southeast.

Two fault zones are also present in the Chicago area. The Sandwich Fault zone is located southwest of Chicago and trends from southeast to northwest. The Des Plains Complex is a 25-square mile area in Cook County bounded and cut by a series of faults. Presently the area is structurally inactive.

Site-Specific

The SCA Chicago incinerator facility site is a pier-like structure incorporating an active area of 5.5 acres. The structure, approximately 2,800 feet long and 325 feet wide, extends westward into Lake Calumet and was constructed by dumping assorted fill material over unconsolidated marsh and lacustrine deposits.

Materials used in the fill operation consist mainly of broken concrete, bricks, wood and metal scraps, slag and cinders, and loamy cover materials. Thickness of the fill material varies from a maximum of more than 15 feet in the central and western areas of the site to approximately 2.5 feet in the extreme southeastern corner near the incinerator process area.

A variety of natural sediments underlie the fill material (Figure 1). The extreme eastern end of the site is constructed upon sand and silty sand. In the western section of the incinerator process area, the fill is underlain by as much as 6 feet of peat. Just north of the western incinerator process area, the peat grades to black, organic rich silt and sand. The central and western parts of the pier are underlain by gray to brown silty clay.

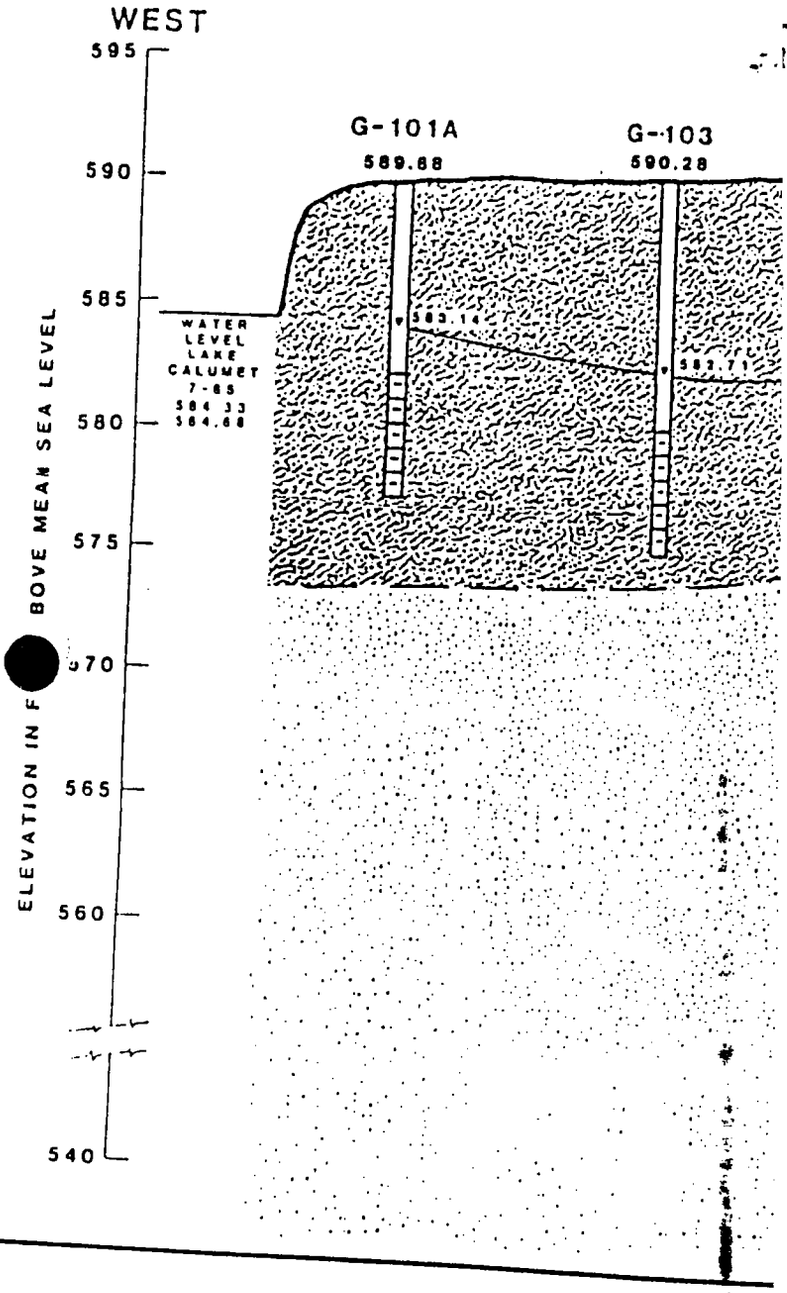


FIGURE 1. HYDROGEOLOGIC CROSS SECTION A-A', CHICAGO INCINERATOR FACILITY.

FILL
CEMENT, BRICKS, WOOD, METAL SCRAPS, AND EARTHEN COVER MATERIAL

HOLOCENE GRAYSLAKE PEAT
ORGANIC RICH SILT AND SAND

PLEISTOCENE EQUALITY FORMATION
LACUSTRINE SILTS, SANDS, AND CLAYS

PLEISTOCENE WEDRON FORMATION
GLACIAL SILT, SAND, CLAY, AND GRAVEL

PLEISTOCENE UNDIFFERENTIATED

ELEVATION OF WATER TABLE (5-15-85)

FORMATION OR LITHOLOGIC UNIT CONTACT (DASHED WHERE INFERRED)

MONITORING WELL SHOWING SCREENED INTERVAL AND ELEVATION AT LAND SURFACE

200 0 200 400
HORIZONTAL SCALE IN FEET

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

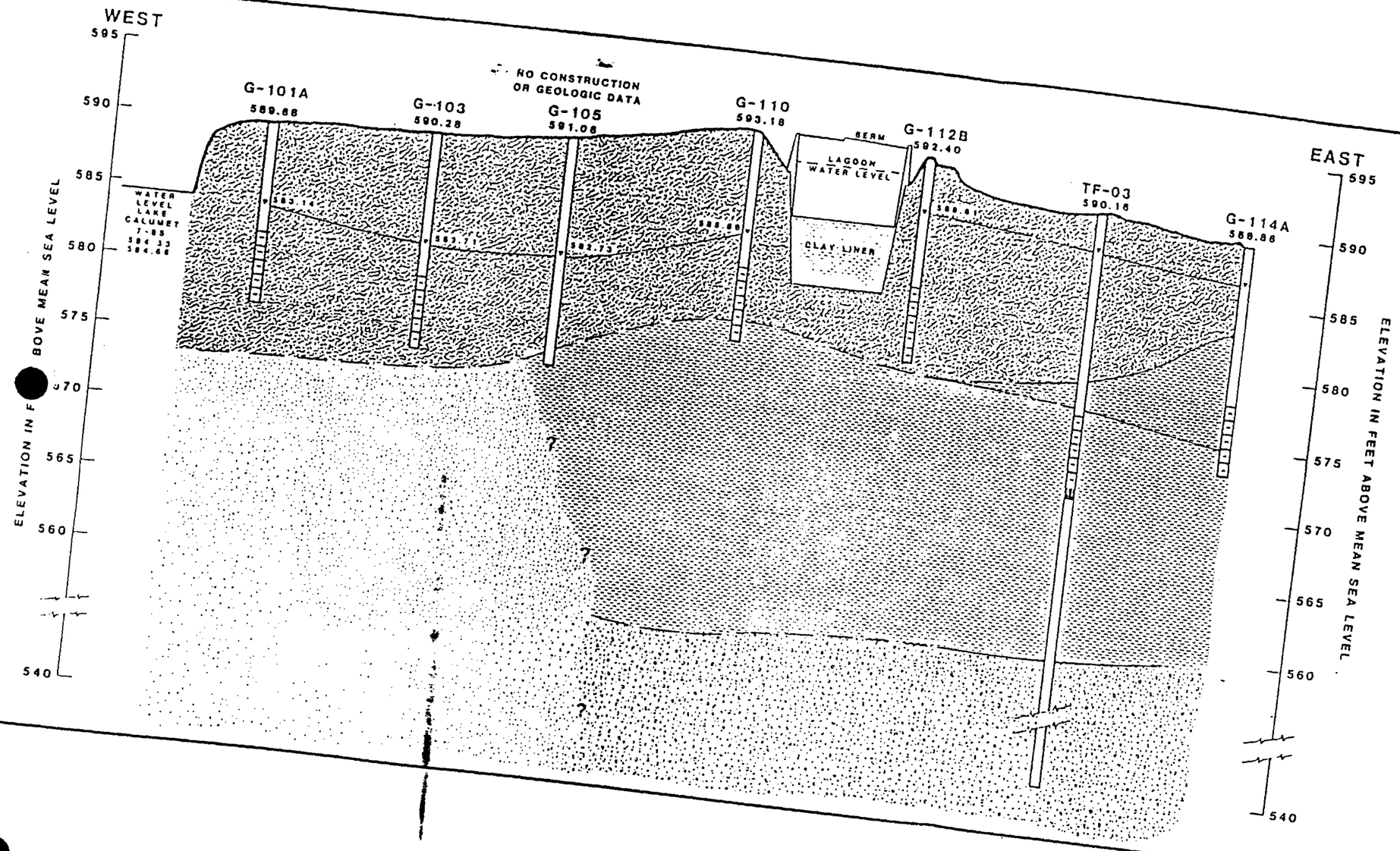


FIGURE 1. HYDROGEOLOGIC CROSS SECTION A-A', CHICAGO INCINERATOR FACILITY.

FILL
CEMENT, BRICKS, WOOD, METAL SCRAPS, AND EARTHEN COVER MATERIAL

HOLOCENE GRAYSLAKE PEAT
ORGANIC RICH SILT AND SAND

PLEISTOCENE EQUALITY FORMATION
LACUSTRINE SILTS, SANDS, AND CLAYS

PLEISTOCENE WEDRON FORMATION
GLACIAL SILT, SAND, CLAY, AND GRAVEL

PLEISTOCENE UNDIFFERENTIATED

ELEVATION OF WATER TABLE (5-15-85)

FORMATION OR LITHOLOGIC UNIT CONTACT (DASHED WHERE INFERRED)

MONITORING WELL SHOWING SCREENED INTERVAL AND ELEVATION AT LAND SURFACE

200 0 200 400
HORIZONTAL SCALE IN FEET

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

The peat and organic silt and sand in the eastern area of the site are the Holocene Grayslake Peat. Underlying the Grayslake Peat in the eastern area and the fill in the central and western parts of the pier are Wisconsinan age lacustrine clay, silt, and sand of the Equality Formation. Based on the evaluation of limited borehole data, the Equality Formation is probably less than 20 feet thick in the study area.

Beneath the lacustrine sediments are Wisconsinan glacial deposits of the Wedron Formation. Borehole data from the SCA site supplemented by data from other investigations in the vicinity indicate that the glacial silt, clay, sand, and gravel may be as much as 70 feet thick in the study area. The glacial material is more consolidated than the overlying lacustrine deposits and, in adjacent areas, has been described as "overconsolidated."

The Wisconsinan glacial material unconformably overlies the Silurian age Racine dolomite of the Niagaran series. Although none of the boreholes drilled in the study area penetrate the bedrock, data from adjacent areas indicate that the dolomite is finely to coarsely crystalline and very dense.

HYDROLOGY

Regional Ground-Water Setting

Four (4) aquifers occur in the Chicago area that are used as sources of water for municipal and industrial supply. They are the glacial drift aquifer, the shallow bedrock aquifer, and the two (2) deep bedrock aquifers.

The glacial drift aquifer is composed of irregular deposits of gravel, sand, and silt interbedded with relatively impermeable silty clay. Although the water occurring in the glacial drift aquifer is generally under water-table conditions, the impermeable units (clay) may locally serve as semi-confining beds. The lenticular nature of the permeable sediments in this aquifer limits its use as a source of water in the Chicago area. The glacial aquifer is not used as a source of water in the near vicinity of the study area.

The shallow bedrock aquifer occurs in the Silurian dolomite which underlies the unconsolidated glacial material. Recharge to this aquifer is from the discharge of water from the overlying glacial drift into solution openings in the dolomite. Production from wells tapping this aquifer is generally greatest in areas where it is overlain by a thin glacial sand and gravel and where the dolomite sequence is thickest containing well developed solution openings. The shallow bedrock aquifer is widely used as a source of water for industrial and municipal supplies.

Relatively impermeable Ordovician shale of the Maquoketa Group separates the shallow bedrock aquifer from the lower bedrock aquifers.

The upper deep bedrock aquifer system includes the Glenwood/St. Peter Sandstone of Ordovician age and the Cambrian Ironton/Galesville Sandstone. Separating the upper deep bedrock aquifer from the lower are the siltstone and shale of the upper and middle parts of the Eau Claire Formation. The lower bedrock aquifer consists of the lower sandstone units of the Eau Claire and the Mt. Simon Sandstone. The upper deep bedrock aquifer is extensively used as a source of water. The use of water from the lower bedrock aquifer is limited as the water quality deteriorates with depth and is too highly mineralized for most purposes.

Site-Specific Hydrology

Surface Water

The SCA Chicago incinerator site is an artificially created peninsula extending into Lake Calumet, the major hydrologic feature of the area. Lake Calumet is a natural lake connected by the Calumet River to Lake Michigan. The margins of Lake Calumet have have been industrialized. The northern portion of the lake is diked and is actively being filled, while the southern portion has been developed as a harbor facility. The natural flow of the Calumet River was into Lake Michigan; however, that flow has been reversed and is regulated by the O'Brien Lock and Dam.

A topographic high trending east-west along the artificial peninsula controls the surface drainage of the site. Precipitation falling on the western part of the site drains north or south from the topographic high into the lake or infiltrates the fill material used to construct the

peninsula. Precipitation falling on the site in the vicinity of the cooling ponds infiltrates the fill material. Precipitation falling in the vicinity of the incinerator facility itself is captured and transferred to the storm water impoundment.

A subtle drainage divide trends north and south paralleling the Lake Calumet shoreline immediately east of the site. Surface drainage east of the divide flows to a swampy area between the lake and the Calumet River. Drainage west of the divide is to the SCA facility and Lake Calumet.

During the winter when the ground is frozen, precipitation drains via established surface drainage patterns. Infiltration to the ground-water system may be limited to those areas thawed by generated heat for various sources. At the SCA site some infiltration may occur in the vicinity of the impoundments.

Ground Water

The SCA Chicago incinerator facility site is an artificially created peninsula constructed of cement fragments, masonry scrap, wood and metal scraps, slag, cinders, and earthen cover material. During the history of the site, lagoons have been constructed and subsequently cleaned out and filled (Plate 2). The entire structure is underlain by Holocene marsh deposits and lacustrine deposits of Wisconsin age.

Because of the variety of materials comprising the fill and the scarcity of detailed data in specific areas, the hydrologic properties of the site are difficult to evaluate. Permeability values were determined from test data for wells G-111A (2.5×10^{-4} cm/sec^2) and G-112B (5.2 x

10^{-4} cm/sec²), and calculations performed using Hazen's formula applied to results of sieve analysis for borings close to TF-03 and TF-04. Results of permeability calculations are as follows:

Borehole Number	Depth (feet below land surface)	Permeability (cm/sec²)
BTF-1	5.0 - 6.5	2.9×10^{-6}
	30.0 - 31.5	4.7×10^{-6}
	45.0 - 46.5	3.0×10^{-7}
BTF-2	33.0 - 34.5	4.6×10^{-6}
BTF-3	5.0 - 6.5	1×10^{-2}
	40.0	1.2×10^{-7}

Permeability values range from a maximum of 1×10^{-2} cm/sec for fill material consisting mainly of concrete, bricks, slag, and loamy materials to a minimum of 3×10^{-7} cm/sec for silty clay, some fine to coarse sand, with a trace of fine gravel.

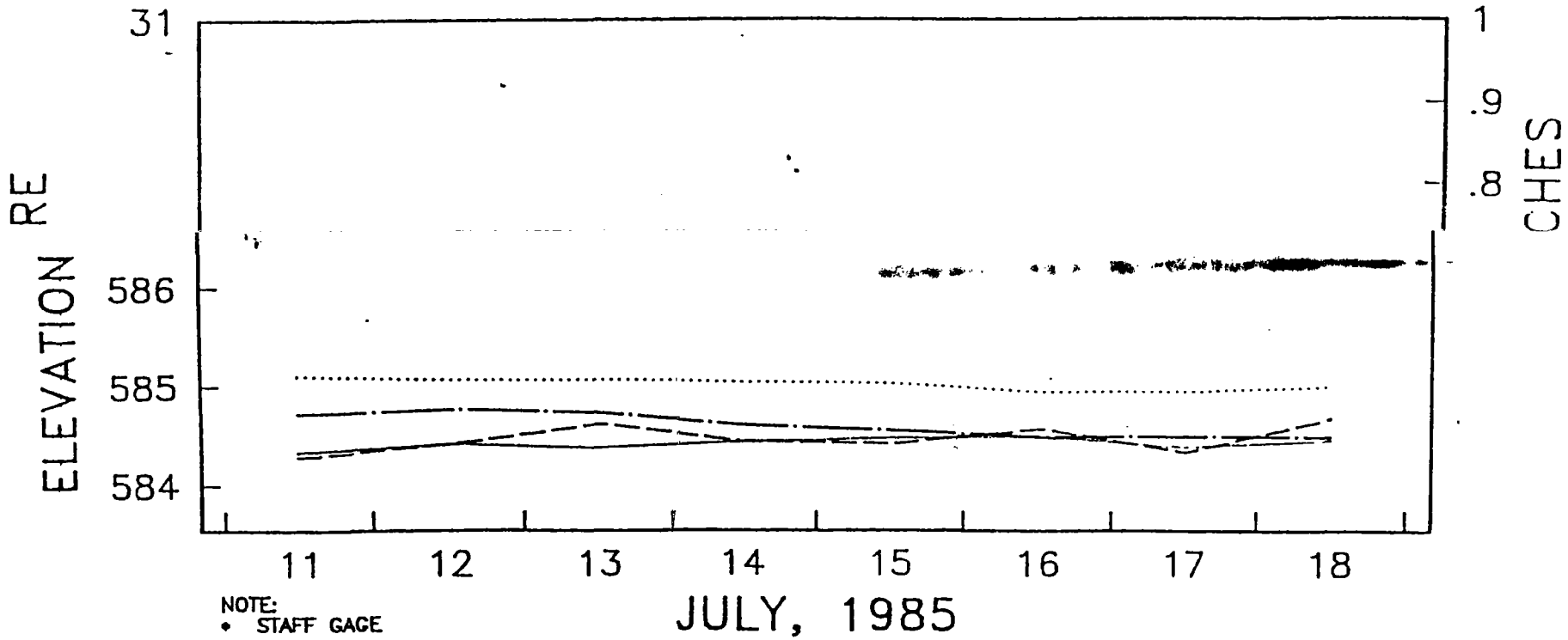
The hydraulic gradient was determined (using the ground-water configuration on Plate 3) for several areas around the impoundments. The ground water flowing southeast of G-112B has a gradient south toward Lake Calumet estimated at 0.025. The ground water northeast of G-112B has a gradient north estimated at 0.025. Using this estimated hydrologic gradient and permeability values, a range of flow velocities of 2.5×10^{-4} to 1.5×10^{-8} cm/sec were determined. Westward from G-112B toward G-110 the gradient decreases to 0.0075. This decrease in gradient is reflected in a decrease in the range of flow

velocities from approximately 7.5 x 10^{-5} to 1.0 x 10^{-9} cm/sec. The estimated values indicate an increase in flow velocity toward the perimeter of the peninsula, and lower velocity of ground water flowing westward toward the end of the peninsula. However, these results can only be considered estimates and are not necessarily representative of the entire area.

Data indicate that Lake Calumet has an influence on water levels in perimeter wells. The effect of the lake resulted in variations of less than 2 feet fluctuation in perimeter wells measured in July 1985 (Figure 2). The water level in fill material toward the perimeter is in near equilibrium with the lake and fluctuates correlative with changes in the level of the lake water.

Water level elevations in the interior of the site are as much as 6 feet higher than those near the lake (Plate 3). Measured water levels in the eastern section of the site and inferred levels in the western section, based on the location of previously existing lagoon areas, show a series of ground-water mounds in the interior of the site (Plate 3). In the lagoon areas ground-water mounds result from the retardation of the downward infiltration of water resulting from rainfall within the boundaries of the filled lagoons. The change in slope of the water table between wells G-112B and G-110, shown in Figure 1, may be caused by the decrease in permeability created by the ground-water mounding upgradient of the impermeable liner in the impoundments. The water level in well G-112B just east of the impoundments is more than 3 feet higher than in well G-110 adjacent to the western border of the impoundments (Figure 1). Higher water levels in the vicinity of

FIGURE 2. SUMMARY OF AVERAGE DAILY WATER LEVELS FOR MONITOR WELLS G-110A, G-111A, G-112B AND G-113A WITH CLIMATOLOGICAL DATA AT O'HARE FIELD WSMO STATION.



NOTE:
• STAFF GAGE

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

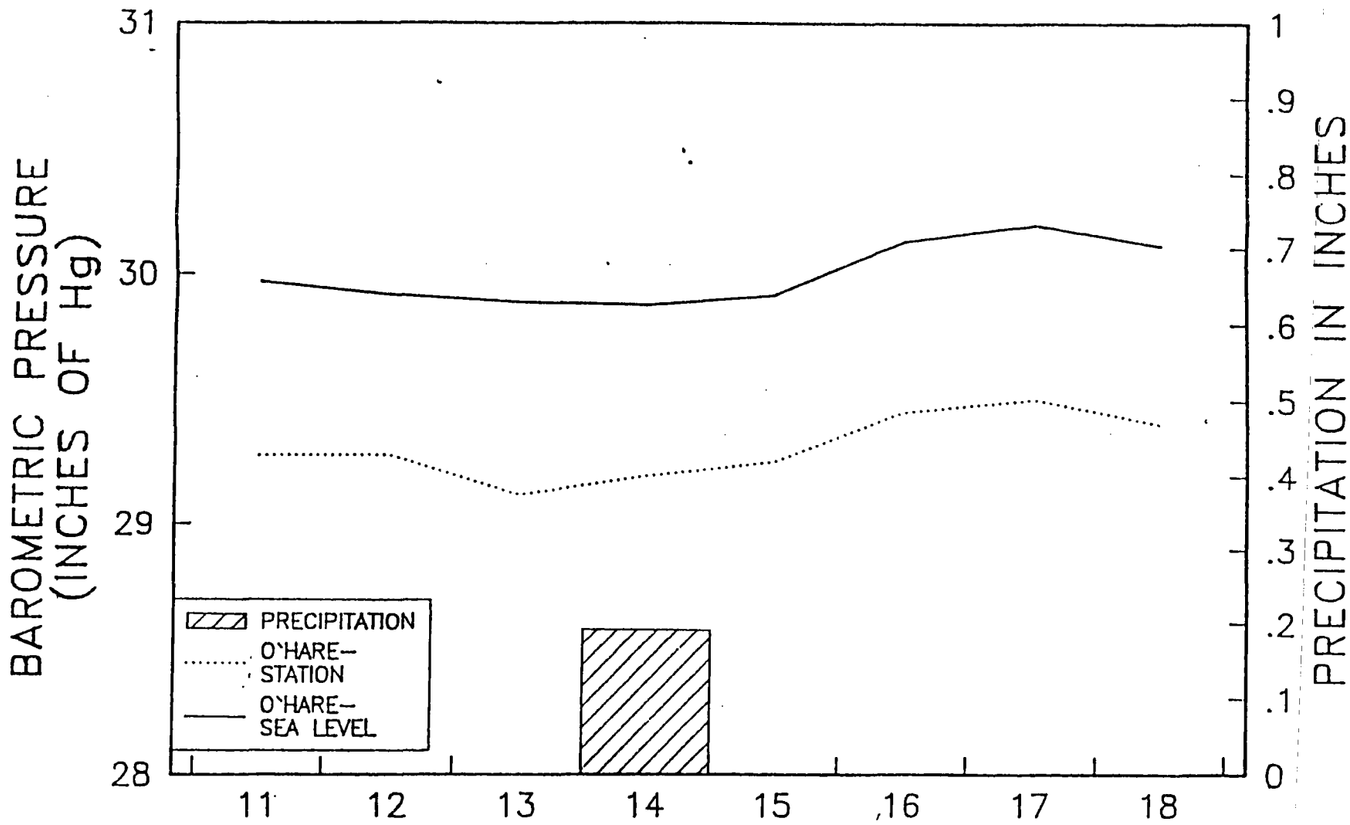
SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

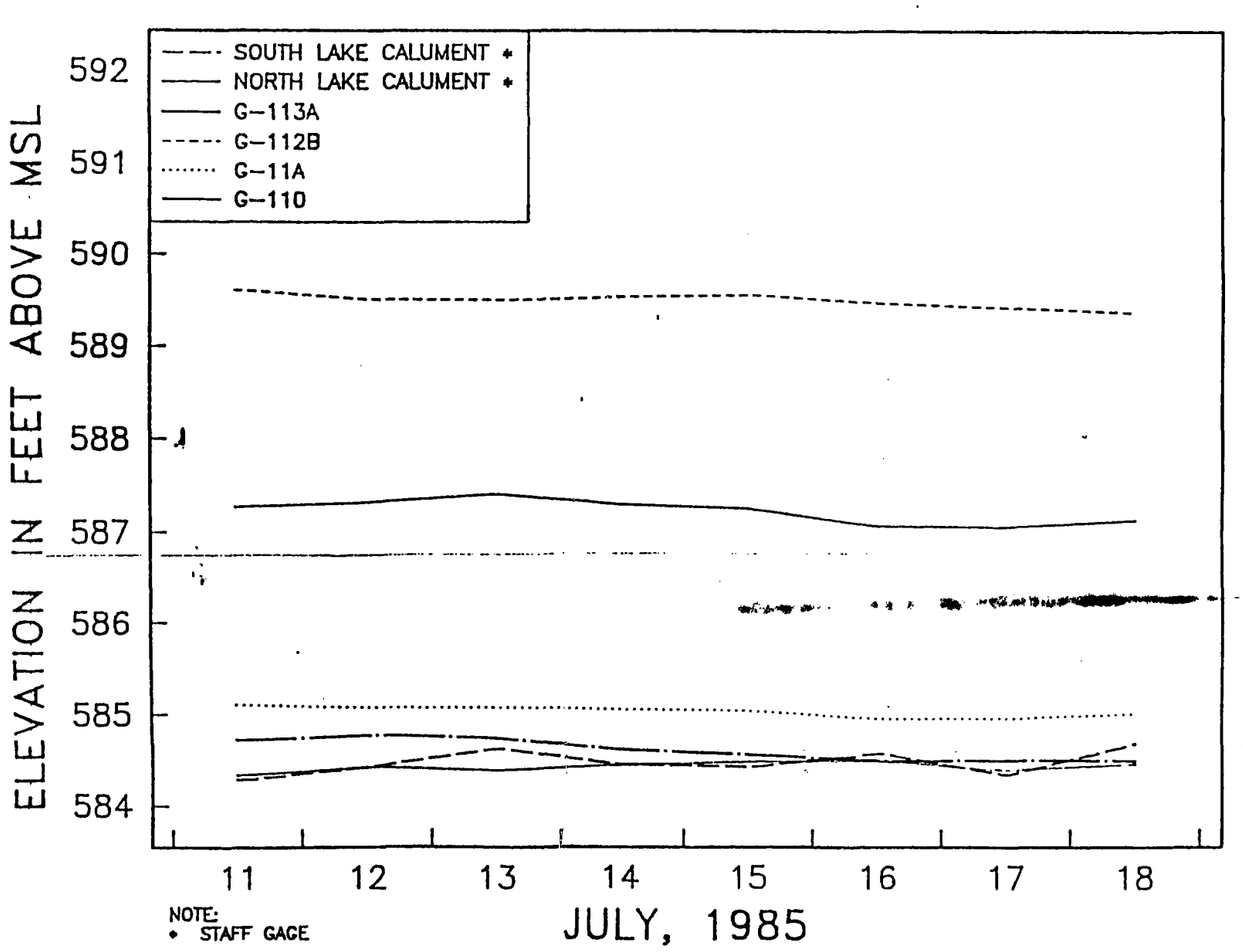
APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	Comments
Priority Pollutant Acids (ug/l)			
2-Chlorophenol	3510/8270/625	200	
2,4-Dichlorophenol	3510/8270/625	**	PI
2,4-Dimethylphenol	3510/8270/625	180	
2-Methyl-4,6-dinitrophenol	3510/8270/625	*	
2,4-Dinitrophenol	3510/8270/625	340	
2-Nitrophenol	3510/8270/625	240	
4-Nitrophenol	3510/8270/625	330	
4-Chloro-3-methylphenol	3510/8270/625	260	
Pentachlorophenol	3510/8270/625	340	
Phenol	3510/8270/625	160	
2,4,6-Trichlorophenol	3510/8270/625	220	

* To be determined on a case by case basis
** To be calculated when sufficient data is available

FIGURE 2. SUMMARY OF AVERAGE DAILY WATER LEVELS FOR MONITOR WELLS G-110A, G-111A, G-112B AND G-113A WITH CLIMATOLOGICAL DATA AT O'HARE FIELD WSMO STATION.





NOTE:
* STAFF GAGE

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SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR
Priority Pollutant Base/Neutrals (ug/l)		
Acenaphthene	3510/8270/625	190
Acenaphthylene	3510/8270/625	280
Anthracene	3510/8270/625	220
Benzidine	3510/8270/625	*
Benzo(a)anthracene	3510/8270/625	190
Benzo(a)pyrene	3510/8270/625	270
Benzo(b)fluoranthene	3510/8270/625	270
Benzo(ghi)perylene	3510/8270/625	410
Benzo(k)fluoranthene	3510/8270/625	220
bis(2-Chloroethoxy)methane	3510/8270/625	240
bis(2-Chloroethyl)ether	3510/8270/625	380
bis(2-Chloroisopropyl)ether	3510/8270/625	320
bis(2-Ethylhexyl)phthalate	3510/8270/625	280
4-Bromophenyl phenyl ether	3510/8270/625	160
Butyl benzyl phthalate	3510/8270/625	160
2-Chloronaphthalene	3510/8270/625	90
4-Chlorophenyl phenyl ether	3510/8270/625	230
Chrysene	3510/8270/625	330
Dibenzo(a,h)anthracene	3510/8270/625	480
1,2-Dichlorobenzene	3510/8270/625	210
1,3-Dichlorobenzene	3510/8270/625	290
1,4-Dichlorobenzene	3510/8270/625	220
3,3-Dichlorobenzidine	3510/8270/625	490
Diethyl phthalate	3510/8270/625	180
Dimethyl phthalate	3510/8270/625	160
Di-n-butyl phthalate	3510/8270/625	120
2,4-Dinitrotoluene	3510/8270/625	150
2,6-Dinitrotoluene	3510/8270/625	210
Di-n-octyl phthalate	3510/8270/625	220
1,2-Diphenylhydrazine	3510/8270(625)	*
Fluoranthene	3510/8270/625	230
Fluorene	3510/8270/625	140

* To be determined

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	Comments
Hexachlorobenzene	3510/8270/625	170	
Hexachlorobutadiene	3510/8270/625	180	
Hexachlorocyclopentadiene	3510/8270(625)	*	
Hexachloroethane	3510/8270/625	170	
Isophorone	3510/8270/625	440	
Naphthalene	3510/8270/625	**	PI
Nitrobenzene	3510/8270/625	270	
N-Nitrosodimethylamine	3510/8270(625)	*	
N-Nitrosodiphenylamine	3510/8270/625	200	
N-Nitrosodi-n-propylamine	3510/8270/625	380	
Phenanhrene	3510/8270/625	140	
Pyrene	3510/8270/625	170	
1,2,4-Trichlorobenzene	3510/8270/625	190	

* To be determined on a case by case basis

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	Comments
Miscellaneous Volatiles (ug/l)			
Acetone	5030/8240(624)	**	Special (L[illegible] Artifact)
Acetonitrile	MOD8240(624)	140	
Allyl Alcohol	MOD8240(624)	110	
Carbon disulfide	5030/8240(624)	140	
2-Chloro-1,3-butadiene	5030/8240(624)	N/A	
3-Chloropropene	5030/8240(624)	N/A	
1,2-Dibromo-3-chloropropane	5030/8240(624)	140	
1,2-Dibromoethane	5030/8240(624)	140	
Dibromomethane	5030/8240(624)	140	
1,4-Dichloro-2-butene	5030/8240(624)	140	
1,4-Dioxane	MOD8240(624)	140	
Ethyl cyanide	MOD8240(624)	110	
Ethyl methacrylate	5030/8240(624)	140	
Ethylene oxide	MOD8240(624)	N/A	
2-Hexanone	5030/8240(624)	140	
Iodomethane	5030/8240(624)	140	
Isobutyl alcohol	MOD8240(624)	110	
Methacrylonitrile	MOD8240(624)	*	
Methyl ethyl ketone	5030/8240(624)	140	
Methyl methacrylate	5030/8240(624)	140	
Methyl-iso-butyl ketone	5030/8240(624)	140	
N-Nitrosopyrrolidine	MOD8240(624)	N/A	
Pentachloroethane	5030/8240(624)	140	
2-Propyn-1-ol	MOD8240(624)	N/A	
Pyridine	MOD8240(624)	*	
Styrene	5030/8240(624)	140	
1,1,1,2-Tetrachloroethane	5030/8240(624)	140	
Trichloromethanethiol	5030/8240(624)	N/A	
1,2,3-Trichloropropane	5030/8240(624)	140	
m-Xylene	5030/8240(624)	140	
o + p-Xylenes	5030/8240(624)	140	
Vinyl acetate	5030/8240(624)	140	

N/A - Not Applicable

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	Comments
Miscellaneous Acid/Base/Neutrals (ug/l)			
Acetophenone	3510/8270(625)	*	
2-Acetylaminofluorene	3510/8270(625)	*	
4-Aminobiphenyl	3510/8270(625)	*	
Aniline	3510/8270(625)	**	PI
Aramite	3510/8270(625)	*	
Benzenethiol	3510/8270(625)	N/A	
Benzoic acid	3510/8270(625)	*	
p-Benzoquinone	3510/8270(625)	*	
Benzyl alcohol	3510/8270(625)	*	
2-sec-Butyl-4,6-dinitrophenol	3510/8270(625)	*	
p-Chloroaniline	3510/8270(625)	*	
3-Chloropropionitrile	3510/8270(625)	*	
o-Cresol	3510/8270(625)	*	
m + p-Cresols	3510/8270(625)	*	
Dibenzo(a,e)pyrene	3510/8270(625)	N/A	
Dibenzo(a,h)pyrene	3510/8270(625)	N/A	
Dibenzo(a,i)pyrene	3510/8270(625)	N/A	
Dibenzofuran	3510/8270(625)	*	
tris(2,3-Dibromopropyl)phosphate	3510/8270(625)	N/A	
2,6-Dichlorophenol	3510/8270(625)	*	
3,3'-Dimethoxybenzidine	3510/8270(625)	*	
p-Dimethylaminoazobenzene	3510/8270(625)	*	
3,3'-Dimethylbenzidine	3510/8270(625)	*	
7,12-Dimethylbenzo(a)anthracene	3510/8270(625)	*	
alpha-alpha-Dimethylphenethylamine	3510/8270(625)	N/A	
m-Dinitrobenzene	3510/8270(625)	*	
Diphenylamine	3510/8270(625)	*	
Hexachlorophene	3510/8270(625)	*	
Hexachloropropene	3510/8270(625)	*	

N/A - Not Applicable
* To be determined on a case by case basis

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR
Indeno(1,2,3-cd)pyrene	3510/8270(625)	310
Isodrin	3510/8270(625)	*
Isosafrole	3510/8270(625)	*
Malononitrile	3510/8270(625)	N/A
Methapyrilene	3510/8270(625)	N/A
3-Methylcholanthrene	3510/8270(625)	*
4,4'-Methylenebis(2-chloroaniline)	3510/8270(625)	*
Methyl methanesulfonate	3510/8270(625)	*
2-Methylnaphthalene	3510/8270(625)	*
1,4-Naphthoquinone	3510/8270(625)	*
1-Naphthylamine	3510/8270(625)	*
2-Naphthylamine	3510/8270(625)	*
m-Nitroaniline	3510/8270(625)	*
o-Nitroaniline	3510/8270(625)	*
p-Nitroaniline	3510/8270(625)	*
N-Nitrosodi-n-butylamine	3510/8270(625)	*
N-Nitrosodiethylamine	3510/8270(625)	*
N-Nitrosomethylethylamine	3510/8270(625)	*
N-Nitrosomorpholine	3510/8270(625)	*
N-Nitrosopiperidine	3510/8270(625)	*
5-Nitro-o-toluidine	3510/8270(625)	*
Pentachlorobenzene	3510/8270(625)	*
Pentachloronitrobenzene	3510/8270(625)	*
Phenacetin	3510/8270(625)	*
2-Picoline	3510/8270(625)	*
Pronamide	3510/8270(625)	*
Resorcinol	3510/8270(625)	*
Safrole	3510/8270(625)	*
1,2,4,5-Tetrachlorobenzene	3510/8270(625)	*
2,3,4,6-Tetrachlorophenol	3510/8270(625)	*
Tetraethyldithiopyrophosphate	3510/8270(625)	N/A
2,4,5-Trichlorophenol	3510/8270(625)	*

N/A - Not Applicable
* To be determined on a case by case basis

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR
PCB's (ug/l)		
Aroclor 1242	8080/608	85
Aroclor 1254	8080/608	95
Aroclor 1260	8080/608	70
Aroclor 1248	8080/608	110
Aroclor 1232	8080/608	120
Aroclor 1221	8080/608	170
Aroclor 1016	8080/608	70
Herbicides (ug/l)		
2,4-D	8150(509 B)	140
2,4,5-T	8150(509 B)	14
2,4,5-TP (Silvex)	8150(509 B)	14
Dioxins and Furans (ug/l)		
Hexachlorodibenzo-p-dioxins	8280	0.8
Pentachlorodibenzodioxin	8280	0.7
Tetrachlorodibenzodioxin	8280	0.1
Hexachlorodibenzofurans	8280	1.7
Pentachlorodibenzofuran	8280	0.7
Tetrachlorodibenzofuran	8280	0.4
2,3,7,8-TCDD	8280	0.2

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR
Pesticides (ug/l)		
Aldrin	8080/608	3.0
Alpha-BHC	8080/608	3.5
Beta-BHC	8080/608	4.5
Delta-BHC	8080/608	5.0
Chlordane	8080/608	7.0
Chlorobenzilate	8140	*
4,4'-DDD	8080/608	20
4,4'-DDE	8080/608	4.0
4,4'-DDT	8080/608	25
Dieldrin	8080/608	5.5
Disulfoton	8140	*
Endosulfan I	8080/608	3.5
Endosulfan II	8080/608	40
Endrin	8080/608	30
Endrin aldehyde	8080/608	200
Famphur	8150	*
Heptachlor	8080/608	3.0
Heptachlor epoxide	8080/608	3.0
Kepone	8080(608)	*
Lindane	8080/608	3.0
Methoxychlor	8080(608)	*
Methyl parathion	8150	*
Parathion	8150	*
Phorate	8150	*
Thionazin	8140	*
Toxaphene	8080/608	90

* To be determined on a case by case basis

SCA CHICAGO INCINERATOR - GROUND-WATER MONITORING PROGRAM
TABLE III - PROPOSED ACTION LEVELS

APPENDIX IX

PARAMETER	METHOD	CWM PROPOSED ACTION LEVEL FOR SCA INCINERATOR	COMMENTS
Conventionals (mg/l)			
Cyanide	9010(335.2)	0.3	PMDL
Fluoride	340.2	*	PI
Sulfide	376.1	1.5	PMDL
Metals (mg/l)			
Aluminum	6010/200.7	*	PI
Antimony	6010/200.7	7.0	PMDL
Arsenic	7060(206.2)	*	PI
Barium	6010/200.7	*	PI
Beryllium	6010/200.7	0.05	PMDL
Cadmium	6010/200.7	0.05	PMDL
Calcium	6010/200.7	*	PI
Chromium	6010/200.7	0.5	PMDL
Cobalt	6010/200.7	0.5	PMDL
Copper	6010/200.7	0.5	PMDL
Iron	6010/200.7	*	PI
Lead	7420(239.2)	*	PI
Magnesium	6010/200.7	*	PI
Manganese	6010/200.7	*	PI
Mercury	7470(245.1)	0.01	PMDL
Nickel	6010/200.7	0.5	PMDL
Osmium	6010(200.7)	N/A	-
Potassium	258.1 -	*	PI
Selenium	7740(270.2)	0.1	PMDL
Silver	6010/200.7	0.5	PMDL
Sodium	6010/200.7	*	PI
Thallium	200.7	5.0	PMDL
Tin	6010(282.2)	15	PMDL
Vanadium	6010/200.7	0.2	PMDL
Zinc	6010/200.7	*	PI

CHICAGO INCINERATOR - GROUNDWATER MONITORING PROGRAM
TABLE II - PREDICTION INTERVAL CALCULATIONS
APPENDIX IX

PARAMETER	Method	Prediction Interval (PI)	Comments
Metals (mg/l)			
Iron	6010/200.7	0.340	Well #G-123S
Manganese	6010/200.7	0.178	
Sodium	6010/200.7	1260	
Iron	6010/200.7	**	Well #G-121S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	
Iron	6010/200.7	**	Well #G-125S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	
Iron	6010/200.7	**	Well #G-120S
Manganese	6010/200.7	**	
Sodium	6010/200.7	**	

APPENDIX H

STATISTICAL PREDICTION INTERVALS FOR GROUND-WATER MONITORING AT THE SCA CHICAGO INCINERATOR

August 1987

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Golder Associates

Statistical Prediction Intervals for Ground-Water Monitoring at the SCA Chicago Incinerator

Robert D. Gibbons
University of Illinois

July 28, 1987

1 Introduction

The purpose of this report is to demonstrate how the method of statistical prediction limits (Gibbons, 1987a) can be applied to the problem of ground-water monitoring at the SCA Chicago Incinerator facility. Statistical prediction limits provide an interval estimate that will include the next k future measurements based on a sample of n previous measurements, with a specific level of confidence, say 99%. In the context of ground-water monitoring, the k future measurements represent the observations for a particular compound at a series of monitoring wells that will be obtained on the next round of sampling. For example, if there are 5 downgradient wells to be monitored for Iron, then $k = 5$ for the prediction interval for Iron. In the context of ground-water monitoring the value of n (*i.e.*, the number of previous measurements) can vary depending on the most appropriate sampling strategy for the facility under study. In the most common scenario, n represents the number of upgradient wells multiplied by the number of quarterly measurements available. For example, if a site has four upgradient wells and has monitored those wells quarterly for a period of two years, then $n = 4(8) = 32$. Alternatively, if we restrict our background to the first four quarterly samplings (as suggested by RCRA), then $n = 4(4) = 16$. Of course, we might also find situations where upgradient and downgradient wells were to be compared for a single quarter (*e.g.*, if only one quarter of data were available or natural variability in the measurements was quite large from season to season). In this case, n simply equals the number of upgradient wells and k the number of downgradient wells to be monitored on that occasion. Although it is perfectly reasonable, from a statistical perspective, to construct prediction intervals for $k = 1$, these interval estimates should never be computed for $n < 4$.

It is important to note that the computational form of the prediction interval depends completely on the type of data being examined. Data exhibiting bell shaped distributions such as pH, can be evaluated using Normal prediction limits. Data exhibiting a few elevated values such as TOC, TOX, Iron etc. are typically analyzed using Lognormal prediction limits. Data in which up to 90% of the values may be below a detection limit are termed "censored" and can be analyzed using prediction limits for a Delta distribution (Aitchsion, 1955) or a censored normal distribution (Cohen, 1961). Finally, those indicator parameters that are only rarely detected, say less than 10%, can be analyzed using prediction limits and or tolerance limits for a Poisson distribution (Gibbons, 1987b). Complete computational details and theoretical development of these various prediction limits are provided in the appendix.

2 Method

To provide a site-specific illustration of the prediction interval methodology, we examined historical data for upgradient wells 123-S and 112-B and downgradient wells G-120S, G-121S, G-122S, G-124S, G125S, G-111A, G-113A and G-110. The set of indicator parameters that we initially considered included *(a)* the method 624 volatile organic priority pollutant compounds and *(b)* the following metals: Alu-

minum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Osmium, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Vanadium and Zinc. Unfortunately, existing data at the facility for most of these parameters was quite sparse and sufficient data for the computation of prediction limits were only available for Iron, Manganese and Sodium, and these data were restricted to a single upgradient well (*i.e.*, 123-S). In terms of volatile organic scans, a single upgradient scan was also available for well 123-S which was obtained on 11/21/85.

3 Results

Tables 1, 2 and 3 present the historical upgradient data and summary statistics for Iron, Manganese and Sodium respectively. Inspection of Table 1 reveals that 3 of the 7 values for both Manganese and Sodium were detected. As such, we computed a Delta prediction limit for Iron and Lognormal prediction limits for Manganese and Sodium. These interval estimates are presented in Table 4, and appear to be quite reasonable given the limited observed data. We note however, that these estimates are not really suitable for practical application because they are based on a single upgradient well. Since spatial variability is the largest component of natural groundwater variability, the absence of spatial variance from these calculations strongly suggests that the prediction limits listed in Table 4 are underestimates of the true values.

In terms of downgradient measurements, current monitoring values are provided in Tables 5, 6 and 7. Inspection of Tables 5-7 reveal that *(a)* data were only available for downgradient wells G-110, G-111A and G-113A and *(b)* G-111A exceeded the current prediction limit slightly for Manganese and more dramatically for Sodium. Since there is only one available upgradient well, it is impossible to determine if this difference is due to contamination or simply spatial variability (*i.e.*, the two are completely confounded when there is only a single upgradient well).

In terms of volatile organic compounds, detected upgradient constituents for the single scan in well 123-S on 11/21/85 produced three low level "hits", which are presented in Tables 8 and 9. Based on these values we can compute a provisional 99% Poisson Tolerance limit using the exact method given by Zacks (1970) and described in Gibbons (1987b), which is included in the Appendix. Results of this computation yield a Poisson tolerance limit of 125 *ppb*. Since 84 *ppb* were detected in this single upgradient scan (see Table 8), this interval estimate appears to be quite reasonable. Interestingly, if we had used the simple 3σ quality control rule proposed by Gibbons (1986) we would have obtained a limit value of $84 + 3\sqrt{84} = 112 ppb$, which further confirms the conservative nature of this approximate procedure.

Inspection of the few volatile organic scans available for downgradient wells reveals that well G-111A also exceeded the interval estimates, both in 1982 and in 1985. Well G-110 does not exceed the site-specific tolerance limit, but does exceed the limit value obtained for field blanks and trip blanks from the ETC database (see Appendix).

4 Conclusion

The method of statistical prediction limits appears to be well suited to ground-water monitoring problems at the SCA facility in spite of the small amount of data that are currently available. With continued monitoring of this facility and the addition of upgradient samples from other wells, the procedure will provide a reasonable balance between false positive and false negative results and will in no way bias results in favor of the owner/operator.

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TABLE 1

UPGRADIENT BACKGROUND DATA FOR Iron

WELL	DATE	Iron	
123S	11/21/85	0.0590	
123S	02/14/86	0.0620	
123S	05/15/86	0.0300	*
123S	08/14/86	0.0300	*
123S	11/14/86	0.0750	
123S	01/28/87	0.0300	*
123S	04/29/87	0.0690	
Normal			
	$\bar{X}$	0.0663	
	S	0.0072	
Log Transformed			
	$\bar{X}_{log}$	-2.7187	
	S_{log}	0.1077	
Lognormal			
	C	0.0379	
	$\sqrt{D}$	0.0358	
N (Detected)		4	
N (Not Detected)		3	

* Below Detection Limit

TABLE 2

UPGRADIENT BACKGROUND DATA FOR Manganese

WELL	DATE	Manganese
123S	11/21/85	0.0620
123S	02/14/86	0.1050
123S	05/15/86	0.0740
123S	08/14/86	0.0940
123S	11/14/86	0.1010
123S	01/28/87	0.0980
123S	04/29/87	0.0930
Normal		
	$\bar{X}$	0.0896
	S	0.0157
Log Transformed		
	$\bar{X}_{log}$	-2.4276
	S_{log}	0.1923
Lognormal		
	C	0.0897
	$\sqrt{D}$	0.0173
N (Detected)		7
N (Not Detected)		0

TABLE 3

UPGRADIENT BACKGROUND DATA FOR Sodium

WELL	DATE	Sodium
123S	11/21/85	487.9999
123S	02/14/86	517.0000
123S	05/15/86	476.9999
123S	08/14/86	620.0000
123S	11/14/86	628.0000
123S	01/28/87	843.0000
123S	04/29/87	695.0000
Normal		
	$\bar{X}$	609.7143
	S	131.1228
Log Transformed		
	$\bar{X}_{log}$	6.3941
	S_{log}	0.2073
Lognormal		
	C	609.4248
	$\sqrt{D}$	126.4622
N (Detected)		7
N (Not Detected)		0

TABLE 4

Lognormal t-Prediction Limits
($\bar{X}$ and S based on Lognormal)

Parameter	$C + \sqrt{D}k = t$	n_1 detected	n_2 not detected
Iron	0.0379 + 0.0358(8.45) = 0.3403	4	3
Manganese	0.0897 + 0.0173(5.13) = 0.1781	7	0
Sodium	609.4248 + 126.4622(5.13) = 1257.9218	7	0

$k = t_{(n_1-1,1-\alpha/m)}(1 + 1/n_1)^{\frac{1}{2}}$
where m is the number of downgradient wells

TABLE 5

CURRENT MONITORING DATA FOR Iron

WELL	DATE	Iron	
G110	04/29/87	0.0300	*
G111A	04/29/87	0.0900	
G113A	08/14/86	0.1710	

* Below Detection Limit

[1] Exceeds Lognormal t-Prediction Limit

TABLE 6

CURRENT MONITORING DATA FOR Manganese

WELL	DATE	Manganese	
G110	04/29/87	0.0100	*
G111A	04/29/87	0.1820	1
G113A	08/14/86	0.0970	

* Below Detection Limit

[1] Exceeds Lognormal t-Prediction Limit

TABLE 7

CURRENT MONITORING DATA FOR Sodium

WELL	DATE	Sodium	
G110	04/29/87	101.0000	
G111A	04/29/87	5970.0000	1
G113A	08/14/86	899.9999	

[1] Exceeds Lognormal t-Prediction Limit

TABLE 8

VOLATILE ORGANIC COMPOUNDS
DETECTED UPGRADIENT DATA

Compound	Well	Date	*ppb*
Benzene	123S	11/21/85	32.0000
Toluene	123S	11/21/85	14.5000
Vinyl Chloride	123S	11/21/85	36.7000

[1]Exceeds Trip and Field Blank Tolerance Limit

TABLE 9

SUMMARY OF UPGRADIENT VOC DATA
NUMBER OF SAMPLES AND DETECTIONS

Parameter	Number of Samples	Number of Detections	Detection Limit
Benzene	1	1	4.4
Bromoform	0	0	4.7
Carbon Tetrachloride	1	0	2.8
Chlorobenzene	1	0	6.0
Chlorodibromomethane	0	0	10.0
Chloroethane	0	0	10.0
2-Chloroethylvinyl Ether	0	0	10.0
Chloroform	1	0	1.6
Dichlorobromomethane	0	0	2.2
1,1-Dichloroethane	0	0	4.7
1,2-Dichloroethane	1	0	2.8
1,1-Dichloroethylene	0	0	2.8
1,2-Dichloropropane	0	0	6.0
Ethylbenzene	0	0	7.2
Methyl Bromide	0	0	10.0
Methyl Chloride	1	0	10.0
1,1,2,2,-Tetrachloroethane	1	0	6.9
Tetrachloroethylene	1	0	4.1
Toluene	1	1	6.0
1,2-Trans-Dichloroethylene	0	0	10.0
1,1,1-Trichloroethane	1	0	3.8
1,1,2-Trichloroethane	1	0	5.0
Trichloroethylene	1	0	1.9
Trichlorofluoromethane	1	0	10.0
Vinyl Chloride	1	1	10.0
cis-1,3-Dichloropropylene	0	0	5.0
trans-1,3-Dichloropropylene	0	0	10.0

TABLE 10

VOLATILE ORGANIC COMPOUNDS
DETECTED DOWNGRADIENT DATA

Compound	Well	Date	*ppb*	
Benzene	G110	11/21/85	109.0000	[1]
Benzene	G111A	04/07/82	581.0000	[1]
Benzene	G111A	11/21/85	245.0000	[1]
Chlorobenzene	G110	11/21/85	22.8000	
Chlorobenzene	G111A	04/07/82	81.0000	[1]
Chlorobenzene	G111A	11/21/85	12.8000	
Ethylbenzene	G111A	04/07/82	12.0000	
Toluene	G110	11/21/85	13.4000	
Toluene	G111A	04/07/82	220.0000	[1]
Toluene	G111A	11/21/85	6.6800	

[1]Exceeds Trip and Field Blank Tolerance Limit

TABLE 11

SUMMARY OF DOWNGRADIENT VOC DATA
NUMBER OF SAMPLES AND DETECTIONS

Parameter	Number of Samples	Number of Detections	Detection Limit
Benzene	5	3	4.4
Bromoform	3	0	4.7
Carbon Tetrachloride	5	0	2.8
Chlorobenzene	5	3	6.0
Chlorodibromomethane	1	0	10.0
Chloroethane	1	0	10.0
2-Chloroethylvinyl Ether	1	0	10.0
Chloroform	5	0	1.6
Dichlorobromomethane	1	0	2.2
1,1-Dichloroethane	4	0	4.7
1,2-Dichloroethane	5	0	2.8
1,1-Dichloroethylene	0	0	2.8
1,2-Dichloropropane	2	0	6.0
Ethylbenzene	2	1	7.2
Methyl Bromide	1	0	10.0
Methyl Chloride	5	0	10.0
1,1,2,2,-Tetrachloroethane	5	0	6.9
Tetrachloroethylene	5	0	4.1
Toluene	5	3	6.0
1,2-Trans-Dichloroethylene	1	0	10.0
1,1,1-Trichloroethane	5	0	3.8
1,1,2-Trichloroethane	5	0	5.0
Trichloroethylene	5	0	1.9
Trichlorofluoromethane	5	0	10.0
Vinyl Chloride	5	0	10.0
cis-1,3-Dichloropropylene	0	0	5.0
trans-1,3-Dichloropropylene	0	0	10.0

Statistical Prediction Intervals for the Evaluation of Ground-Water Quality

Robert D. Gibbons
University of Illinois

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Dr. R.D. Gibbons
Biometric Laboratory
Illinois State Psychiatric Institute,
1601 W. Taylor St., Chicago, IL 60612, USA.

ABSTRACT

Factors for a normal distribution are given such that one may be 99% confident that the two-sided prediction interval $\bar{x} \pm rs$ or the one-sided prediction interval $\bar{x} + rs$ will contain all of the k future values, where $\bar{x}$ and s are the sample mean and standard deviation obtained from n previous values. In the context of ground-water monitoring, the future samples may represent new monitoring values at each of k downgradient wells, and the n previous values might be the historical monitoring results for one or more upgradient wells. The Tables provided in this paper allow the computation of one-sided and two-sided 99% prediction intervals for previous sample sizes of $n = 4$ to 100 and future samples of $k = 1$ to 100. Modification of these intervals for log-normally distributed data is also presented.

1 INTRODUCTION

The principal objective of ground-water monitoring at hazardous waste disposal facilities is to empirically determine if on-site chemical waste is migrating off-site in ground water. The principal method of ground-water monitoring involves a comparison of specific chemical constituents of ground water upgradient of the site with similarly collected and analyzed samples downgradient of the site. The null hypothesis of interest in such monitoring programs is that of no difference in chemical composition of ground water upgradient and downgradient of the facility. The logic in such a comparison is that presumably, the upgradient wells monitor ground water that is unaffected by the waste disposal facility, whereas, the downgradient wells are in the path of ground water that flows underneath the site and therefore, should provide an early warning system for any potential off-site migration of hazardous waste. The validity of this monitoring procedure *is not* the focus of this paper. The development of a statistically rigorous hypothesis testing strategy *is* the focus of this paper.

If ground water were in the form of a well mixed underground river or lake that spanned the entire area of the site, the most direct approach to testing for upgradient versus downgradient differences would be to obtain estimates of means and variances for individual compounds for all upgradient wells and similar estimates for all downgradient wells. If the variances of these two distributions were reasonably similar, the measurements independent (*i.e.*, not replicate measurements obtained from the same sample), and the compounds in question had approximately Normal (*i.e.*, Gaussian) distributions, one could readily compare the two distributions using Student's t-statistic for each indicator parameter separately, or if a sufficient number of monitoring wells were available, all of the indicator parameters could be compared simultaneously using Hotelling's T^2 statistic (*i.e.*, the multivariate extension of the t-statistic, see Anderson (1958)). Alternatively, if the assumption of homogeneity of variance could not be supported, one could use an unequal variance t-statistic such as Cochran's approximation to the Behrens-Fisher t-statistic (Snedecor and Cochran, 1980).

From a statistical perspective it is unfortunate that the ground-water lake or river example falls considerably short of reality. Ground water occurs in geologically discrete aquifers which generally move extremely slowly (*i.e.*, inches per year) and in rare cases can exhibit a plume like projection, such that only localized areas of the downgradient geology may exhibit contamination. In light of this, pooling information obtained from downgradient wells, some of which may be contaminated and some of which may be perfectly normal, does not seem sensible.

If we cannot estimate a mean and variance for a collection of downgradient well measurements on a particular occasion, we cannot compute a t-statistic. The reason for this is that a t-statistic is appropriate for the comparison of two mean values, however, if each downgradient well is examined individually, its measurement is not the mean of anything, it is simply a single new observation which must in turn be compared to a historical upgradient sample of measurements in order to assess

its significance. Stated statistically, we desire an interval or range of values that will have high probability of containing all new monitoring observations. If the monitoring program involves multiple wells, we must construct an interval that will include all of the k future observations, where k is the number of wells that are to be evaluated on the next monitoring event. Intervals of this type are called "prediction intervals" and need be distinguished both from a confidence interval on an unknown distribution parameter (*e.g.*, a confidence interval of a mean value), and from a tolerance interval which contains the values of a specified proportion of the population with a certain level of confidence. Hahn (1970) illustrates this distinction by providing an example of the typical astronaut's problem.

> An astronaut who has been assigned to a limited number of space flights is not very interested in what will happen on the average in the population of all space flights, of which his happens to be a random sample, or even in what will happen in 99% of the population of such space flights. His main interest is in the worst that may happen in the one, or three, or five flights in which he will be personally involved.

In this example, what will happen on average in the population of all space flights represents a confidence interval, what will happen in 99% of the population of space flights is a tolerance interval, and what will happen in the next one, or three, or five space flights represents a prediction interval.

2 STATISTICAL DEVELOPMENT

Our objective is to define an interval

$$\bar{x} \pm r(k, n; 1-\alpha)\, s$$

that will contain the values of all k future measurements, where $\bar{x}$ and s are the sample mean and standard deviation calculated from the values $x_1, \ldots, x_n$ of n previous measurements, that is,

$$\begin{aligned} \bar{x} &= \sum_{i=1}^{n} x_i/n \\ s^2 &= \sum_{i=1}^{n} (x_i - \bar{x})^2/(n-1). \end{aligned}$$

The original n observations and the additional k samples are assumed to be independent random samples (*i.e.*, not analytical replicates) from the same Normal distribution. For the case of a single new observation, Wilks (1941) showed that when sampling from a $\mathcal{N}(\mu, \sigma^2)$ with μ and σ^2 unknown, the coverage c of the interval

$$c = \int_{\bar{x}-rs}^{\bar{x}+rs} \sqrt{2\pi\sigma^2}\, \exp\left\{-\frac{1}{2\sigma^2}(x-\mu)^2\right\} \partial y$$

will on average be $1-\alpha$ if and only if

$$r = \sqrt{1+1/n}\ t_{[n-1;\alpha/2]}$$

where $t_{[n-1;\alpha/2]}$ is the $100(1-\alpha)\%$ point of "Student's" t distribution with $n-1$ degrees of freedom.

Chew (1968) extended this result to the case of k future observations using an approximate conservative method for obtaining prediction intervals based on the Bonferroni Inequality (Miller, 1966). This approximations leads to the $100(1-\alpha)\%$ two-sided prediction limit:

$$\bar{x} \pm \sqrt{1+1/n}\ t_{[n-1;\alpha/2k]}\ s$$

and the $100(1-\alpha)\%$ one-sided upper prediction limit:

$$\bar{x} + \sqrt{1+1/n}\ t_{[n-1;\alpha/k]}\ s$$

Hahn (1969 & 1970) compared results using this method and selected exact values obtained using numerical quadrature and found the approximation to be satisfactory for practical purposes. Comparison of values in Tables 1-3, which provide values of $r(k,n;.99)$ for $n=4$ to 100 and $k=1$ to 100 for one-sided intervals, and Tables 4-6 for the corresponding two-sided intervals reveal that on average, the bias is less than 1% with a maximum deviation of 7% for $n=4$ and $k=1$. In fact for $n>4$ the bias is never greater than 1% regardless of k. The small bias observed for $n=4$ is always an underestimate; therefore the approximation is conservative for very small n which should probably not be used in practice. For example, the exact one-tailed result for $n=15$ and $k=4$ is $r(4,15;.99)=3.42$ and the approximate value given in Table 1 is 3.43. Using this example in a practical application, we would compute the 99% upper prediction limit as $\bar{x}+3.43s$, where in this example, $\bar{x}$ and s would be computed on 15 background (upgradient) measurements, and each of the 4 new monitoring (downgradient) measurements would simply be compared to this limit value.

3 PREDICTION LIMITS FOR THE LOG-NORMAL DISTRIBUTION

When data exhibit a few elevated values such that the frequency distribution is "skewed" with a long right tail, estimates based on the assumption of normality do not apply. In practice, transformations of data are used to stabilize variance and bring about normality (see Box and Cox, 1964). Perhaps the most commonly used transformation in this situation is the natural log transformation (Aroian, 1941), where x is a log-normal random variable, such that $y=\log_e x \sim \mathcal{N}(\mu,\sigma^2)$. When μ and σ^2 are unknown, we may substitute the sample estimates $\bar{y}$ and σ^2 where

$$\bar{y} = \sum_{i=1}^{n} \log_e(x_i)/n$$

and

$$s^2 = \sum_{i=1}^{n} (\log_e(x_i) - \bar{y})^2/(n-1).$$

Based on a result obtained by Dahiya and Guttman (1982) the $100(1-\alpha)\%$ prediction interval has the familiar form

$$\exp\{\bar{y} \pm \sqrt{1 + 1/n}\ t_{[n-1,\alpha/2]}\ s\}.$$

In light of this, the values in Tables 1-3 may be used to obtain the one-sided 99% prediction limit:

$$\exp\{\bar{y} + \tau(k, n; .99)\ s\}$$

where $\bar{y}$ and s are the mean and standard deviation computed on natural log transformed data. Similarly, Tables 4-6 may be used to compute the corresponding two-sided 99% prediction limit:

$$\exp\{\bar{y} \pm \tau(k, n; .99)\ s\}$$

A note of caution must be raised regarding the use of log transformation in calculating prediction limits. This point is best illustrated by an example. Consider the following data for TOX, and for simplicity let us assume that these measurements were collected from a single upgradient well, quarterly for two years so that s^2 is an unbiased estimate of σ^2.

upgradient well	quarter	year	TOX	$\log_e$(TOX)
MW01	1	1985	48	3.87
MW01	2	1985	5	1.61
MW01	3	1985	44	3.78
MW01	4	1985	24	3.18
MW01	1	1986	17	2.83
MW01	2	1986	6	1.79
MW01	3	1986	12	2.48
MW01	4	1986	60	4.09
			$\bar{x} = 27.00$	$\bar{x} = 2.96$
			$s = 20.97$	$s = 0.95$
			$n = 8$	$n = 8$

Inspection of the original TOX values reveals a distribution that is skewed to the right, therefore, log transformation appears to be a natural choice for better approximating the assumed normality of the statistical procedure. Indeed, the transformation appears to have somewhat normalized the distribution of these measurements.

Assuming that we are interested in evaluating a single new downgradient measurement, the 99% prediction limit based on the original data is:

$$27.00 + 20.97(3.16) = 93.27\ ppb$$

whereas, the 99% prediction limit for the log transformed data is:

$$\exp[2.96 + .95(3.16)] = 388.39\ ppb.$$

Alternatively, if we directly estimate the mean and standard deviation of the lognormal distribution (see Aitchison, 1955), we obtain for the 99% prediction limit

$$28.16 + 27.71(3.16) = 115.73\ ppb.$$

Inspection of these three prediction limits reveals that the estimate based on log transformed data is remarkably elevated relative to the normal and lognormal interval estimates. The lognormal prediction limit is, of course, incorrect because the use of these limits assumes a normal distribution for x_i, whereas, these estimates are based on lognormal assumptions; however, they do seem to give quite reasonable estimates, at least, for practical purposes. Conversely, the interval estimate obtained following log transformation of the data, a seemingly standard and benign practice, is extremely high and is likely to lead to elevated false negative rates even for liberal effect magnitudes. In fact, the limit value for the log transformed data is almost an entire order of magnitude higher than the maximum value in the background sample. It is for this reason that log transformation must be used very cautiously when constructing prediction intervals.

4 SAMPLING STRATEGIES

When using prediction intervals, we assume that both the original observations $(x_1, \ldots, x_n)$ and the future observations $(x_{n+1}, \ldots, x_{n+k})$ arise from the same probability distribution, namely, $\mathcal{N}(\mu, \sigma^2)$. Since, in practice, μ and σ^2 are unknown quantities, we must estimate their value from a random sample of previous measurements, by obtaining the sufficient statistics $\bar{x}$ and s, that is, the sample mean and standard deviation. If our background measurements consist of multiple quarterly measurements of a single well or multiple upgradient wells at a single time-point, $s^2 = \sum_{i=1}^{n}(x_i - \bar{x})^2/(n-1)$ is an unbiased estimate of σ^2. However, when multiple upgradient wells are evaluated on several quarters the previous equation yields biased results unless we make the demonstrably false assumption that temporal and spatial variability are identical.

The unbiased variance estimate for the case of multiple upgradient wells and multiple samplings of each well (selected at sufficient intervals to insure independence,

for example, quarterly sampling) can be obtained from the *random effects* analysis of variance model (see Winer (1971), page 427, for a similar example). Here, we are modeling the background measurements in terms of two random factors corresponding to wells and time-points. The general form of this model is given by:

$$x_{ij} = \mu + \omega_i + \tau_j + \varepsilon_{ij}$$

where x_{ij} is the measurement on background (upgradient) well i on sampling event j, μ is the unknown mean level for background measurements (*i.e.*, averaged across wells and time), ω_i is a random variable distributed $\mathcal{N}(0, \sigma_\omega^2)$ that describes the deviation of well i from μ, τ_j is a random variable distributed $\mathcal{N}(0, \sigma_\tau^2)$ that describes the deviation at time j from μ, and ε_{ij} is a random residual distributed $\mathcal{N}(0, \sigma_\varepsilon^2)$. Assuming independence of the x_{ij}, the expected value of a measurement is:

$$\mathcal{E}(x_{ij}) = \mu$$

with variance

$$\mathcal{V}(x_{ij}) = \sigma_\omega^2 + \sigma_\tau^2 + \sigma_\varepsilon^2$$

This model corresponds to what is termed a *randomized block design* in the statistical literature, and the expected mean square for the wells, time-points, and residuals are given, respectively, as:

$$\begin{aligned}
MS_\omega &= t\sigma_\omega^2 + \sigma_\varepsilon^2 \\
&= t\sum_{i=1}^{w}(\bar{x}_i - \bar{x})^2/(w-1) \\
MS_\tau &= w\sigma_\tau^2 + \sigma_\varepsilon^2 \\
&= w\sum_{j=1}^{t}(\bar{x}_j - \bar{x})^2/(t-1) \\
MS_\varepsilon &= \sigma_\varepsilon^2 \\
&= \sum_{i=1}^{w}\sum_{j=1}^{t}(x_{ij} - \bar{x}_i - \bar{x}_j + \bar{x})^2/(w-1)(t-1)
\end{aligned}$$

where

x_{ij}	is the measurement for well i on occasion j
w	is the number of wells
t	is the number of quarterly measurements per well
$\bar{x}_i$	is the mean for all measurements from well i
$\bar{x}_j$	is the mean for all measurements from time j
$\bar{x}$	is the mean of all measurements across wells and times.

Solving for the individual variance components σ_ω^2, σ_τ^2, and σ_ε^2 we find that:

$$\sigma_\omega^2 = \frac{MS_\omega - MS_\epsilon}{t}$$

$$\sigma_\tau^2 = \frac{MS_\tau - MS\epsilon}{\omega}$$

and

$$\sigma_\epsilon^2 = MS_\epsilon$$

The unbiased estimate of the total variance is therefore:

$$\begin{aligned} \mathcal{V}(x_{ij}) &= \sigma_\omega^2 + \sigma_\tau^2 + \sigma_\epsilon^2 \\ &= \frac{MS_\omega - MS_\epsilon}{t} + \frac{MS_\tau - MS_\epsilon}{\omega} + MS_\epsilon \end{aligned}$$

The above model assumes that all wells are measured at the same time-points, and thus, the two factors are referred to as "crossed" factors. When the time-points corresponding to the different wells cannot be assumed to be equal, then the time-point factor is said to be "nested" within the well factor (see Winer (1971) page 360 for a detailed description of nested factor designs). This would occur, for instance, if the background observations for well 1 were made quarterly in 1972, while the observations for well 2 were made quarterly in 1976, and those for well 3 made in 1975, etc. This nested model is given by:

$$x_{ij} = \mu + \omega_i + \tau_{ij} + \epsilon_{ij}$$

where x_{ij}, μ, ω_i, and ϵ_{ij} are as before, while τ_{ij} is a random variable distributed $\mathcal{N}(0, \sigma_\tau^2)$ that describes the deviation of well i at time j from the overall mean value for well i $(\mu + \omega_i)$ averaged over time.

If sampling events are "nested" within wells the expected mean squares must be modified to reflect this design. Specifically, the expected mean square for the wells is:

$$\begin{aligned} MS_\omega &= t\sigma_\omega^2 + \sigma_\tau^2 + \sigma_\epsilon^2 \\ &= t\sum_{i=1}^{w}(\bar{x}_i - \bar{x})^2/(w-1) \end{aligned}$$

While, the mean square for time is:

$$\begin{aligned} MS_\tau &= \sigma_\tau^2 + \sigma_\epsilon^2 \\ &= \sum_{i=1}^{w}\sum_{j=1}^{t}(x_{ij} - \bar{x}_i)^2/(w(t-1)) \end{aligned}$$

With time nested within wells the error term σ_ϵ^2 cannot be seperately estimated since there is only one observation per well x time cell. Thus, solving for the individual variance components σ_ω^2 and σ_τ^2 we find that:

$$\sigma_\omega^2 = \frac{MS_\omega - MS_\tau}{t}$$

and

$$\sigma_\tau^2 + \sigma_\epsilon^2 = MS_\tau$$

The unbiased estimate of the total variance is now:

$$\begin{aligned}
\mathcal{V}(x_{ij}) &= \sigma_\omega^2 + \sigma_\tau^2 + \sigma_\epsilon^2 \\
&= \frac{MS_\omega - MS_\tau}{t} + MS_\tau \\
&= \frac{t\sum_{i=1}^{w}(\bar{x}_i - \bar{x})^2/(w-1) - \sum_{i=1}^{w}\sum_{j=1}^{t}(x_{ij} - \bar{x}_i)^2/(w(t-1))}{t} \\
&\quad + \sum_{i=1}^{w}\sum_{j=1}^{t}(x_{ij} - \bar{x}_i)^2/(w(t-1))
\end{aligned}$$

It is of considerable interest to compare the biased variance estimate s^2 with the unbiased variance estimate $\mathcal{V}(x_{ij})$ given above. The simple variance estimate that assumes equal spatial and temporal variability has expectation[1]

$$\begin{aligned}
\mathcal{E}[\sigma^2] &= \mathcal{E}[\sum_{i=1}^{w}\sum_{j=1}^{t}(x_{ij} - \bar{x}_i)^2/(n-1)] \\
&= \frac{n-t}{n}\sigma_\omega^2 + \sigma_\tau^2 + \sigma_\epsilon^2
\end{aligned}$$

where n is the total number of measurements. This equation reveals that s^2 will always underestimate $\mathcal{V}(x_{ij})$. For example, with 2 wells and 4 quarterly measurements, the contribution of the well variance σ_ω^2 is underestimated by 43%. The addition of 2 upgradient wells decreases this bias to 20%, and the addition of a second years background increases the bias only slightly to 23%.

When multiple upgradient wells comprise the background sample, the unbiased estimate $\mathcal{V}(x_{ij})$ should *always* be used in place of s^2. The importance of using multiple upgradient wells is due both to the large spatial variability that is commonly observed for naturally occurring constituents of ground water and because it eliminates the confound between spatial variability and contamination. In the case of

[1]The author is grateful to an anonymous reviewer for raising this point.

a single upgradient well, an upgradient versus downgradient difference may reflect either spatial variability or contamination (*i.e.*, there is no estimate of σ_ω^2). In contrast, when multiple upgradient wells are sampled, an estimate of spatial variability σ_ω^2 is available and the resulting prediction limit will provide for spatial effects. A critical assumption, however, is that both spatial and temporal variability are the same for upgradient and downgradient locations. This is a complex problem and the feasibility of this assumption should always be evaluated on a site-specific basis to bring into consideration hydrogeology as well as problems with previous conditions and sources of off-site contamination.

5 ILLUSTRATION

Consider the following data for pH obtained from two upgradient wells each with four quarterly measurements.

Quarter	Upgradient Well 1	Upgradient Well 2
1	7.1	7.7
2	7.4	7.8
3	7.7	7.9
4	8.0	8.0

The summary statistics for the nested design are:

$$
\begin{aligned}
\bar{x} &= (7.1 + 7.4 + 7.7 + 8.0 + 7.7 + 7.8 + 7.9 + 8.0)/8 = 7.70 \\
\bar{x}_{well1} &= (7.1 + 7.4 + 7.7 + 8.0)/4 = 7.55 \\
\bar{x}_{well2} &= (7.7 + 7.8 + 7.9 + 8.0)/4 = 7.85 \\
MS_\omega &= 4[(7.55 - 7.70)^2 + (7.85 - 7.70)^2]/(2-1) = 0.180 \\
MS_\tau &= [(7.1 - 7.55)^2 + (7.4 - 7.55)^2 + (7.7 - 7.55)^2 + (8.0 - 7.55)^2 + \\
&\quad (7.7 - 7.85)^2 + (7.8 - 7.85)^2 + (7.9 - 7.85)^2 + (8.0 - 7.85)^2]/(2(4-1)) \\
&= 0.083
\end{aligned}
$$

The resulting variance estimates are therefore:

$$
\begin{aligned}
\sigma_\omega^2 &\doteq \frac{MS_\omega - MS_\tau}{t} \\
&= (.180 - .083)/4 = 0.024 \\
\sigma_\tau^2 &= MS_\tau = 0.083 \\
\mathcal{V}(x_{ij}) &= 0.108
\end{aligned}
$$

As expected, the biased variance estimate $s^2 = .097$ underestimates $\mathcal{V}(x_{ij})$ since, in this example, $s^2 = 4/7\sigma_\omega^2 + \sigma_\tau^2 + \sigma_\epsilon^2$. The variance estimate for the randomized blocks design $\mathcal{V}(x_{ij}) = .120$ was somewhat larger than the result obtained for the nested model, because a unique estimate of the residual error is available ($\sigma_\omega^2 = .037, \sigma_\tau^2 = .050$ and $\sigma_\epsilon^2 = .033$).

In terms of establishing prediction intervals for future observations, we obtain the following estimates from Tables 4 - 6 assuming the more general nested sampling design (*i.e.*, the time-points are not the same for all wells).

Number of Downgradient wells	Prediction interval		
1	$7.70 \pm 3.67(\sqrt{.108})$	=	6.49 - 8.91
2	$7.70 \pm 4.20(\sqrt{.108})$	=	6.32 - 9.08
3	$7.70 \pm 4.52(\sqrt{.108})$	=	6.22 - 9.19
4	$7.70 \pm 4.75(\sqrt{.108})$	=	6.13 - 9.26
5	$7.70 \pm 4.94(\sqrt{.108})$	=	6.08 - 9.32
6	$7.70 \pm 5.09(\sqrt{.108})$	=	6.03 - 9.37
7	$7.70 \pm 5.22(\sqrt{.108})$	=	5.98 - 9.42
8	$7.70 \pm 5.34(\sqrt{.108})$	=	5.94 - 9.46
9	$7.70 \pm 5.44(\sqrt{.108})$	=	5.91 - 9.49
10	$7.70 \pm 5.53(\sqrt{.108})$	=	5.88 - 9.52
20	$7.70 \pm 6.15(\sqrt{.108})$	=	5.68 - 9.72
30	$7.70 \pm 6.53(\sqrt{.108})$	=	5.55 - 9.85
40	$7.70 \pm 6.81(\sqrt{.108})$	=	5.46 - 9.94
50	$7.70 \pm 7.02(\sqrt{.108})$	=	5.39 - 10.01
100	$7.70 \pm 7.72(\sqrt{.108})$	=	5.16 - 10.24

With a doubling of sample size from 8 to 16 (*e.g.*, 4 upgradient wells with quarterly sampling for one year), the prediction intervals would range from 6.70 to 8.70 for a single downgradient well to 5.94 to 9.46 for a site with 100 downgradient wells, assuming that $\bar{x}$ and $\mathcal{V}(x_{ij})$ remained constant.

6 DISCUSSION

Although the statistical monitoring strategy developed here may appear comprehensive, it is only a small first step. For example, none of the methodology presented here is directly appropriate for the analysis of indicator compounds that exhibit values below method detection limits, or go undetected in a proportion of the sample. Perhaps, the simplest solution to this problem is to use the prediction limits developed here with estimates of the mean and variance of a censored normal distribution (see Cohen, 1961) or censored Log-normal distribution (see Aitchison, 1955). Using these procedures, however, it is not at all clear how unbiased variance estimates

would be obtained, as are described here for the case of complete information. As an even more extreme omission, the strategy presented here is completely inappropriate for the analysis of volatile organic compounds that occur in less than 5% of all measurements obtained from clean upgradient wells, trip blanks and field blanks (Plumb and Parolini, 1986; Hurd, 1987). Inspection of these potentially useful indicator compounds suggest that they may arise from a Poisson process (Gibbons, 1986) or possibly even a censored Poisson distribution. Statistical methods for monitoring infrequently detected compounds, such as the volatile organic priority pollutant compounds are sorely needed in ground-water monitoring, and statistical research in this area is strongly encouraged.

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TABLE 1

FACTORS FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	4.70	5.81	6.52	7.06	7.49	7.86	8.17	8.45	8.71	8.94	9.15	9.35	9.53	9.70	9.86
5	3.96	4.77	5.28	5.66	5.96	6.22	6.44	6.63	6.81	6.97	7.11	7.24	7.37	7.48	7.59
6	3.57	4.23	4.63	4.93	5.17	5.37	5.54	5.69	5.83	5.95	6.06	6.16	6.26	6.35	6.43
7	3.32	3.89	4.24	4.49	4.69	4.86	5.00	5.13	5.24	5.34	5.43	5.52	5.60	5.67	5.74
8	3.16	3.67	3.98	4.20	4.38	4.52	4.65	4.75	4.85	4.94	5.02	5.09	5.16	5.22	5.28
9	3.04	3.51	3.79	3.99	4.15	4.28	4.39	4.49	4.58	4.66	4.73	4.79	4.85	4.91	4.96
10	2.95	3.39	3.65	3.84	3.98	4.10	4.21	4.30	4.37	4.45	4.51	4.57	4.62	4.68	4.72
11	2.88	3.30	3.54	3.72	3.85	3.97	4.06	4.14	4.22	4.28	4.34	4.40	4.45	4.50	4.54
12	2.82	3.22	3.46	3.62	3.75	3.86	3.95	4.03	4.09	4.16	4.21	4.26	4.31	4.36	4.40
13	2.78	3.16	3.39	3.54	3.67	3.77	3.85	3.93	3.99	4.05	4.11	4.16	4.20	4.24	4.28
14	2.74	3.11	3.33	3.48	3.60	3.70	3.78	3.85	3.91	3.97	4.02	4.07	4.11	4.15	4.19
15	2.71	3.07	3.28	3.43	3.54	3.63	3.71	3.78	3.84	3.90	3.95	3.99	4.03	4.07	4.11
16	2.68	3.03	3.24	3.38	3.49	3.58	3.66	3.72	3.78	3.84	3.88	3.93	3.97	4.00	4.04
17	2.66	3.00	3.20	3.34	3.45	3.54	3.61	3.68	3.73	3.78	3.83	3.87	3.91	3.95	3.98
18	2.64	2.97	3.17	3.31	3.41	3.50	3.57	3.63	3.69	3.74	3.78	3.82	3.86	3.89	3.93
19	2.62	2.95	3.14	3.28	3.38	3.46	3.53	3.60	3.65	3.70	3.74	3.78	3.82	3.85	3.88
20	2.60	2.93	3.12	3.25	3.35	3.43	3.50	3.56	3.61	3.66	3.70	3.74	3.78	3.81	3.84
21	2.59	2.91	3.10	3.22	3.32	3.41	3.47	3.53	3.58	3.63	3.67	3.71	3.75	3.78	3.81
22	2.57	2.89	3.08	3.20	3.30	3.38	3.45	3.51	3.56	3.60	3.64	3.68	3.71	3.75	3.78
23	2.56	2.88	3.06	3.18	3.28	3.36	3.42	3.48	3.53	3.58	3.62	3.65	3.69	3.72	3.75
24	2.55	2.86	3.04	3.17	3.26	3.34	3.40	3.46	3.51	3.55	3.59	3.63	3.66	3.69	3.72
25	2.54	2.85	3.03	3.15	3.24	3.32	3.39	3.44	3.49	3.53	3.57	3.61	3.64	3.67	3.70
26	2.53	2.84	3.01	3.14	3.23	3.30	3.37	3.42	3.47	3.51	3.55	3.59	3.62	3.65	3.68
27	2.52	2.83	3.00	3.12	3.21	3.29	3.35	3.41	3.45	3.50	3.53	3.57	3.60	3.63	3.66
28	2.52	2.82	2.99	3.11	3.20	3.27	3.34	3.39	3.44	3.48	3.52	3.55	3.58	3.61	3.64
29	2.51	2.81	2.98	3.10	3.19	3.26	3.32	3.38	3.42	3.46	3.50	3.54	3.57	3.60	3.62
30	2.50	2.80	2.97	3.09	3.18	3.25	3.31	3.36	3.41	3.45	3.49	3.52	3.55	3.58	3.61
31	2.50	2.79	2.96	3.08	3.17	3.24	3.30	3.35	3.40	3.44	3.47	3.51	3.54	3.57	3.59
32	2.49	2.79	2.95	3.07	3.16	3.23	3.29	3.34	3.39	3.43	3.46	3.50	3.53	3.55	3.58
33	2.49	2.78	2.94	3.06	3.15	3.22	3.28	3.33	3.37	3.41	3.45	3.48	3.51	3.54	3.57
34	2.48	2.77	2.94	3.05	3.14	3.21	3.27	3.32	3.36	3.40	3.44	3.47	3.50	3.53	3.56
35	2.48	2.77	2.93	3.04	3.13	3.20	3.26	3.31	3.35	3.39	3.43	3.46	3.49	3.52	3.54
36	2.47	2.76	2.92	3.04	3.12	3.19	3.25	3.30	3.35	3.39	3.42	3.45	3.48	3.51	3.53
37	2.47	2.76	2.92	3.03	3.12	3.19	3.24	3.29	3.34	3.38	3.41	3.44	3.47	3.50	3.53
38	2.46	2.75	2.91	3.02	3.11	3.18	3.24	3.29	3.33	3.37	3.40	3.44	3.46	3.49	3.52
39	2.46	2.75	2.91	3.02	3.10	3.17	3.23	3.28	3.32	3.36	3.40	3.43	3.46	3.48	3.51
40	2.46	2.74	2.90	3.01	3.10	3.17	3.22	3.27	3.31	3.35	3.39	3.42	3.45	3.47	3.50
41	2.45	2.74	2.90	3.01	3.09	3.16	3.22	3.27	3.31	3.35	3.38	3.41	3.44	3.47	3.49
42	2.45	2.73	2.89	3.00	3.09	3.15	3.21	3.26	3.30	3.34	3.37	3.41	3.43	3.46	3.48
43	2.45	2.73	2.89	3.00	3.08	3.15	3.20	3.25	3.30	3.33	3.37	3.40	3.43	3.45	3.48
44	2.44	2.73	2.88	2.99	3.08	3.14	3.20	3.25	3.29	3.33	3.36	3.39	3.42	3.45	3.47
45	2.44	2.72	2.88	2.99	3.07	3.14	3.19	3.24	3.28	3.32	3.36	3.39	3.41	3.44	3.46
46	2.44	2.72	2.88	2.98	3.07	3.13	3.19	3.24	3.28	3.32	3.35	3.38	3.41	3.43	3.46
47	2.44	2.72	2.87	2.98	3.06	3.13	3.18	3.23	3.27	3.31	3.34	3.38	3.40	3.43	3.45
48	2.43	2.71	2.87	2.98	3.06	3.12	3.18	3.23	3.27	3.31	3.34	3.37	3.40	3.42	3.45
49	2.43	2.71	2.86	2.97	3.05	3.12	3.18	3.22	3.26	3.30	3.34	3.37	3.39	3.42	3.44
50	2.43	2.71	2.86	2.97	3.05	3.12	3.17	3.22	3.26	3.30	3.33	3.36	3.39	3.41	3.44
60	2.41	2.68	2.84	2.94	3.02	3.08	3.14	3.18	3.22	3.26	3.29	3.32	3.35	3.37	3.40
70	2.40	2.67	2.82	2.92	3.00	3.06	3.12	3.16	3.20	3.24	3.27	3.30	3.32	3.35	3.37
80	2.39	2.66	2.80	2.91	2.98	3.05	3.10	3.14	3.18	3.22	3.25	3.28	3.30	3.33	3.35
90	2.38	2.65	2.79	2.89	2.97	3.03	3.08	3.13	3.17	3.20	3.23	3.26	3.29	3.31	3.33
100	2.38	2.64	2.79	2.89	2.96	3.02	3.07	3.12	3.16	3.19	3.22	3.25	3.27	3.30	3.32

Factor = $t_{(n-1,1-\alpha/k)}\sqrt{1+1/n}$

TABLE 2

FACTORS FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4	10.01	10.16	10.30	10.43	10.55	10.67	10.79	10.90	11.00	11.11	11.21	11.30	11.40	11.49	11.57
5	7.70	7.79	7.89	7.97	8.06	8.14	8.22	8.29	8.36	8.43	8.50	8.56	8.62	8.68	8.74
6	6.51	6.58	6.65	6.72	6.79	6.85	6.90	6.96	7.02	7.07	7.12	7.17	7.21	7.26	7.30
7	5.80	5.86	5.92	5.98	6.03	6.08	6.13	6.17	6.21	6.26	6.30	6.34	6.38	6.41	6.45
8	5.34	5.39	5.44	5.49	5.53	5.57	5.61	5.65	5.69	5.73	5.76	5.80	5.83	5.86	5.89
9	5.01	5.06	5.10	5.14	5.18	5.22	5.25	5.29	5.32	5.35	5.39	5.42	5.44	5.47	5.50
10	4.77	4.81	4.85	4.89	4.92	4.96	4.99	5.02	5.05	5.08	5.11	5.14	5.16	5.19	5.21
11	4.58	4.62	4.66	4.69	4.73	4.76	4.79	4.82	4.84	4.87	4.90	4.92	4.94	4.97	4.99
12	4.44	4.47	4.51	4.54	4.57	4.60	4.63	4.65	4.68	4.71	4.73	4.75	4.77	4.80	4.82
13	4.32	4.35	4.38	4.42	4.44	4.47	4.50	4.52	4.55	4.57	4.59	4.62	4.64	4.66	4.68
14	4.22	4.25	4.28	4.31	4.34	4.37	4.39	4.42	4.44	4.46	4.48	4.50	4.52	4.54	4.56
15	4.14	4.17	4.20	4.23	4.25	4.28	4.30	4.33	4.35	4.37	4.39	4.41	4.43	4.45	4.46
16	4.07	4.10	4.13	4.15	4.18	4.20	4.23	4.25	4.27	4.29	4.31	4.33	4.35	4.37	4.38
17	4.01	4.04	4.07	4.09	4.12	4.14	4.16	4.18	4.20	4.22	4.24	4.26	4.28	4.30	4.31
18	3.96	3.99	4.01	4.04	4.06	4.08	4.11	4.13	4.15	4.17	4.18	4.20	4.22	4.24	4.25
19	3.91	3.94	3.97	3.99	4.01	4.04	4.06	4.08	4.10	4.11	4.13	4.15	4.17	4.18	4.20
20	3.87	3.90	3.92	3.95	3.97	3.99	4.01	4.03	4.05	4.07	4.09	4.10	4.12	4.14	4.15
21	3.84	3.86	3.89	3.91	3.93	3.95	3.97	3.99	4.01	4.03	4.05	4.06	4.08	4.09	4.11
22	3.80	3.83	3.85	3.88	3.90	3.92	3.94	3.96	3.98	3.99	4.01	4.03	4.04	4.06	4.07
23	3.77	3.80	3.82	3.85	3.87	3.89	3.91	3.93	3.94	3.96	3.98	3.99	4.01	4.02	4.04
24	3.75	3.77	3.80	3.82	3.84	3.86	3.88	3.90	3.92	3.93	3.95	3.96	3.98	3.99	4.01
25	3.72	3.75	3.77	3.79	3.82	3.84	3.85	3.87	3.89	3.91	3.92	3.94	3.95	3.97	3.98
26	3.70	3.73	3.75	3.77	3.79	3.81	3.83	3.85	3.87	3.88	3.90	3.91	3.93	3.94	3.95
27	3.68	3.71	3.73	3.75	3.77	3.79	3.81	3.83	3.84	3.86	3.87	3.89	3.90	3.92	3.93
28	3.66	3.69	3.71	3.73	3.75	3.77	3.79	3.81	3.82	3.84	3.85	3.87	3.88	3.90	3.91
29	3.65	3.67	3.69	3.71	3.73	3.75	3.77	3.79	3.80	3.82	3.83	3.85	3.86	3.88	3.89
30	3.63	3.66	3.68	3.70	3.72	3.74	3.75	3.77	3.79	3.80	3.82	3.83	3.85	3.86	3.87
31	3.62	3.64	3.66	3.68	3.70	3.72	3.74	3.75	3.77	3.79	3.80	3.81	3.83	3.84	3.85
32	3.60	3.63	3.65	3.67	3.69	3.71	3.72	3.74	3.76	3.77	3.79	3.80	3.81	3.83	3.84
33	3.59	3.61	3.64	3.66	3.67	3.69	3.71	3.73	3.74	3.76	3.77	3.79	3.80	3.81	3.82
34	3.58	3.60	3.62	3.64	3.66	3.68	3.70	3.71	3.73	3.74	3.76	3.77	3.78	3.80	3.81
35	3.57	3.59	3.61	3.63	3.65	3.67	3.69	3.70	3.72	3.73	3.75	3.76	3.77	3.78	3.80
36	3.56	3.58	3.60	3.62	3.64	3.66	3.67	3.69	3.71	3.72	3.73	3.75	3.76	3.77	3.79
37	3.55	3.57	3.59	3.61	3.63	3.65	3.66	3.68	3.69	3.71	3.72	3.74	3.75	3.76	3.77
38	3.54	3.56	3.58	3.60	3.62	3.64	3.65	3.67	3.68	3.70	3.71	3.73	3.74	3.75	3.76
39	3.53	3.55	3.57	3.59	3.61	3.63	3.64	3.66	3.67	3.69	3.70	3.72	3.73	3.74	3.75
40	3.52	3.54	3.56	3.58	3.60	3.62	3.63	3.65	3.67	3.68	3.69	3.71	3.72	3.73	3.74
41	3.51	3.54	3.56	3.58	3.59	3.61	3.63	3.64	3.66	3.67	3.68	3.70	3.71	3.72	3.73
42	3.51	3.53	3.55	3.57	3.59	3.60	3.62	3.63	3.65	3.66	3.68	3.69	3.70	3.71	3.73
43	3.50	3.52	3.54	3.56	3.58	3.59	3.61	3.63	3.64	3.65	3.67	3.68	3.69	3.71	3.72
44	3.49	3.51	3.53	3.55	3.57	3.59	3.60	3.62	3.63	3.65	3.66	3.67	3.69	3.70	3.71
45	3.49	3.51	3.53	3.55	3.56	3.58	3.60	3.61	3.63	3.64	3.65	3.67	3.68	3.69	3.70
46	3.48	3.50	3.52	3.54	3.56	3.57	3.59	3.61	3.62	3.63	3.65	3.66	3.67	3.68	3.70
47	3.48	3.50	3.52	3.53	3.55	3.57	3.58	3.60	3.61	3.63	3.64	3.65	3.67	3.68	3.69
48	3.47	3.49	3.51	3.53	3.55	3.56	3.58	3.59	3.61	3.62	3.63	3.65	3.66	3.67	3.68
49	3.46	3.48	3.50	3.52	3.54	3.56	3.57	3.59	3.60	3.62	3.63	3.64	3.65	3.66	3.68
50	3.46	3.48	3.50	3.52	3.53	3.55	3.57	3.58	3.60	3.61	3.62	3.64	3.65	3.66	3.67
60	3.42	3.44	3.46	3.47	3.49	3.51	3.52	3.54	3.55	3.56	3.58	3.59	3.60	3.61	3.62
70	3.39	3.41	3.43	3.45	3.46	3.48	3.49	3.51	3.52	3.53	3.54	3.56	3.57	3.58	3.59
80	3.37	3.39	3.41	3.42	3.44	3.45	3.47	3.48	3.50	3.51	3.52	3.53	3.54	3.55	3.57
90	3.35	3.37	3.39	3.41	3.42	3.44	3.45	3.47	3.48	3.49	3.50	3.51	3.53	3.54	3.55
100	3.34	3.36	3.38	3.39	3.41	3.42	3.44	3.45	3.46	3.48	3.49	3.50	3.51	3.52	3.53

Factor = $t_{(n-1,1-\alpha/k)}\sqrt{1+1/n}$

TABLE 3

FACTORS FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
4	[illegible]	11.98	12.34	12.66	12.95	13.22	13.47	13.70	13.91	14.11	14.31	14.49	14.66	14.82	14.98
5	[illegible]	9.01	9.25	9.46	9.65	9.83	9.99	10.14	10.29	10.42	10.54	10.66	10.77	10.88	10.98
6	[illegible]	7.51	7.68	7.84	7.99	8.12	8.24	8.35	8.46	8.55	8.65	8.73	8.82	8.90	8.97
7	[illegible]	6.61	6.76	6.89	7.00	7.11	7.20	7.29	7.38	7.46	7.53	7.60	7.67	7.73	7.79
8	[illegible]	6.03	6.15	6.26	6.36	6.45	6.53	6.61	6.68	6.74	6.81	6.87	6.92	6.97	7.02
9	[illegible]	5.62	5.73	5.82	5.91	5.99	6.06	6.13	6.19	6.25	6.30	6.35	6.40	6.45	6.49
10	[illegible]	5.32	5.42	5.50	5.58	5.65	5.72	5.77	5.83	5.88	5.93	5.98	6.02	6.06	6.10
11	[illegible]	5.09	5.18	5.26	5.33	5.39	5.45	5.51	5.56	5.60	5.65	5.69	5.73	5.77	5.80
12	[illegible]	4.91	4.99	5.07	5.13	5.19	5.25	5.30	5.34	5.39	5.43	5.47	5.50	5.54	5.57
13	[illegible]	4.77	4.84	4.91	4.97	5.03	5.08	5.13	5.17	5.21	5.25	5.28	5.32	5.35	5.38
14	[illegible]	4.65	4.72	4.78	4.84	4.89	4.94	4.99	5.03	5.07	5.10	5.14	5.17	5.20	5.23
15	[illegible]	4.54	4.61	4.68	4.73	4.78	4.83	4.87	4.91	4.95	4.98	5.01	5.04	5.07	5.10
16	[illegible]	4.46	4.53	4.59	4.64	4.69	4.73	4.77	4.81	4.84	4.88	4.91	4.94	4.96	4.99
17	[illegible]	4.39	4.45	4.51	4.56	4.61	4.65	4.69	4.72	4.76	4.79	4.82	4.85	4.87	4.90
18	[illegible]	4.32	4.39	4.44	4.49	4.54	4.58	4.61	4.65	4.68	4.71	4.74	4.77	4.79	4.82
19	[illegible]	4.27	4.33	4.38	4.43	4.47	4.51	4.55	4.58	4.61	4.64	4.67	4.70	4.72	4.75
20	[illegible]	4.22	4.28	4.33	4.38	4.42	4.46	4.49	4.53	4.56	4.59	4.61	4.64	4.66	4.68
21	[illegible]	4.18	4.23	4.28	4.33	4.37	4.41	4.44	4.48	4.50	4.53	4.56	4.58	4.61	4.63
22	[illegible]	4.14	4.19	4.24	4.29	4.33	4.36	4.40	4.43	4.46	4.49	4.51	4.54	4.56	4.58
23	[illegible]	4.10	4.16	4.21	4.25	4.29	4.32	4.36	4.39	4.42	4.44	4.47	4.49	4.51	4.54
24	[illegible]	4.07	4.12	4.17	4.21	4.25	4.29	4.32	4.35	4.38	4.41	4.43	4.45	4.48	4.50
25	[illegible]	4.04	4.09	4.14	4.18	4.22	4.26	4.29	4.32	4.35	4.37	4.40	4.42	4.44	4.46
26	[illegible]	4.01	4.07	4.11	4.16	4.19	4.23	4.26	4.29	4.31	4.34	4.36	4.39	4.41	4.43
27	[illegible]	3.99	4.04	4.09	4.13	4.17	4.20	4.23	4.26	4.29	4.31	4.33	4.36	4.38	4.40
28	[illegible]	3.97	4.02	4.06	4.11	4.14	4.17	4.21	4.23	4.26	4.28	4.31	4.33	4.35	4.37
29	[illegible]	3.95	4.00	4.04	4.08	4.12	4.15	4.18	4.21	4.24	4.26	4.28	4.30	4.32	4.34
30	[illegible]	3.93	3.98	4.02	4.06	4.10	4.13	4.16	4.19	4.21	4.24	4.26	4.28	4.30	4.32
31	[illegible]	3.91	3.96	4.00	4.04	4.08	4.11	4.14	4.17	4.19	4.22	4.24	4.26	4.28	4.30
32	[illegible]	3.90	3.94	3.99	4.03	4.06	4.09	4.12	4.15	4.17	4.20	4.22	4.24	4.26	4.28
33	[illegible]	3.88	3.93	3.97	4.01	4.04	4.08	4.10	4.13	4.16	4.18	4.20	4.22	4.24	4.26
34	[illegible]	3.87	3.91	3.96	3.99	4.03	4.06	4.09	4.11	4.14	4.16	4.18	4.20	4.22	4.24
35	[illegible]	3.85	3.90	3.94	3.98	4.01	4.04	4.07	4.10	4.12	4.15	4.17	4.19	4.21	4.22
36	[illegible]	3.84	3.89	3.93	3.97	4.00	4.03	4.06	4.08	4.11	4.13	4.15	4.17	4.19	4.21
37	[illegible]	3.83	3.88	3.92	3.95	3.99	4.02	4.04	4.07	4.09	4.12	4.14	4.16	4.18	4.19
38	[illegible]	3.82	3.86	3.90	3.94	3.97	4.00	4.03	4.06	4.08	4.10	4.12	4.14	4.16	4.18
39	[illegible]	3.81	3.85	3.89	3.93	3.96	3.99	4.02	4.05	4.07	4.09	4.11	4.13	4.15	4.17
40	[illegible]	3.80	3.84	3.88	3.92	3.95	3.98	4.01	4.03	4.06	4.08	4.10	4.12	4.14	4.15
41	[illegible]	3.79	3.83	3.87	3.91	3.94	3.97	4.00	4.02	4.05	4.07	4.09	4.11	4.12	4.14
42	[illegible]	3.78	3.82	3.86	3.90	3.93	3.96	3.99	4.01	4.04	4.06	4.08	4.10	4.11	4.13
43	[illegible]	3.77	3.82	3.85	3.89	3.92	3.95	3.98	4.00	4.03	4.05	4.07	4.09	4.10	4.12
44	[illegible]	3.76	3.81	3.85	3.88	3.91	3.94	3.97	3.99	4.02	4.04	4.06	4.08	4.09	4.11
45	[illegible]	3.75	3.80	3.84	3.87	3.91	3.93	3.96	3.98	4.01	4.03	4.05	4.07	4.08	4.10
46	[illegible]	3.75	3.79	3.83	3.87	3.90	3.93	3.95	3.98	4.00	4.02	4.04	4.06	4.08	4.09
47	[illegible]	3.74	3.78	3.82	3.86	3.89	3.92	3.94	3.97	3.99	4.01	4.03	4.05	4.07	4.08
48	[illegible]	3.73	3.78	3.82	3.85	3.88	3.91	3.94	3.96	3.98	4.00	4.02	4.04	4.06	4.07
49	[illegible]	3.73	3.77	3.81	3.84	3.88	3.90	3.93	3.95	3.98	4.00	4.02	4.03	4.05	4.07
50	[illegible]	3.72	3.76	3.80	3.84	3.87	3.90	3.92	3.95	3.97	3.99	4.01	4.03	4.04	4.06
60	[illegible]	3.67	3.71	3.75	3.78	3.81	3.84	3.87	3.89	3.91	3.93	3.95	3.97	3.98	4.00
70	[illegible]	3.64	3.68	3.72	3.75	3.78	3.80	3.83	3.85	3.87	3.89	3.91	3.93	3.94	3.96
80	[illegible]	3.61	3.65	3.69	3.72	3.75	3.78	3.80	3.82	3.84	3.86	3.88	3.89	3.91	3.93
90	[illegible]	3.59	3.63	3.67	3.70	3.73	3.75	3.78	3.80	3.82	3.84	3.85	3.87	3.89	3.90
100	[illegible]	3.58	3.62	3.65	3.68	3.71	3.74	3.76	3.78	3.80	3.82	3.84	3.85	3.87	3.88

Factor = $t_{(n-1,\ \alpha/k)}\sqrt{1+1/n}$

TABLE 4

FACTORS FOR OBTAINING TWO-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	5.81	7.06	7.86	8.45	8.94	9.35	9.70	10.01	10.30	10.55	10.79	11.00	11.21	11.40	11.57
5	4.77	5.66	6.22	6.63	6.97	7.24	7.48	7.70	7.89	8.06	8.22	8.36	8.50	8.62	8.74
6	4.23	4.93	5.37	5.69	5.95	6.16	6.35	6.51	6.65	6.79	6.90	7.02	7.12	7.21	7.30
7	3.89	4.49	4.86	5.13	5.34	5.52	5.67	5.80	5.92	6.03	6.13	6.21	6.30	6.38	6.45
8	3.67	4.20	4.52	4.75	4.94	5.09	5.22	5.34	5.44	5.53	5.61	5.69	5.76	5.83	5.89
9	3.51	3.99	4.28	4.49	4.66	4.79	4.91	5.01	5.10	5.18	5.25	5.32	5.39	5.44	5.50
10	3.39	3.84	4.10	4.30	4.45	4.57	4.68	4.77	4.85	4.92	4.99	5.05	5.11	5.16	5.21
11	3.30	3.72	3.97	4.14	4.28	4.40	4.50	4.58	4.66	4.73	4.79	4.84	4.90	4.94	4.99
12	3.22	3.62	3.86	4.03	4.16	4.26	4.36	4.44	4.51	4.57	4.63	4.68	4.73	4.77	4.82
13	3.16	3.54	3.77	3.93	4.05	4.16	4.24	4.32	4.38	4.44	4.50	4.55	4.59	4.64	4.68
14	3.11	3.48	3.70	3.85	3.97	4.07	4.15	4.22	4.28	4.34	4.39	4.44	4.48	4.52	4.56
15	3.07	3.43	3.63	3.78	3.90	3.99	4.07	4.14	4.20	4.25	4.30	4.35	4.39	4.43	4.46
16	3.03	3.38	3.58	3.72	3.84	3.93	4.00	4.07	4.13	4.18	4.23	4.27	4.31	4.35	4.38
17	3.00	3.34	3.54	3.68	3.78	3.87	3.95	4.01	4.07	4.12	4.16	4.20	4.24	4.28	4.31
18	2.97	3.31	3.50	3.63	3.74	3.82	3.89	3.96	4.01	4.06	4.11	4.15	4.18	4.22	4.25
19	2.95	3.28	3.46	3.60	3.70	3.78	3.85	3.91	3.97	4.01	4.06	4.10	4.13	4.17	4.20
20	2.93	3.25	3.43	3.56	3.66	3.74	3.81	3.87	3.92	3.97	4.01	4.05	4.09	4.12	4.15
21	2.91	3.22	3.41	3.53	3.63	3.71	3.78	3.84	3.89	3.93	3.97	4.01	4.05	4.08	4.11
22	2.89	3.20	3.38	3.51	3.60	3.68	3.75	3.80	3.85	3.90	3.94	3.98	4.01	4.04	4.07
23	2.88	3.18	3.36	3.48	3.58	3.65	3.72	3.77	3.82	3.87	3.91	3.94	3.98	4.01	4.04
24	2.86	3.17	3.34	3.46	3.55	3.63	3.69	3.75	3.80	3.84	3.88	3.92	3.95	3.98	4.01
25	2.85	3.15	3.32	3.44	3.53	3.61	3.67	3.72	3.77	3.82	3.85	3.89	3.92	3.95	3.98
26	2.84	3.14	3.30	3.42	3.51	3.59	3.65	3.70	3.75	3.79	3.83	3.87	3.90	3.93	3.95
27	2.83	3.12	3.29	3.41	3.50	3.57	3.63	3.68	3.73	3.77	3.81	3.84	3.87	3.90	3.93
28	2.82	3.11	3.27	3.39	3.48	3.55	3.61	3.66	3.71	3.75	3.79	3.82	3.85	3.88	3.91
29	2.81	3.10	3.26	3.38	3.46	3.54	3.60	3.65	3.69	3.73	3.77	3.80	3.83	3.86	3.89
30	2.80	3.09	3.25	3.36	3.45	3.52	3.58	3.63	3.68	3.72	3.75	3.79	3.82	3.85	3.87
31	2.79	3.08	3.24	3.35	3.44	3.51	3.57	3.62	3.66	3.70	3.74	3.77	3.80	3.83	3.85
32	2.79	3.07	3.23	3.34	3.43	3.50	3.55	3.60	3.65	3.69	3.72	3.76	3.79	3.81	3.84
33	2.78	3.06	3.22	3.33	3.41	3.48	3.54	3.59	3.64	3.67	3.71	3.74	3.77	3.80	3.82
34	2.77	3.05	3.21	3.32	3.40	3.47	3.53	3.58	3.62	3.66	3.70	3.73	3.76	3.78	3.81
35	2.77	3.04	3.20	3.31	3.39	3.46	3.52	3.57	3.61	3.65	3.69	3.72	3.75	3.77	3.80
36	2.76	3.04	3.19	3.30	3.39	3.45	3.51	3.56	3.60	3.64	3.67	3.71	3.73	3.7	3.79
37	2.76	3.03	3.19	3.29	3.38	3.44	3.50	3.55	3.59	3.63	3.66	3.69	3.72	3.75	3.77
38	2.75	3.02	3.18	3.29	3.37	3.44	3.49	3.54	3.58	3.62	3.65	3.68	3.71	3.74	3.76
39	2.75	3.02	3.17	3.28	3.36	3.43	3.48	3.53	3.57	3.61	3.64	3.67	3.70	3.73	3.75
40	2.74	3.01	3.17	3.27	3.35	3.42	3.47	3.52	3.56	3.60	3.63	3.67	3.69	3.72	3.74
41	2.74	3.01	3.16	3.27	3.35	3.41	3.47	3.51	3.56	3.59	3.63	3.66	3.68	3.71	3.73
42	2.73	3.00	3.15	3.26	3.34	3.41	3.46	3.51	3.55	3.59	3.62	3.65	3.68	3.70	3.73
43	2.73	3.00	3.15	3.25	3.33	3.40	3.45	3.50	3.54	3.58	3.61	3.64	3.67	3.69	3.72
44	2.73	2.99	3.14	3.25	3.33	3.39	3.45	3.49	3.53	3.57	3.60	3.63	3.66	3.69	3.71
45	2.72	2.99	3.14	3.24	3.32	3.39	3.44	3.49	3.53	3.56	3.60	3.63	3.65	3.68	3.70
46	2.72	2.98	3.13	3.24	3.32	3.38	3.43	3.48	3.52	3.56	3.59	3.62	3.65	3.67	3.70
47	2.72	2.98	3.13	3.23	3.31	3.38	3.43	3.48	3.52	3.55	3.58	3.61	3.64	3.67	3.69
48	2.71	2.98	3.12	3.23	3.31	3.37	3.42	3.47	3.51	3.55	3.58	3.61	3.63	3.66	3.68
49	2.71	2.97	3.12	3.22	3.30	3.37	3.42	3.46	3.50	3.54	3.57	3.60	3.63	3.65	3.68
50	2.71	2.97	3.12	3.22	3.30	3.36	3.41	3.46	3.50	3.53	3.57	3.60	3.62	3.65	3.67
60	2.68	2.94	3.08	3.18	3.26	3.32	3.37	3.42	3.46	3.49	3.52	3.55	3.58	3.60	3.62
70	2.67	2.92	3.06	3.16	3.24	3.30	3.35	3.39	3.43	3.46	3.49	3.52	3.54	3.57	3.59
80	2.66	2.91	3.05	3.14	3.22	3.28	3.33	3.37	3.41	3.44	3.47	3.50	3.52	3.54	3.57
90	2.65	2.89	3.03	3.13	3.20	3.26	3.31	3.35	3.39	3.42	3.45	3.48	3.50	3.53	3.55
100	2.64	2.89	3.02	3.12	3.19	3.25	3.30	3.34	3.38	3.41	3.44	3.46	3.49	3.51	3.53

Factor = $t_{(n-1,1-\alpha/2k)}\sqrt{1+1/n}$

TABLE 5

FACTORS FOR OBTAINING TWO-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4	11.74	11.90	12.05	12.20	12.34	12.47	12.60	12.72	12.84	12.95	13.06	13.17	13.27	13.37	13.47
5	8.85	8.96	9.06	9.16	9.25	9.34	9.42	9.50	9.58	9.65	9.73	9.80	9.86	9.93	9.99
6	7.39	7.47	7.54	7.61	7.68	7.75	7.81	7.87	7.93	7.99	8.04	8.09	8.14	8.19	8.24
7	6.52	6.58	6.64	6.70	6.76	6.81	6.86	6.91	6.96	7.00	7.04	7.09	7.13	7.17	7.20
8	5.95	6.00	6.06	6.10	6.15	6.20	6.24	6.28	6.32	6.36	6.40	6.43	6.47	6.50	6.53
9	5.55	5.60	5.64	5.69	5.73	5.77	5.81	5.84	5.88	5.91	5.94	5.97	6.00	6.03	6.06
10	5.26	5.30	5.34	5.38	5.42	5.45	5.49	5.52	5.55	5.58	5.61	5.64	5.66	5.69	5.72
11	5.03	5.07	5.11	5.15	5.18	5.21	5.24	5.27	5.30	5.33	5.36	5.38	5.41	5.43	5.45
12	4.86	4.89	4.93	4.96	4.99	5.02	5.05	5.08	5.11	5.13	5.16	5.18	5.20	5.22	5.25
13	4.71	4.75	4.78	4.81	4.84	4.87	4.90	4.92	4.95	4.97	5.00	5.02	5.04	5.06	5.08
14	4.60	4.63	4.66	4.69	4.72	4.75	4.77	4.80	4.82	4.84	4.86	4.88	4.90	4.92	4.94
15	4.50	4.53	4.56	4.59	4.61	4.64	4.66	4.69	4.71	4.73	4.75	4.77	4.79	4.81	4.83
16	4.41	4.45	4.47	4.50	4.53	4.55	4.57	4.60	4.62	4.64	4.66	4.68	4.70	4.71	4.73
17	4.34	4.37	4.40	4.43	4.45	4.47	4.50	4.52	4.54	4.56	4.58	4.60	4.61	4.63	4.65
18	4.28	4.31	4.34	4.36	4.39	4.41	4.43	4.45	4.47	4.49	4.51	4.53	4.54	4.56	4.58
19	4.23	4.25	4.28	4.31	4.33	4.35	4.37	4.39	4.41	4.43	4.45	4.47	4.48	4.50	4.51
20	4.18	4.21	4.23	4.26	4.28	4.30	4.32	4.34	4.36	4.38	4.39	4.41	4.43	4.44	4.46
21	4.14	4.16	4.19	4.21	4.23	4.25	4.27	4.29	4.31	4.33	4.35	4.36	4.38	4.39	4.41
22	4.10	4.12	4.15	4.17	4.19	4.21	4.23	4.25	4.27	4.29	4.30	4.32	4.34	4.35	4.36
23	4.06	4.09	4.11	4.14	4.16	4.18	4.20	4.21	4.23	4.25	4.27	4.28	4.30	4.31	4.32
24	4.03	4.06	4.08	4.10	4.12	4.14	4.16	4.18	4.20	4.21	4.23	4.25	4.26	4.28	4.29
25	4.00	4.03	4.05	4.07	4.09	4.11	4.13	4.15	4.17	4.18	4.20	4.21	4.23	4.24	4.26
26	3.98	4.00	4.03	4.05	4.07	4.09	4.10	4.12	4.14	4.16	4.17	4.19	4.20	4.21	4.23
27	3.96	3.98	4.00	4.02	4.04	4.06	4.08	4.10	4.11	4.13	4.14	4.16	4.17	4.19	4.20
28	3.93	3.96	3.98	4.00	4.02	4.04	4.06	4.07	4.09	4.11	4.12	4.13	4.15	4.16	4.17
29	3.91	3.94	3.96	3.98	4.00	4.02	4.03	4.05	4.07	4.08	4.10	4.11	4.13	4.14	4.15
30	3.90	3.92	3.94	3.96	3.98	4.00	4.01	4.03	4.05	4.06	4.08	4.09	4.10	4.12	4.13
31	3.88	3.90	3.92	3.94	3.96	3.98	4.00	4.01	4.03	4.04	4.06	4.07	4.09	4.10	4.11
32	3.86	3.88	3.91	3.93	3.94	3.96	3.98	4.00	4.01	4.03	4.04	4.05	4.07	4.08	4.09
33	3.85	3.87	3.89	3.91	3.93	3.95	3.96	3.98	3.99	4.01	4.02	4.04	4.05	4.06	4.08
34	3.83	3.86	3.88	3.90	3.91	3.93	3.95	3.96	3.98	3.99	4.01	4.02	4.03	4.05	4.06
35	3.82	3.84	3.86	3.88	3.90	3.92	3.93	3.95	3.97	3.98	3.99	4.01	4.02	4.03	4.04
36	3.81	3.83	3.85	3.87	3.89	3.90	3.92	3.94	3.95	3.97	3.98	3.99	4.01	4.02	4.03
37	3.80	3.82	3.84	3.86	3.88	3.89	3.91	3.92	3.94	3.95	3.97	3.98	3.99	4.00	4.02
38	3.79	3.81	3.83	3.85	3.86	3.88	3.90	3.91	3.93	3.94	3.95	3.97	3.98	3.99	4.00
39	3.78	3.80	3.82	3.84	3.85	3.87	3.89	3.90	3.92	3.93	3.94	3.96	3.97	3.98	3.99
40	3.77	3.79	3.81	3.83	3.84	3.86	3.88	3.89	3.91	3.92	3.93	3.95	3.96	3.97	3.98
41	3.76	3.78	3.80	3.82	3.83	3.85	3.87	3.88	3.90	3.91	3.92	3.94	3.95	3.96	3.97
42	3.75	3.77	3.79	3.81	3.82	3.84	3.86	3.87	3.89	3.90	3.91	3.93	3.94	3.95	3.96
43	3.74	3.76	3.78	3.80	3.82	3.83	3.85	3.86	3.88	3.89	3.90	3.92	3.93	3.94	3.95
44	3.73	3.75	3.77	3.79	3.81	3.82	3.84	3.85	3.87	3.88	3.89	3.91	3.92	3.93	3.94
45	3.72	3.74	3.76	3.78	3.80	3.82	3.83	3.85	3.86	3.87	3.89	3.90	3.91	3.92	3.93
46	3.72	3.74	3.76	3.77	3.79	3.81	3.82	3.84	3.85	3.87	3.88	3.89	3.90	3.91	3.93
47	3.71	3.73	3.75	3.77	3.78	3.80	3.82	3.83	3.84	3.86	3.87	3.88	3.90	3.91	3.92
48	3.70	3.72	3.74	3.76	3.78	3.79	3.81	3.82	3.84	3.85	3.86	3.88	3.89	3.90	3.91
49	3.70	3.72	3.74	3.75	3.77	3.79	3.80	3.82	3.83	3.84	3.86	3.87	3.88	3.89	3.90
50	3.69	3.71	3.73	3.75	3.76	3.78	3.80	3.81	3.82	3.84	3.85	3.86	3.87	3.89	3.90
60	3.64	3.66	3.68	3.70	3.71	3.73	3.74	3.76	3.77	3.78	3.80	3.81	3.82	3.83	3.84
70	3.61	3.63	3.65	3.66	3.68	3.69	3.71	3.72	3.74	3.75	3.76	3.77	3.78	3.79	3.80
80	3.59	3.60	3.62	3.64	3.65	3.67	3.68	3.70	3.71	3.72	3.73	3.74	3.75	3.76	3.78
90	3.57	3.58	3.60	3.62	3.63	3.65	3.66	3.67	3.69	3.70	3.71	3.72	3.73	3.74	3.75
100	3.55	3.57	3.59	3.60	3.62	3.63	3.65	3.66	3.67	3.68	3.69	3.71	3.72	3.73	3.74

Factor = $t_{(n-1,1-\alpha/2k)}\sqrt{1+1/n}$

TABLE 6

FACTORS FOR OBTAINING TWO-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
4	13.47	13.91	14.31	14.66	14.98	15.27	15.54	15.80	16.03	16.26	16.46	16.66	16.85	17.03	17.20
5	9.99	10.29	10.54	10.77	10.98	11.17	11.35	11.51	11.67	11.81	11.94	12.07	12.19	12.31	12.42
6	8.24	8.46	8.65	8.82	8.97	9.11	9.24	9.36	9.48	9.58	9.68	9.77	9.86	9.95	10.03
7	7.20	7.38	7.53	7.67	7.79	7.90	8.01	8.10	8.19	8.28	8.35	8.43	8.50	8.57	8.63
8	6.53	6.68	6.81	6.92	7.02	7.12	7.20	7.29	7.36	7.43	7.50	7.56	7.62	7.67	7.72
9	6.06	6.19	6.30	6.40	6.49	6.57	6.65	6.72	6.78	6.84	6.90	6.95	7.00	7.05	7.10
10	5.72	5.83	5.93	6.02	6.10	6.17	6.24	6.30	6.36	6.41	6.46	6.51	6.56	6.60	6.64
11	5.45	5.56	5.65	5.73	5.80	5.87	5.93	5.99	6.04	6.09	6.13	6.18	6.22	6.25	6.29
12	5.25	5.34	5.43	5.50	5.57	5.63	5.69	5.74	5.79	5.83	5.87	5.91	5.95	5.99	6.02
13	5.08	5.17	5.25	5.32	5.38	5.44	5.49	5.54	5.58	5.63	5.66	5.70	5.74	5.77	5.80
14	4.94	5.03	5.10	5.17	5.23	5.28	5.33	5.38	5.42	5.46	5.49	5.53	5.56	5.59	5.62
15	4.83	4.91	4.98	5.04	5.10	5.15	5.20	5.24	5.28	5.32	5.35	5.38	5.42	5.45	5.47
16	4.73	4.81	4.88	4.94	4.99	5.04	5.08	5.12	5.16	5.20	5.23	5.26	5.29	5.32	5.35
17	4.65	4.72	4.79	4.85	4.90	4.94	4.99	5.03	5.06	5.10	5.13	5.16	5.19	5.21	5.24
18	4.58	4.65	4.71	4.77	4.82	4.86	4.90	4.94	4.98	5.01	5.04	5.07	5.10	5.12	5.15
19	4.51	4.58	4.64	4.70	4.75	4.79	4.83	4.87	4.90	4.93	4.96	4.99	5.02	5.04	5.06
20	4.46	4.53	4.59	4.64	4.68	4.73	4.77	4.80	4.83	4.86	4.89	4.92	4.95	4.97	4.99
21	4.41	4.48	4.53	4.58	4.63	4.67	4.71	4.74	4.77	4.80	4.83	4.86	4.88	4.91	4.93
22	4.36	4.43	4.49	4.54	4.58	4.62	4.66	4.69	4.72	4.75	4.78	4.80	4.83	4.85	4.87
23	4.32	4.39	4.44	4.49	4.54	4.58	4.61	4.64	4.67	4.70	4.73	4.75	4.78	4.80	4.82
24	4.29	4.35	4.41	4.45	4.50	4.53	4.57	4.60	4.63	4.66	4.69	4.71	4.73	4.76	4.78
25	4.26	4.32	4.37	4.42	4.46	4.50	4.53	4.56	4.59	4.62	4.65	4.67	4.69	4.71	4.73
26	4.23	4.29	4.34	4.39	4.43	4.46	4.50	4.53	4.56	4.58	4.61	4.63	4.66	4.68	4.70
27	4.20	4.26	4.31	4.36	4.40	4.43	4.47	4.50	4.53	4.55	4.58	4.60	4.62	4.64	4.66
28	4.17	4.23	4.28	4.33	4.37	4.40	4.44	4.47	4.50	4.52	4.55	4.57	4.59	4.61	4.63
29	4.15	4.21	4.26	4.30	4.34	4.38	4.41	4.44	4.47	4.49	4.52	4.54	4.56	4.58	4.60
30	4.13	4.19	4.24	4.28	4.32	4.35	4.39	4.42	4.44	4.47	4.49	4.51	4.53	4.55	4.57
31	4.11	4.17	4.22	4.26	4.30	4.33	4.36	4.39	4.42	4.44	4.47	4.49	4.51	4.53	4.55
32	4.09	4.15	4.20	4.24	4.28	4.31	4.34	4.37	4.40	4.42	4.45	4.47	4.49	4.51	4.52
33	4.08	4.13	4.18	4.22	4.26	4.29	4.32	4.35	4.38	4.40	4.42	4.45	4.47	4.48	4.50
34	4.06	4.11	4.16	4.20	4.24	4.27	4.30	4.33	4.36	4.38	4.40	4.43	4.45	4.46	4.48
35	4.04	4.10	4.15	4.19	4.22	4.26	4.29	4.31	4.34	4.36	4.39	4.41	4.43	4.45	4.46
36	4.03	4.08	4.13	4.17	4.21	4.24	4.27	4.30	4.32	4.35	4.37	4.39	4.41	4.43	4.45
37	4.02	4.07	4.12	4.16	4.19	4.23	4.26	4.28	4.31	4.33	4.35	4.37	4.39	4.41	4.43
38	4.00	4.06	4.10	4.14	4.18	4.21	4.24	4.27	4.29	4.32	4.34	4.36	4.38	4.40	4.41
39	3.99	4.05	4.09	4.13	4.17	4.20	4.23	4.25	4.28	4.30	4.32	4.34	4.36	4.38	4.40
40	3.98	4.03	4.08	4.12	4.15	4.19	4.21	4.24	4.27	4.29	4.31	4.33	4.35	4.37	4.38
41	3.97	4.02	4.07	4.11	4.14	4.17	4.20	4.23	4.25	4.28	4.30	4.32	4.34	4.35	4.37
42	3.96	4.01	4.06	4.10	4.13	4.16	4.19	4.22	4.24	4.26	4.29	4.31	4.32	4.34	4.36
43	3.95	4.00	4.05	4.09	4.12	4.15	4.18	4.21	4.23	4.25	4.27	4.29	4.31	4.33	4.35
44	3.94	3.99	4.04	4.08	4.11	4.14	4.17	4.20	4.22	4.24	4.26	4.28	4.30	4.32	4.33
45	3.93	3.98	4.03	4.07	4.10	4.13	4.16	4.19	4.21	4.23	4.25	4.27	4.29	4.31	4.32
46	3.93	3.98	4.02	4.06	4.09	4.12	4.15	4.18	4.20	4.22	4.24	4.26	4.28	4.30	4.31
47	3.92	3.97	4.01	4.05	4.08	4.11	4.14	4.17	4.19	4.21	4.23	4.25	4.27	4.29	4.30
48	3.91	3.96	4.00	4.04	4.07	4.11	4.13	4.16	4.18	4.20	4.22	4.24	4.26	4.28	4.29
49	3.90	3.95	4.00	4.03	4.07	4.10	4.12	4.15	4.17	4.20	4.22	4.23	4.25	4.27	4.29
50	3.90	3.95	3.99	4.03	4.06	4.09	4.12	4.14	4.17	4.19	4.21	4.23	4.24	4.26	4.28
60	3.84	3.89	3.93	3.97	4.00	4.03	4.05	4.08	4.10	4.12	4.14	4.16	4.18	4.19	4.21
70	3.80	3.85	3.89	3.93	3.96	3.98	4.01	4.03	4.06	4.08	4.09	4.11	4.13	4.14	4.16
80	3.78	3.82	3.86	3.89	3.93	3.95	3.98	4.00	4.02	4.04	4.06	4.08	4.09	4.11	4.12
90	3.75	3.80	3.84	3.87	3.90	3.93	3.95	3.98	4.00	4.02	4.03	4.05	4.07	4.08	4.10
100	3.74	3.78	3.82	3.85	3.88	3.91	3.93	3.96	3.98	4.00	4.01	4.03	4.05	4.06	4.08

Factor = $t_{(n-1,1-\alpha/2k)}\sqrt{1+1/n}$

Statistical Models for the Analysis of Volatile Organic Compounds in Waste Disposal Sites

Robert D. Gibbons
University of Illinois

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Dr. R.D. Gibbons
Biometric Laboratory
Illinois State Psychiatric Institute,
1601 W. Taylor St., Chicago, IL 60612, USA.

ABSTRACT

The occurrence of low level hits of volatile organic priority pollutant compounds is statistically modeled as a Poisson process. Methods are developed to estimate the mean of the Poisson distribution for a random sample of volatile organic measurements as well as 99% prediction limits and 99% tolerance limits. The prediction limits provide an interval estimate that will include values obtained for the next k future measurements based on a sample of n previous measurements with 99% confidence. The tolerance limits provide an interval estimate for the n previous measurements that will contain 99% of the population of background measurements with 95% confidence. These methods are illustrated with measurements obtained from 61 field blanks, 56 trip blanks, and 162 samples obtained from 29 upgradient wells. Both prediction and tolerance limits yielded extremely similar results in all three examples.

1 INTRODUCTION

The current regulatory approach to ground-water monitoring at hazardous waste disposal facilities relies on "indicator parameters" to establish the need for more extensive characterization of ground-water monitoring samples. The critical assumption underlying this strategy, is that the selected indicator parameters, pH, specific conductance (SC), total organic carbon (TOC), and total organic halogen (TOX) reflect levels of four major priority pollutant groups (volatiles, base/neutrals, acid extractables, and pesticides). If these four indicator parameters did serve as reasonable surrogates for the extensive list of priority pollutant compounds, statistical monitoring of these four compounds could indicate when analysis of the more extensive list was required. Based on a study of 350 CERCLA and RCRA sites and over 1000 elements and compounds, Plumb (1987) has demonstrated that increases in these four indicator parameters are rarely accompanied by increases in the levels of priority pollutant compounds. In fact, the concordance rates were only 10% for TOC, 16% for TOX, 38% for pH, and 38% for SC. In contrast, use of the 32 volatile organic priority pollutant compounds (VOC) as indicator parameters produced a concordance rate of 80%, and the correlation between the number of detected VOCs and the total number of priority pollutant compounds detected was $r = .97$ (*i.e.*, VOCs accounted for 94% of the variation in the total number of priority pollutant compounds detected). In fact, 49 out of the top 50 detected contaminants were either VOCs or discrete pairs of VOCs (*e.g.*, benzene and chloroform detected in the same scan). This finding also holds for 97 out of the top 100 contaminants and 139 out of the top 150 contaminants. These results taken as a whole, clearly indicate the superiority of VOCs as indicator parameters relative to the current use of pH, SC, TOC, and TOX.

Although VOCs may provide a major improvement over the previous indicator parameters, they are far more challenging from a statistical perspective. For example, Hurd (1987) has shown that low level "hits" of VOCs are found in approximately 5% of trip blanks, field blanks, and clean upgradient wells. Inspection of the frequency distributions for field blanks, trip blanks, and clean upgradient wells exhibit virtually identical patterns (see Table 1). Similarly, when compared to downgradient data, the same low level hit distribution observed in blanks and upgradient data is found; however, in the case of downgradient wells a second elevated component distribution is also observed (see Table 1). This elevated component distribution, presumably reflects those values obtained from contaminated wells. Simple inspection of Table 1 suggests that low level "hits" are common in the 0-40 *ppb* range, whereas, the contaminant distribution begins between 50 and 100 *ppb*.

What should be immediately obvious from Table 1 is that while VOCs are detected in background measurements, their frequency of detection classifies them as rare events. In light of this, it will take a considerable amount of monitoring to establish a site-specific background that is suitable for statistical predictions of limits for future downgradient measurements.

TABLE 1

Frequency Distributions for Field Blanks, Trip Blanks, Clean Upgradient Wells, and Downgradient Wells

ppb	Field Blanks		Trip Blanks		Upgradient Wells		Downgradient Wells	
	n	%	n	%	n	%	n	%
ND	1985	(94%)	1777	(96%)	4981	(93%)	6023	(87%)
0-10	43	(2%)	42	(2.2%)	130	(2.4%)	296	(4.3%)
11-20	74	(3.5%)	28	(1.5%)	243	(4.5%)	320	(4.6%)
21-30	4	(0.2%)	2	(0.1%)	12	(0.2%)	39	(0.6%)
31-40	1	(0.05%)	3	(0.2%)	6	(0.1%)	28	(0.4%)
41-50	1	(0.05%)	0		1	(0.01%)	16	(0.2%)
51-100	0		1	(0.05%)	1	(0.01%)	49	(0.7%)
101-500	0		0		0		59	(0.9%)
500-	0		0		0		93	(1.3%)
# of scans	61		56		162		223	

ND= not detected

2 STATISTICAL PROCEDURES

2.1 Prediction Limits for a Normal Distribution

Inspection of the data in Table 1 suggests several statistical approaches. Perhaps the simplest procedure, is to ignore the non-detected values and compute the mean and standard deviation of only those values that were, in fact, detected. Given the long right tail of the frequency distributions in Table 1, we might first transform the data by taking natural logarithms and compute the mean and standard deviation on a logarithmic scale. For example, the mean and standard deviation for the 123 detected field blanks is 2.78 ± 0.37, for the 76 detected trip blanks is 2.67 ± 0.47, and for the 393 detected values from the sample of 29 upgradient wells is 2.80 ± 0.31. Given these sample estimates, we may compute prediction limits (Hahn, 1969; Dahiya and Guttman, 1982; Gibbons, 1987) that will contain all of the next k VOC measurements with 99% confidence. In the present context k represents the number of downgradient monitoring wells. For example, if we wished to obtain a limit value that would include the next single observation, assuming that we had estimated $\bar{y}_{log}$ and s_{log} from the sample of field blanks in Table 1, we would apply the equation:

$$\exp\{\bar{y}_{log} + \sqrt{1 + 1/n}\, t_{[n-1,\alpha]}\, s_{log}\}$$

which in this case would yield:

$$\exp\{2.78 + \sqrt{1 + 1/123}\, 2.37\ (0.37)\} = 38.88$$

or 39 *ppb*. Similarly, the 99% prediction limit based on trip blanks would be:

$$\exp\{2.67 + \sqrt{1 + 1/76}\, 2.38\ (0.47)\} = 44.52$$

or 45 *ppb*. Finally, the 99% prediction limit based on the 29 clean upgradient wells would be:

$$\exp\{2.80 + \sqrt{1 + 1/323}\, 2.33\ (0.38)\} = 39.92$$

or 40 *ppb*. These findings confirm what is evident from the frequency distributions in Table 1, namely, it is rare to find a VOC above 40 *ppb* in trip blanks, field blanks, or clean upgradient wells.

Statistically, there are two unattractive features of what has just been presented. First, in terms of our estimates for the sample of upgradient wells, the sample standard deviation is a biased estimate of the population parameter σ, unless we assume that temporal and spatial variability are equivalent. Given that VOCs are not naturally occurring constituents of ground water, this may be a reasonable assumption; however, a more statistically rigorous approach would be to compute the total variance $\mathcal{V}(x_{ij})$, where x_{ij} is the measurement on well i for monitoring event j using a *random effects* analysis of variance model (see Winer 1971, page 360). Details for obtaining unbiased estimates of σ in the context of ground-water monitoring are described by Gibbons (1987) and Starks (1986).

Second, it is difficult to justify simply ignoring those values that are not detected in computing estimates of μ and σ. Alternate procedures for estimating the mean and variance of a "censored" normal distribution (Cohen, 1961) or "censored" lognormal distribution (Aitchison, 1955) are available, however, these estimates are generally inappropriate for background samples in which only 5% of the data are actually detected. In the following section, a model that incorporates both detected and non-detected values is presented.

2.2 The Poisson Distribution

In 1837 Poisson published the derivation of a distribution that bears his name. Poisson's approach was to derive a distribution for a series of independent events in which the number of trials was large, the probability of the occurrence of the outcome was small and the probability remained constant over trials. In the classic illustration of the Poisson distribution, Bortkiewicz (1898) considered the number of deaths from being kicked by mules, per annum, in the Prussian Army Corps. In this case, the probability of death from this cause was small and the number of soldiers exposed to risk was large. "Student" (W.S. Gosset) in 1907, used the Poisson distribution to represent the number of particles falling in a small area when a large number of areas are spread at random over a surface. Similarly, Rutherford

and Geiger (1910) used the Poisson distribution to model variations in the number of particles emitted by a radioactive source per unit time.

In more recent years, the Poisson distribution has been used to characterize rare events such as suicide rates and number of mutated cells on plates containing 10^6 cells.

In the context of ground-water monitoring two applications of the Poisson distribution suggest themselves. First, the number of "hits" out of a large number of VOC measurements could be modeled by the Poisson distribution (see Silver, 1986). Second, we might consider the molecule the unit of observation and postulate that the number of molecules of a particular compound out of a much larger number of molecules of water is the result of a Poisson process. For example, we might consider 12 *ppb* of benzene to represent a count of 12 units of benzene for every billion units examined. In this context, Poisson's approach is justified in that the number of units (*i.e.*, molecules) examined is large and the probability of the occurrence (*i.e.*, a molecule being classified as benzene) is small.

As an illustration of the Poisson distribution consider the data for field blanks in Table 1. First, let us examine the question of, on average, how many detected compounds can be expected to occur per scan of 32 compounds. The probability of a scan with exactly x detected compounds is:

$$f(x,\mu) = \frac{\mu^x}{x!} e^{-\mu}$$

$$x = 0, 1, 2, \ldots$$
$$e = 2.718$$

The term μ is the mean of the Poisson distribution, that is:

$$\mu = \sum_{x=0}^{\infty} x\, f(x)$$

for which the sample mean is the unbiased estimator, that is:

$$\hat{\mu} = \bar{x} = \sum_{i=1}^{N} x_i / n$$

For example, the probability of a sample with no detected compounds is:

$$f(0, \bar{x}) = e^{-\bar{x}}$$

and the probability of a sample with 3 detected compounds is:

$$f(3, \bar{x}) = \frac{\bar{x}^3\, e^{-\bar{x}}}{(2)(3)}$$

The expected number of samples with 3 detected compounds is, therefore, $n\,f(3,\bar{x})$, where n is the number of samples.

Turning to our example of field blanks in Table 1, 123 detections are reported for 61 scans, therefore, $\bar{x} = 123/61$ or 2.02 detections per scan. The probability of a sample with 5 detected compounds is therefore:

$$f(5, 2.02) = \frac{(2.02)^5\ e^{-2.02}}{5!} = 0.037$$

and we would expect $61(.037) = 2.26$ out of 61 samples to have 5 detected compounds. Similarly, the probability of 5 detected compounds is $f(5, 1.36) = 0.01$ for trip blanks and $f(5, 2.42) = 0.06$ for the sample of 29 upgradient wells.

Although this example nicely illustrates the use of the Poisson distribution, it says nothing about the concentration of individual detected compounds. For example, 4 compounds detected at 10 *ppb* would provide exactly the same probability estimate as 4 compounds detected at 1 *ppm*!

Second, let us examine the case in which the molecule is the unit of observation. Returning to the field blank example, we find 2120 *ppb* out of a total of 61 samples, therefore, $\bar{x} = 2120/61$ or 34.75 *ppb* per sample. The probability of a sample with exactly 40 *ppb* is therefore:

$$f(40, 34.75) = \frac{(34.75)^{40}\ e^{-34.75}}{40!} = 0.04$$

2.3 Poisson Tolerance Limits

One possible decision rule that can be generated from the Poisson distribution is to compute a limit value that will contain 99% of the previous background measurements with 95% confidence. Individual new downgradient sample values might then be informally compared to this tolerance limit. However, this comparison does not, in and of itself, constitute a statistical test of the null hypothesis that the new observation was drawn from the same distribution as the previous samples.

The uniformly most accurate upper tolerance limit for the Poisson distribution is given by Zacks (1970). The derivation begins by obtaining the cumulative probability that a or more occurrences will be observed:

$$P(a, \mu) = \sum_{x=a}^{\infty} f(x, \mu)$$

which can be computed as

$$P(a, \mu) = P\left(\chi^2[2a+2] \geq 2\mu\right)$$

where $\chi^2[\gamma]$ designates a chi-square random variable with γ degrees of freedom. This relationship between the Poisson and chi-square distribution was first described by Hartley and Pearson (1950). Given n independent and identically distributed Poisson random variables (*i.e.*, one count per sample), the sum

$$T_n = \sum_{i=1}^{n} x_i$$

also has a Poisson distribution.

Substituting T_n for μ we can find the value for which the cumulative probability is 99%, that is:

$$K_{.99}(T_n) = \frac{1}{2n}\chi^2_{.99}[2Tn + 2]$$

The 99% upper tolerance limit is therefore:

$$\begin{aligned} P^{-1}(\alpha; K_{.99}(T_n)) &= \text{least non-negative integer } j \text{ such that} \\ &\quad \chi^2_{\alpha}[2j + 2] > 2K_{.99}(T_n) \\ \text{where} &\quad \alpha \text{ is the required confidence level,} \\ &\quad \text{say, 95\%} \end{aligned}$$

For example, in the previous field blank data set, we observed 123 detections out of 61 VOC scans, therefore, $T_n = 123$ and $n = 61$. The cumulative 99% probability point is[1]:

$$\begin{aligned} K_{.99}(123) &= \frac{1}{122}\chi^2_{.99}[2(123) + 2] \\ &= \frac{302}{122} = 2.48 \end{aligned}$$

The 99% upper tolerance limit is obtained by finding the smallest non-negative integer j such that:

$$\chi^2_{.05}[2j + 2] \geq 2(2.48)$$

Inspection of standard chi-square tables (extracted below for $j = 3$ to 6) reveals that the value of j that satisfies this equation is 5.

j	$\chi^2_{.05}[2j+2]$
3	2.73
4	3.94
5	5.23
6	6.57

[1]Probability points of the chi-square distribution were obtained using the Peiser and Pratt approximation described by Maindonald (1984) page 294.

Therefore, the $P^{-1}(0.95; K_{.99}(123))$ upper tolerance limit is 5 compounds per scan. For trip blanks $K_{.99}(76) = 1.76$ therefore $j = 4 = \chi^2_{.05}[10] = 3.94 \geq 2(1.76)$ and the upper tolerance limit is 4 detected compounds per scan. Finally, for upgradient wells $K_{.99}(393) = 2.72$ and the upper tolerance limit is 6 compounds per scan (*i.e.*, $\chi^2_{.05}[2(6) + 2] = 6.57$, which is the smallest value of j that produces a chi-square value greater than $2(2.72) = 5.44$).

Turning to the second case in which the molecule is the unit of observation, we obtain for field blanks,

$$\begin{aligned} K_{.99}(2120) &= \frac{1}{122}\chi^2_{.99}[2(2120) + 2] \\ &= 36.52 \end{aligned}$$

and find that $j = 46$ satisfies the equation

$$\chi^2_{.05}[2(46) + 2] \geq 73.05$$

In this case, the value of j represents the total number of parts per billion detected in an entire volatile organic scan, that is, no more than 46 *ppb* per scan. The 99% tolerance limit for trip blanks was 32 *ppb* and the upper 99% tolerance limit for the sample of 29 upgradient wells was 55 *ppb*.

2.4 Poisson Prediction Limits

The previously described tolerance limits provide interval estimates that contain a specified proportion of the population of background measurements with a certain level of confidence. A somewhat more appropriate interval estimate for the purpose of ground-water monitoring is a prediction limit which specifies an interval computed from n previous measurements that will contain k future measurements. In this context the n previous measurements are either a series of site-specific scans or the trip blank and field blank measurements reported in Table 1, and the k future measurements refer to the observations obtained on the next monitoring event at k downgradient wells.

Cox and Hinkley (1974) consider the case in which y has a Poisson distribution with mean μ. Having observed y their goal is to predict y^* which has a Poisson distribution with mean $c\mu$ where c is a known constant. In the context of ground-water monitoring y is the number of events observed in n previous samples, and y^* is the number of events observed in a single future sample, therefore, $c = 1/n$. Following Cox and Hinkley (1974) we develop a prediction limit using, as an approximation, the fact that the left side of:

$$\left(y^* - \frac{c(y + y^*)}{(1 + c)}\right)^2 \Big/ \left(\frac{c(y + y^*)}{(1 + c)^2}\right) < t^2_{[n-1,\alpha]}$$

is approximately a standard normal deviate, therefore, the $100(1-\alpha)\%$ prediction limit for y^* is formed from Student's t-distribution. Upon solving for y^* the upper limit value is found as the positive root of the quadratic equation:

$$y^* = \frac{2cy + t^2c + \sqrt{(-2cy - t^2c)^2 - 4[(cy)^2 - t^2cy]}}{2}$$

which after a bit of algebra simplifies somewhat to:

$$y^* = cy + \frac{t^2c}{2} + tc\sqrt{y(1+1/c) + t^2/4}$$

For example, applying this equation to the number of detected field blanks in Table 1 yields $y = 123$, $n = 61$, and $t_{[60,.01]} = 2.39$; therefore, the 99% upper prediction limit is:

$$\begin{aligned} y^* &= \frac{123}{61} + \frac{(2.39)^2}{2(61)} + \frac{2.39}{61}\sqrt{123(1+61) + (2.39)^2/4} \\ &= 5.47 \text{ detections per scan.} \end{aligned}$$

When applied to the number of detected values for trip blanks we have $y = 76$, $n = 56$, and $t_{[55,.01]} = 2.40$ which yields a 99% prediction limit of 4.23 detections per scan. Similarly, for upgradient wells we have $y = 393$, $n = 162$, and $t_{[161,.01]} = 2.35$ which yields the 99% prediction limit for the next single measurement of 6.11 detections. These results are identical to the previously estimated tolerance limits which yielded limit values of 5, 4, and 6 for field blanks, trip blanks, and upgradient wells, respectively.

Turning to the molecular approach, we may simply substitute previously defined values for y, such that we obtain for field blanks ($y = 2120$) a 99% upper prediction limit of 49 *ppb* per scan, for trip blanks ($y = 1260$) a 99% upper prediction limit of 34 *ppb* per scan, and for upgradient wells ($y = 6910$) a 99% upper prediction limit of 58 *ppb* per scan. Again, these prediction limit values are extremely similar to their corresponding tolerance limit values of 46 *ppb*, 32 *ppb*, and 55 *ppb*, respectively.

The previous prediction limits can only be used to obtain a limit value that will include a single future measurement. A simple yet conservative approximate method for obtaining a limit value that will contain the next k future measurements, where k is the number of downgradient wells, can be obtained by substituting $t_{[n-1,\,\alpha/k]}$ for $t_{[n-1,\,\alpha]}$ in the previous equations. This method of obtaining prediction intervals is based on the Bonferroni inequality (Miller, 1966) and has been shown to be satisfactory for practical purposes in computing normal prediction limits by Hahn (1969). Tables 2-4 provide values of $t_{[n-1,\,\alpha/k]}$ for previous sample sizes of $n = 4$ to 100 and future samples of size 1 to 100, using the algorithm provided by Maindonald (1984).

The method developed for computing Poisson prediction limits is approximate due to the previously described normality assumption which leads to use of Student's t-distribution. These estimates should be adequate for practical purposes and their

similarity to the uniformly most accurate Poisson tolerance limits is strong support for this claim. Exact 99% prediction limits for the Poisson distribution do not appear to have been published in the statistical literature, although they may be obtained using Bayesian methods for interval estimation (Guttman, 1970). This derivation is beyond the scope of the present paper; however, work on this problem is currently under way.

3 SUMMARY

Volatile organic compounds are detected at low levels in trip blanks, field blanks, and clean upgradient wells. Inspection of the frequency distributions for these three sets of data clearly reveals the characteristic shape of a Poisson distribution. In contrast, similar data for a large sample of downgradient wells yields a much different frequency distribution which appears to be a mixture of two processes; one of low level hits, similar to that observed in blanks and upgradient wells, and a second elevated component distribution that probably represents contamination.

In this paper, interval estimates have been derived which a) contain a specified proportion of the background measurements with a given level of confidence (*i.e.*, a tolerance limit), and b) allow us to predict the maximum allowable value of a series of future measurements obtained from one or more downgradient wells, based on the results of n previous measurements (*i.e.*, a prediction limit). These interval estimates have been constructed both for the absolute number of detected compounds and for their concentration, which is measured in terms of the total number of detected parts per billion per volatile organic scan.

Application of these estimates to actual volatile organic datasets revealed remarkably consistent results. In the sample of field blanks, we find that no more than 5 detected compounds in a single scan are permissible and that the number of detected parts per billion for the entire scan cannot exceed 49 *ppb*. In terms of trip blanks, the results are somewhat lower (*i.e.*, 4 compounds and 34 *ppb* detected per scan) and slightly higher for upgradient wells (*i.e.*, 6 compounds detected per scan at no more than a total of 58 *ppb*). Interestingly, if we had simply computed normal prediction limits on only those measurements that were detected, we would have obtained 99% upper limit values around 40 *ppb* for all three datasets.

In addition to the methods outlined here, alternative strategies are also available. As previously mentioned, exact 99% prediction intervals could be developed using Bayesian methods. Work in this area is currently under way. Alternatively, we might consider estimates based on a censored Poisson distribution (Cohen, 1954)[2]. In the methods previously described, non-detects are assigned a value of zero. This is not strictly correct. Values below a method detection limit represent *censored* or missing data. We know the proportion of the sample that is missing but we do not really know that their values are zero. Methods for estimating the mean of the Poisson distribution when the sample is restricted, as in the case of method detection limits, may also prove useful in the analysis of volatile organic data.

[2] We are grateful to an anonymous reviewer for suggesting this approach.

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TABLE 2

VALUES OF t FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	4.54	5.84	5.83	6.31	6.70	7.03	7.31	7.56	7.79	8.00	8.18	8.36	8.52	8.68	8.82
5	3.75	4.60	4.82	5.17	5.45	5.68	5.88	6.06	6.21	6.36	6.49	6.61	6.73	6.83	6.93
6	3.37	4.03	4.29	4.57	4.79	4.97	5.13	5.27	5.40	5.51	5.61	5.71	5.79	5.88	5.95
7	3.14	3.71	3.97	4.20	4.39	4.55	4.68	4.80	4.90	5.00	5.08	5.16	5.23	5.30	5.37
8	2.99	3.50	3.75	3.96	4.13	4.26	4.38	4.48	4.57	4.66	4.73	4.80	4.86	4.92	4.98
9	2.90	3.36	3.59	3.79	3.94	4.06	4.17	4.26	4.34	4.42	4.48	4.55	4.60	4.66	4.71
10	2.82	3.25	3.48	3.66	3.80	3.91	4.01	4.10	4.17	4.24	4.30	4.36	4.41	4.46	4.50
11	2.76	3.17	3.39	3.56	3.69	3.80	3.89	3.97	4.04	4.10	4.16	4.21	4.26	4.31	4.35
12	2.71	3.10	3.32	3.48	3.60	3.71	3.79	3.87	3.93	3.99	4.05	4.10	4.14	4.19	4.23
13	2.68	3.05	3.26	3.42	3.53	3.63	3.71	3.79	3.85	3.91	3.96	4.00	4.05	4.09	4.13
14	2.65	3.01	3.21	3.36	3.48	3.57	3.65	3.72	3.78	3.83	3.88	3.93	3.97	4.01	4.04
15	2.62	2.97	3.17	3.32	3.43	3.52	3.60	3.66	3.72	3.77	3.82	3.86	3.90	3.94	3.97
16	2.60	2.94	3.14	3.28	3.39	3.48	3.55	3.61	3.67	3.72	3.77	3.81	3.85	3.88	3.92
17	2.58	2.92	3.11	3.25	3.35	3.44	3.51	3.57	3.63	3.68	3.72	3.76	3.80	3.83	3.87
18	2.57	2.90	3.08	3.22	3.32	3.40	3.47	3.54	3.59	3.64	3.68	3.72	3.76	3.79	3.82
19	2.55	2.88	3.06	3.19	3.29	3.38	3.44	3.50	3.56	3.60	3.65	3.68	3.72	3.75	3.78
20	2.54	2.86	3.04	3.17	3.27	3.35	3.42	3.48	3.53	3.57	3.62	3.65	3.69	3.72	3.75
21	2.53	2.84	3.02	3.15	3.25	3.33	3.39	3.45	3.50	3.55	3.59	3.62	3.66	3.69	3.72
22	2.52	2.83	3.01	3.13	3.23	3.31	3.37	3.43	3.48	3.52	3.56	3.60	3.63	3.66	3.69
23	2.51	2.82	2.99	3.12	3.21	3.29	3.35	3.41	3.46	3.50	3.54	3.58	3.61	3.64	3.67
24	2.50	2.81	2.98	3.10	3.20	3.27	3.34	3.39	3.44	3.48	3.52	3.56	3.59	3.62	3.65
25	2.49	2.80	2.97	3.09	3.18	3.26	3.32	3.37	3.42	3.46	3.50	3.54	3.57	3.60	3.63
26	2.48	2.79	2.96	3.08	3.17	3.24	3.30	3.36	3.41	3.45	3.49	3.52	3.55	3.58	3.61
27	2.48	2.78	2.95	3.07	3.16	3.23	3.29	3.34	3.39	3.43	3.47	3.50	3.54	3.56	3.59
28	2.47	2.77	2.94	3.06	3.15	3.22	3.28	3.33	3.38	3.42	3.46	3.49	3.52	3.55	3.58
29	2.47	2.76	2.93	3.05	3.14	3.21	3.27	3.32	3.37	3.41	3.44	3.48	3.51	3.54	3.56
30	2.46	2.76	2.92	3.04	3.13	3.20	3.26	3.31	3.35	3.39	3.43	3.46	3.49	3.52	3.55
31	2.46	2.75	2.91	3.03	3.12	3.19	3.25	3.30	3.34	3.38	3.42	3.45	3.48	3.51	3.54
32	2.45	2.74	2.91	3.02	3.11	3.18	3.24	3.29	3.33	3.37	3.41	3.44	3.47	3.50	3.53
33	2.45	2.74	2.90	3.01	3.10	3.17	3.23	3.28	3.32	3.36	3.40	3.43	3.46	3.49	3.51
34	2.44	2.73	2.90	3.01	3.09	3.16	3.22	3.27	3.32	3.36	3.39	3.42	3.45	3.48	3.50
35	2.44	2.73	2.89	3.00	3.09	3.16	3.21	3.26	3.31	3.35	3.38	3.41	3.44	3.47	3.50
36	2.44	2.72	2.88	3.00	3.08	3.15	3.21	3.26	3.30	3.34	3.37	3.41	3.43	3.46	3.49
37	2.43	2.72	2.88	2.99	3.07	3.14	3.20	3.25	3.29	3.33	3.37	3.40	3.43	3.45	3.48
38	2.43	2.72	2.87	2.98	3.07	3.14	3.19	3.24	3.29	3.32	3.36	3.39	3.42	3.45	3.47
39	2.43	2.71	2.87	2.98	3.06	3.13	3.19	3.24	3.28	3.32	3.35	3.38	3.41	3.44	3.46
40	2.43	2.71	2.87	2.98	3.06	3.13	3.18	3.23	3.27	3.31	3.35	3.38	3.41	3.43	3.46
41	2.42	2.70	2.86	2.97	3.05	3.12	3.18	3.23	3.27	3.31	3.34	3.37	3.40	3.43	3.45
42	2.42	2.70	2.86	2.97	3.05	3.12	3.17	3.22	3.26	3.30	3.33	3.37	3.39	3.42	3.44
43	2.42	2.70	2.85	2.96	3.05	3.11	3.17	3.22	3.26	3.30	3.33	3.36	3.39	3.41	3.44
44	2.42	2.69	2.85	2.96	3.04	3.11	3.16	3.21	3.25	3.29	3.32	3.35	3.38	3.41	3.43
45	2.41	2.69	2.85	2.96	3.04	3.10	3.16	3.21	3.25	3.29	3.32	3.35	3.38	3.40	3.43
46	2.41	2.69	2.84	2.95	3.03	3.10	3.15	3.20	3.24	3.28	3.31	3.34	3.37	3.40	3.42
47	2.41	2.69	2.84	2.95	3.03	3.10	3.15	3.20	3.24	3.28	3.31	3.34	3.37	3.39	3.42
48	2.41	2.68	2.84	2.95	3.03	3.09	3.15	3.19	3.24	3.27	3.31	3.34	3.36	3.39	3.41
49	2.41	2.68	2.84	2.94	3.02	3.09	3.14	3.19	3.23	3.27	3.30	3.33	3.36	3.38	3.41
50	2.40	2.68	2.83	2.94	3.02	3.09	3.14	3.19	3.23	3.26	3.30	3.33	3.35	3.38	3.40
60	2.39	2.66	2.81	2.92	3.00	3.06	3.11	3.16	3.20	3.23	3.27	3.30	3.32	3.35	3.37
70	2.38	2.65	2.80	2.90	2.98	3.04	3.09	3.14	3.18	3.21	3.24	3.27	3.30	3.32	3.34
80	2.37	2.64	2.79	2.89	2.97	3.03	3.08	3.12	3.16	3.20	3.23	3.26	3.28	3.31	3.33
90	2.37	2.63	2.78	2.88	2.96	3.02	3.07	3.11	3.15	3.18	3.21	3.24	3.27	3.29	3.31
100	2.36	2.63	2.77	2.87	2.95	3.01	3.06	3.10	3.14	3.17	3.20	3.23	3.26	3.28	3.30

Factor = $t_{(n-1,1-\alpha/k)}$

TABLE 3

VALUES OF t FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4	8.96	9.09	9.21	9.33	9.44	9.54	9.65	9.75	9.84	9.93	10.02	10.11	10.19	10.27	10.35
5	7.03	7.11	7.20	7.28	7.36	7.43	7.50	7.57	7.63	7.70	7.76	7.82	7.87	7.93	7.98
6	6.03	6.10	6.16	6.22	6.28	6.34	6.39	6.44	6.49	6.54	6.59	6.63	6.68	6.72	6.76
7	5.43	5.48	5.54	5.59	5.64	5.68	5.73	5.77	5.81	5.85	5.89	5.93	5.96	6.00	6.03
8	5.03	5.08	5.13	5.17	5.21	5.25	5.29	5.33	5.37	5.40	5.43	5.46	5.49	5.52	5.55
9	4.75	4.80	4.84	4.88	4.92	4.95	4.99	5.02	5.05	5.08	5.11	5.14	5.16	5.19	5.22
10	4.55	4.59	4.62	4.66	4.69	4.73	4.76	4.79	4.82	4.84	4.87	4.90	4.92	4.94	4.97
11	4.39	4.42	4.46	4.49	4.52	4.56	4.58	4.61	4.64	4.66	4.69	4.71	4.73	4.76	4.78
12	4.26	4.30	4.33	4.36	4.39	4.42	4.45	4.47	4.50	4.52	4.54	4.57	4.59	4.61	4.63
13	4.16	4.19	4.23	4.25	4.28	4.31	4.34	4.36	4.38	4.41	4.43	4.45	4.47	4.49	4.51
14	4.08	4.11	4.14	4.17	4.19	4.22	4.24	4.27	4.29	4.31	4.33	4.35	4.37	4.39	4.41
15	4.01	4.04	4.07	4.09	4.12	4.14	4.17	4.19	4.21	4.23	4.25	4.27	4.29	4.31	4.32
16	3.95	3.98	4.00	4.03	4.06	4.08	4.10	4.12	4.14	4.16	4.18	4.20	4.22	4.24	4.25
17	3.90	3.92	3.95	3.98	4.00	4.02	4.05	4.07	4.09	4.11	4.12	4.14	4.16	4.17	4.19
18	3.85	3.88	3.91	3.93	3.95	3.98	4.00	4.02	4.04	4.05	4.07	4.09	4.11	4.12	4.14
19	3.81	3.84	3.86	3.89	3.91	3.93	3.95	3.97	3.99	4.01	4.03	4.04	4.06	4.08	4.09
20	3.78	3.80	3.83	3.85	3.88	3.90	3.92	3.94	3.95	3.97	3.99	4.00	4.02	4.04	4.05
21	3.75	3.77	3.80	3.82	3.84	3.86	3.88	3.90	3.92	3.94	3.95	3.97	3.98	4.00	4.01
22	3.72	3.75	3.77	3.79	3.81	3.83	3.85	3.87	3.89	3.91	3.92	3.94	3.95	3.97	3.98
23	3.70	3.72	3.74	3.77	3.79	3.81	3.83	3.84	3.86	3.88	3.89	3.91	3.92	3.94	3.95
24	3.67	3.70	3.72	3.74	3.76	3.78	3.80	3.82	3.84	3.85	3.87	3.88	3.90	3.91	3.93
25	3.65	3.68	3.70	3.72	3.74	3.76	3.78	3.80	3.81	3.83	3.85	3.86	3.87	3.89	3.90
26	3.63	3.66	3.68	3.70	3.72	3.74	3.76	3.78	3.79	3.81	3.82	3.84	3.85	3.87	3.88
27	3.62	3.64	3.66	3.68	3.70	3.72	3.74	3.76	3.77	3.79	3.80	3.82	3.83	3.85	3.86
28	3.60	3.62	3.65	3.67	3.69	3.71	3.72	3.74	3.76	3.77	3.79	3.80	3.81	3.83	3.84
29	3.59	3.61	3.63	3.65	3.67	3.69	3.71	3.72	3.74	3.76	3.77	3.78	3.80	3.81	3.82
30	3.57	3.60	3.62	3.64	3.66	3.68	3.69	3.71	3.73	3.74	3.76	3.77	3.78	3.80	3.81
31	3.56	3.58	3.60	3.62	3.64	3.66	3.68	3.70	3.71	3.73	3.74	3.75	3.77	3.78	3.79
32	3.55	3.57	3.59	3.61	3.63	3.65	3.67	3.68	3.70	3.71	3.73	3.74	3.75	3.77	3.78
33	3.54	3.56	3.58	3.60	3.62	3.64	3.65	3.67	3.69	3.70	3.72	3.73	3.74	3.75	3.77
34	3.53	3.55	3.57	3.59	3.61	3.63	3.64	3.66	3.68	3.69	3.70	3.72	3.73	3.74	3.76
35	3.52	3.54	3.56	3.58	3.60	3.62	3.63	3.65	3.66	3.68	3.69	3.71	3.72	3.73	3.74
36	3.51	3.53	3.55	3.57	3.59	3.61	3.62	3.64	3.65	3.67	3.68	3.70	3.71	3.72	3.73
37	3.50	3.52	3.54	3.56	3.58	3.60	3.61	3.63	3.65	3.66	3.67	3.69	3.70	3.71	3.72
38	3.49	3.52	3.54	3.55	3.57	3.59	3.61	3.62	3.64	3.65	3.66	3.68	3.69	3.70	3.71
39	3.49	3.51	3.53	3.55	3.56	3.58	3.60	3.61	3.63	3.64	3.66	3.67	3.68	3.69	3.71
40	3.48	3.50	3.52	3.54	3.56	3.57	3.59	3.61	3.62	3.63	3.65	3.66	3.67	3.69	3.70
41	3.47	3.49	3.51	3.53	3.55	3.57	3.58	3.60	3.61	3.63	3.64	3.65	3.67	3.68	3.69
42	3.47	3.49	3.51	3.53	3.54	3.56	3.58	3.59	3.61	3.62	3.63	3.65	3.66	3.67	3.68
43	3.46	3.48	3.50	3.52	3.54	3.55	3.57	3.58	3.60	3.61	3.63	3.64	3.65	3.66	3.68
44	3.45	3.48	3.49	3.51	3.53	3.55	3.56	3.58	3.59	3.61	3.62	3.63	3.65	3.66	3.67
45	3.45	3.47	3.49	3.51	3.53	3.54	3.56	3.57	3.59	3.60	3.61	3.63	3.64	3.65	3.66
46	3.44	3.46	3.48	3.50	3.52	3.54	3.55	3.57	3.58	3.59	3.61	3.62	3.63	3.64	3.66
47	3.44	3.46	3.48	3.50	3.51	3.53	3.55	3.56	3.58	3.59	3.60	3.61	3.63	3.64	3.65
48	3.43	3.45	3.47	3.49	3.51	3.53	3.54	3.56	3.57	3.58	3.60	3.61	3.62	3.63	3.64
49	3.43	3.45	3.47	3.49	3.50	3.52	3.54	3.55	3.57	3.58	3.59	3.60	3.62	3.63	3.64
50	3.43	3.45	3.46	3.48	3.50	3.52	3.53	3.55	3.56	3.57	3.59	3.60	3.61	3.62	3.63
60	3.39	3.41	3.43	3.45	3.46	3.48	3.49	3.51	3.52	3.53	3.55	3.56	3.57	3.58	3.59
70	3.37	3.39	3.40	3.42	3.44	3.45	3.47	3.48	3.49	3.51	3.52	3.53	3.54	3.55	3.56
80	3.35	3.37	3.38	3.40	3.42	3.43	3.45	3.46	3.47	3.49	3.50	3.51	3.52	3.53	3.54
90	3.33	3.35	3.37	3.39	3.40	3.42	3.43	3.45	3.46	3.47	3.48	3.50	3.51	3.52	3.53
100	3.32	3.34	3.36	3.38	3.39	3.41	3.42	3.43	3.45	3.46	3.47	3.48	3.49	3.50	3.51

Factor = $t_{(n-1,1-\alpha/k)}$

TABLE 4

VALUES OF t FOR OBTAINING ONE-SIDED 99% PREDICTION LIMITS FOR k ADDITIONAL SAMPLES GIVEN A BACKGROUND SAMPLE OF SIZE n

Previous	Number of new measurements (k)														
n	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
4	10.35	10.71	11.03	11.32	11.58	11.82	12.04	12.25	12.44	12.62	12.80	12.96	13.11	13.26	13.40
5	7.98	8.23	8.44	8.64	8.81	8.97	9.12	9.26	9.39	9.51	9.62	9.73	9.83	9.93	10.03
6	6.76	6.95	7.11	7.26	7.39	7.52	7.63	7.73	7.83	7.92	8.01	8.09	8.16	8.24	8.31
7	6.03	6.19	6.32	6.44	6.55	6.65	6.74	6.82	6.90	6.98	7.05	7.11	7.17	7.23	7.29
8	5.55	5.68	5.80	5.90	6.00	6.08	6.16	6.23	6.30	6.36	6.42	6.47	6.52	6.57	6.62
9	5.22	5.33	5.43	5.53	5.61	5.68	5.75	5.81	5.87	5.93	5.98	6.03	6.07	6.12	6.16
10	4.97	5.07	5.17	5.25	5.32	5.39	5.45	5.51	5.56	5.61	5.65	5.70	5.74	5.78	5.82
11	4.78	4.87	4.96	5.03	5.10	5.16	5.22	5.27	5.32	5.37	5.41	5.45	5.49	5.52	5.56
12	4.63	4.72	4.80	4.87	4.93	4.99	5.04	5.09	5.13	5.17	5.21	5.25	5.29	5.32	5.35
13	4.51	4.59	4.67	4.73	4.79	4.85	4.89	4.94	4.98	5.02	5.06	5.09	5.13	5.16	5.19
14	4.41	4.49	4.56	4.62	4.68	4.73	4.77	4.82	4.86	4.89	4.93	4.96	4.99	5.02	5.05
15	4.32	4.40	4.47	4.53	4.58	4.63	4.67	4.72	4.75	4.79	4.82	4.85	4.88	4.91	4.94
16	4.25	4.33	4.39	4.45	4.50	4.55	4.59	4.63	4.67	4.70	4.73	4.76	4.79	4.82	4.84
17	4.19	4.26	4.33	4.38	4.43	4.48	4.52	4.55	4.59	4.62	4.65	4.68	4.71	4.74	4.76
18	4.14	4.21	4.27	4.32	4.37	4.41	4.45	4.49	4.52	4.56	4.59	4.61	4.64	4.66	4.69
19	4.09	4.16	4.22	4.27	4.32	4.36	4.40	4.43	4.47	4.50	4.53	4.55	4.58	4.60	4.63
20	4.05	4.12	4.17	4.23	4.27	4.31	4.35	4.38	4.42	4.45	4.47	4.50	4.53	4.55	4.57
21	4.01	4.08	4.14	4.19	4.23	4.27	4.31	4.34	4.37	4.40	4.43	4.45	4.48	4.50	4.52
22	3.98	4.05	4.10	4.15	4.19	4.23	4.27	4.30	4.33	4.36	4.39	4.41	4.44	4.46	4.48
23	3.95	4.02	4.07	4.12	4.16	4.20	4.23	4.27	4.30	4.32	4.35	4.37	4.40	4.42	4.44
24	3.93	3.99	4.04	4.09	4.13	4.17	4.20	4.23	4.26	4.29	4.32	4.34	4.36	4.38	4.41
25	3.90	3.96	4.01	4.06	4.10	4.14	4.17	4.21	4.23	4.26	4.29	4.31	4.33	4.35	4.37
26	3.88	3.94	3.99	4.04	4.08	4.11	4.15	4.18	4.21	4.23	4.26	4.28	4.30	4.32	4.34
27	3.86	3.92	3.97	4.01	4.05	4.09	4.12	4.15	4.18	4.21	4.23	4.26	4.28	4.30	4.32
28	3.84	3.90	3.95	3.99	4.03	4.07	4.10	4.13	4.16	4.19	4.21	4.23	4.25	4.27	4.29
29	3.82	3.88	3.93	3.98	4.01	4.05	4.08	4.11	4.14	4.16	4.19	4.21	4.23	4.25	4.27
30	3.81	3.87	3.91	3.96	4.00	4.03	4.06	4.09	4.12	4.14	4.17	4.19	4.21	4.23	4.25
31	3.79	3.85	3.90	3.94	3.98	4.01	4.05	4.07	4.10	4.13	4.15	4.17	4.19	4.21	4.23
32	3.78	3.84	3.88	3.93	3.96	4.00	4.03	4.06	4.08	4.11	4.13	4.15	4.17	4.19	4.21
33	3.77	3.82	3.87	3.91	3.95	3.98	4.01	4.04	4.07	4.09	4.12	4.14	4.16	4.18	4.19
34	3.76	3.81	3.86	3.90	3.94	3.97	4.00	4.03	4.05	4.08	4.10	4.12	4.14	4.16	4.18
35	3.74	3.80	3.85	3.89	3.92	3.96	3.99	4.02	4.04	4.06	4.09	4.11	4.13	4.15	4.16
36	3.73	3.79	3.83	3.88	3.91	3.95	3.98	4.00	4.03	4.05	4.07	4.09	4.11	4.13	4.15
37	3.72	3.78	3.82	3.86	3.90	3.93	3.96	3.99	4.02	4.04	4.06	4.08	4.10	4.12	4.14
38	3.71	3.77	3.81	3.85	3.89	3.92	3.95	3.98	4.00	4.03	4.05	4.07	4.09	4.11	4.13
39	3.71	3.76	3.80	3.84	3.88	3.91	3.94	3.97	3.99	4.02	4.04	4.06	4.08	4.10	4.11
40	3.70	3.75	3.80	3.84	3.87	3.90	3.93	3.96	3.98	4.01	4.03	4.05	4.07	4.09	4.10
41	3.69	3.74	3.79	3.83	3.86	3.89	3.92	3.95	3.97	4.00	4.02	4.04	4.06	4.08	4.09
42	3.68	3.73	3.78	3.82	3.85	3.89	3.91	3.94	3.97	3.99	4.01	4.03	4.05	4.07	4.08
43	3.68	3.73	3.77	3.81	3.85	3.88	3.91	3.93	3.96	3.98	4.00	4.02	4.04	4.06	4.07
44	3.67	3.72	3.76	3.80	3.84	3.87	3.90	3.92	3.95	3.97	3.99	4.01	4.03	4.05	4.06
45	3.66	3.71	3.76	3.80	3.83	3.86	3.89	3.92	3.94	3.96	3.98	4.00	4.02	4.04	4.06
46	3.66	3.71	3.75	3.79	3.82	3.86	3.88	3.91	3.93	3.96	3.98	4.00	4.01	4.03	4.05
47	3.65	3.70	3.74	3.78	3.82	3.85	3.88	3.90	3.93	3.95	3.97	3.99	4.01	4.02	4.04
48	3.64	3.70	3.74	3.78	3.81	3.84	3.87	3.90	3.92	3.94	3.96	3.98	4.00	4.02	4.03
49	3.64	3.69	3.73	3.77	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.97	3.99	4.01	4.03
50	3.63	3.68	3.73	3.77	3.80	3.83	3.86	3.88	3.91	3.93	3.95	3.97	3.99	4.00	4.02
60	3.59	3.64	3.68	3.72	3.75	3.78	3.81	3.83	3.86	3.88	3.90	3.92	3.93	3.95	3.97
70	3.56	3.61	3.65	3.69	3.72	3.75	3.78	3.80	3.82	3.84	3.86	3.88	3.90	3.91	3.93
80	3.54	3.59	3.63	3.67	3.70	3.73	3.75	3.78	3.80	3.82	3.84	3.85	3.87	3.89	3.90
90	3.53	3.57	3.61	3.65	3.68	3.71	3.73	3.76	3.78	3.80	3.82	3.83	3.85	3.87	3.88
100	3.51	3.56	3.60	3.63	3.66	3.69	3.72	3.74	3.76	3.78	3.80	3.82	3.83	3.85	3.86

Factor = $t_{(n-1,1-\alpha/k)}$

APPENDIX I
SUMMARY REPORT
GROUNDWATER ASSESSMENT PROGRAM
SCA CHICAGO INCINERATOR FACILITY
SCA CHEMICAL SERVICES, INC.
CHICAGO, ILLINOIS

August 1987

873-2096

Golder Associates

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

SUMMARY REPORT
GROUNDWATER ASSESSMENT PROGRAM
SCA CHICAGO INCINERATOR FACILITY
SCA CHEMICAL SERVICES, INC.
CHICAGO, ILLINOIS

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1.0 INTRODUCTION

This report presents a summary of the groundwater assessment program undertaken by SCA Chemical Services, Inc. for the RCRA waste management unit (impoundment) at the SCA Chemical Services, Inc. Chicago Incinerator Facility. The groundwater assessment program was undertaken as a result of calculated statistical changes determined in accordance with 725.193 of the State of Illinois regulations for interim status facilities (35 IAC 725).

1.1 Site Description

The SCA Chemical Services, Inc. (SCA) Chicago Incinerator Facility is located on and adjacent to a pier at the southeastern side of Lake Calumet in southeastern Chicago, Cook County, Illinois. The facility includes the incinerator process area at the head of Slip 6 and a surface impoundment basin approximately midway out on the pier between Slips 6 and 8. The pier was built in the late 1950's and fill for the pier consists of cement fragments, masonry rubble, wood and metal scraps, slag, cinders, and clay. Prior to SCA's lease of the site from the Chicago Regional Port District, the pier was used for several waste-related operations, including storage of hazardous waste and processing of organic materials in the so-called "bio-beds". Numerous lagoons which were constructed for those purposes were subsequently cleaned out and backfilled. The landfill associated with the clean-up of the lagoons is located on the existing pier west of the process water basins in accordance with the consent agreement between the State of Illinois and the Port Authority.

The impoundment basin, which consists of four clay-lined ponds, constitutes a waste management unit for RCRA groundwater monitoring purposes. The two eastern ponds, referred to in this report as Pond 1 (northern) and Pond 2 (southern), are used to cool and store process water from the air pollution-control system of the hazardous waste incinerator. The southwestern pond, referred to as Pond 3, receives precipitation runoff from the process area. Sludge periodically removed from Ponds 1 and 2 is temporarily stored in the northwestern pond, referred to as Pond 4, where it is stabilized prior to disposal in an off-site hazardous waste disposal facility.

The pier materials are underlain by Holocene marsh deposits and lacustrine silty clay deposits of Wisconsin age. The resulting artificial hydrogeologic setting of the surface impoundment basin consequently requires a rather interesting application of the "uppermost acquifer" concept. By strict interpretation of the RCRA regulations, the fill itself serves the hydraulic function of the uppermost aquifer. Furthermore, because the fill is in hydraulic connection with Lake Calumet, this surface-water body would be the eventual receptor for any potential seepage from the facility. This fact eliminates the need to consider any other aquifers which exist at depth (boreholes at the landfills to the east have encountered at least 40 feet of clay) below the clay.

East of Stoney Island Road and upgradient from the site, there are two pre-RCRA landfills. The Illinois Environmental Protection Agency has reported that highly elevated levels of organic constituents have been measured in the groundwater at the landfills located to the east of

the site. Some of the major organic constituents encountered in the landfills and other facilities located east of the site are as follows.

Methylethoxy propanal	=	7,500 ug/l
Benzene	=	150 ug/l
Tetrahydrofuran	=	8,400 ug/l
Phenol	=	1,600 ug/l
Toluene	=	4,300 ug/l
Methylene chloride	=	2,300 ug/l
1,2-Dichloroethylene	=	1,050 ug/l
Methoxy aliphatic acid esters	=	67,000 ug/l

Since the landfills are located upgradient of the SCA Incinerator site, the groundwater geochemistry at the incinerator site will be impacted by the existing pre-RCRA landfills.

2.0 BACKGROUND

There have been numerous wells installed in the general vicinity of the SCA Chicago Incinerator facility over the course of activities around the site, and not all wells are related to the activities of the incinerator and impoundment facilities.

Four of the G-series wells -- G112B (the nominal upgradient well), G110, G11A, and G113A -- on the perimeter of the impoundment basin were established as RCRA groundwater monitoring wells for the impoundment basin. Sampling of these wells began in June 1982, and the requisite quarterly samples for defining background water quality were collected by late 1983. In February 1984, the first post-background sampling of the wells yielded data indicating a statistically significant change in pH had occurred in all wells (including the upgradient well) according to analysis by Cochran's approximation to the Behrens-Fisher Student's t-Test. This statistical test also indicated a significant change in specific conductance in well G111A. Similar evaluation of data from a subsequently obtained set of water-quality samples "confirmed" that statistically significant changes had occurred; and in June 1984, SCA notified the Illinois Environmental Protection Agency (IEPA) of these findings. In July 1984, a proposed groundwater quality assessment plan was submitted to the IEPA as required by 40 CFR 265.93(d)(2). Based on comments from the IEPA, the assessment plan was revised by SCA and resubmitted in September 1984. This revised plan was approved; and with its implementation, the SCA Chicago Incinerator Facility was placed in the groundwater assessment mode.

The initial phase of the groundwater assessment program for the SCA Chicago Incinerator Facility was carried out by P.E. LaMoreaux & Associates, Inc. (PELA), and results of the assessment were presented in the following report:

a) PELA Report No. 463300-R entitled, "Hydrologic Assessment and an Evaluation of Water Quality at the SCA Chemical Services, Inc. Chicago Incinerator Facility, Chicago, Illinois," dated August 30, 1985.

Although contamination attributable to the impoundment basin was not confirmed, two additional investigations were carried out at the site as a result of recommendations made by PELA.

In September 1985, a geophysical investigation of the area of the pier between Slips 6 and 8 was carried out by Hydro-Search, Inc. (HSI). The area covered by the geophysical survey extended from approximately 200 feet west of the process water impoundment basin to the easterly boundary of the site, and did not include the area physically occupied by the incinerator. The purpose of this investigation was to provide approximate information on the extent of a chloride-rich plume of process water that had leaked from plant-to-cooling pond pipelines. The results of this investigation were presented in the following report:

b) Hydro-Search, Inc. Report No. 1546 entitled, "Geophysical Investigation, SCA Chicago Incinerator Facility, Chicago, Illinois," dated September 16, 1985.

In addition to the above, Golder Associates, Inc. (GAI) was retained to carry out an assessment of the existing data and a further hydrogeologic assessment of the area in the

immediate vicinity of the waste management unit. Results of the investigation and evaluation carried out by GAI were presented in the following report:

c) Golder Associates Report No. 853-2054 entitled, "Results of Hydrogeologic Investigation, SCA Chicago Incinerator Facility, SCA Chemical Services, Inc., Chicago, Illinois," dated February 1986.

This current summary report presents the key findings and conclusions of the reports prepared by PELA, HSI, and GAI, and provides recommendations for groundwater quality monitoring.

3.0 SUMMARY OF GROUNDWATER ASSESSMENT REPORTS

The initial phase of the groundwater assessment program carried out by PELA included an extensive review of the statistical procedures used for analyses of the indicator parameter data, together with additional statistical analyses of the available data using the Student's t-Test, the Mann-Whitney U-test, and the Wilcoxon matched-pairs signed-ranks test.

In addition to the statistical analyses, PELA also reviewed the regional and site-specific hydrology and geology, and assessed the background and site-specific water quality. Based on the results of their review and analyses, PELA concluded the following:

a) Application of all four statistical analytical procedures provided inconsistent results, making the application of the statistical assessment meaningless and application of methods inappropriate.

b) The past history of development and the heterogeneous nature of the fill materials makes the hydrogeologic characterization of the site difficult. While around the perimeter of the pier the water levels are in near equilibrium with the lake levels, a groundwater mound exists within the limits of the pier.

c) There is evidence from chemical analyses on groundwater from Well 114A that the quality of groundwater entering the site along the northeast side has been adversely impacted by external sources.

d) Previous development and waste disposal activities at the site, together with migration of contaminants from off-site onto the site, makes technically valid evaluation of changes in the groundwater quality due to the operation of the process water ponds using the Student's t-Test essentially impossible.

e) The elevated ion-concentrations in Wells G112B and G113A reflect impact on the groundwater in the vicinity of the surface impoundments as a result of prior process water release(s) from pipeline breakage. The buried pipeline was subsequently replaced by above-ground lines.

f) Based on a review of existing data, the hydraulic gradients were estimated to range from 0.025 to 0.0075 feet/feet and the hydraulic conductivities of the materials in the vicinities of the well installations ranged from $1x10^{-2}$ to $3x10^{-7}$ cm/sec.

g) The fill material comprising the pier is underlain by lacustrine silt and clay. Therefore, the potential for downward migration of groundwater into the underlying silty clay is inhibited.

Based on results of the initial phase of the groundwater assessment program, PELA recommended that the following additional work be carried out:

1) Investigation of the condition of the process water pipeline between the incinerator and cooling ponds;

2) Collection of samples from selected groundwater monitoring points and analyses for chlorides, selected metals, and selected cations/anions which would serve as indicator parameters for potential process water sources; and

3) Installation of additional wells to permit additional groundwater sampling and additional characterization of the hydrogeologic setting of the pier.

All recommendations for additional work made in the PELA report were addressed in the reports prepared by HSI and GAI.

The geophysical investigation carried out by HSI included an electro-magnetic conductivity survey of the area between the incinerator facility and impoundments. The geophysical survey provided supplemental information on the extent of probable areas of impacted groundwater associated with both the process water pipeline and with other sources such as the previously existing Hyon "bio-beds". The HSI geophysical investigation highlighted at least five distinct areas of anomalously high EM conductivity readings. The conductivity highs located immediately east of the existing process water ponds and along the old pipeline alignment are related to breaks in the pipeline. Significant conductivity highs were also noted in the areas of the former Hyon "bio-beds" and southwest of the existing process water cooling ponds. From the observed shape, the conductivity highs in the "bio-beds" area are obviously related to activities at the site prior to SCA operations. It is probable that the conductivity highs observed to the west of the process water ponds are also related to prior activities

at the site and are not associated with any breaks in the process water supply line located more than 500 feet to the east.

Concurrent with the studies carried out by PELA and HSI, SCA Chemical Services, Inc. had the buried process water pipeline from the incinerator to the impoundment areas replaced by a new, above-grade protected pipeline. The new pipeline was installed and in operation by October 22, 1985.

During October 1985, GAI was retained by SCA Chemical Services, Inc. to carry out an additional hydrogeological investigation in the area of the process water ponds. Based on results of the investigation, it was concluded that fill materials that form the pier in the area of the process water ponds were extremely heterogeneous in nature. The results of in-situ testing using both bail recovery tests and a pumping test indicated that the hydraulic conductivity of the fill materials to the north and northeast of the impoundment basin area is approximately 1 to 2 orders of magnitude higher than to the south, west, and southeast. The estimated effective transport velocity ranged from 2.0 feet/day toward the north in the materials with higher hydraulic conductivity to 0.16 feet/day toward the south in the area of fill with lower hydraulic conductivity.

Due to the extreme heterogeneity of the fill, the influence of previous lagoon liners (bio-beds), and former site development activities, it is difficult to completely describe the configuration of the potentiometric surface within the general vicinity of the waste management unit. Based on results of the water-level information obtained

during the GAI investigation, the potentiometric surface forms a general ridge-like pattern whose long axis parallels the longest dimension of the pier. Further, a groundwater mound to the east of the impoundment basis is probably the result of a groundwater damming effect of the pond liners.

Also included in the investigation program by GAI was the installation of six new stainless steel wells to upgrade the groundwater monitoring system. The approximate locations of the four initial monitoring wells and six new monitoring wells are shown on Figure 1 following the text of this report.

4.0 GEOCHEMICAL SAMPLING

Subsequent to the installation and development of the new groundwater monitoring wells, sampling of groundwater from the wells and process water from the waste management unit was carried out at the request of SCA Chemical Services. Sampling was carried out by Gulf Coast Labs, and geochemical analyses of the samples was performed by Environmental Testing and Certification (ETC). Samples from all of the wells and from the impoundment were analyzed for all hazardous waste constituents listed in 40 CFR 261 Appendix VII and chemical constituents covered by the analytical methods outlined in 40 CFR 261 Appendix III. Results of the testing by ETC are summarized in the attached Table 1. Table 1 includes only those constituents observed and does not include the myriad of chemical constituents tested for but not observed.

As outlined in Table 1, numerous volatile organic compounds (and several similar to those encountered upgradient of the site) were determined to exist in several of the monitoring wells at the site. The most contaminated wells at the site were G112 and G121S. Well G112, which was the upgradient well in the original groundwater monitoring program, showed (for the geochemical analyses of the November 21, 1985 samples) significant levels of benzene; 1,1 dichloroethylene; methyl ethyl ketone; toluene; anidine; 2,4 dichlorophenol; napthalene; and phenols.

Wells G113, G120S, G122S, G124S, and G125S did not show any significant evidence of the presence of any volatile organic compounds, with the exception of methylene chloride which is a laboratory cleaning agent.

Results of the geochemical analysis of a sample of the process water taken from the impoundment area on October 29, 1985 are also summarized in Table 1. The analysis of the impoundment water indicated the presence of carbon disulfide, methylene chloride, and methyl ethyl ketone in the sample. The presence of these hazardous waste constituents in the process water can be related to solvents and adhesives used to assemble the new pipeline which was put into operation just prior to the sampling date. It is worthwhile noting that none of the volatile organic compounds encountered in the monitoring wells around the waste management unit were encountered in the analyses of the process water in the impoundments.

The geochemical analyses of the process water also indicated the presence of several heavy metals, including arsenic, cadmium, chromium, lead, mercury, and nickel in the process water. While arsenic was found in several of the monitoring wells and the impoundment, it is a naturally occurring, leachable chemical constituent in the clayey soils in the Chicago area and as such, would provide questionable results when used as an indicator of any groundwater contamination.

Occasional traces of heavy metals species similar to those encountered in the process water were observed in some of the monitoring wells. There is, however, no consistent or identifiable trend to suggest that heavy metal species encountered in the monitoring wells are related to process water in the impoundment. The heavy metal species occasionally encountered in some of the monitoring wells are most likely also related to previous activities at the site.

5.0 COMPLETION OF GROUNDWATER ASSESSMENT PROGRAM

Once a site has entered the groundwater assessment phase, the regulations require that investigations be carried out to characterize the detailed hydrogeologic setting and define the rate of migration and extent of the contaminant plume.

Specifically, 40 CFR 265.93(4) states, "The owner or operator must implement the ground-water quality assessment plan which satisfies the requirements of paragraph (d)(3) of this section and, at a minimum, determine:

(i) The rate and extent of migration of the hazardous waste or hazardous waste constituents in the groundwater; and

(ii) The concentrations of the hazardous waste or hazardous waste constituents in the groundwater.

The three investigations carried out by GAI, PELA, and HSI have defined the hydrogeology of the area of the pier that forms the compliance unit. Further, to the extent possible given the complex history of the site and site area, the rate and extent of contaminant migration from the pipeline breaks have also been determined.

The extent of the process water plume from prior pipeline leaks at the site is shown graphically on Figure 4-3 in the GAI report which was assembled from electrical conductivity data from the groundwater wells. As a result of the distinct hydraulic conductivity boundaries that exist in the pier fill materials, the orientation of the process water plume is skewed to the northerly side of the pier. As outlined in Section 3.0, based on results of the monitoring and in-situ testing, the effective transport velocity ranges

from approximately 2.0 feet/day toward the north in the materials with higher hydraulic conductivity, to 0.16 feet/day toward the south in the area of fill with lower hydraulic conductivity.

Results of the geochemical evaluation of the groundwater carried out by ETC have identified the hazardous waste constituents present within the groundwater in the area of the process water plume. It should be noted that the volatile organic compounds present within the groundwater are not representative of the chemical constituents in the process water. Based on the results of the investigations, it is probable that the process water detected during these investigations has been the result of breaks in the supply lines to the waste management unit. To preclude further entry of the process water to the ground water, SCA Chemical Services, Inc. has replaced the underground pipeline with an above-grade pipeline.

The results of the most recent groundwater sampling program indicate that the specific conductance of the groundwater in the monitoring wells is decreasing and, consequently, the process water plume is diminishing.

Based on the above therefore, we conclude that SCA Chemical Services, Inc. has more than fulfilled the letter and intent of the groundwater assessment program outlined in 40 CFR 265.93.

6.0 ONGOING MONITORING

With the completion of the groundwater assessment program, one alternative would be to resume detection monitoring using the indicator parameters outlined in 40 CFR 265.92(3). However, due to the varied historical use of the site, detection monitoring using the four indicator parameters of pH, specific conductance, TOX, and TOC outlined by the regulations is not recommended. It is readily apparent from a review of Table 1 that there are distinct differences in water quality among the various monitoring wells. Further, there are a variety of hazardous waste constituents present in the groundwater which are not related to process water in the impoundments but which are related to upgradient activities and previous site uses. Detection monitoring using the indicator parameters outlined in 265.92(3) would undoubtedly result in statistically significant differences being determined under 40 CFR 265.93. Inappropriately, this would result in the return of the waste management unit to the groundwater assessment phase.

Rather than return to detection monitoring as specifically defined by the regulations, it is recommended that an alternative approach to groundwater monitoring be adopted.

The following alternate monitoring program is recommended for the facility. The program is designed to verify that no groundwater contamination attributable to the impoundment is occurring. Both the process water in the impoundment and the RCRA monitoring wells at the site should be sampled and tested semi-annually for volatile organic compounds listed in Table 1. SCA Chemical Services, Inc. will develop a data interpretation protocol to evaluate the

results. If volatile organic compounds in the monitoring wells are found at significant concentrations and determined not to be released from the regulated unit, they can only be considered to have been influenced by external sources, and the alternate monitoring program should continue on a routine basis.

Since volatile organic compounds are much more mobile than heavy metals, heavy metals are not considered to be suitable indicator parameters for the alternate monitoring program. Further, a review of the historical levels of heavy metal species (summarized in Table 2) in the vicinity of the compliance unit indicates that significant and extremely variable levels of most of the heavy metal species have existed in the pier area since before the inception of the present facility. While data available suggest that the levels of heavy metal species in the pier area have been declining since the facility has been in operation, as a result of the wide historical variation, the use of heavy metal species for indicator parameters is recommended only as a secondary parameter.

GOLDER ASSOCIATES, INC.

W. M. Kellestine
Associate

Attachments: Table 1
Table 2
Figure 1

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TABLE 1

SUMMARY OF GEOCHEMICAL CHARACTERISTICS:
GROUNDWATER AND PROCESS WATER
SCA CHICAGO INCINERATOR FACILITY
CHICAGO, ILLINOIS

Concentration of Constituents (ug/l)

Chemical Constituent WELL NO:	G110	G111	G112	G113	120S	121S	122S	123S	124S	125S	120P	121P	122P	125P	IMPDE
Benzene	109	245	16.0	ND	BMDL	270	ND	32.0	ND	ND	--	--	--	--	BMDL
Carbon Disulfide	ND	BMDL	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	36.7
Chlorobenzene	22.8	12.8	BMDL	ND	BMDL	59.4	ND	ND	ND	ND	--	--	--	--	ND
1,1-Dichloroethylene	ND	ND	70.0	ND	ND	ND	ND	144	ND	ND	--	--	--	--	ND
Methylene Chloride	13.5	4.00	19.2	3.40	8.20	7.10	ND	ND	ND	8.70	--	--	--	--	71.0
Methyl Ethyl Ketone	ND	ND	ND	ND	ND	BMDL	BMDL	ND	ND	ND	--	--	--	--	13.4
Toluene	13.4	6.68	26.8	ND	ND	67.1	ND	14.5	ND	ND	--	--	--	--	ND
Trichloroethylene	ND	ND	5.09	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
Vinyl Chloride	ND	ND	41.1	ND	ND	ND	ND	36.7	ND	ND	--	--	--	--	ND
o+p Xylenes	ND	BMDL	10.1	ND	--	--	--	--	--	--	--	--	--	--	ND
Methyl-iso-butyl Ketone	ND	ND	34.0	ND	--	--	--	--	--	--	--	--	--	--	ND
Ethyl Ether	ND	28.6	ND	ND	--	--	--	--	--	--	--	--	--	--	ND
Aniline	ND	44.0	374	ND	ND	491	ND	78.3	ND	ND	--	--	--	--	ND
2-Chlorophenol	ND	ND	36.0	ND	ND	25.0	ND	17.3	ND	ND	--	--	--	--	ND
m+p-Cresols	ND	BMDL	22.0	ND	ND	25.7	ND	BMDL	ND	ND	--	--	--	--	ND
1,2-Dichlorobenzene	ND	ND	3.61	ND	ND	3.29	ND	ND	ND	BMDL	--	--	--	--	ND
2,4-Dichlorophenol	45	ND	494	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
2,6-Dichlorophenol	ND	BMDL	54.0	ND	ND	16.9	ND	BMDL	ND	ND	--	--	--	--	ND
2,4-Dimethylphenol	ND	14.0	23.0	ND	ND	30.3	ND	BMDL	ND	ND	--	--	--	--	ND
Fluoranthene	ND	ND	2.33	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
Naphthalene	ND	BMDL	78.1	ND	ND	113	ND	4.88	ND	ND	--	--	--	--	ND
Phenol	ND	ND	48.6	ND	ND	47.0	ND	ND	ND	ND	--	--	--	--	9.00
2,4,6-Trichlorophenol	ND	ND	51.0	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
Antimony	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
Arsenic	36	56	14	16	18	32	30	BMDL	BMDL	7	63	21	12	BMDL	48
Cadmium	5	7	BMDL	8	4	BMDL	7	6	BMDL	10	BMDL	BMDL	BMDL	BMDL	23
Chromium	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	20	BMDL	26	BMDL	BMDL	BMDL	BMDL	BMDL	130
Lead	BMDL	BMDL	BMDL	BMDL	BMDL	6	5	BMDL	BMDL	BMDL	BMDL	34	4	BMDL	207
Mercury	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	0.5
Nickel	29	BMDL	25	BMDL	86	46	51	BMDL	40	BMDL	BMDL	BMDL	BMDL	BMDL	51
Cyanide, Total	214	BMDL	BMDL	BMDL	BMDL	BMDL	45	BMDL	BMDL	BMDL	BMDL	BMDL	40	BMDL	BMDL
Chromium, Hexavalent	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
Iron	--	--	--	--	1620	BMDL	BMDL	59	141	470	2010	45	32	89	--
Manganese	--	--	--	--	1840	2120	350	62	721	382	1420	1700	217	646	--
Sodium	--	--	--	--	114000	6220000	3310000	488000	414000	219000	104000	7620000	5730000	174000	--

BMDL: Below Minimum Detection Limit
ND: Not Detected
--: Not Analyzed

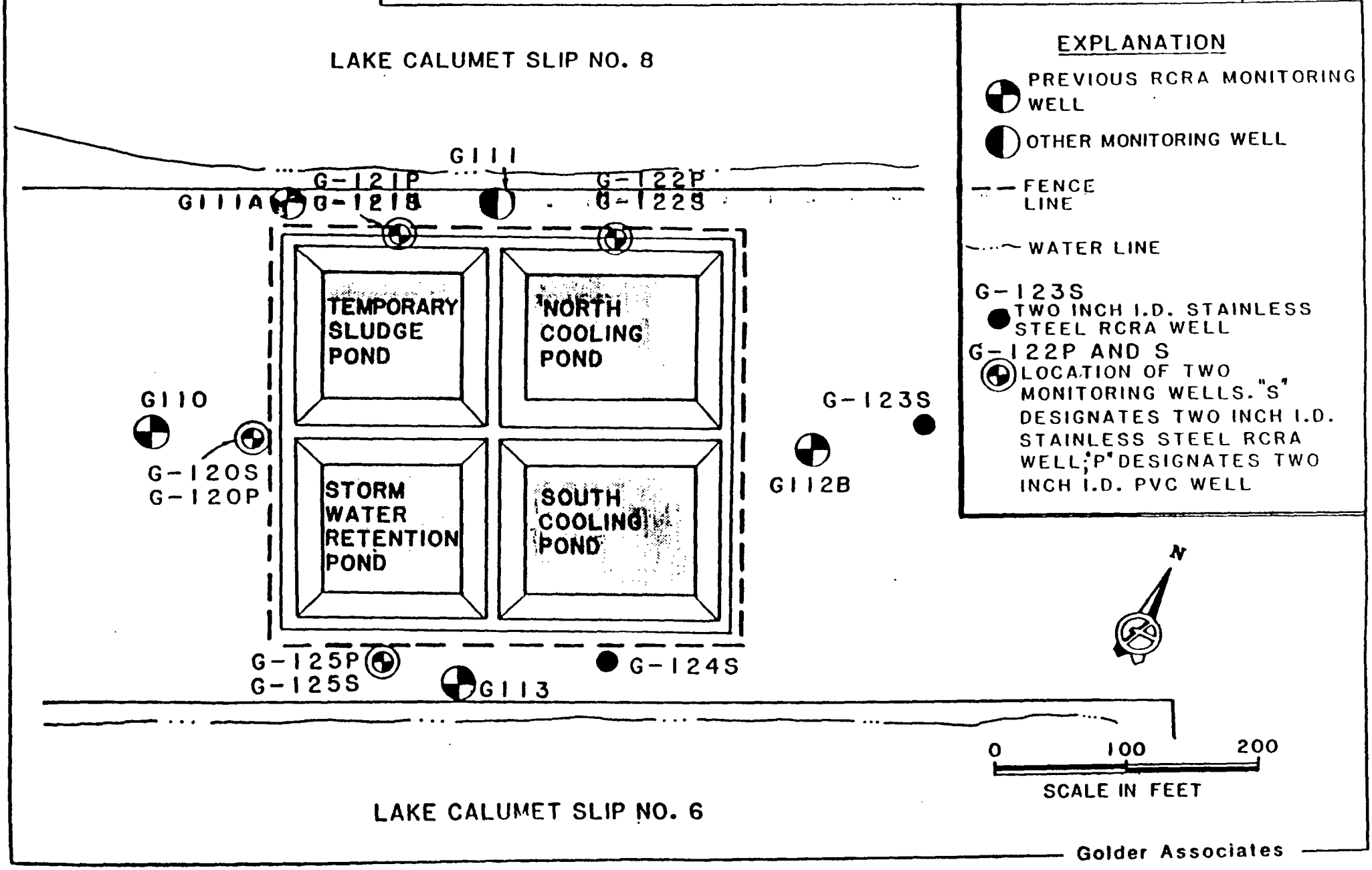
TABLE 2: SUMMARY OF HISTORIC HEAVY METAL ION CONCENTRATIONS
SCA CHICAGO INCINERATOR FACILITY, CHICAGO, ILLINOIS

	Concentration (ug/l)							
	Well G-110		Well G-111A		Well G-112B		Well G-113A	
Constituent	1982-83	1985	1982	1985	1982-83	1985	1982-83	1985
Arsenic	10-40	36	9-110	56	18-160	14	41-420	16
Cadmium	10-13	5	6-14	7	8-14	<3	7-22	8
Lead	22-33	<4	220-3100	<20	15-6900	<20	57-4400	<20
Mercury	---	<0.5	5-41	<0.5	1-10	<0.5	1.6-14	<0.5
Chromium	---	<20	40-140	<20	30-160	<20	40-120	<20

Proj. No. E 2054 Eng. D.L.O. Date 11-1-85

MONITOR WELL LOCATION MAP

FIGURE 1



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APPENDIX J

HYDROLOGIC ASSESSMENT AND AN EVALUATION OF WATER QUALITY AT THE SCA CHEMICAL SERVICES, INC. CHICAGO, INCINERATOR FACILITY, CHICAGO, ILLINOIS

(PELA NO. 463300-R)

August 1987

873-2096

Golder Associates

PELA

HYDROLOGIC ASSESSMENT AND AN EVALUATION OF WATER QUALITY AT THE SCA CHEMICAL SERVICES, INC. CHICAGO INCINERATOR FACILITY, CHICAGO, ILLINOIS

(PELA NO. 463300-R)

Prepared by

P. E. LaMoreaux & Associates, Inc.
Consulting Hydrologists, Geologists
and Environmental Scientists
Post Office Box 2310
Tuscaloosa, Alabama 35403
(205) 752-5543

August 30, 1985

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EXECUTIVE SUMMARY

This report provides SCA Chemical Services, Inc. (SCA) with an assessment of the hydrologic setting and ground-water quality in the vicinity of the Chicago incinerator facility, Chicago, Illinois, and a compilation of the data used in this assessment.

The hydrologic assessment was the basis for determining if the facility has impacted the chemical composition of the ground water of the area.

The SCA Chicago incinerator facility site is a pier-like structure which extends westward into Lake Calumet. The pier was constructed by dumping assorted refuse over unconsolidated marsh and lacustrine deposits. Materials that comprise the fill are mainly broken concrete, bricks, wood and metal scraps, slag and cinders, and loamy cover materials. During the history of the pier, lagoons have been constructed and subsequently filled, some with organic material to biodegrade the contents of the lagoons. These lagoons were cleaned and subsequently filled. The entire pier structure is underlain by Holocene marsh deposits and lacustrine deposits of Wisconsin age.

The ground-water monitoring data for this report were from fifteen (15) G-series (including G-110, G-111A, G-112B, and G-113A) and two (2) TF-series monitor wells; surface-water monitoring data were from three (3) Lake Calumet and two (2) impoundment sampling points. The monitor wells are constructed with 2-inch PVC pipe and completed with a 5-foot section of slotted plastic screen at the bottom of each well.

In accordance with U.S. Environmental Protection Agency (U.S. EPA) and Illinois Environmental Protection Agency (IEPA) detection monitoring requirements, the active surface impoundments (the waste management area) are monitored by one (1) upgradient well G-112B, and three (3) downgradient wells G-110, G-111A, and G-113A. The hydraulic designations of upgradient and downgradient were made prior to this study. Based on the results of this report, a statistical assessment of the water quality is not applicable.

Results of water quality analyses for monitor wells G-112B and G-113A indicate elevated chloride and sodium concentrations. These elevated concentrations appear to be the result of the release of process water.

Although beyond the scope of this report, investigations indicate that three (3) leaks of process water from the pipeline have occurred and repairs have been completed.

PELA has provided recommendations for additional investigations.

CONCLUSIONS

1. To comply with both U.S. EPA and IEPA regulations for interim status facilities, the Student's t-test and Cochran's approximation to the Student's t-test were completed for the results of water quality analyses on the four (4) monitor wells (G-110, G-111A, G-112B, and G-113A). To determine the appropriate statistical test applicable for the evaluation of a significant change in ground-water quality, quarterly replicate values for the four (4) indicator parameters were checked for normality using the rankits method. A generally non-normal distribution was noted, therefore transformation techniques were performed on all data in an attempt to manipulate the data to meet normal distribution assumptions.

2. Since the data reflect non-normal distribution, neither the Student's t-test nor the Cochran's approximation provide an adequate statistical test for ground-water assessment as they have a tendency to indicate "false positives," i.e., statistically significant increases (or decrease with respect to pH) where contamination may not exist.

3. A comparison of the Student's t-test and Cochran's approximation indicates:

   - A significant change in pH for G-110 analyzed against G-112B background data;

- A significant change in pH and specific conductance for G-111A against G-112B background data, and specific conductance against its own background;
- A significant change in pH and specific conductance for G-112B against itself; and
- A significant change in pH for G-113A against G-112B background data.

4. The Mann-Whitney and Wilcoxon matched-pairs signed-ranks non-parametric tests were performed to more effectively assess statistical significance. A comparison between the two non-parametric test results indicate significant change in G-110 total organic carbon, G-111A specific conductance and against G-112B background data.

5. Results of the statistical significance tests reveal that specific conductance in well G-111A is the only parameter correlative throughout all four (4) tests (Student's t, Cochran's approximation, Mann-Whitney, and Wilcoxon matched-pairs). The inconsistency of the test results makes this statistical assessment meaningless and application of methods inappropriate.

6. PELA concurs with the Chemical Manufacturers Association's criticisms of the Student's t test and the Cochran's approximation for the assessment of ground-water contamination. These tests are flawed in several respects:

a. Assuming normal distribution of data;

b. Assuming independent data points;

c. Unaccounted natural seasonal variations in ground-water quality; and

d. The statistical "lock in" of unrepresentative or anomalous background data.

7. The hydrologic characteristics of the SCA site are difficult to determine due to the heterogeneous nature of the fill. The data available indicate that Lake Calumet has an influence on the water levels in perimeter wells. The water levels in the fill material at the perimeter of the pier are in near equilibrium with the lake and fluctuate correlative to the changes in the lake. The water levels in the interior of the site appear to form a series of ground-water mounds. The mound in the vicinity of well G-112B may be a result of the barrier effect created by the impoundment system. Historical water level indicates that the mound existed prior to the operation of the incinerator.

8. The hydraulic gradient was estimated from the ground-water surface map for several areas around the impoundments. These values range from 0.025 to 0.0075.

9. Permeabilities ranging from 1×10^{-2} to 2.98×10^{-7} cm/sec were estimated from available well data and sieve analysis.

10. The Chicago incinerator facility is located in a highly industrialized region that has a long history of serving as a disposal area for a wide variety of industrial, commercial, and residential wastes. A variety of pollutant emission sources are available from the concentration of industrial plants and waste disposal facilities in the area. The IEPA has, in the past, conducted sampling programs that have indicated localized ground-water pollution in the area.

11. Results of April and May 1985 chemical analyses for G-112B almost identically reflect the chemical concentration of the process water. The sodium and chloride concentrations in the April and May ground-water samples for G-112B account for more than ninety percent (90%) of the total ion concentration.

12. The water quality of G-113A resembles that of Lake Calumet (LC-103) and the process water. This intermediate water quality is due to the combination of ground water flowing downgradient from G-112B toward G-113A and that of Lake Calumet which is being continuously interchanged through the system due to lake water level fluctuations.

13. The elevated concentrations of ions in wells G-112B and G-113A reflect impact on the ground-water quality in the vicinity of the surface impoundments as a result of process water release.

14. A differential release of any contaminants within previously existing lagoon areas could cause erratic results on water quality. Materials contained within the fill material are also expected to influence water quality. No definite conclusions can be drawn. The historical use of the pier is also expected to influence the hydraulic characteristics of the fill material.

15. A relatively steady decrease in ionic concentration and specific conductance in well G-110 in conjunction with the water table configuration indicates that the impoundment effectively separates well G-110 from the sodium and chloride source.

16. Lower ion concentrations in well G-110 substantiate the shunting effect the impoundment area has on the ground-water system.

17. Plots of the concentration of selected chemical constituents versus time for wells G-110, G-111A, G-112B, and G-113A show direct correlations between concentrations of sodium and chloride and specific conductance. Wells G-111A, G-112B, and G-113A indicate an overall, but erratic, rise in ionic concentrations and specific conductance.

18. The high pH values in wells in the vicinity of the impoundments may be attributed to well construction materials.

19. Monitor well G-114A water analyses indicate that the quality of the ground water entering the site along the northeast corner is high in sulfate and magnesium and contains a moderate amount of calcium. This suggests upgradient contamination sources potentially affecting the background water quality of the SCA site.

20. The fill material comprising the pier is underlain by lacustrine silt and clay. Therefore, the potential for downward migration of the ground water into underlying water-bearing zones is inhibited.

RECOMMENDATIONS

Additional data are required to develop a more detailed understanding of the hydrogeology and ground-water quality at the SCA Chicago incinerator site.

1. An investigation is recommended to identify the source(s) of elevated constituents (specifically chloride and sodium) in the ground water and evaluate mechanisms of release of potential contaminants in the vicinity of the cooling ponds.
   a. Investigate the condition of the process water pipeline(s) from the plant to the cooling ponds.
      1) As water in the pipeline is at an elevated temperature (near 200°F), thermography (temperature detecting aerial photography) can be used to assess the extent and patterns of temperature distribution in an attempt to delineate any anomalous area which may indicate release of process water from the system. Several geophysical methods can also be used to delineate any potential areas of ground-water contamination. These methods include electromagnetic induction (conductivity) and surface resistivity.
      2) If anomalous areas are noted, excavate and expose the pipeline, associated junctures, and connections for visual inspection.

3) Based on the results of the visual inspection, reconstruction of the pipeline with an improved engineered design (i.e., above ground or double pipe, etc.) may be required.

b. Collect samples from selected ground-water monitoring and surface-water locations and analyze for chloride, selected metals (for example, antimony, zinc, and lead), and selected cations/anions which would serve as indicator parameters for potential process water sources. Based on the results of chemical analyses performed on February 19, 1985, for priority pollutants of the process water, analyses for Appendix 7 and 8 parameters are not recommended.

2. Establish temporary wells (to be pulled, plugged, and abandoned upon completion of evaluation) at strategic locations on the pier:

a. To better establish the configuration of the ground-water surface, particularly in two localities -- (1) between wells G-111A, G-113A, and TF-03, TF-04 and (2) between well G-110 and the west end of the pier (interior of pier).

b. To provide locations for collection of ground-water samples for analyses of selected parameters.

c. To further physical characterization of the fill material comprising the pier.

d. To complete additional slug or recovery tests on selected wells to further evaluate the range and distribution of hydraulic characteristics of the fill material.

the impoundments and the associated pipeline may possibly be attributed to leakage of process water.

Ground-water flow from the ground-water mounds is radially away from the center of the mound. Where the boundary of the ground-water mound is adjacent to the perimeter of the site, flow is toward the perimeter. Areas between ground-water mounds (between pre-existing lagoon locations) funnel the ground water in both directions away from the interior of the site toward the perimeter.

Discharge of the ground water is through the perimeter into Lake Calumet. The depression in the water table, shown in Figure 1, at wells G-103 and G-105 represents an area of discharge. Since ground water at the perimeter of the pier is in near equilibrium with the lake, the amount of discharge is related to the lake stage. Ground-water discharge increases with the lowering of lake levels and decreases as the lake level rises.

The complex hydrologic system of the fill is hydraulically connected with the marsh deposits underlying the eastern part of the site. This connection is substantiated by water level and water quality data from wells screened in the marsh deposits.

However, the entire system is perched upon the lacustrine clay which inhibits the downward migration of ground water into underlying water-bearing zones.

WATER QUALITY

Background Water Quality

The southeast Chicago area, especially in the vicinity of Lake Calumet, is a densely populated, highly industrialized region that has a long history of serving as a disposal area for a wide variety of industrial, commercial, and residential wastes.

There are thirty-one (31) operating or abandoned landfills and/or waste handling facilities in the area. Of these facilities, more than one-third are located in close proximity to the SCA Chicago incinerator facility. A variety of pollutant emission sources are available from the unique concentrations of the industrial plants and waste disposal facilities in the area. Figure 3 illustrates other land-use and industrial areas in the vicinity of the incinerator. Many of these facilities have been (and continue to be) the subject of intense compliance monitoring and enforcement from governmental agencies. In general, most facilities are in general compliance with the current standards. However, the density of the sources allows for combined concentrations that pose environmental problems. Results from 1983 IEPA ground-water sampling programs conducted throughout the Lake Calumet area indicated that iron, manganese, and silver levels were slightly above the ground-water use standards and low concentrations of several organic compounds (as a result of industrial activity) were detected (Illinois Environmental Protection Agency, 1984). These results indicate localized areas of ground-water contamination.

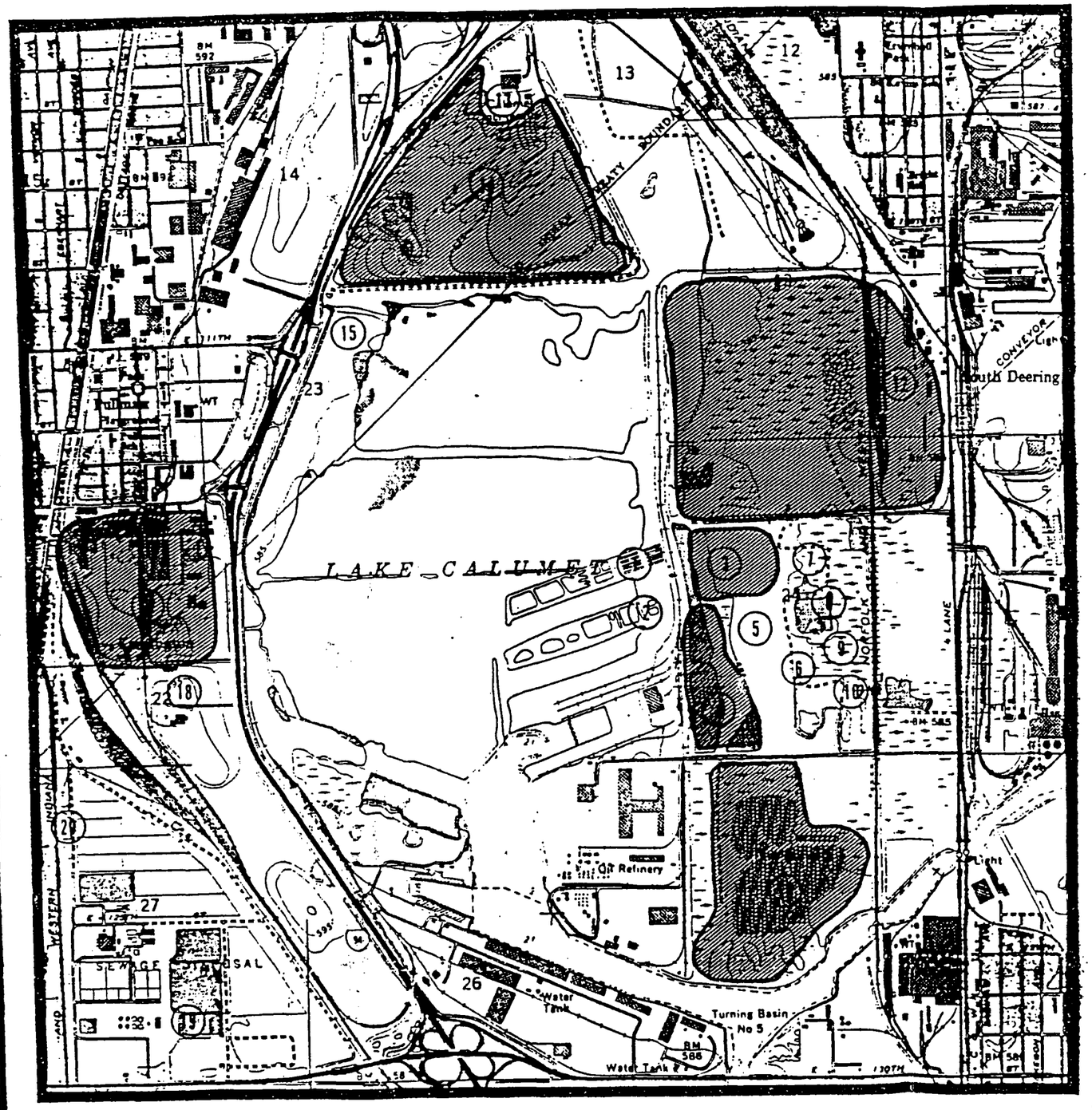


FIGURE 3. LOCATIONS OF LANDFILLS AND WASTE HANDLING FACILITIES IN THE SCA CHICAGO INCINERATOR FACILITY AREA.

FACILITY NAME AND USE

1. **SCA CHICAGO INCINERATOR**
2. **CHEM-CLEAR** Heavy metals, suspended solids, residual organics
3. **PAXTON II** Solid waste and non-hazardous waste
4. **LAND AND LAKE NO.3** General refuse and special waste
5. **119th. STREET AND PAXTON AVE.** Illegal special waste site
6. **ALBURN INCINERATOR** Hazardous waste incineration-closed
7. **PAXTON** General refuse and special waste-closed
8. **L.H.L. NO.2** General refuse and special waste-closed
9. **CALUMET HARBOR DEVELOPMENT** General refuse and special waste-closed
10. **U.S. DRUM DISPOSAL** Illegal special and hazardous waste storage and transfer
11. **MSD NO.4** Municipal wastewater treatment sludge drying
12. **INTERLAKE LANDFILL AND COKE PLANT** General refuse and special waste -closed
13. **103rd. AVE. TRANSFER STATION** General municipal waste transfer
14. **CHICAGO DEPT. OF STREETS AND SANITATION** Sludge drying and disposal
15. **CHICAGO REGIONAL PORT DISTRICT NO.2** Demolition material
16. **SHERWIN WILLIAMS** Hazardous waste treatment and incineration
17. **LIQUID DYNAMICS** Hazardous waste treatment-closed
18. **INLAND METAL** Organic hazardous waste treatment or incineration
19. **MSD NO.3** Municipal waste water sludge drying
20. **U.S. SCRAP** Hazardous waste disposal-closed

-N-

SOURCE OF INFORMATION :
BASE MAP : USGS LAKE CALUMET 7.5 MIN. QUADRANGLE, 1977
SITE LOCATION : IEPA, THE SOUTHEAST CHICAGO STUDY, 1984

2000 0 2000 4000

APPROX. SCALE IN FEET

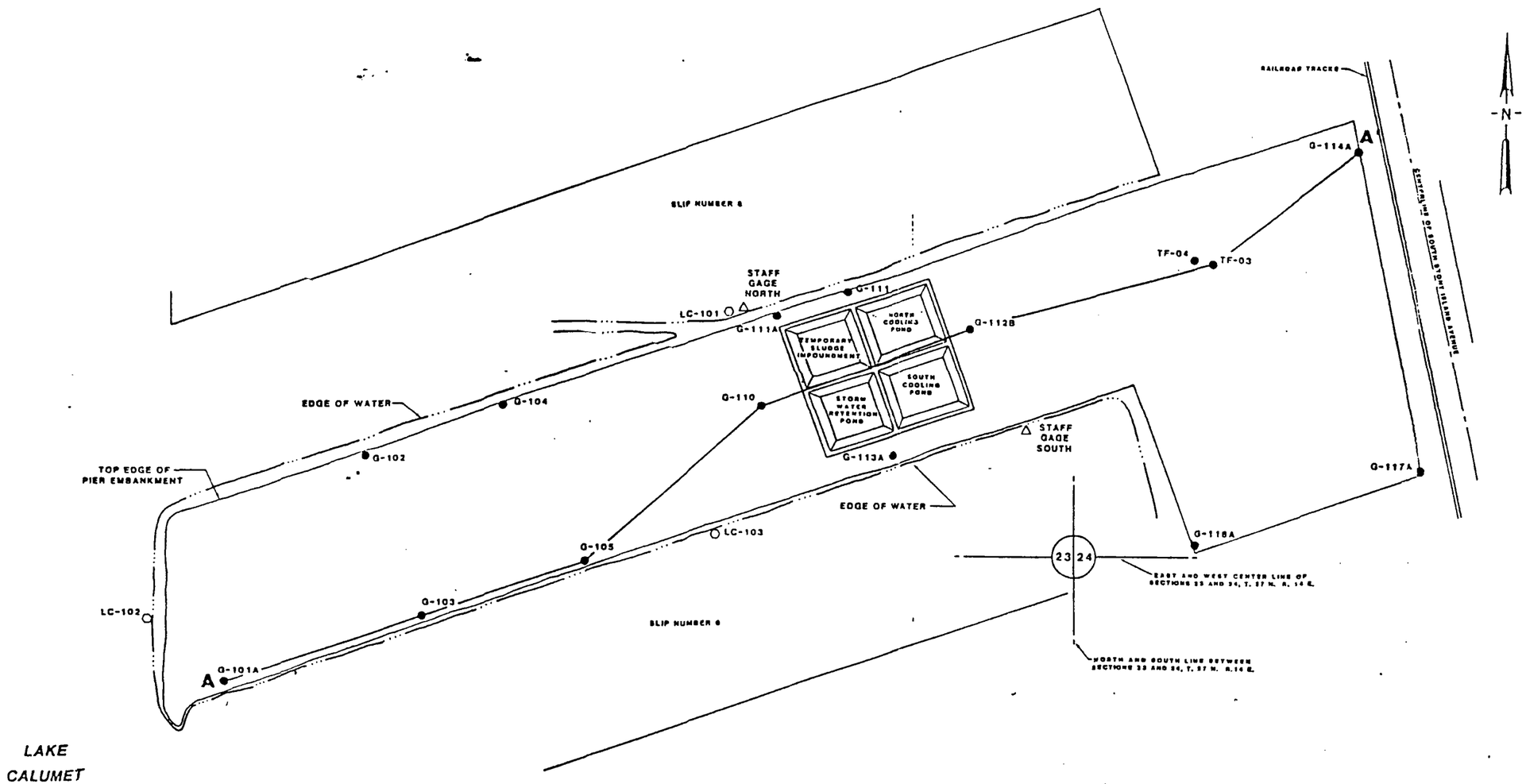
Prepared by :
P.E LAMOREAUX & ASSOCIATES, INC.

Site-Specific Water Quality

Water quality data supplied by SCA for its Chicago incinerator facility were subjected to the previously described statistical analyses. In addition to these analyses, PELA prepared "pie diagrams" to illustrate the major ionic species identified in the water samples. Major cations (sodium, calcium, magnesium, and potassium) and anions (chloride and sulfate) were converted to milliequivalents per liter and summed. This total was then used to calculate a percentage for each ionic species. Figures 4 through 18 show the relative amounts of the major cations and anions at the various sampling sites. Although most of the sampling results vary in concentration from April to May 1985, there are eight (8) sites that remain relatively constant in their composition. Sampling sites Lake Calumet 102, Lake Calumet 103, I East, I West, and wells G-102, G-103, G-105, and G-114A show little change in the percentage of each ionic species for the two (2) sampling dates.

The process water was analyzed for priority pollutants performed in February 1985. The results of the analyses indicate no volatile organics. The results of these analyses are provided in Appendix B. The relative ionic concentrations in the process water in the cooling ponds (I East [composite of north and south cooling ponds] and I West [storm water retention pond]) for April and May are shown in Figures 13 and 14. Each sample contained approximately 1,000 milliequivalents per liter. In conjunction with these high ion concentrations, specific conductance values of over 20,000 µmhos were recorded.

PLATE 1. SITE PLAN SHOWING MONITOR WELL LOCATIONS AND LINE OF CROSS SECTION A-A', SCA CHICAGO INCINERATOR, CHICAGO, ILLINOIS.



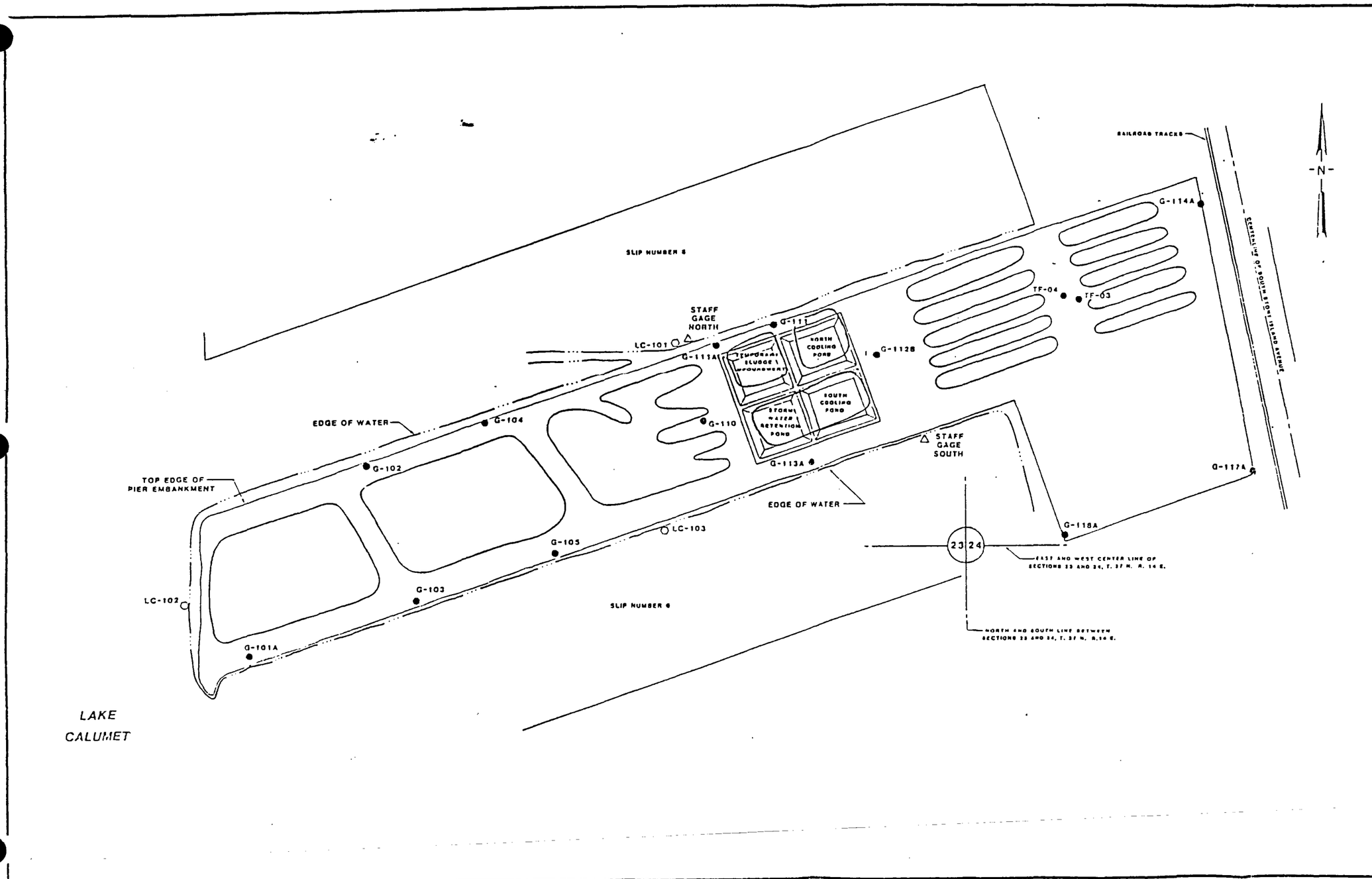
EXPLANATION

LC-101 ○	SURFACE WATER SAMPLE COLLECTION SITE
G-114A ●	GROUND WATER MONITOR WELL
△	STAFF GAGE

100 0 100 200 300
SCALE IN FEET

SCA CHEMICAL SERVICES, INC. CHICAGO, ILLINOIS	
P.E. LAMOREAUX & ASSOCIATES, INC.	
PROJECT NUMBER: 403306	1 OF 3
PREPARED BY: JSD	
DRAFTED BY: TGH	
CHECKED BY: LDG	

PLATE 2. MAP OF PIER 7 WITH LOCATIONS OF PREVIOUSLY EXISTING LAGOONS.



EXPLANATION

LC-101 SURFACE WATER SAMPLE COLLECTION SITE

G-114A GROUND WATER MONITOR WELL

STAFF GAGE

PREVIOUSLY EXISTING LAGOONS

SOURCE:
U.S.G.S. TOPOGRAPHIC 7.5 SERIES LAKE CALUMET, ILL.-IND.; 1964; PHOTOREVISED 1973, PHOTOINSPECTED 1977.

100 0 100 200 300
SCALE IN FEET

SCA
CHEMICAL SERVICES, INC.
CHICAGO, ILLINOIS

P.E. LAMOREAUX & ASSOCIATES, INC.

PROJECT NUMBER: 463300	2 OF 3
PREPARED BY: TSH	
DRAFTED BY: TSH	
CHECKED BY: LDG	

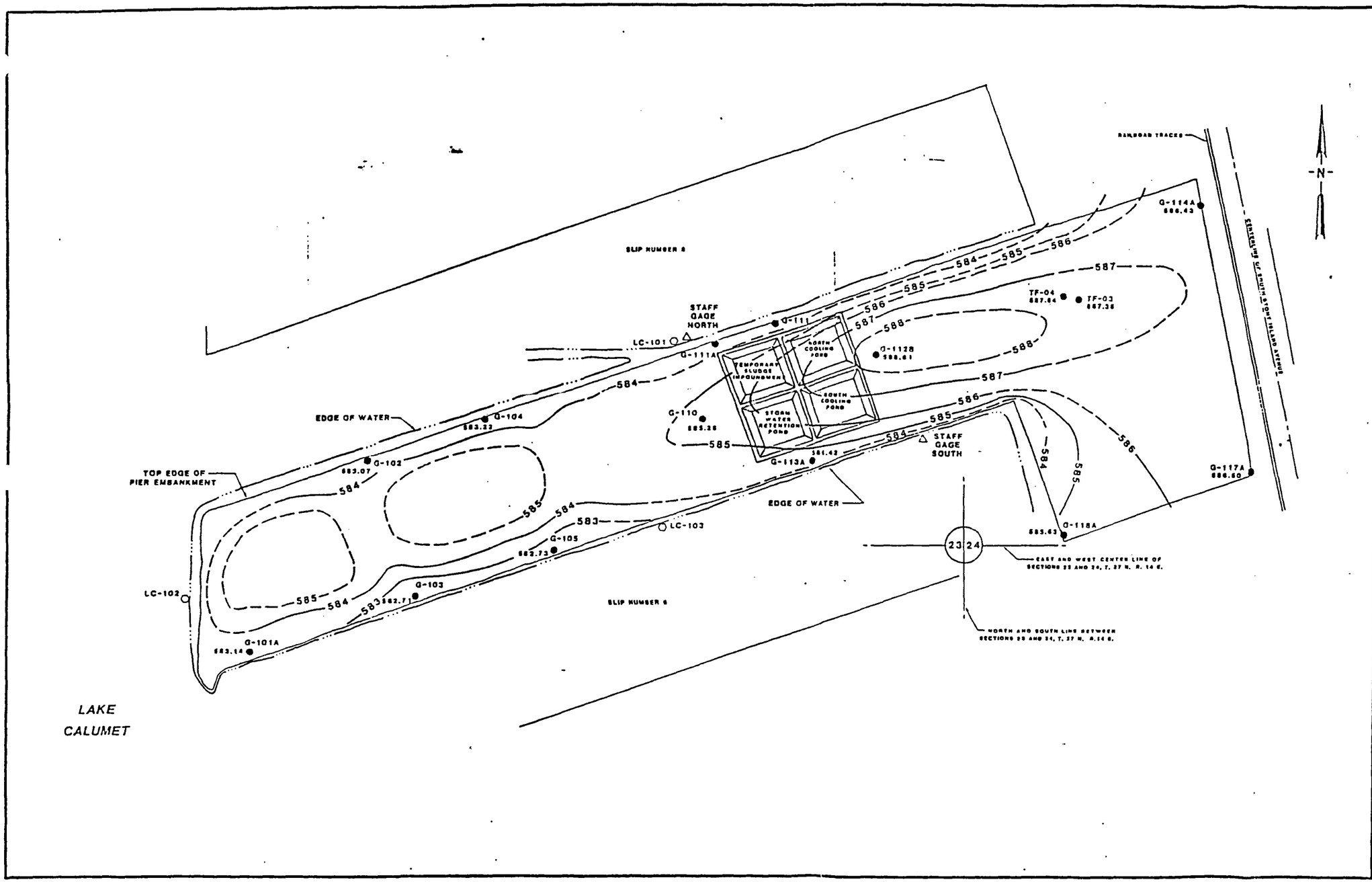


PLATE 3. CONFIGURATION OF PEIZOMETRIC SURFACE ON MAY 16,1985, SCA CHICAGO INCINERATOR, CHICAGO, IL.

EXPLANATION

LC-101 ○ SURFACE WATER SAMPLE COLLECTION SITE

G-114A ● 586.43 GROUND WATER MONITOR WELL AND WATER SURFACE ELEVATION

△ STAFF GAGE

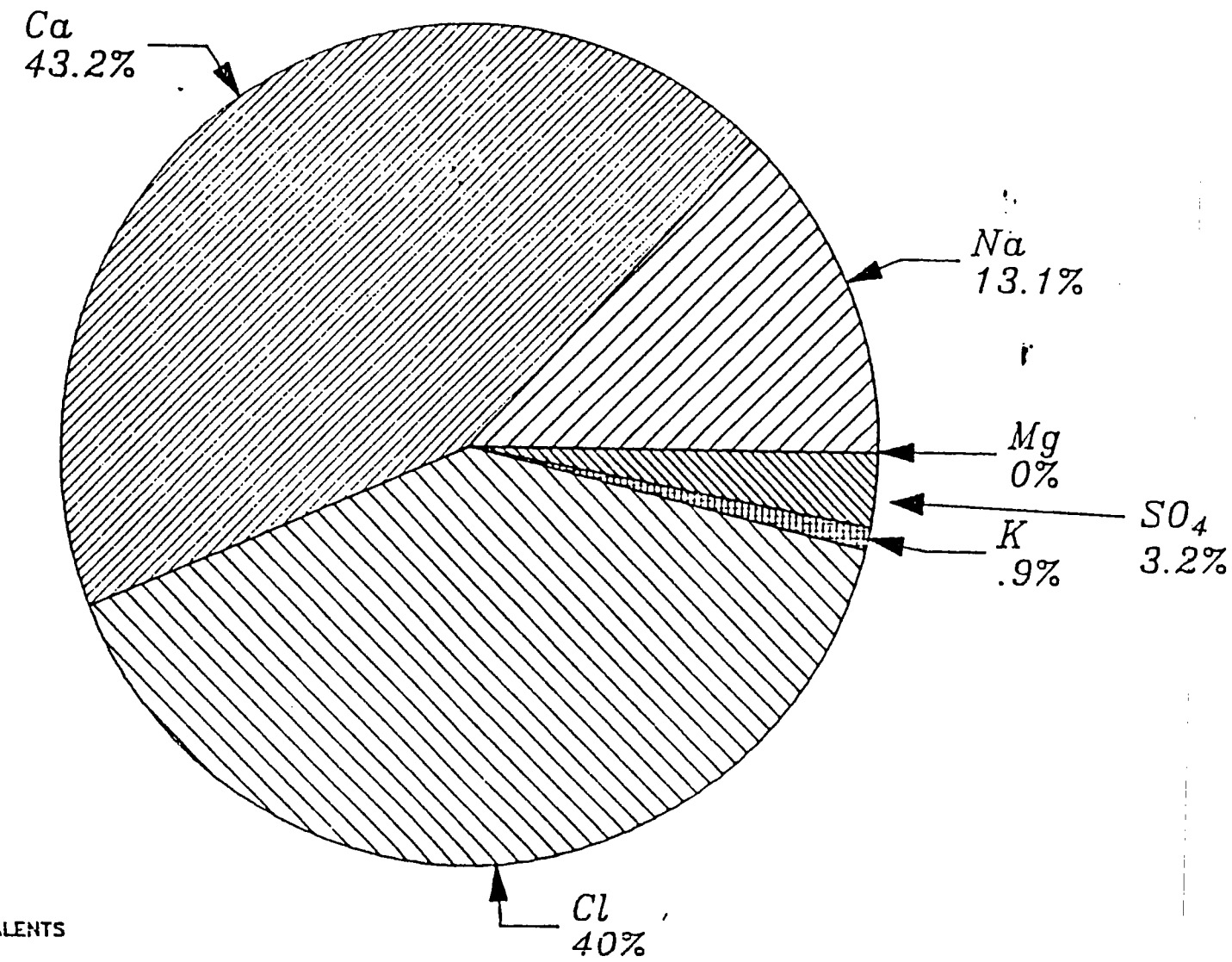
—583— CONTOUR LINE (DASHED WHERE INFERRED) CONTOUR INTERVAL IS 1 FOOT

BASED ON WATER LEVEL AND SURVEY INFORMATION PROVIDED BY SCA CHEMICAL SERVICES, INC.

100 0 100 200 300
SCALE IN FEET

SCA CHEMICAL SERVICES, INC. CHICAGO, ILLINOIS	
P.E. LAMOREAUX & ASSOCIATES, INC.	
PROJECT NUMBER: 483300	3 OF 3
PREPARED BY: JDB	
DRAFTED BY: TSM/SS	
CHECKED BY: LDG	

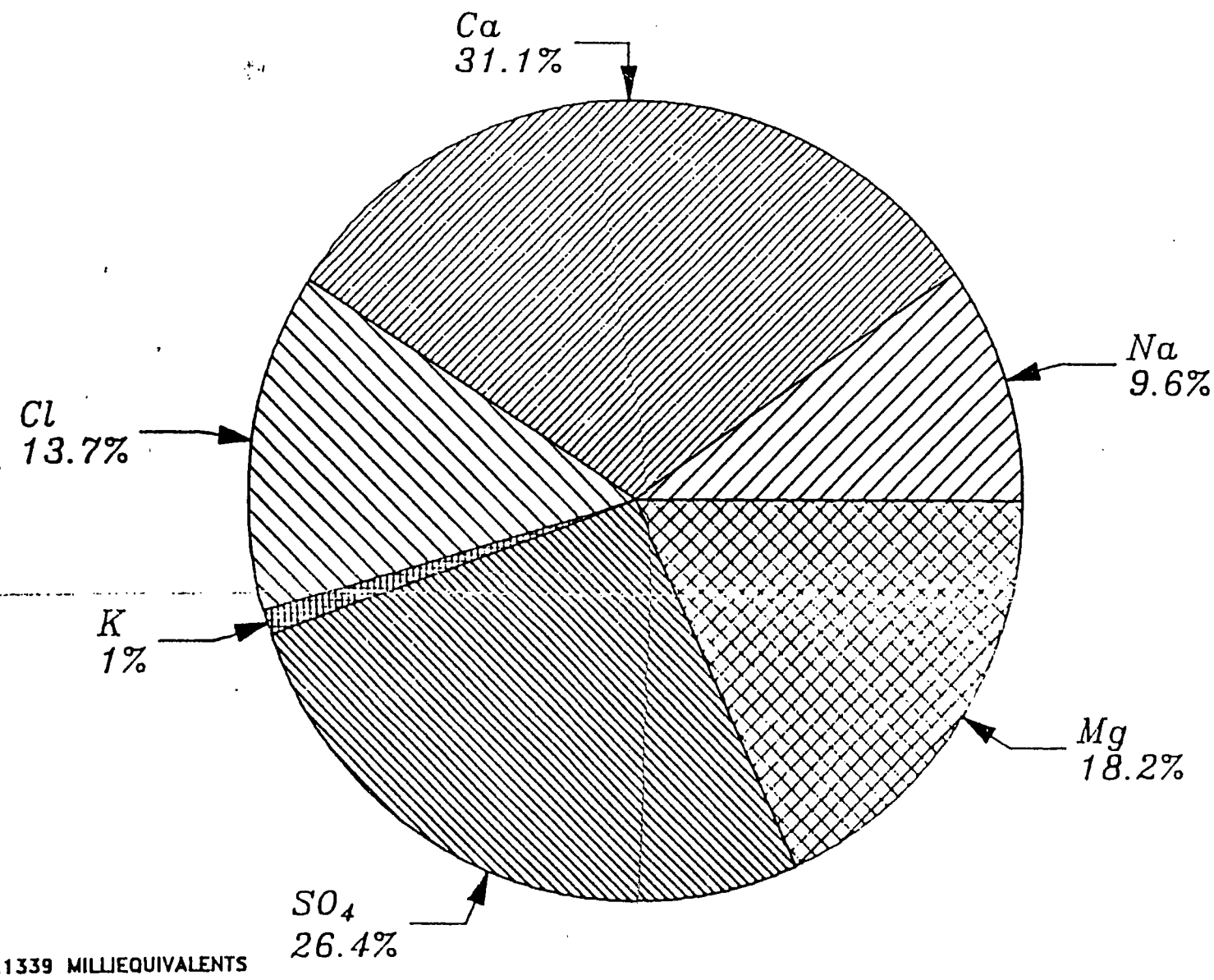
FIGURE 4. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **TF-03** ON APRIL 10, 1985 AND MAY 16, 1985.



NOTE:

TOTAL 147.9567 MILLIEQUIVALENTS PER LITER

4/10/85



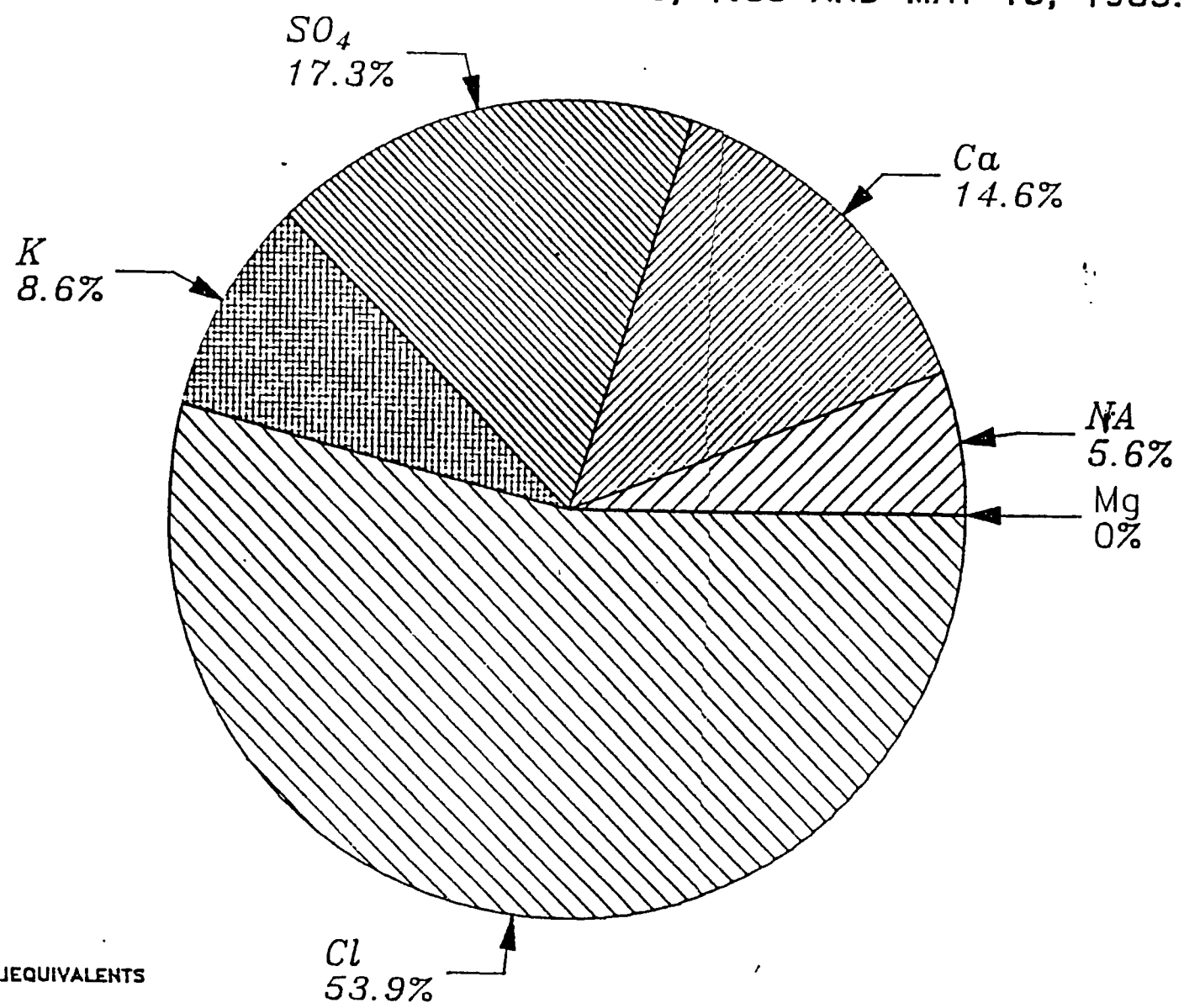
NOTE:

TOTAL 37.1339 MILLIEQUIVALENTS PER LITER

5/16/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

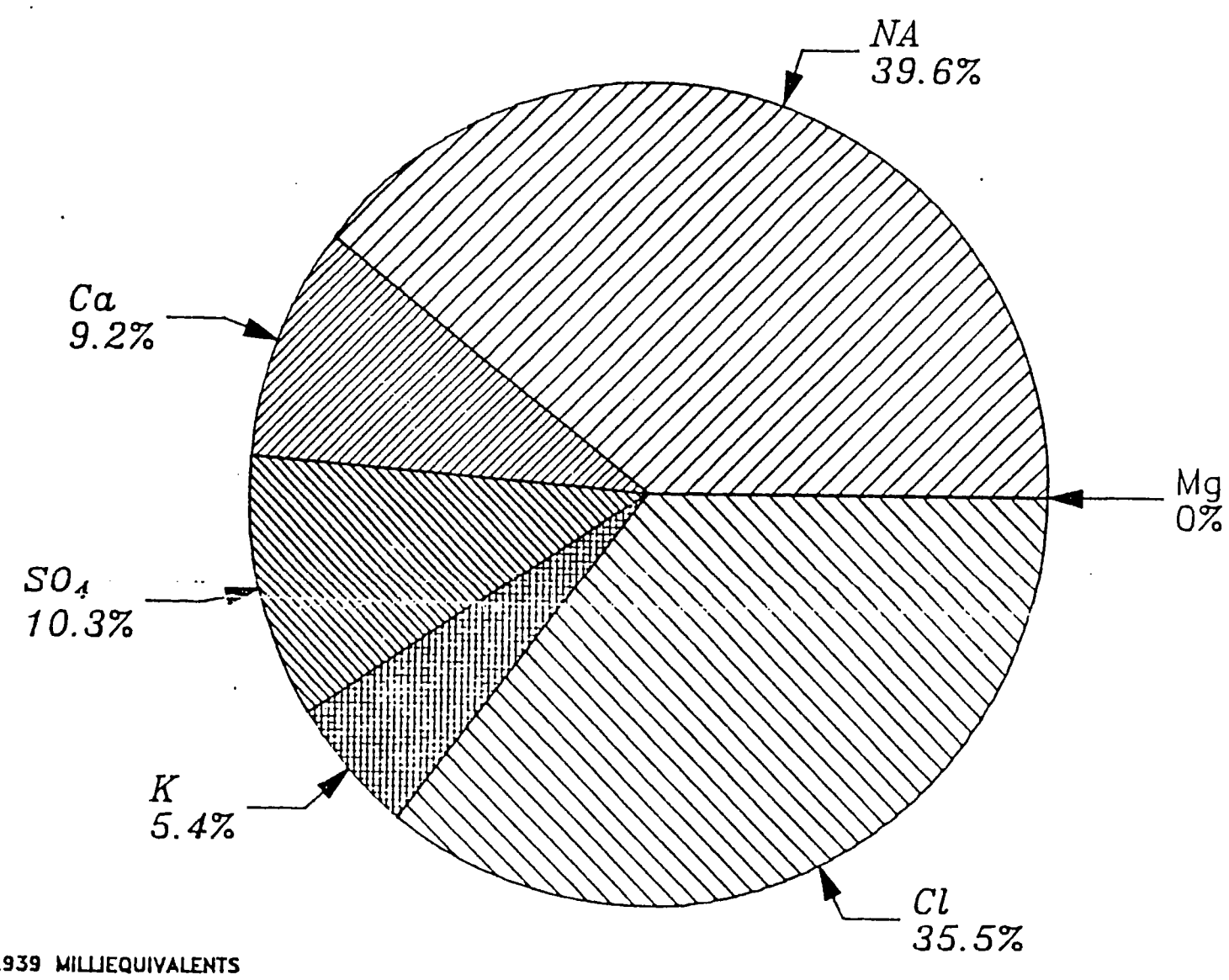
FIGURE 5. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-101** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 89.043 MILLIEQUIVALENTS PER LITER

4/9/85



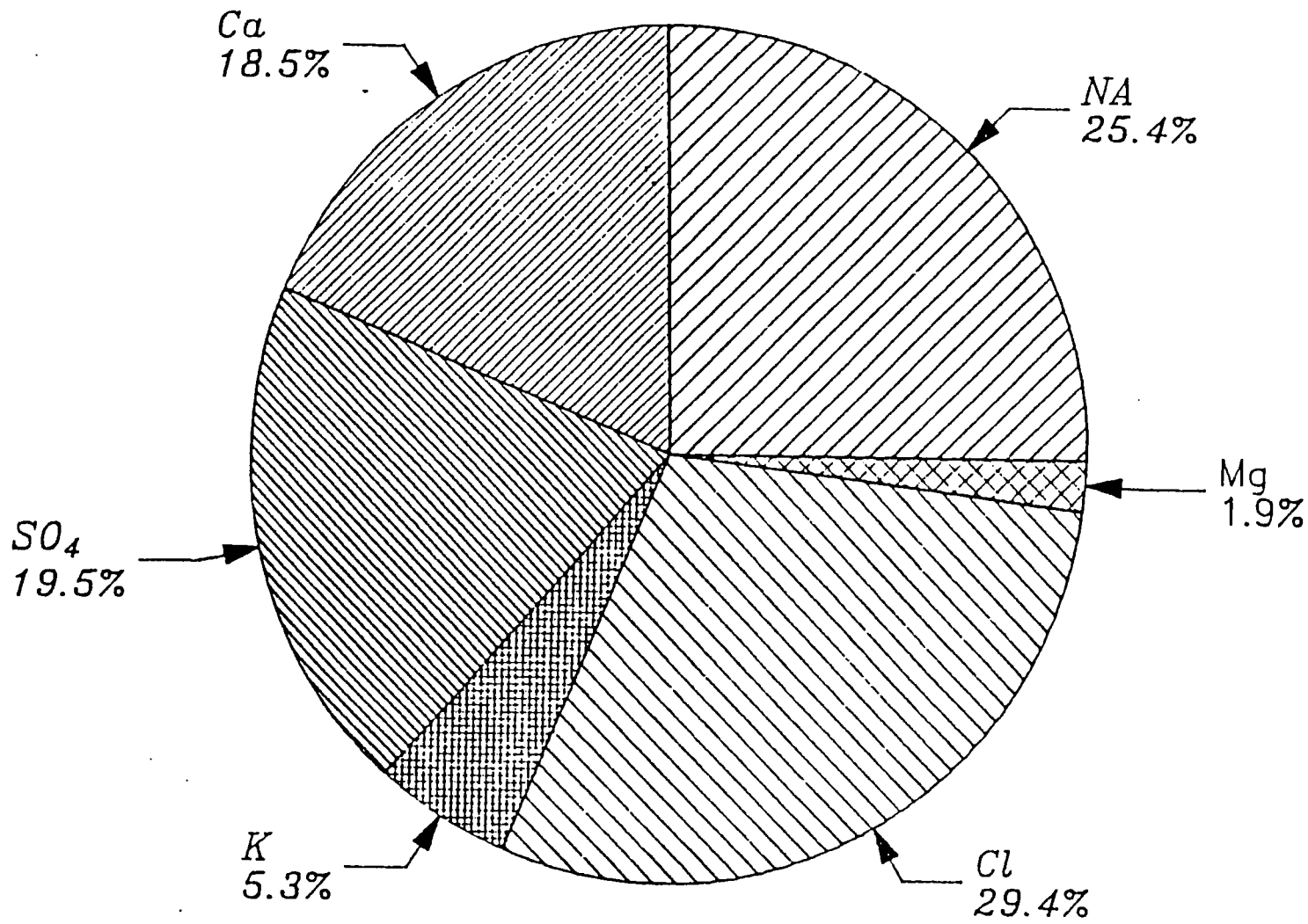
NOTE:

TOTAL 142.939 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

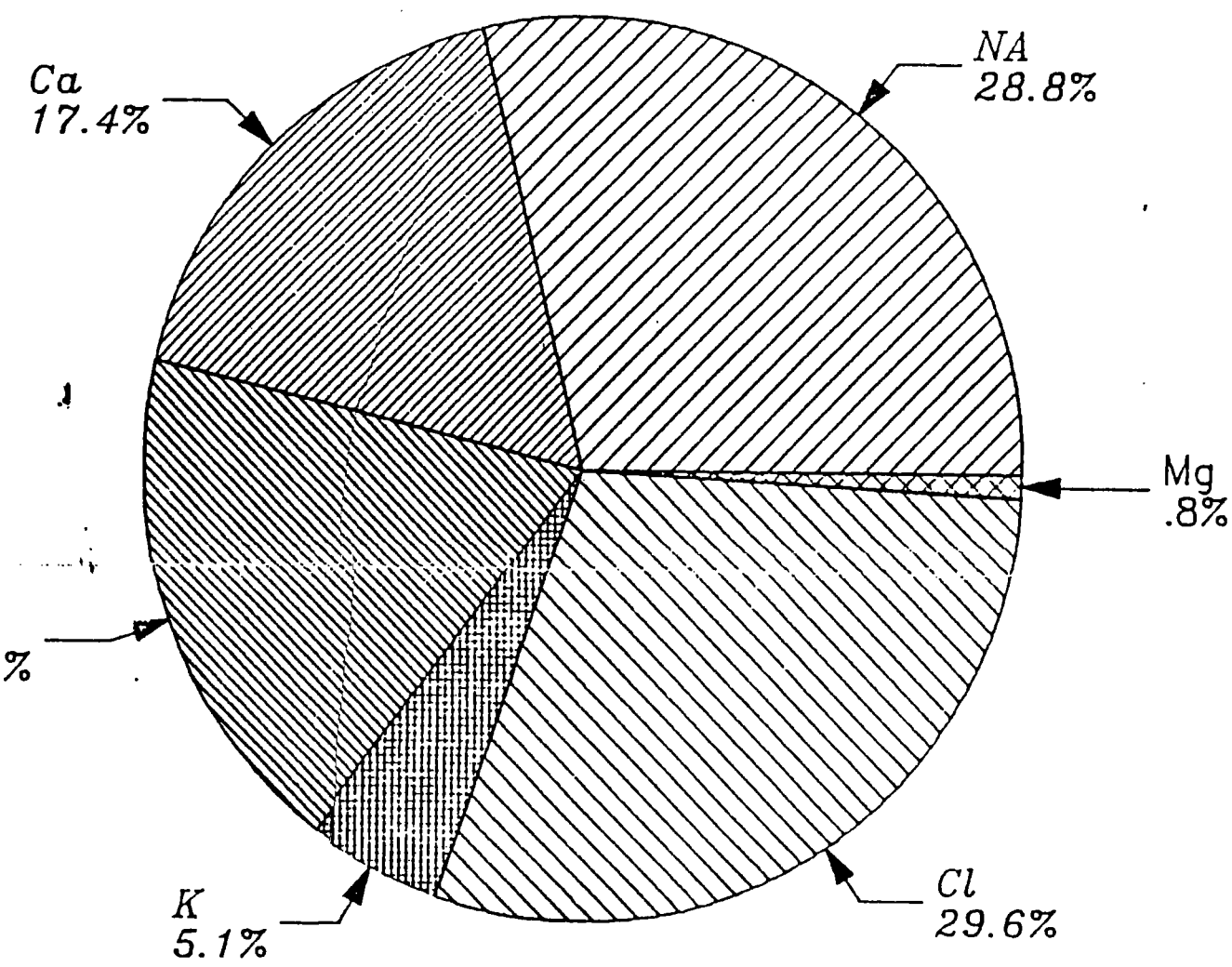
FIGURE 6. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNT OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-102** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 38.378 MILLIEQUIVALENTS PER LITER

4/9/85



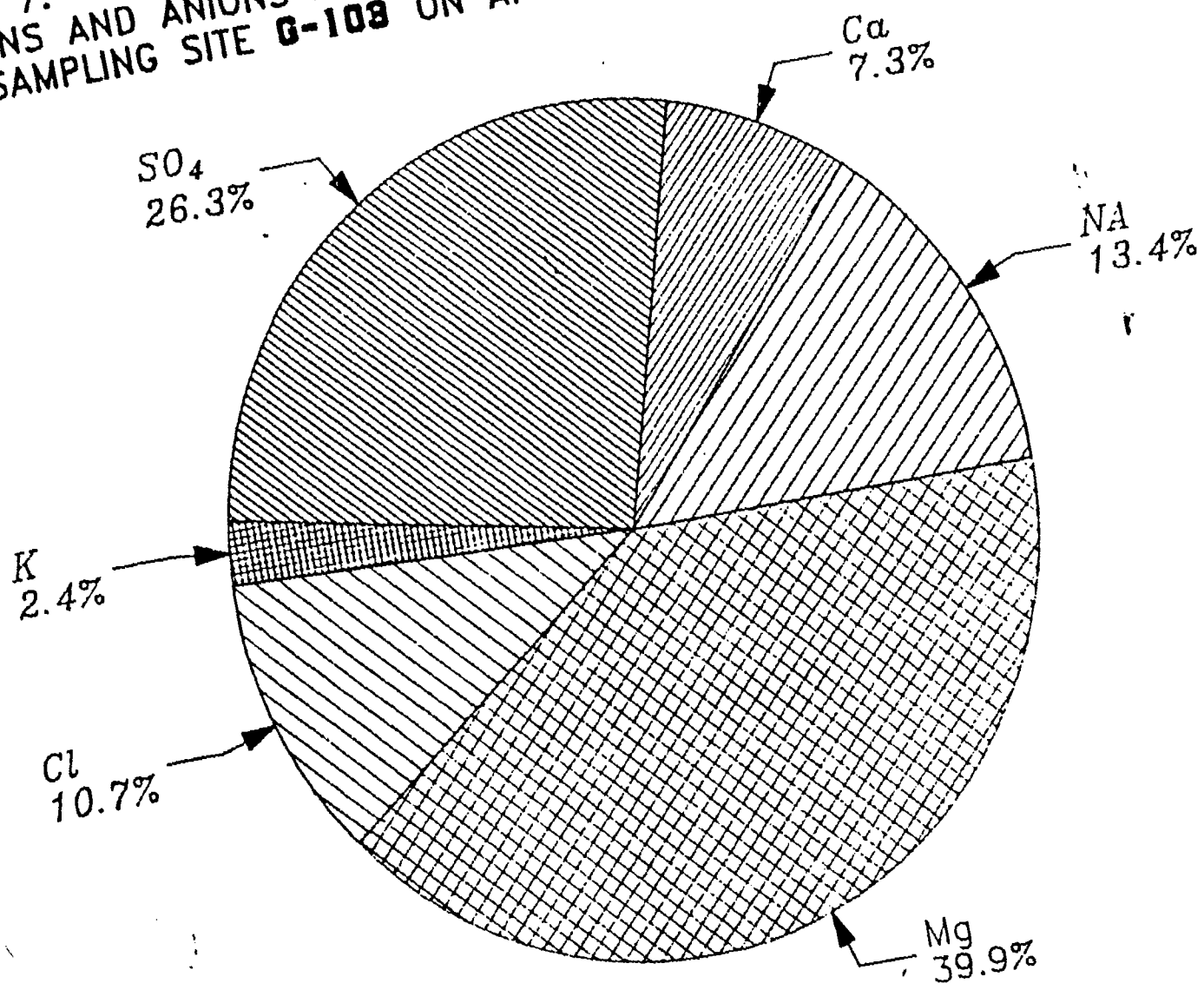
NOTE:

TOTAL 36.344 MILLIEQUIVALENTS PER LITER

5/15/85

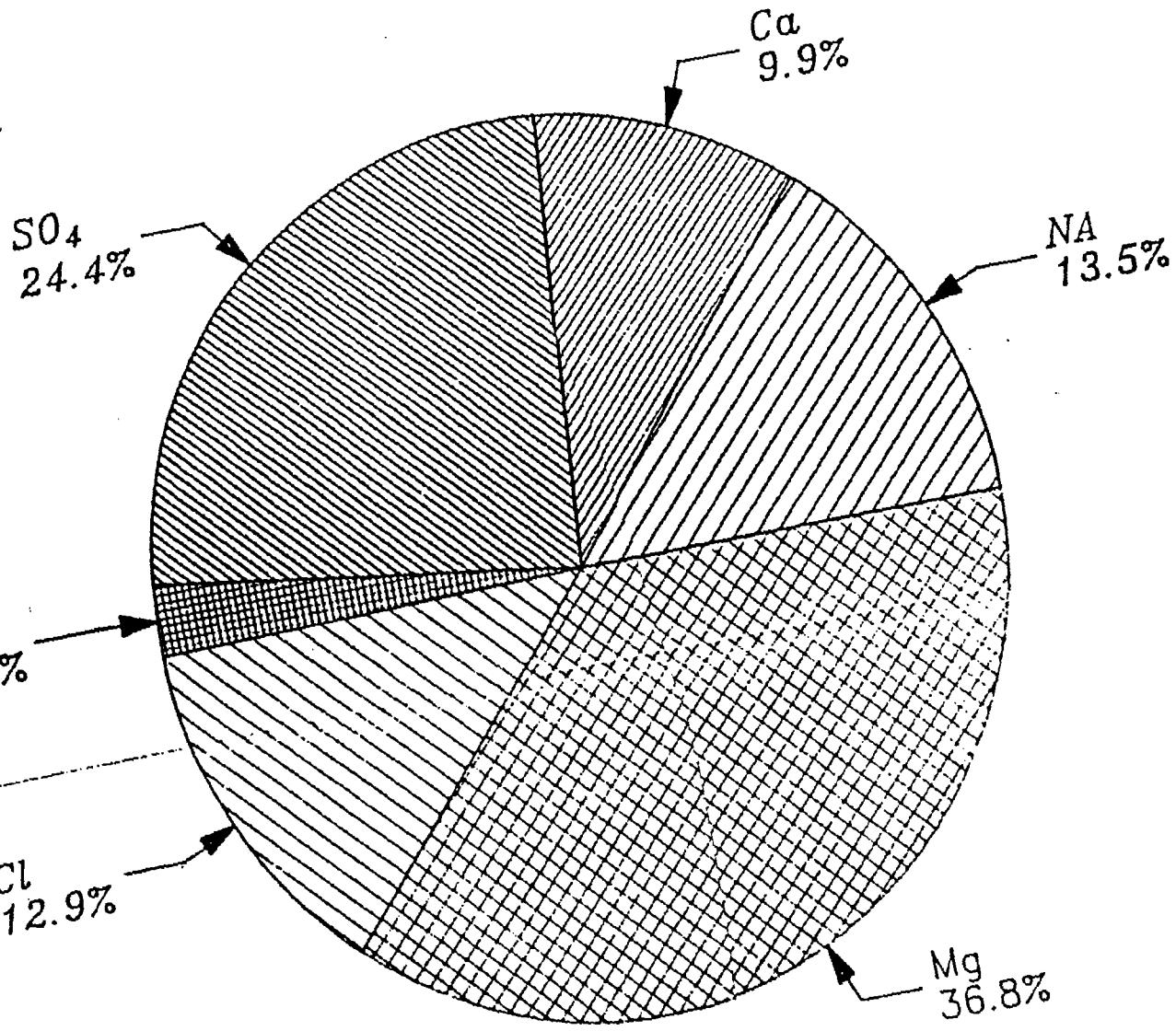
Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

FIGURE 7. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE G-108 ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:
TOTAL 105.188 MILLIEQUIVALENTS PER LITER

4/9/85

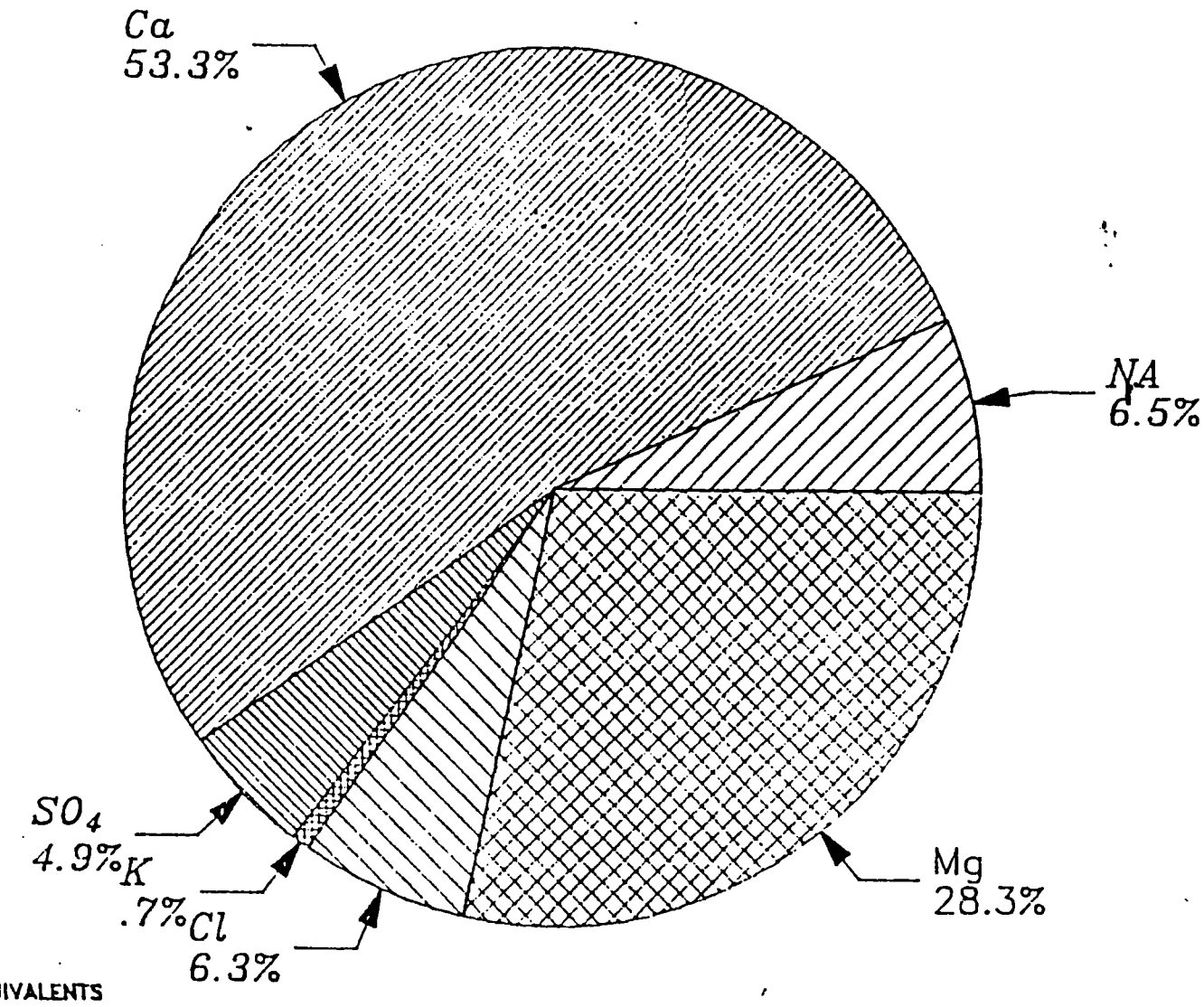


Prepared by:
P.E. LAMOREAUX & ASSOC

NOTE:
TOTAL 70.087 MILLIEQUIVALENTS PER LITER

5/15/85

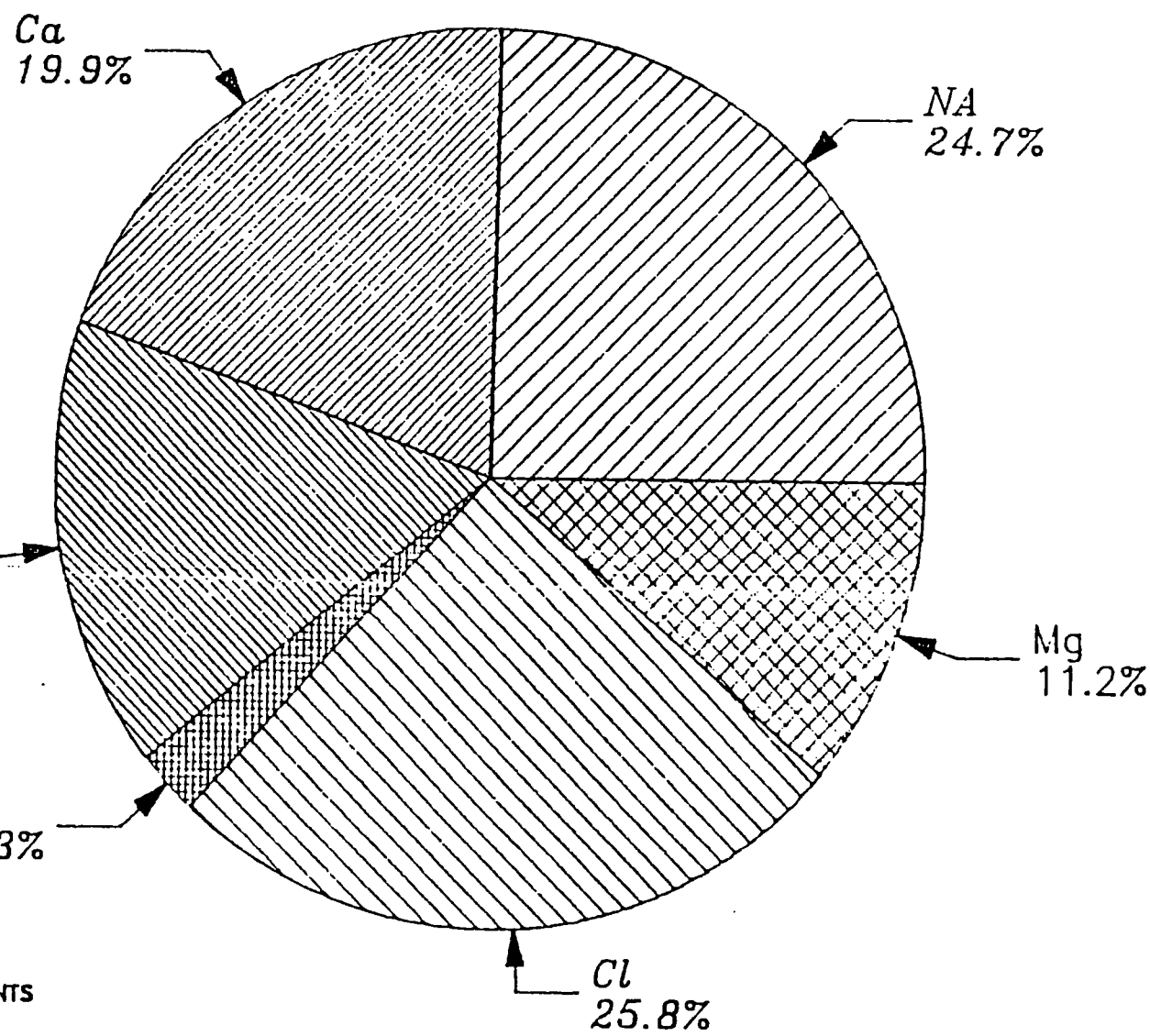
FIGURE 8. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-104** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 67.435 MILLIEQUIVALENTS PER LITER

4/9/85



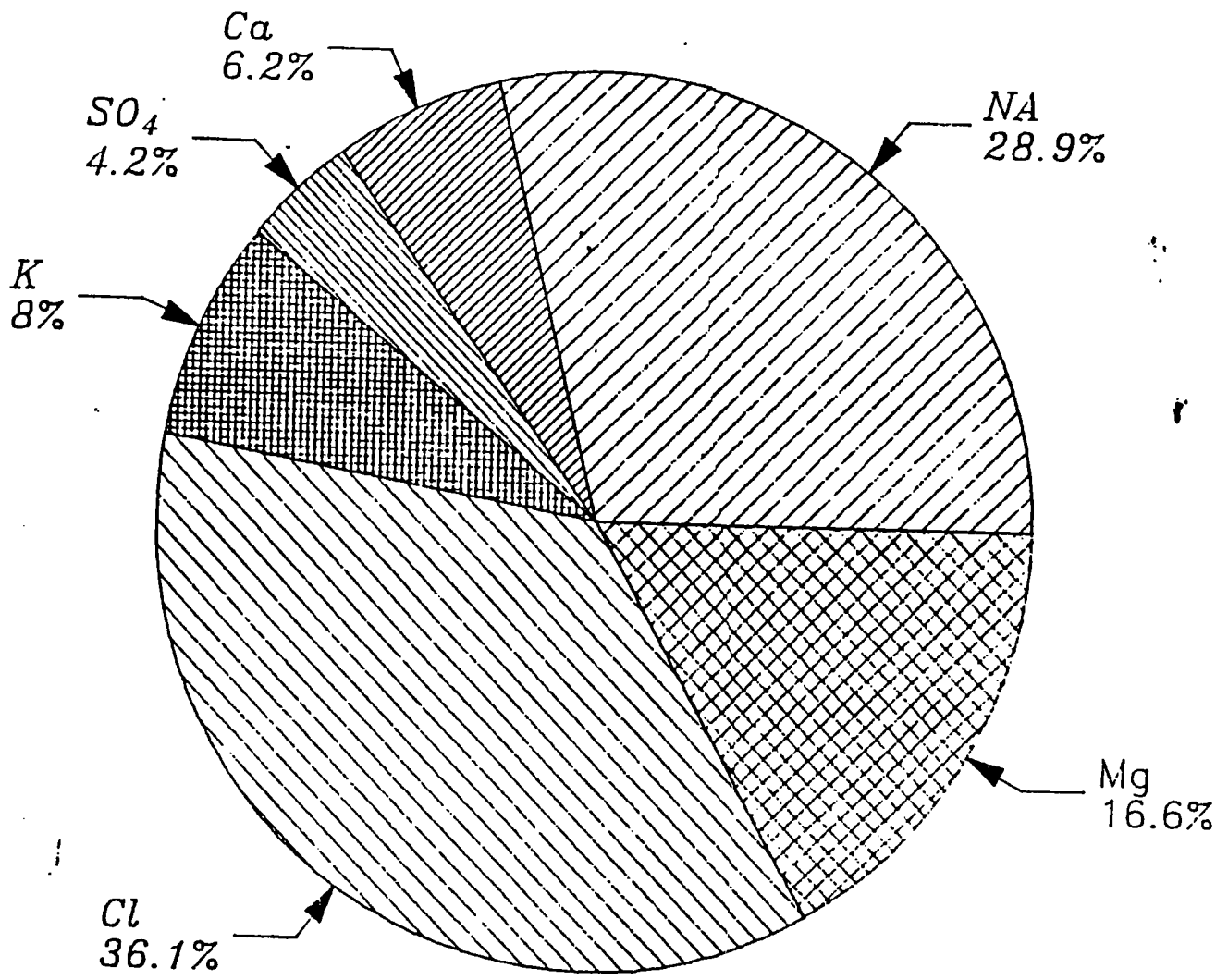
NOTE:

TOTAL 14.221 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

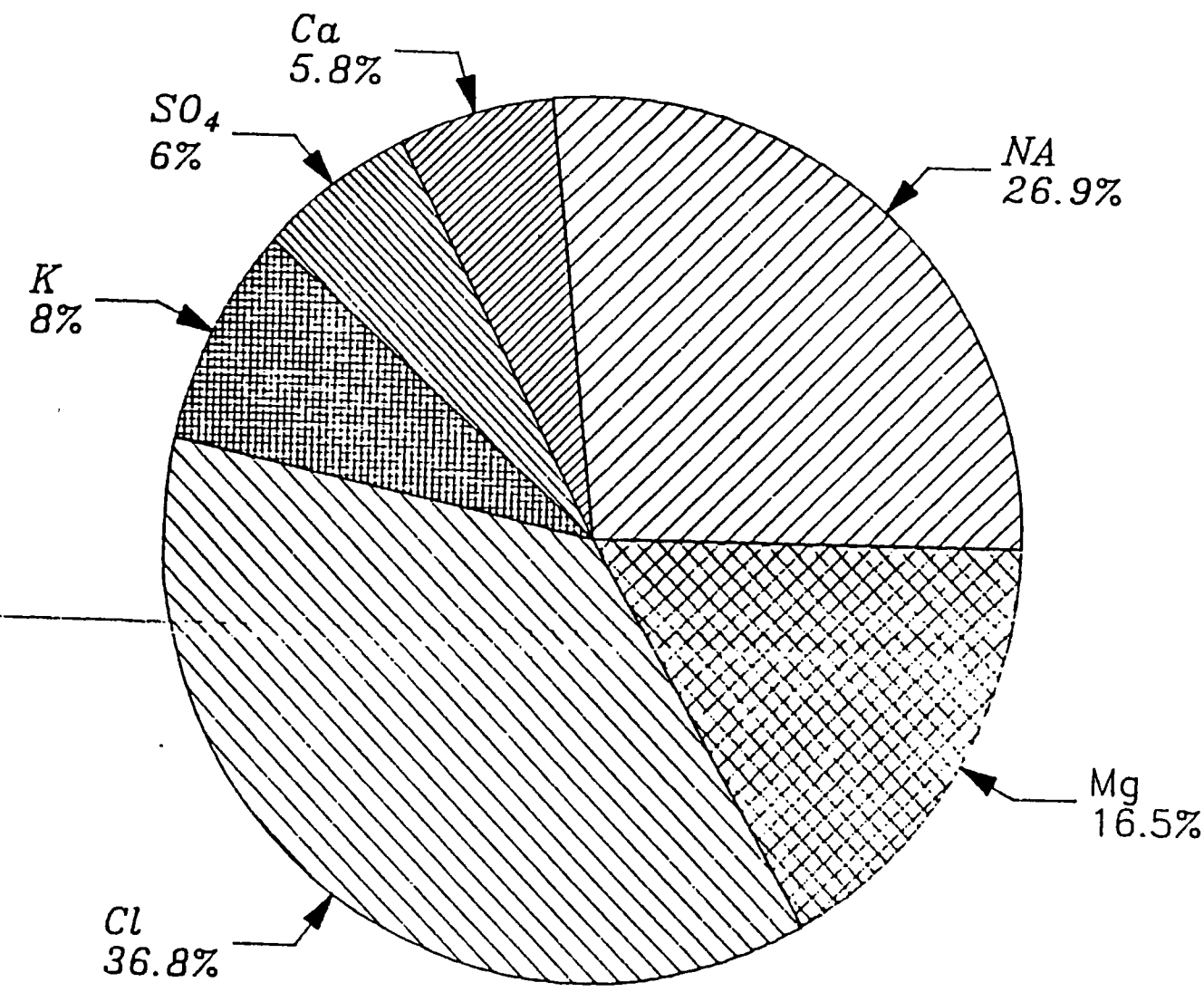
FIGURE 9. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-106** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 54.611 MILLIEQUIVALENTS PER LITER

4/9/85



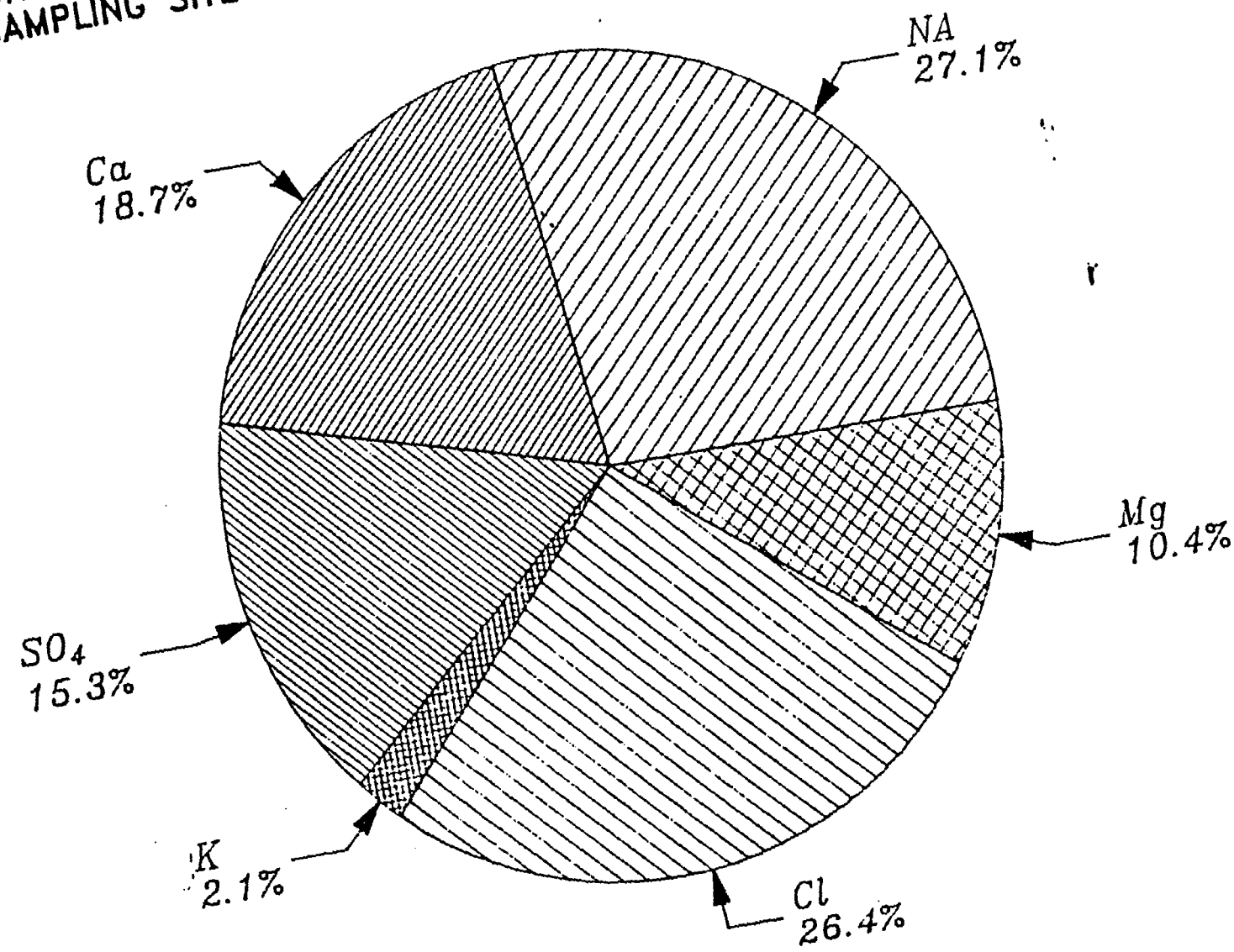
NOTE:

TOTAL 45.201 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

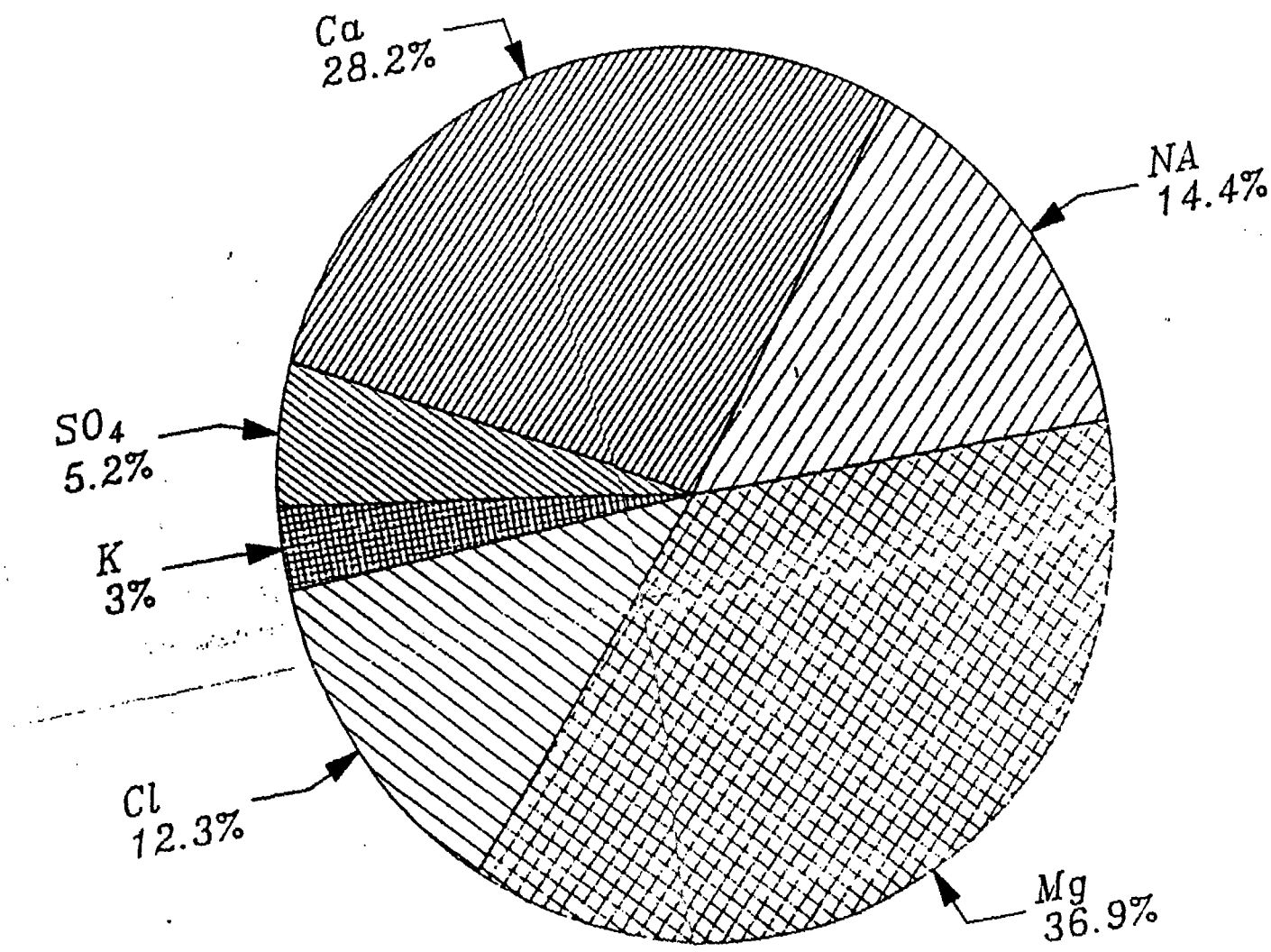
FIGURE 10. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **LC-101** ON APRIL 9, 1985 AND MAY 15, 1985.



4/9/85

NOTE:

TOTAL 14.933 MILLIEQUIVALENTS PER LITER



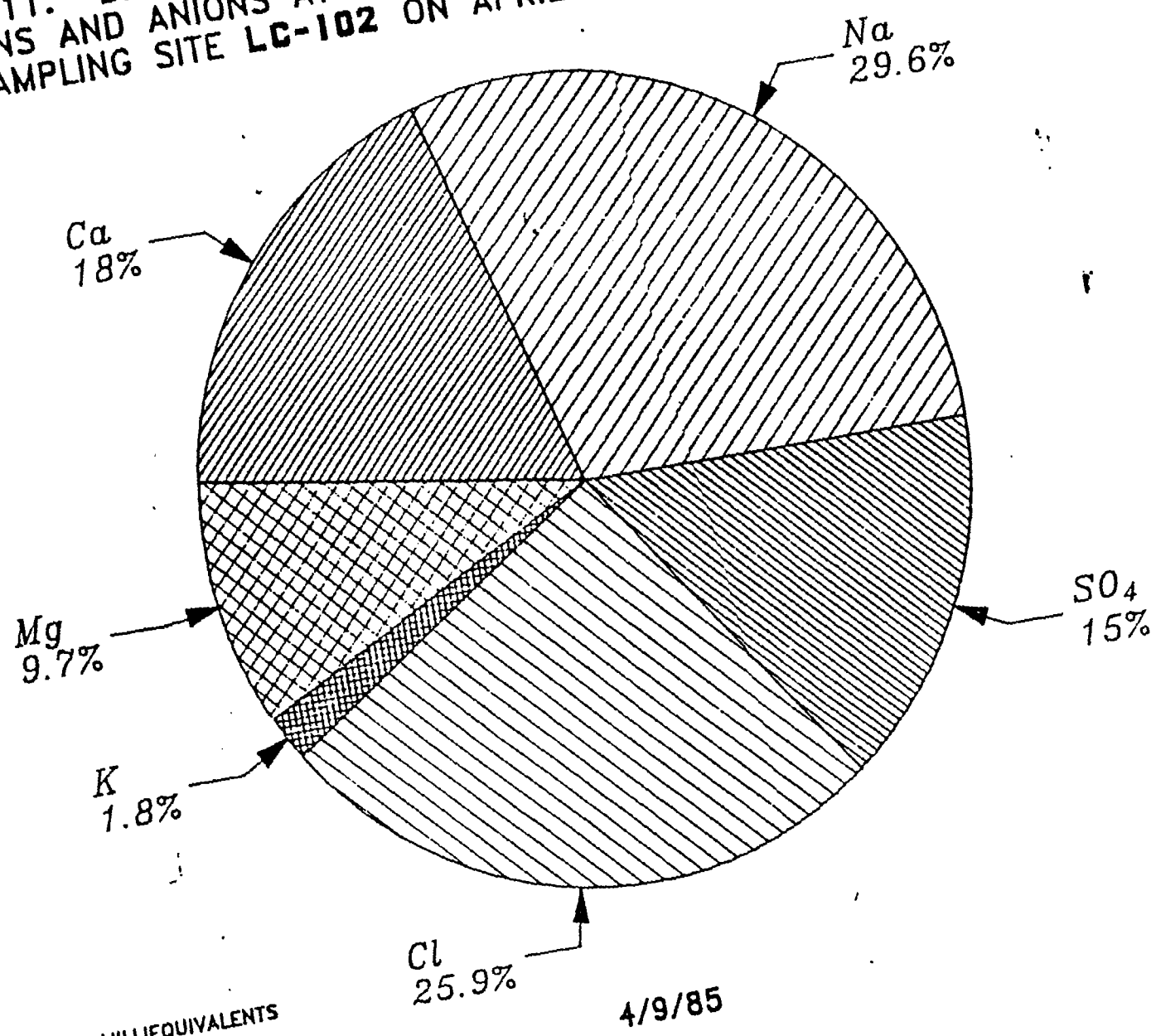
5/15/85

NOTE:

TOTAL 48.137 MILLIEQUIVALENTS PER LITER

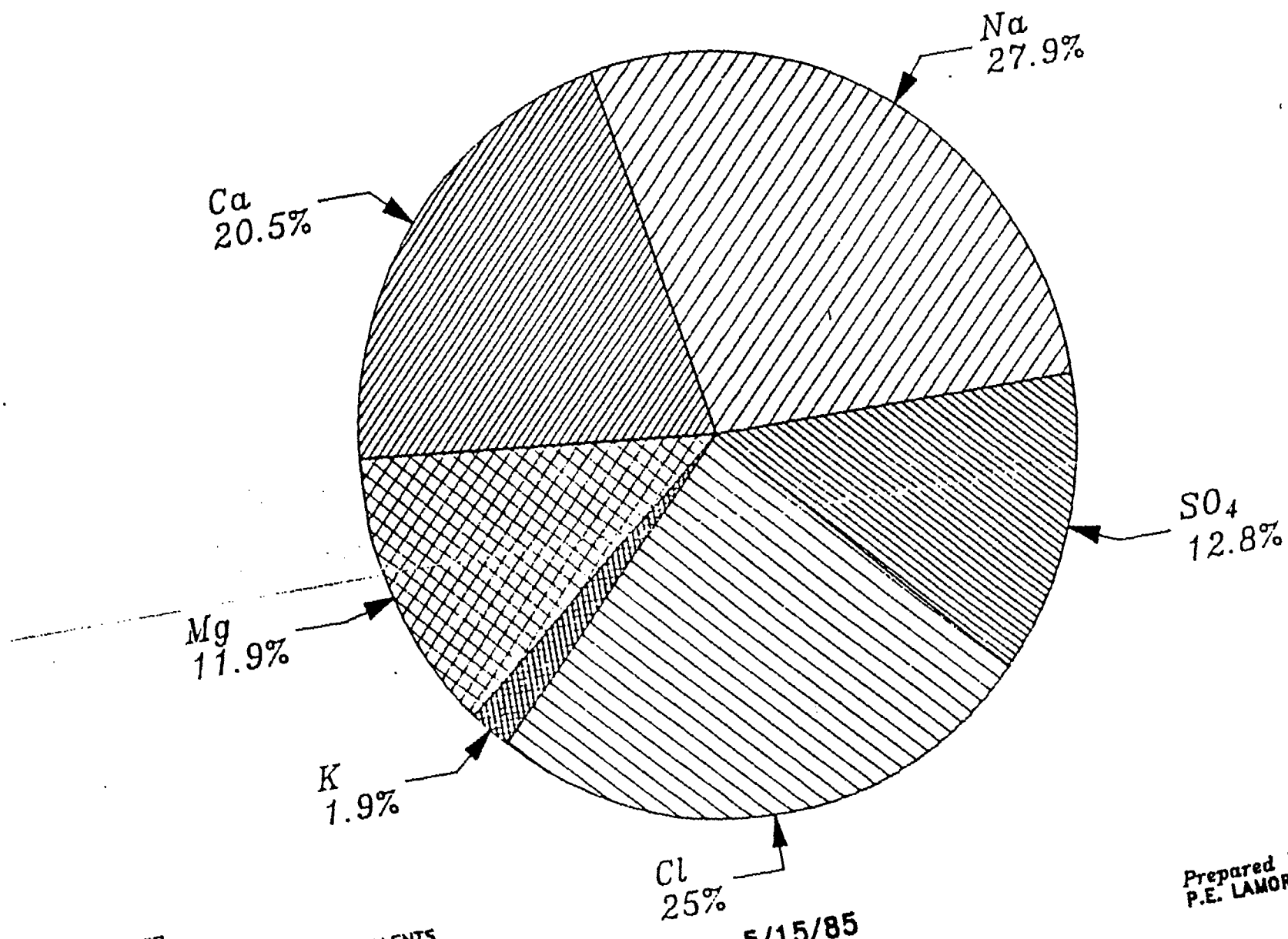
Prepared by:
P.E. LAMOREAUX & ASSOCI

FIGURE 11. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **LC-102** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:
TOTAL 15.2751 MILLIEQUIVALENTS PER LITER

4/9/85

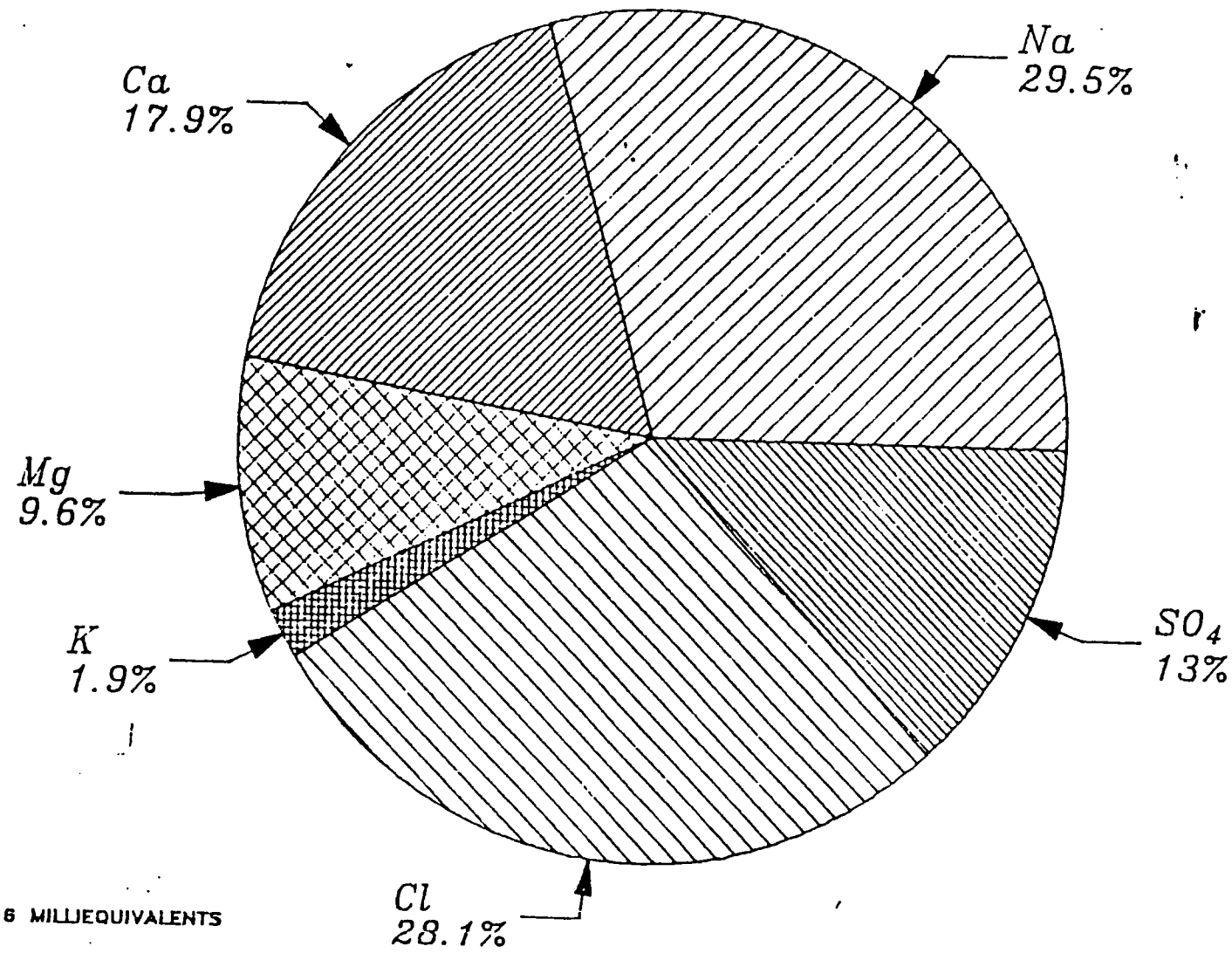


NOTE:
TOTAL 12.3999 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIA

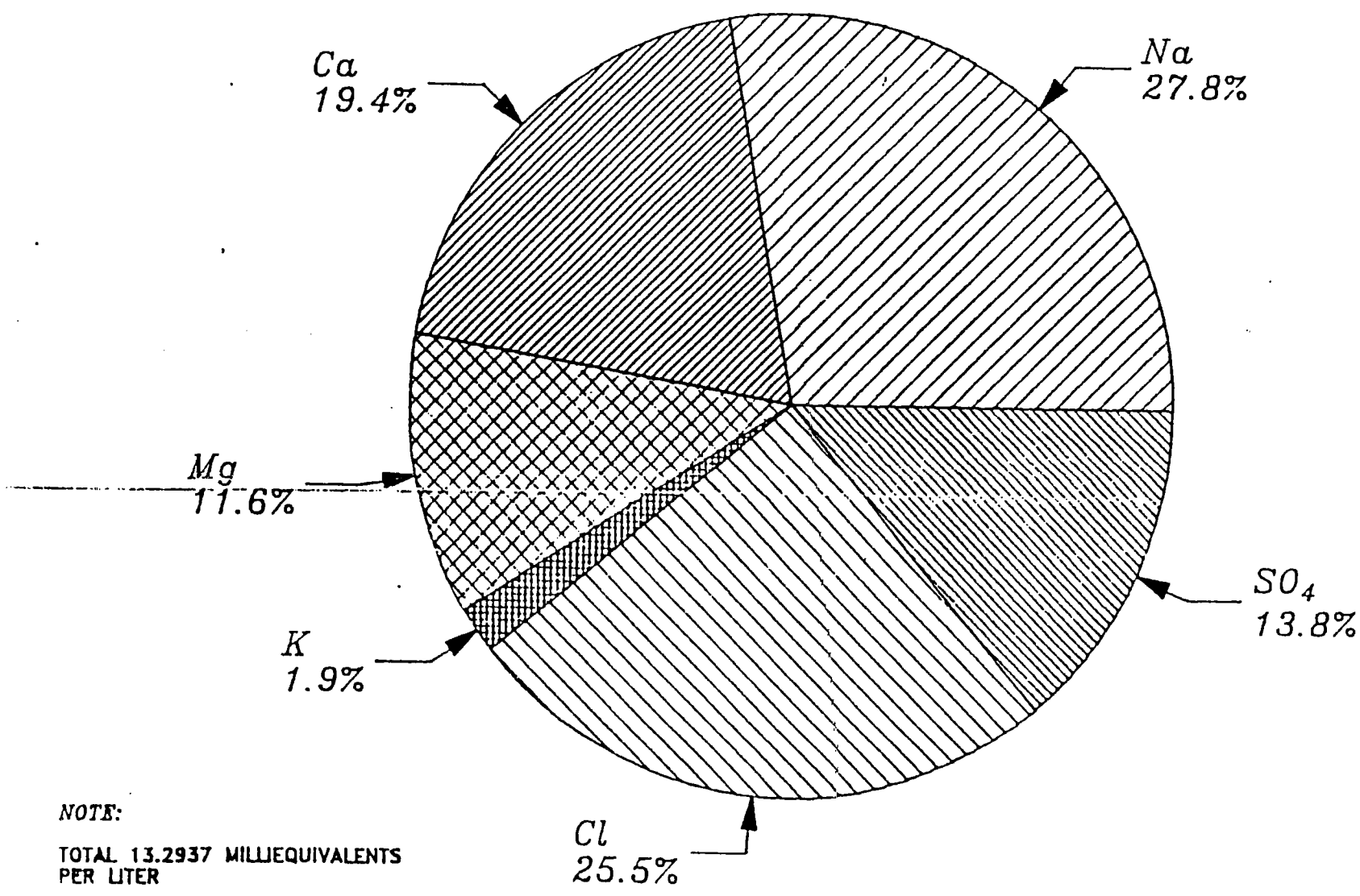
FIGURE 12. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **LC-103** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 16.0696 MILLIEQUIVALENTS PER LITER

4/9/85



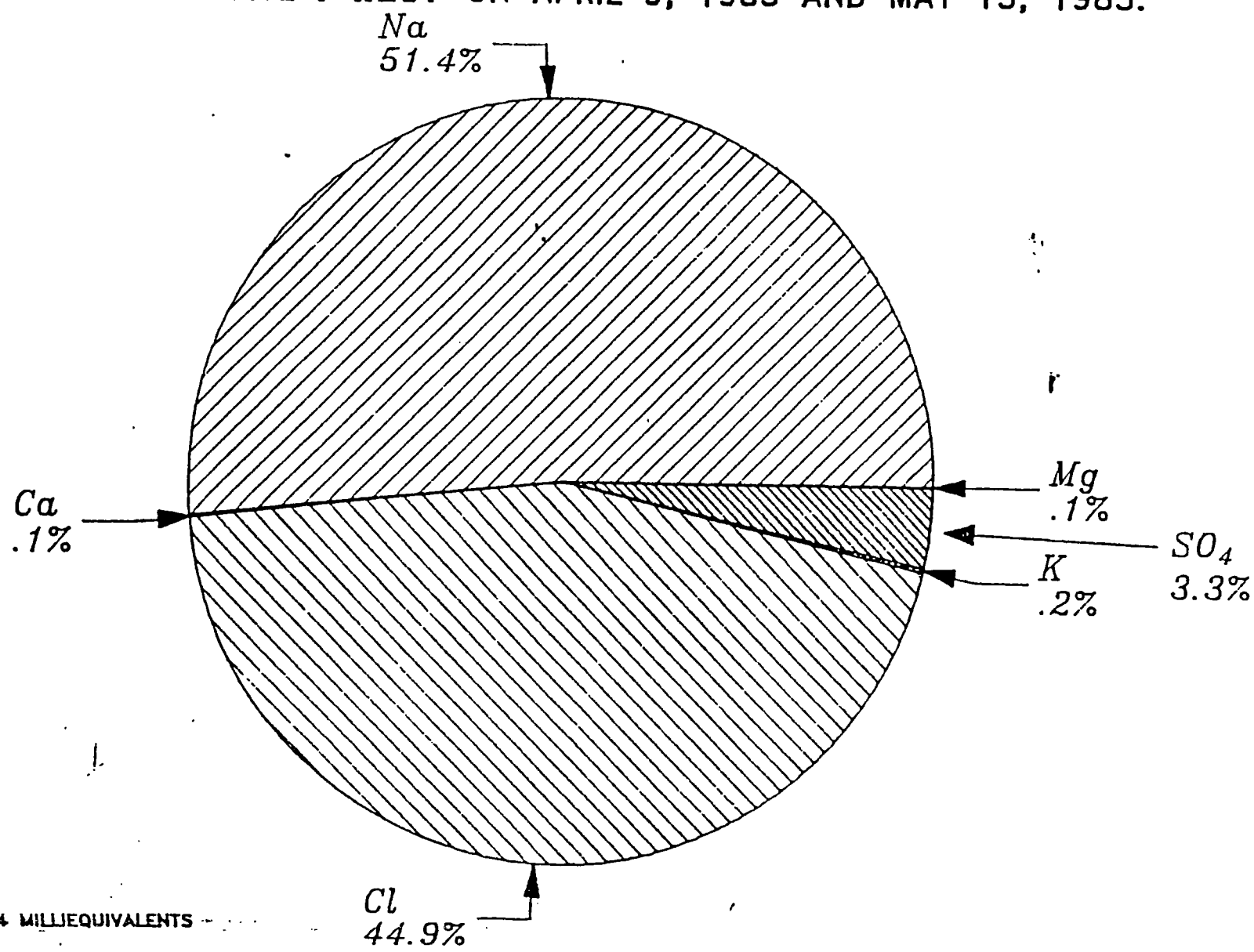
NOTE:

TOTAL 13.2937 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

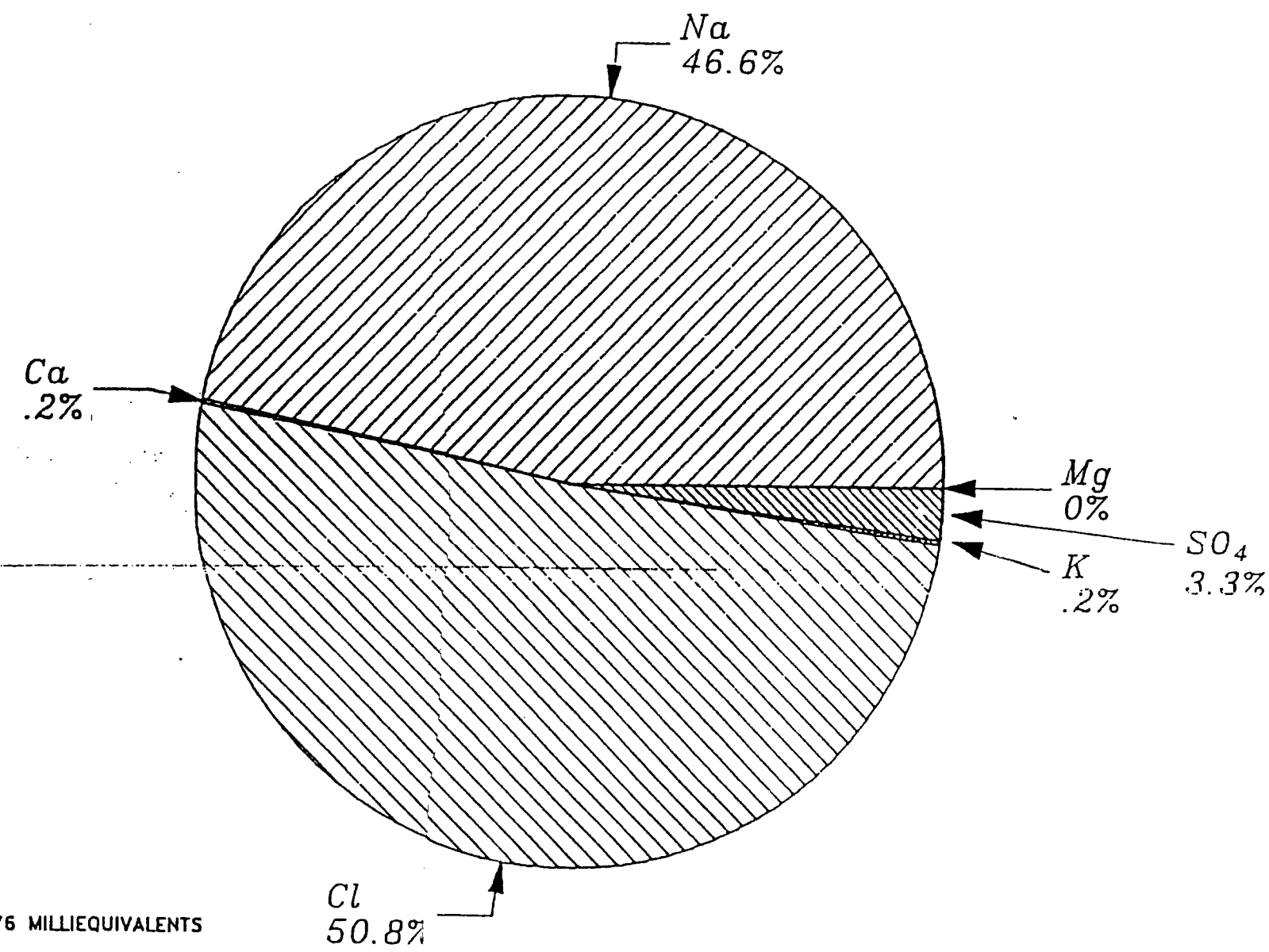
FIGURE 13. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **I WEST** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 609.5224 MILLIEQUIVALENTS PER LITER

4/9/85



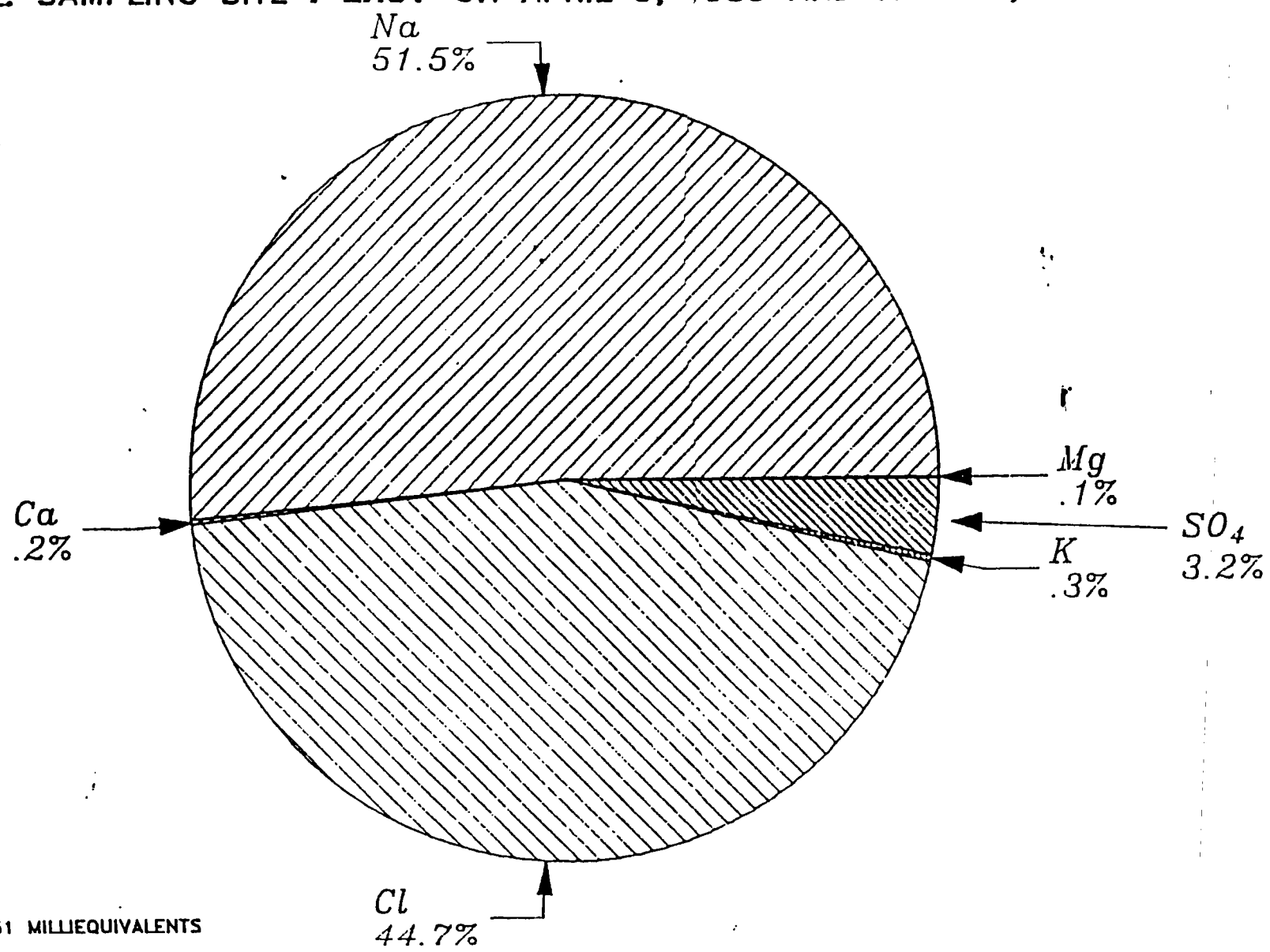
NOTE:

TOTAL 988.6176 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

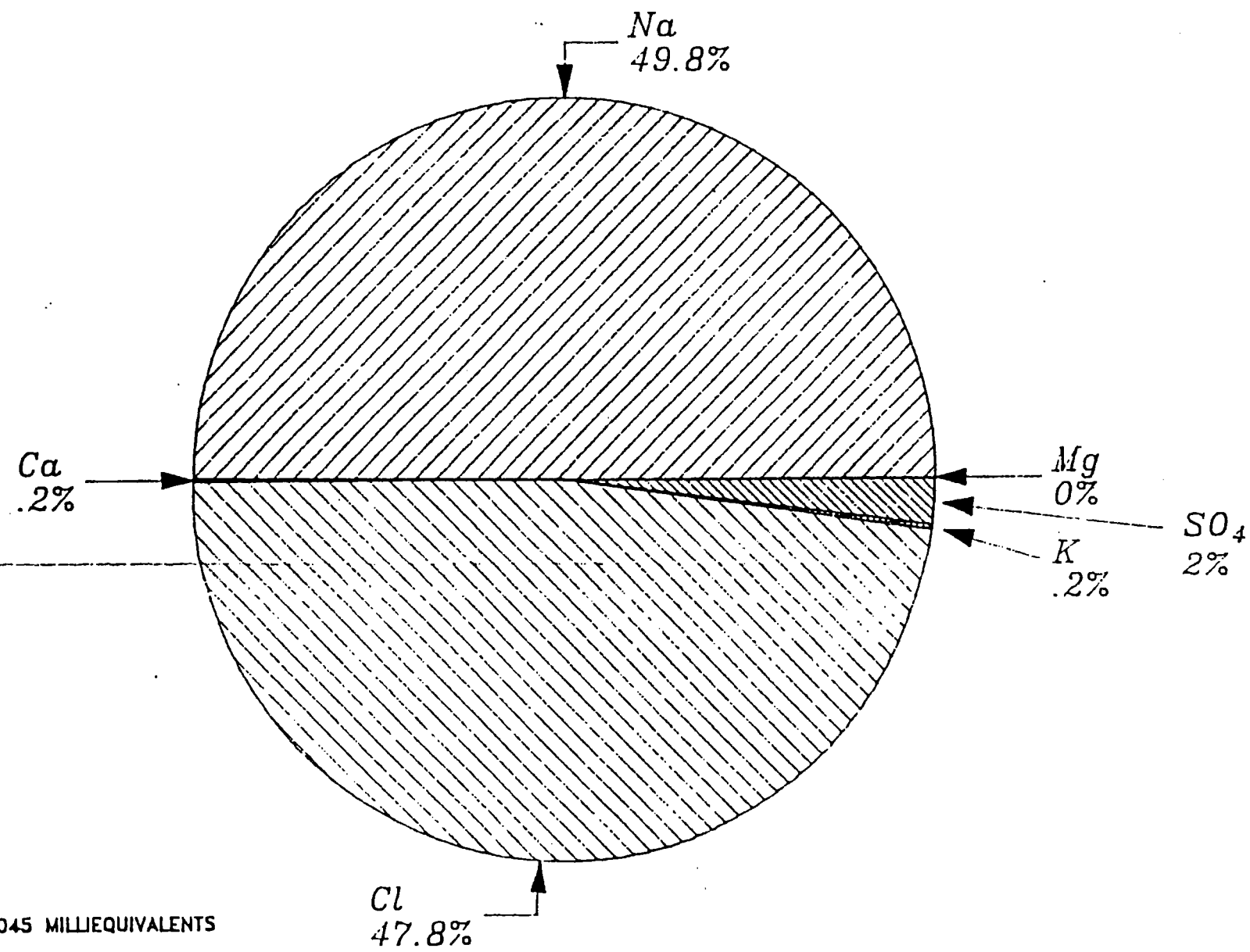
FIGURE 14. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **I EAST** ON APRIL 9, 1985 AND MAY 15, 1985.



NOTE:

TOTAL 611.6851 MILLIEQUIVALENTS PER LITER

4/9/85



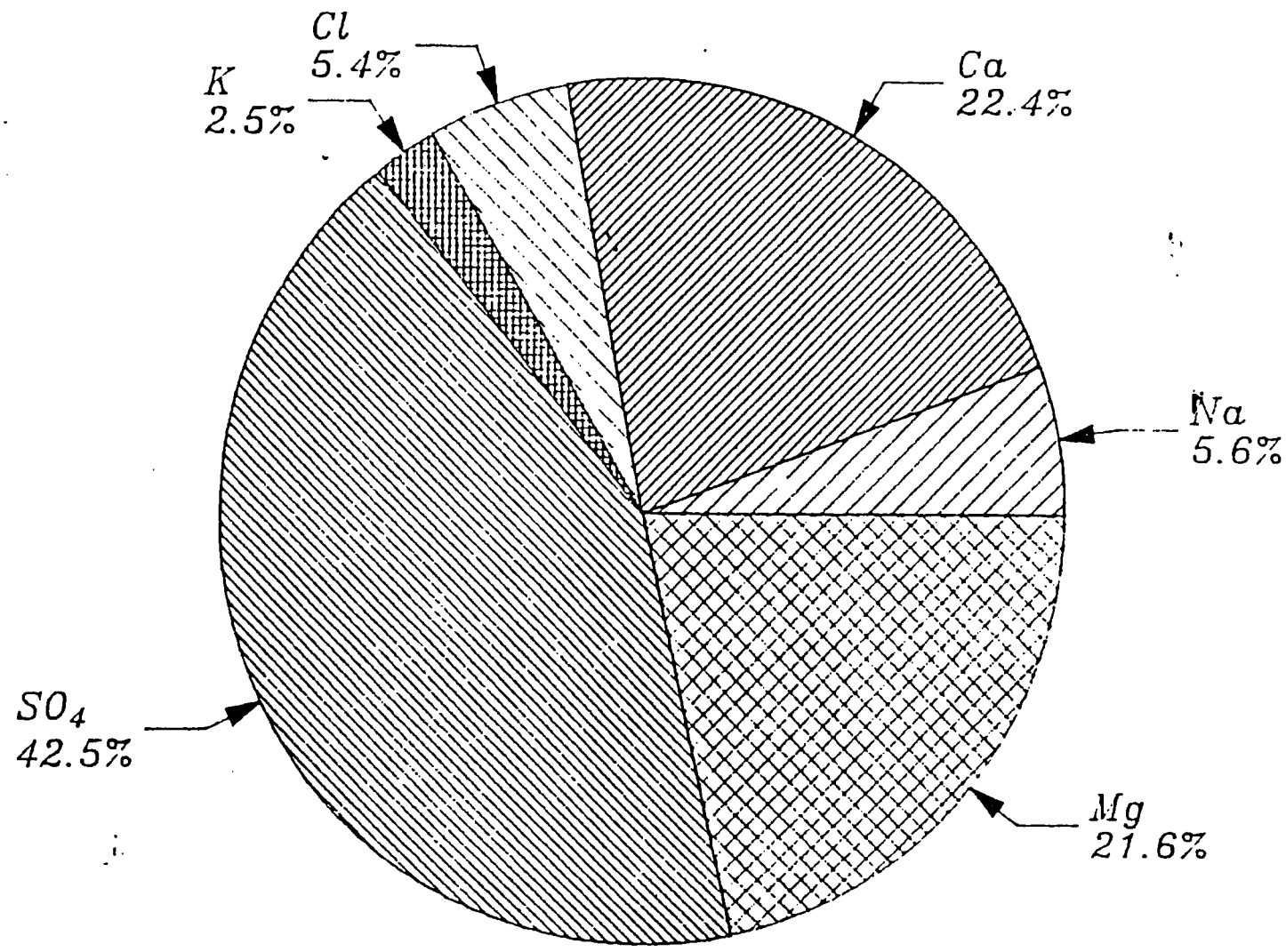
NOTE:

TOTAL 1003.5045 MILLIEQUIVALENTS PER LITER

5/15/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

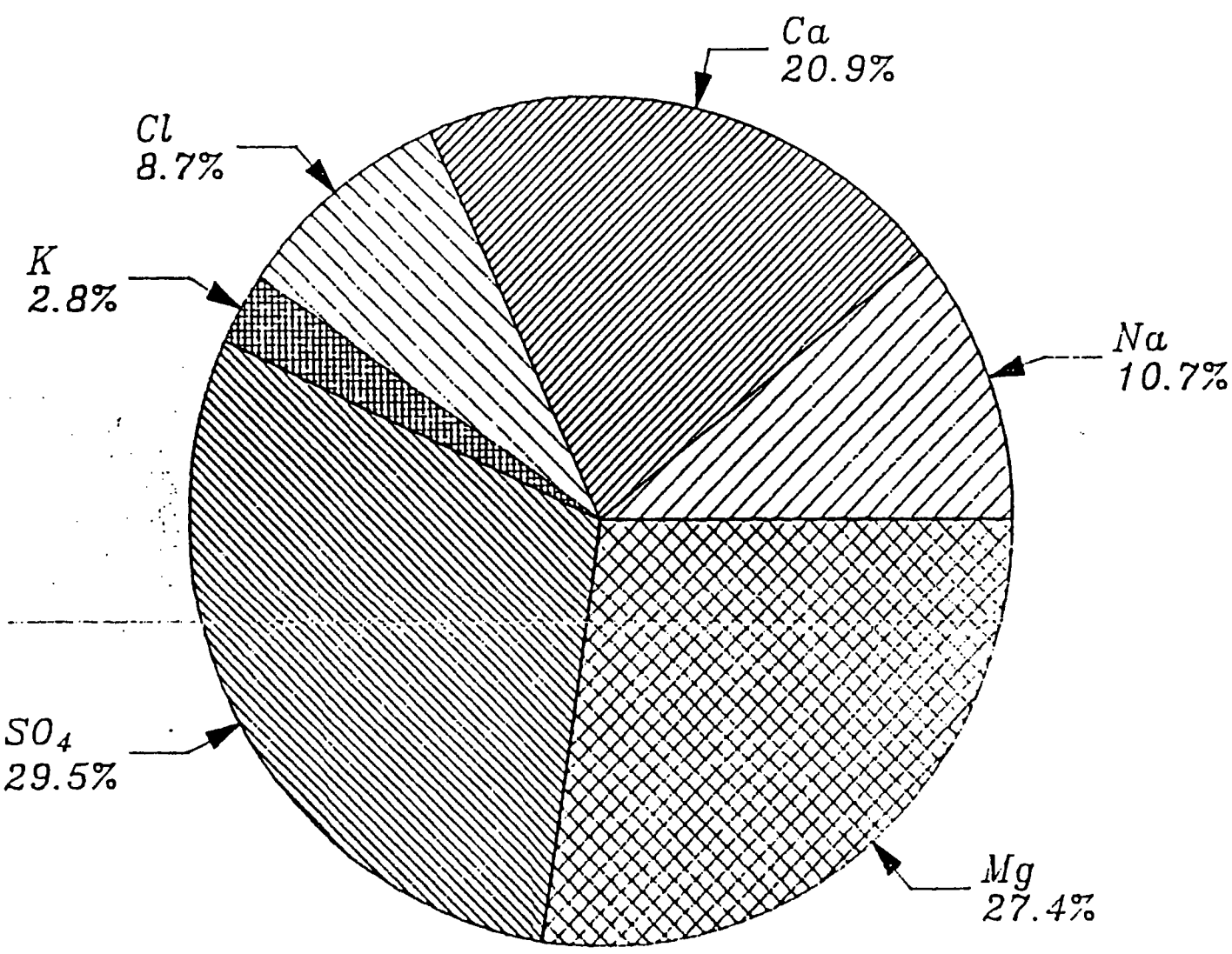
FIGURE 15. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-114A** ON APRIL 10, 1985 AND MAY 16, 1985.



NOTE:

TOTAL 62.5160 MILLIEQUIVALENTS PER LITER

4/10/85



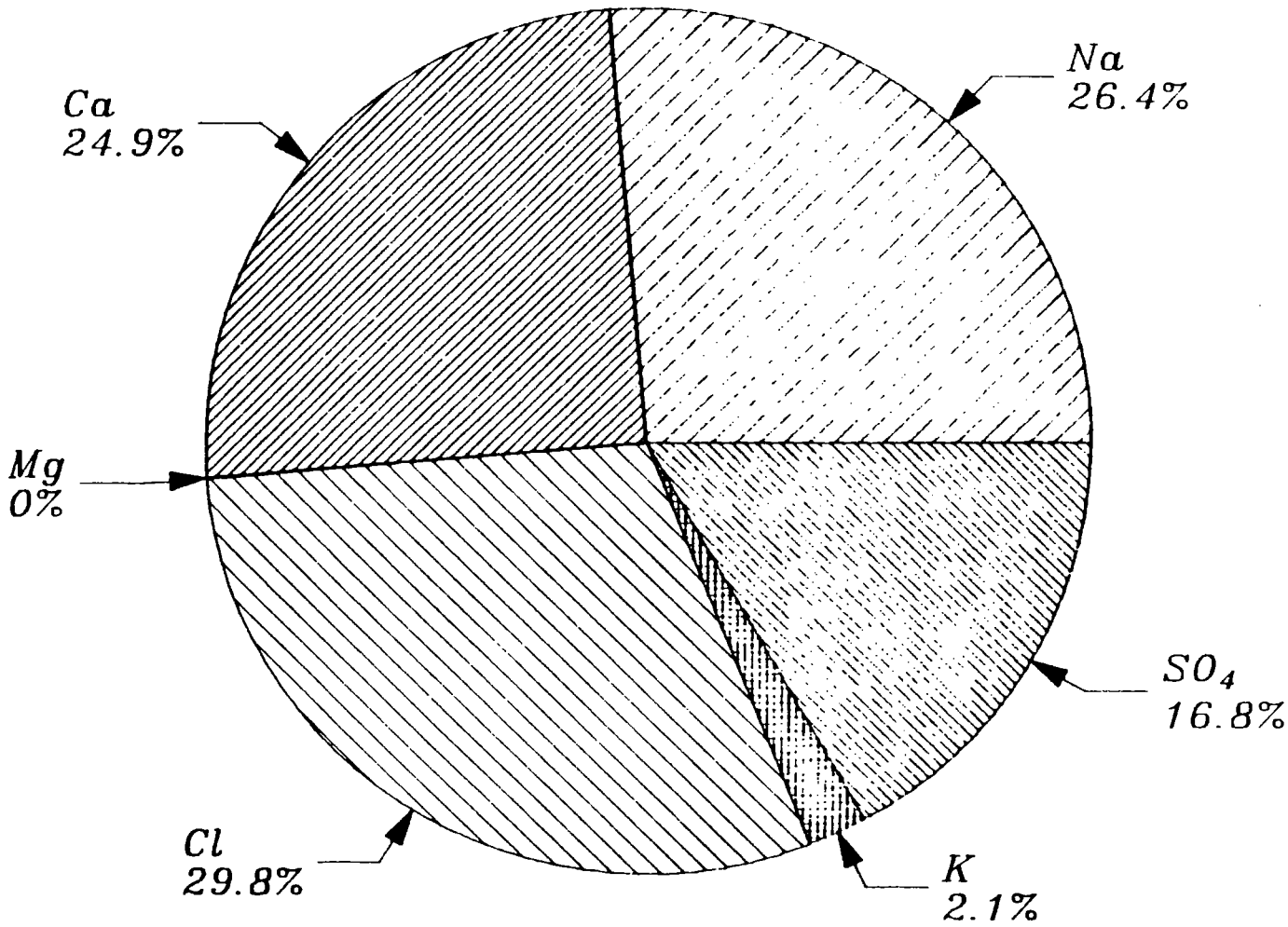
NOTE:

TOTAL 64.8438 MILLIEQUIVALENTS PER LITER

5/16/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

FIGURE 16. DIAGRAM ILLUSTRATING THE RELATIVE AMOUNTS OF MAJOR CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE **G-110A** ON MAY 16, 1985.



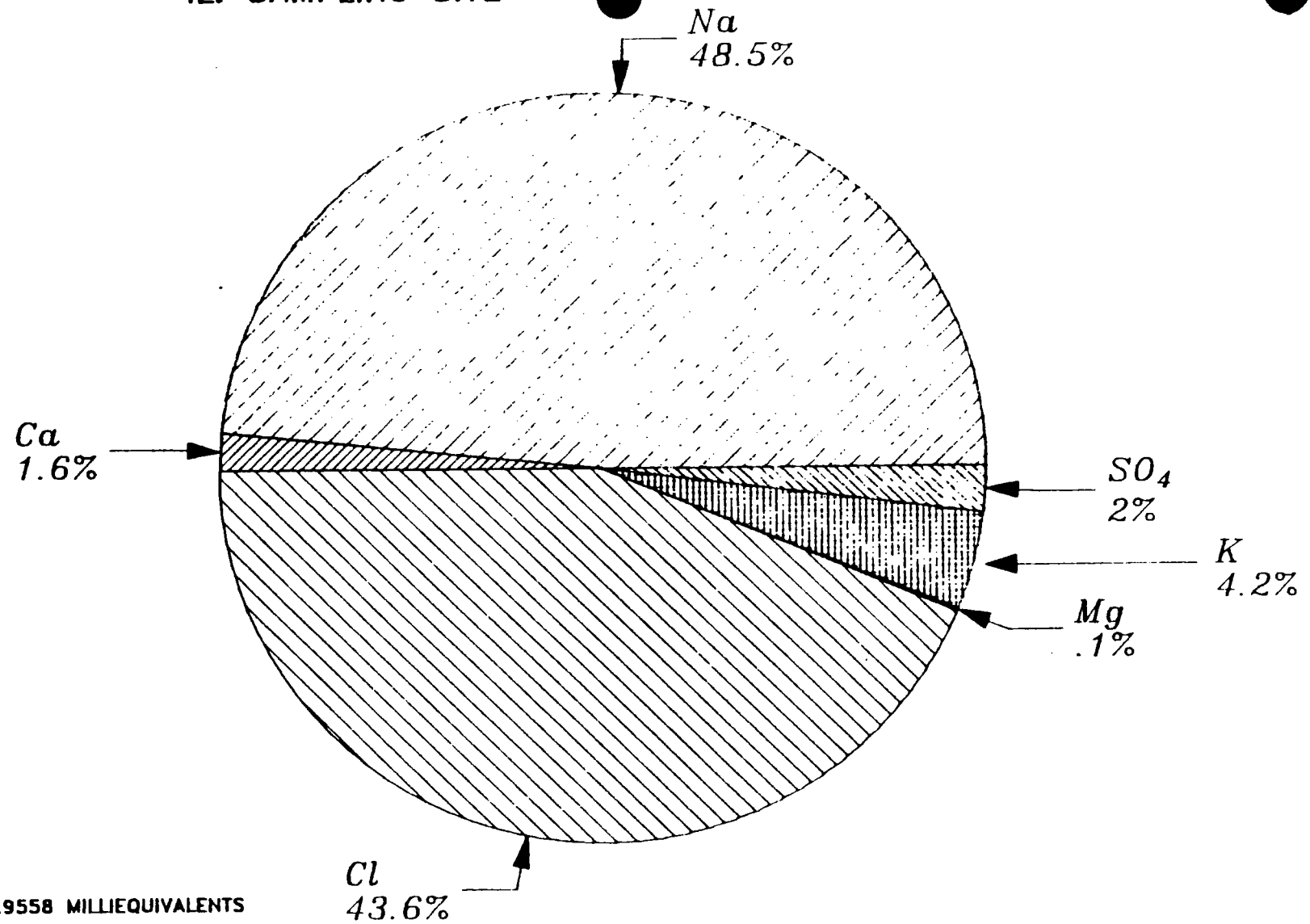
NOTE:

TOTAL 39.8745 MILLIEQUIVALENTS PER LITER

5/16/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

CATIONS AND ANIONS AT THE SCA CHICAGO INCINERATOR, CHICAGO, IL. SAMPLING SITE G-1 ON MAY 16, 1985.



NOTE:

TOTAL 1150.9558 MILLIEQUIVALENTS PER LITER

5/16/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

NOTE:

TOTAL 251.2697 MILLIEQUIVALENTS PER LITER

5/16/85

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

The Lake Calumet samples from LC-102 and LC-103 (Figures 11 and 12) remained essentially the same during April and May. This reflects basically consistent concentrations of ions on the south and east sides of the pier.

LC-101 (Lake Calumet sample) showed variations in its water quality during the two (2) sample dates. The water at LC-101 may be restricted from lake circulation patterns and therefore may not be representative of the overall quality of Lake Calumet.

The analyses of monitor well G-102 indicate a relatively constant ionic composition with time. Chloride is the dominant ionic species, while calcium and sulfate are in approximate equal concentrations (Figure 6). A comparison between G-102 and LC-102 (Lake Calumet) analyses results reveal very similar ion concentrations for chloride, sodium, and calcium. However, LC-102 has a component of magnesium that G-102 analyses did not reveal. This indicates that LC-102 is being influenced by an outside magnesium source which is not effecting G-102 (Figures 11 and 6).

The comparison of April and May analyses for well G-103 indicate a consistent ionic concentration (Figure 7). Large amounts of magnesium were detected in both April and May. Monitor well G-103 has the highest percentage concentration of magnesium of any well on the site. G-103 is located in an area of ground-water discharge of water draining from the interior highs to Lake Calumet (Plate 3).

Results of analyses for monitor well G-105 show high concentrations of chloride, sodium, and magnesium in both April and May (Figure 9). If the concentrations for G-105 are compared to concentrations for

G-103 and LC-103 (Lake Calumet), it is noted that G-105 constituent concentrations are a mixture of the other two. The elevated magnesium content in G-105 possibly indicates influence by the same source of magnesium as G-103. However, more data would be required to properly assess origination of the magnesium.

Results of chemical analyses (May 16, 1985) for G-112B (Figure 17) almost identically reflect the chemical concentration indicated for the contents of the impoundments. The specific conductance values of over 20,000 support this correlation. The sodium and chloride concentrations in the ground-water sample for G-112B account for more than ninety percent (90%) of the total ion concentration. The correlation of ion constituents suggests that the process water may be contributing to the water quality at the designated upgradient monitor well G-112B. The ground-water mound located near G-112B, shown on Plate 3, also indicates a possible hydraulic association between the process water and G-112B and the shunting effect of the clay-lined impoundment.

The water quality of G-113A resembles that of Lake Calumet (LC-103), monitor well G-112B, and the process water. This combination appears to be the mixing of the ground water flowing downgradient from G-112B toward G-113A and that of Lake Calumet, which is being continuously interchanged through the system due to lake water level fluctuations.

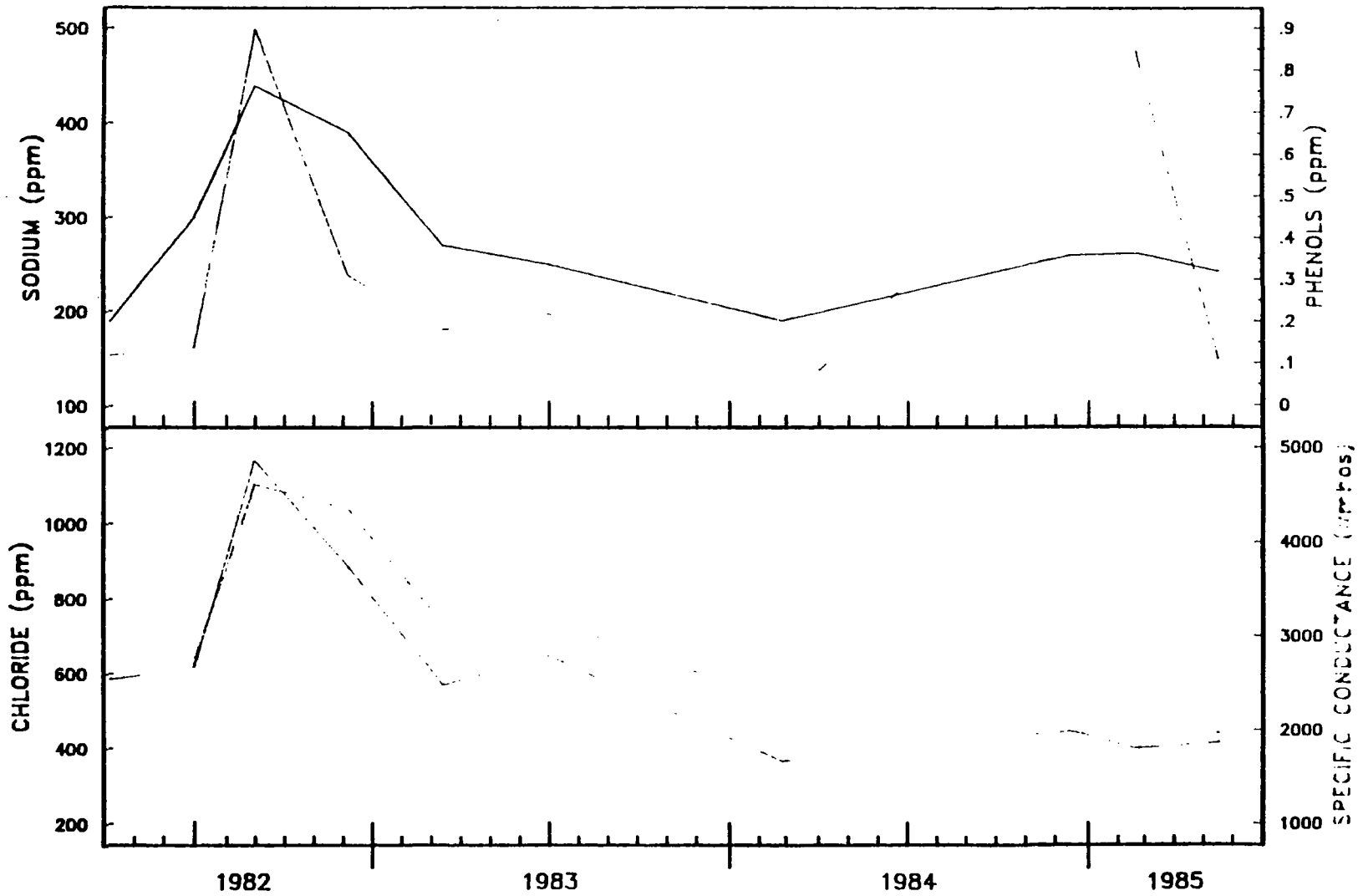
The review and comparison of April and May analyses for monitor well TF-03 indicate results that are highly variable. April analyses results revealed high concentrations of chloride and calcium, with a minor concentration of sodium, totaling approximately 148 milli-

equivalents. Analyses results for May indicated an increase in ionic species with a large decrease in total milliequivalents to only approximately 37. The well is located in between a series of previously existing finger-like lagoons which were initially filled with organic material. The lagoons were excavated, cleaned, and subsequently filled as a result of a Consent Order between the Chicago Regional Port District and the Illinois Environmental Protection Agency. A differential release of any contaminants within these lagoons could cause erratic results on water quality. Other possible explanations include influence by materials contained within the fill material, and sampling and/or analysis procedures. No definite conclusions can be drawn without additional data.

Monitor well G-114A ground-water analyses results for April and May indicate that the quality of the ground water entering the site along the northeast corner is of consistent quality. High amounts of sulfate and magnesium and a moderate amount of calcium are contained in the water entering the SCA Chicago incinerator site. This indicates upgradient contamination sources affecting the background water quality of the SCA site.

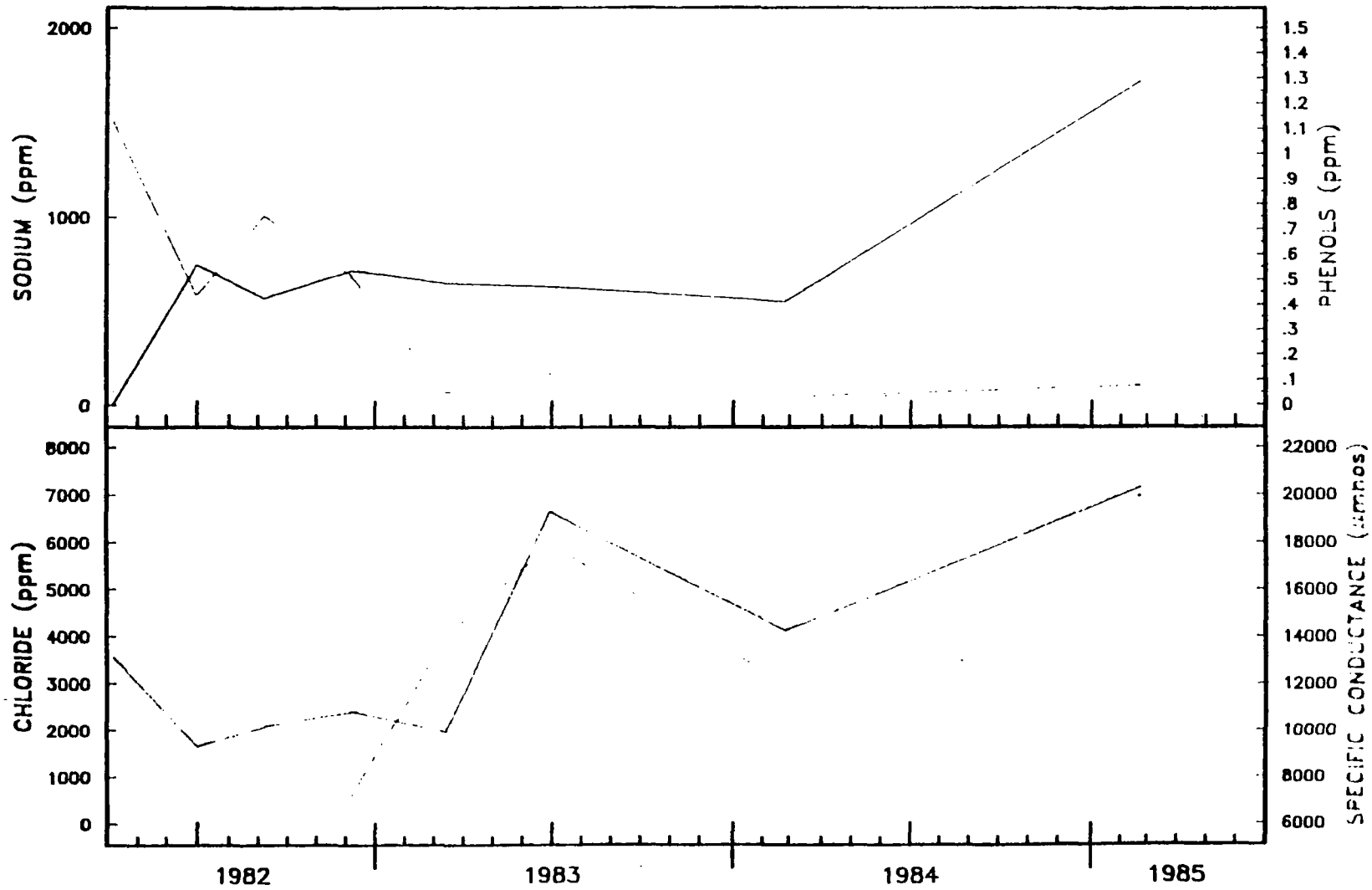
Plots of the concentration of selected chemical constituents versus time for EPA compliance wells G-110, G-111, G-112B, and G-113A (Figures 19 through 22) show direct correlations between concentrations of sodium and chloride and specific conductance. Wells G-113A, G-111A, G-112B, and G-113A indicate an overall, but erratic, rise in ionic concentrations and specific conductance. This rise in ionic concentrations is correlative to initiation of use of sodium hydroxide rather than

FIGURE 19. SUMMARY OF WATER QUALITY ANALYSIS (SELECTED PARAMETERS) FOR WELL G-110, APRIL 1982 THROUGH MAY 1985.



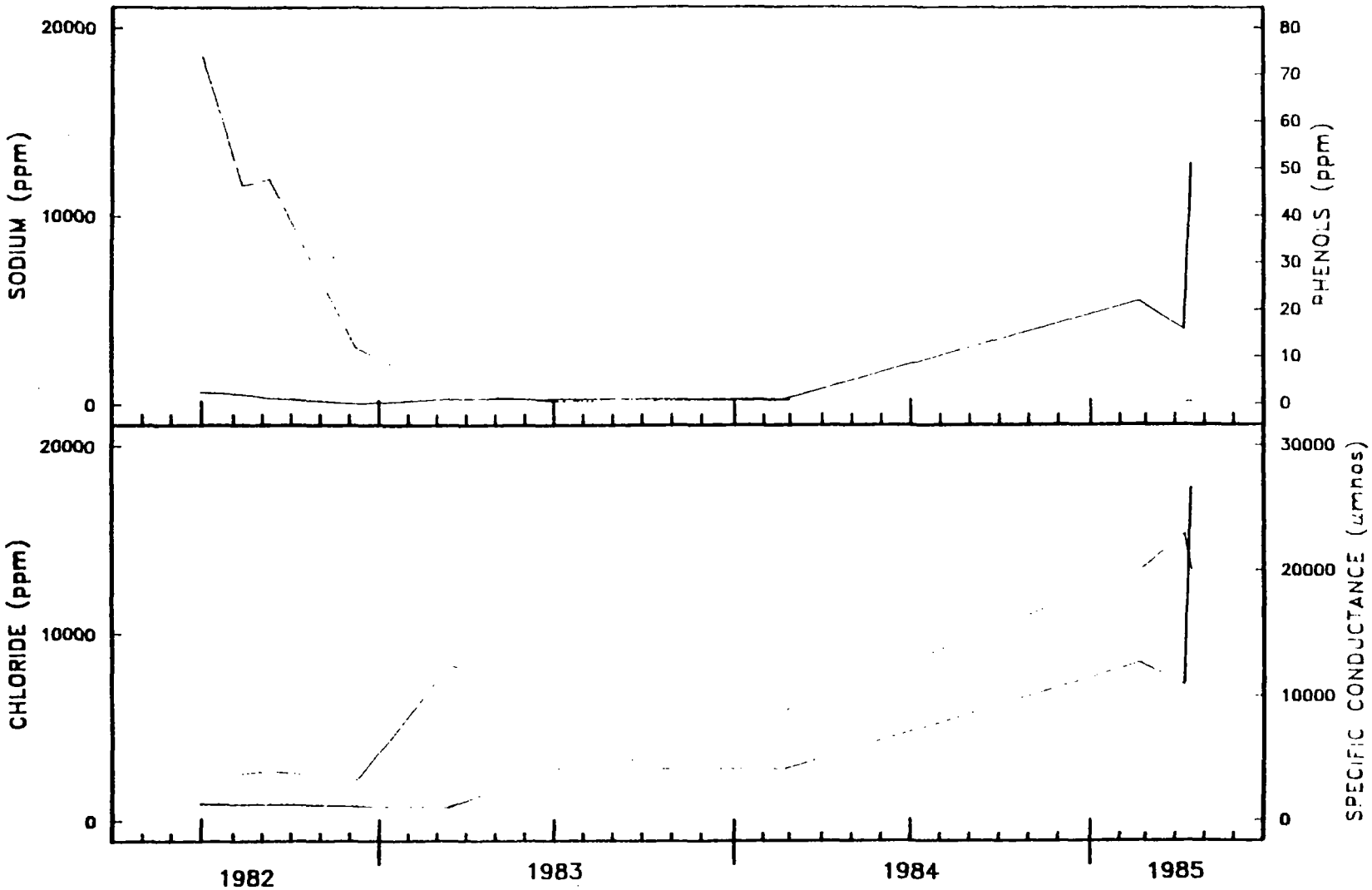
Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

FIGURE 20. SUMMARY OF WATER QUALITY ANALYSIS (SELECTED PARAMETERS) FOR WELL G-111, APRIL 1982 THROUGH MARCH 1985.



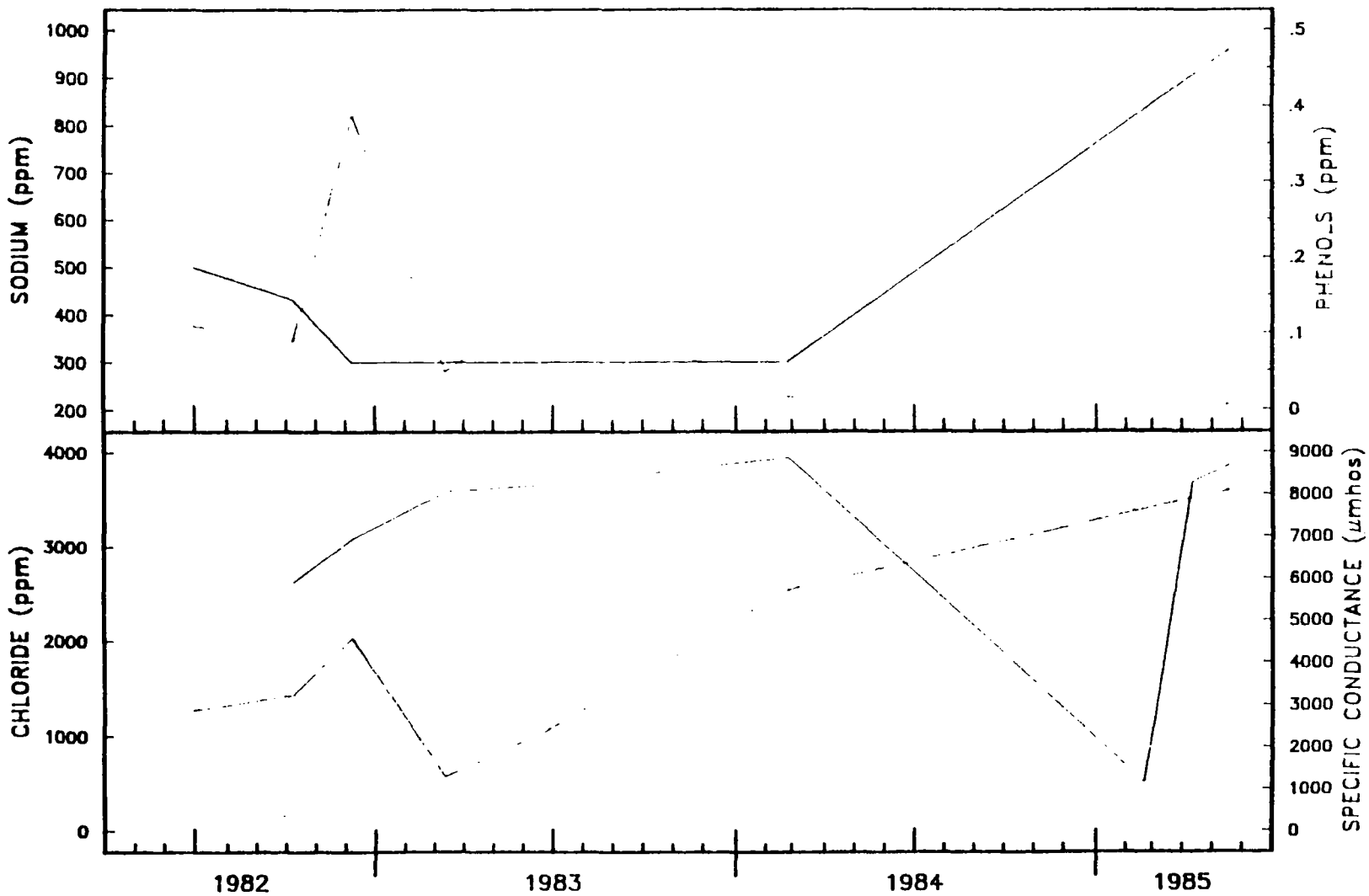
Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

FIGURE 21. SUMMARY OF WATER QUALITY ANALYSIS (SELECTED PARAMETERS) FOR WELL G-112B, JUNE 1982 THROUGH MAY 1985.



Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

FIGURE 22. SUMMARY OF WATER QUALITY ANALYSIS (SELECTED PARAMETERS) FOR WELL G-113A, JUNE 1982 THROUGH MAY 1985.



Prepared by:
R.E. LAUGREAUX & ASSOCIATES, INC.

lime in the scrubbing process. Well G-110, however, shows a relatively steady decrease in ionic concentration and specific conductance. This information in conjunction with the water table configuration (Plate 3) suggests that the impoundment area is effectively separating well G-110 from the sodium and chloride source.

The pie diagram (Figure 16) also indicates lower ion concentrations in well G-110 substantiating the shunting effect the impoundment area has on the ground-water system. The high pH values in wells in the vicinity of the impoundments may be attributed to the use of lime or well construction materials.

The concentrations of phenols versus time for all four (4) wells show randomly elevated concentrations in phenols followed by a general decrease. Results of water-quality analysis indicate elevated concentrations of phenols in well TF-04 and trace amounts in other wells. Analyses of process water indicate only low levels of phenols. No specific conclusions can be made due to the variable concentrations, the nature of the fill material, historical land use practices, and the limited data available.

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APPENDIX K

QUALITY ACTION REPORT (QAR)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

603

2-23-

per P McIsaac

Quality Action Report

ATE 1/22/87 ORIGINATOR L. GRASSL CLIENT ☒ ETC ☐ OTHER _____ WORK AREA _____

COMPANY NAME Chemical Waste Management ETC SAMPLES M3001

FACILITY CODE 7|0|5| | | | | | | SAMPLE PT(S) G124S

DESCRIPTION: TOC value reported incorrectly

1st value -

Should be 19.4 ppm, not 9.4 ppm

per the analytical log page in the Technical Report

Sample date 5/16/86

OLUTION:

SIGNATURE DATE

ERROR TYPE

ETC	EXT.	NONE
☐	☐	☐

ACTION AREA

CS	SM	SP	CV	AA	GC	MS	DI	RP	DM	QA	SUB	FLD	CLI	MK
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10	☐ 11	☐ 12	☐ 13	☐ 14	☐

CLIENT TO BE CONTACTED ☒ YES ☐ NO

BY WHOM [illegible]

CLIENT CONTACT Lisa Grassl

CLIENT PHONE (312) 841-8360

DONE ☒ [illegible] DATE INITIALS

CORRECTED REPORT(S) SENT ☒ YES ☐ NO

SENT BY _____

DATE SENT _____

QAR ENTRY _____ DATE INITIA

TIME SPENT _____

DONE ☐ _____ DATE INITIALS

TIME SPENT _____

2-03-87

ETC ENVIRONMENTAL TESTING and CERTIFICATION

646

Quality Action Report

ATE 7/20/87 ORIGINATOR GRASSL CLIENT ☒ ETC ☐ OTHER _____ WORK AREA _____

COMPANY NAME Chemical Waste Management ETC SAMPLES S2936, S2939, S2943, S29

FACILITY CODE 71Ø51 SAMPLE PT(S) G110, G111A, 1215, 1225

DESCRIPTION: RECHECK CHLORIDE VALUES

G110 (S2936) - Chloride reported at 3800 ppm. Usually around 400 ppm.
G111A (S2939) - Chloride reported at 1.0 ppm. Usually around 10,000 ppm
1215 (S2943) - Chloride reported at 1.0 ppm. Usually greater than 10,000,
1225 (S2933) - Chloride reported at 884 ppm. Usually less than 200 ppm.

(Possible dilution calculation errors?)

LUTION:

SIGNATURE DATE

ERROR TYPE: ETC ☐ EXT. ☐ NONE ☐

ACTION AREA: CS ☐1 SM ☐2 SP ☐3 CV ☐4 AA ☐5 GC ☐6 MS ☐7 DI ☐8 RP ☐9 DM ☐10 QA ☐11 SUB ☐12 FLD ☐13 CLI ☐14 MKT ☐

CLIENT TO BE CONTACTED ☒ YES ☐ NO

BY WHOM _____

CLIENT CONTACT LISA GRASSL

PHONE (312) 841-8360

DONE ☐ _____ DATE INITIALS

CORRECTED REPORT(S) SENT ☐ YES ☐ NO

SENT BY _____

DATE SENT _____

QAR ENTRY _____ DATE INITIALS

TIME SPENT _____

Quality Action Report

L ORIGINATOR GRASSL CLIENT ☒ ETC ☐ OTHER _____ WORK AREA _____

: Chemical Waste Management, Inc. ETC SAMPLES 56605

DE 7015 SAMPLE PT(S) IMPDE

N: Pesticide comment sheet not included in Tech Report.

N

SIGNATURE DATE

ACTION AREA

ONE	CS	SM	SP	CV	AA	GC	MS	DI	RP	DM	QA	SUB	FLD	CLI	MK
☐	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10	☐ 11	☐ 12	☐ 13	☐ 14	☐

NTACTED ☒ YES ☐ NO

Lisa Grassl

(312) 841-8360

7/

DATE INITIALS

CORRECTED REPORT(S) SENT ☐ YES ☐ NO

SENT BY _____

DATE SENT _____

QAR ENTRY _____ DATE INITIA

TIME SPENT _____

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

June 19, 1987 Our Ref.: 853-2055

Chemical Waste Management, Inc.
3003 Butterfield Road
Oak Brook, Illinois 60521

Attention: Mr. Lynn A. Kleinvehn, P.E.
Manager, Environmental Engineering

RE: Procedures to Determine If A Statistically Significant Change Has Occurred, Ground-water Assessment Program, Adams Center Facility, Fort Wayne, Indiana

Dear Sir:

This letter outlines the procedures that will be used to verify the validity of a parameter detected above the action level during the upcoming ground-water assessments at the Adams Center Facility in Fort Wayne, Indiana. In addition, a brief discussion of the techniques that will be used to assess the rate and extent of contaminant migration if statistically significant concentrations of hazardous wastes or hazardous waste constituents are detected in the monitoring wells is also included.

Additional Steps to Confirm "Hits" Are Positive Detection

Because of the many vagaries that can adversely influence analytical results, following identification of a potentially positive detection based on the analytical results (i.e. an exceedence of the action level for the constituent), several steps will be undertaken to determine whether the results are potentially representative, or whether there has been some obvious reason why the analytical results should not be considered valid. Some of the many potential sources of impact on analytical results not related to ground-water contamination that have been observed are listed in the attached table. The steps that will be taken to assess the validity of the analytic results are outlined in the following paragraphs.

ocedures

ampling event, a hazardous waste or tuent is encountered at or above the t step in the assessment of the valid- alytic data will be a thorough review procedures used and data provided. view of the machine calibration infor- the arithmetic calculations, a review sured on spiked samples, and a review blanks tested on that day. In addi- w of the chain of custody records for and preparation of the samples will ermine if there is any obvious reason nalytical results.

cal Data

QA/QC procedures does not reveal or eason for obviating the results of the e next phase in the assessment of the be a detailed review of site specific f site specific data will include an on site specific blanks and up- ermine if there is any indication of for the exceedence of the action level. cal leachate characteristics will be if the analytical results exhibit char- the leachate generated at the facil- torical review will include all avail- n-RCRA wells and wells for State moni- l as results from previous assessments

ical review of the protocols used, the cal methodologies and the historical obvious reason to discount or obviate s, the suspect installations will be possible and analyzed for the specific zardous waste constituents observed in nt.

be carried out if the results of the the exceedence of the action level is culation error, a data transcription laboratory or field artifact. While n to assess the initial results may s ificant reasons to negate the t considered sufficient to invali-

efit of a second interference is ce of the action e extent of the the matrix inter-

s the action level ste or hazardous procedures will ulation, calibra- as occurred, the idered to be con- se of the ground-

aste or hazardous s confirmed, the determination of hazardous waste

termination will stratigraphic and vicinity of the In addition, a erational activi- as traffic pat- etc., will be potentially any ed to the opera- eview of data in a review of site ed units, evalua- lumetric histor- geochemical data same well, as data. Further, eologic modeling eviewed together st in establish- ls to determine

ble information, installation(s) tial for inter-

CWM

POTENTIAL SOURCES OF VARIABILITY OF GROUNDWATER MONITORING ANALYTICAL DATA

SOURCES

Well Installation

- Drilling equipment material
- Prior site activities, well location
- Drilling fluid quality (water, additives)
- Drilling equipment & personnel cleanliness
- Cleaning procedures & chemicals, water quality
- Logging equipment, material, cleanliness
- Casing material, cleanliness, joint type, screens
- Seal quality (bentonite, water, sand pack, grout, other)
- Well protective casing & cap (material, painting)

Well Development

- Pump material and cleanliness (pump, cables, pipes)
- Sampling device-material, construction
- Metering equipment, cleanliness of pH, conductivity, depth meters

Sampling Preparation

- Bottle prep.-cleanliness, chemicals, handling, ambient air exposure, storage exposure, lids, labels, pens, technician's cleanliness.
- Fixing reagents, including handling, preparation
- Packing, handling shuttles

Sampling

- Storage area cleanliness
- Personnel cleanliness
- Ambient air exposure, landfill/vehicle (site and sampling) and off-site air
- Prior site activities in area of wells
- Purging technique (contamination of bailers, ropes, pump, tubing)
- Cleanliness procedures, chemicals

(Sampling, cont'd...)

- Cleaning procedures, chemicals
- Transportation around site and back to lab
- Packing in shuttles, bottle breakage
- Seasonal variation in ambient air & groundwater, and rainfall affects
- Site preparation and analyses (ambient exposure cleanliness)
- Re-packing
- Technician handling, labeling

Analysis

- Storage (air contamination)
- Preparation contamination (air, lab equipment)
- Technician handling, cleaning
- Chemical purity
- Prior usage of lab equipment (e.g, GC/MS)
- Presence of lab chemicals or waste samples-causing air-borne contamination
- QA/QC protocols
- Equipment precision and accuracy
- Capability of lab technician w/ chromatograms
- Matrix interferences
- Transcription or math errors

Other

Contamination of upgradient wells