Table 11-6. (Continued)

Compound	Duplicate Pairs	Overall Mean ppbv	Pooled Standard Deviation ppbv	Pooled %CV
n-Octane	41	3.09	0.38	12.30
Ethylbenzene	46	7.20	0.49	6.81
p-Xylene + m-Xylene	46	21.61	1.91	8.84
Styrene	32	2.57	0.28	10.89
o-Xylene	45	7.40	0.81	10.95
n-Nonane	34	2.34	0.34	14.53
n-Propylbenzene	44	4.70	2.18	46.38
p-Ethyltoluene	44	6.44	2.43	37.73
1,3,5-Trimethylbenzene	39	3.33	0.82	24.62
o-Ethyltoluene	30	2.20	0.76	34.55
1,2,4-Trimethylbenzene	18	7.80	2.31	29.62
1-Decene	37	7.83	1.04	13.28
n-Decane	27	2.37	0.36	15.19
1,2,3-Trimethylbenzene	31	3.20	1.13	35.31
p-Diethylbenzene	24	3.36	1.15	34.23
Tridecene	12	2.34	2.76	117.95
Propyne	0	-	-	-
1-Pentene	30	3.30	0.82	24.85
2-Methyl-1-butene	38	3.69	0.49	13.28
2-Methyl-2-butene	36	4.81	0.80	16.63
Cyclopentene	10	1.57	0.20	12.74
1-Hexene	10	2.67	0.27	10.11
1-Undecene	41	3.94	2.08	52.79
n-Tridecane	10	1.03	0.12	11.65
1-Octene	20	2.81	0.34	12.10
m-Ethyltoluene	25	1.97	0.23	11.68
n-Undecane	35	2.94	3.23	109.86
Dodecene	18	2.34	1.09	46.58
Tetradecene	0	-	-	-
2-Ethyl-1-butene	0	-	-	-
n-Dodecane	23	0.56	0.62	110.71

ELTX, FIFL, HITX, JUMX, NWNJ, PBFL, PLNJ, and RINC. Overall summary statistics for all sites are presented in Section 11.5.2. Analytical results of each sample taken during the 1991 monitoring period are presented in Appendix N.

11.5.1 Site-Specific Monitoring Data

Site-specific statistics are given in Tables 11-7 through 11-16. For each site, the compounds identified in any analysis for the 1991 monitoring season are given in the first column. The quantity N denotes the number of times the compound was identified in the 1991 monitoring season. The last column in the table records the percent of the analyses in which a particular compound was identified. For example, for Beaumont, Texas (BMTX), there were 80 analyses performed in the 1991 monitoring season and ethylene and acelyene were seen in 100% of the analyses (N=80). Ethane, however, was identified in only 79 analyses for a 98.75% frequency. Minima, maxima, standard deviations, and averages of the measured concentrations in ppbv are listed in each table for each compound. For Beaumont, Texas, for example, 66 compounds were identified, ranging in average concentration from 0.634 ppbv for n-dodecane to 62.671 ppbv for isopentane.

11.5.2 Overall Data Summary

Table 11-17 presents the overall summary statistics for all sites in the 1991 monitoring program. A total of 374 analyses were performed. Propane, isopentane, n-pentane, isohexane, benzene, toluene, m-xylene, and p-xylene were seen in each sample analyzed. These results are consistent with the results found in the UATMP. Measured concentrations ranged from 0.37 ppbv for n-nonane to 1032 ppbv for n-pentane. Averages ranged from 0.925 ppbv for n-dodecane to 63.447 for isopentane. Isopentane also gave the largest standard deviation of concentration, 81.773 ppbv. Average compound concentrations found in this study for 3-hour samples are from about five to ten times higher than the concentrations found in the UATMP. This was expected because the UATMP samples were 24-hour samples and would show much lower concentrations than the 6 to 9 a.m., 3-hour samples analyzed in this study.

Table 11-7. 1991 Summary Statistics for Beaumont, TX (BMTX)

	Beaumont, TX (BMTX)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	80	37.240	26.726	117.28	1.09	100.00%
Acetylene	80	7.753	6.546	45.63	0.81	100.00%
Ethane	79	42.564	18.287	88.83	8.02	98.75%
Propylene	80	13.637	20.661	160.40	1.06	100.00%
Propane	80	45.234	22.967	108.39	9.77	100.00%
Isobutane	80	34.194	26.054	156.63	6.17	100.00%
1-Butene + Isobutene	79	4.943	4.000	27.86	0.83	98.75%
1,3-Butadiene	58	2.670	2.282	12.28	0.45	72.50%
n-Butane	80	41.872	26.433	177.09	10.11	100.00%
t-2-Butene	70	2.735	1.661	10.31	0.94	87.50%
c-2-Butene	64	2.102	1.357	8.74	0.56	80.00%
Isopentane	80	62.671	54.059	353.86	8.53	100.00%
n-Pentane	80	24.411	15.548	92.79	4.69	100.00%
t-2-Pentene	74	3.312	2.001	10.70	0.76	92.50%
c-2-Pentene	59	1.883	1.284	7.79	0.77	73.75%
Cyclopentane	73	2.502	1.536	8.84	0.78	91.25%
2,3-Dimethylbutane	79	4.062	2.636	15.83	1.32	98.75%
Isohexane	80	15.801	10.812	59.49	3.28	100.00%
3-Methylpentane	80	10.361	6.142	35.71	0.74	100.00%
n-Hexane	80	16.462	10.733	59.64	2.97	100.00%
Methylcyclopentane	80	6.730	4.039	22.31	1.54	100.00%
2,4-Dimethylpentane	61	2.284	2.676	19.87	0.82	76.25%
Benzene	80	11.264	10.532	77.54	3.84	100.00%
Cyclohexane	80	6.251	4.912	29.56	0.92	100.00%
Isoheptane	80	4.158	2.372	12.52	1.20	100.00%
2,3-Dimethylpentane	53	1.992	1.875	12.49	0.76	66.25%
3-Methylhexane	80	4.288	2.336	12.08	0.38	100.00%
1-Heptene	8	2.299	1.669	6.01	0.85	10.00%
2,2,4-Trimethylpentane	77	7.577	9.813	78.02	1.38	96.25%
n-Heptane	80	4.982	3.099	17.40	1.46	100.00%
Methylcyclohexane	80	5.773	3.815	20.50	1.63	100.00%
2,2,3-Trimethylpentane	63	1.770	1.077	7.19	0.79	78.75%
2,3,4-Trimethylpentane	75	2.167	1.510	9.75	0.55	93.75%
Toluene	80	24.045	15.166	93.91	6.13	100.00%
3-Methylheptane	71	1.874	0.858	4.54	0.66	88.75%

Table 11-7. (Continued)

Compound	Beaumont, TX (BMTX)					
		ppbC				
	N	Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	77	2.899	2.192	14.22	0.61	96.25%
Ethylbenzene	80	4.028	2.316	14.99	0.91	100.00%
p-Xylene + m-Xylene	80	12.854	6.351	31.21	3.54	100.00%
Styrene	57	2.396	3.407	25.36	0.76	71.25%
o-Xylene	80	5.117	4.742	37.75	0.79	100.00%
n-Nonane	55	2.137	1.782	12.10	0.37	68.75%
n-Propylbenzene	76	3.067	1.755	11.09	0.49	95.00%
p-Ethyltoluene	78	4.763	2.888	14.54	0.97	97.50%
1,3,5-Trimethylbenzene	72	2.597	3.140	26.00	0.75	90.00%
o-Ethyltoluene	56	1.617	0.707	3.56	0.58	70.00%
1,2,4-Trimethylbenzene	62	4.771	4.668	29.05	0.88	77.50%
1-Decene	68	5.313	3.070	14.84	1.26	85.00%
n-Decane	44	2.652	2.925	15.93	0.74	55.00%
1,2,3-Trimethylbenzene	60	3.228	1.375	7.90	1.21	75.00%
p-Diethylbenzene	45	3.042	4.895	34.30	0.94	56.25%
Tridecene	33	1.780	1.734	10.49	0.83	41.25%
Propyne	2	0.990	0.099	1.06	0.92	2.50%
1-Pentene	65	2.515	1.446	7.24	0.52	81.25%
2-Methyl-1-butene	72	2.736	2.079	11.06	0.82	90.00%
2-Methyl-2-butene	74	3.506	2.340	12.34	0.93	92.50%
Cyclopentene	10	1.208	0.563	2.69	0.69	12.50%
1-Hexene	26	1.847	1.467	8.50	0.89	32.50%
1-Undecene	75	3.439	4.774	41.54	0.92	93.75%
n-Tridecane	23	1.902	2.492	13.04	0.79	28.75%
1-Octene	3	1.011	0.127	1.14	0.89	3.75%
m-Ethyltoluene	42	1.644	0.916	5.54	0.78	52.50%
n-Undecane	64	3.067	6.165	48.43	0.83	80.00%
Dodecene	62	2.801	5.087	40.21	0.79	77.50%
Tetradecene	9	1.578	0.519	2.84	1.15	11.25%
2-Ethyl-1-butene	1	0.960	-	0.96	0.96	1.25%
n-Dodecane	52	0.634	0.929	6.85	0.01	65.00%

Table 11-8. 1991 Summary Statistics for Baton Rouge, LA (BRLA)

		Baton Rouge, LA (BRLA)				
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	70	17.278	17.967	100.13	2.93	98.59%
Acetylene	71	5.679	3.520	18.16	1.84	100.00%
Ethane	71	29.936	15.513	72.94	2.35	100.00%
Propylene	71	11.209	12.533	53.79	1.28	100.00%
Propane	71	90.301	99.138	572.03	2.08	100.00%
Isobutane	71	31.788	37.468	213.15	4.88	100.00%
1-Butene + Isobutene	71	6.388	6.190	39.97	0.85	100.00%
1,3-Butadiene	42	4.119	5.131	23.44	0.51	59.15%
n-Butane	71	60.013	77.864	462.93	10.30	100.00%
t-2-Butene	59	4.374	6.382	39.04	0.68	83.10%
c-2-Butene	51	3.842	5.612	33.25	0.84	71.83%
Isopentane	71	72.145	98.111	728.23	17.99	100.00%
n-Pentane	71	25.766	29.356	198.95	4.37	100.00%
t-2-Pentene	61	5.469	10.781	77.73	0.72	85.92%
c-2-Pentene	46	3.310	6.535	41.84	0.76	64.79%
Cyclopentane	69	2.187	2.218	16.06	0.80	97.18%
2,3-Dimethylbutane	70	5.000	6.238	45.98	1.06	98.59%
Isohexane	71	14.316	16.643	120.25	2.49	100.00%
3-Methylpentane	71	8.830	8.750	61.17	1.15	100.00%
n-Hexane	71	12.461	8.646	42.63	2.03	100.00%
Methylcyclopentane	71	6.325	6.003	37.00	1.17	100.00%
2,4-Dimethylpentane	62	2.343	2.061	13.71	0.59	87.32%
Benzene	71	9.928	9.956	67.32	2.32	100.00%
Cyclohexane	63	2.376	1.482	7.48	0.69	88.73%
Isoheptane	70	4.239	2.921	16.62	0.83	98.59%
2,3-Dimethylpentane	51	2.039	1.293	7.30	0.68	71.83%
3-Methylhexane	70	3.421	2.677	18.06	0.95	98.59%
1-Heptene	3	1.363	0.568	2.00	0.91	4.23%
2,2,4-Trimethylpentane	71	6.753	7.040	46.63	1.23	100.00%
n-Heptane	71	4.062	3.037	19.27	0.92	100.00%
Methylcyclohexane	68	3.574	2.516	13.62	1.18	95.77%
2,2,3-Trimethylpentane	46	1.662	1.037	6.56	0.85	64.79%
2,3,4-Trimethylpentane	64	2.278	2.026	13.47	0.75	90.14%
Toluene	71	26.534	13.158	90.03	10.90	100.00%
3-Methylheptane	58	1.864	1.456	7.58	0.64	81.69%

Table 11-8. (Continued)

Compound	N	Baton Rouge, LA (BRLA) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	70	2.823	2.010	13.85	1.08	98.59%
Ethylbenzene	71	8.820	2.257	15.54	3.81	100.00%
p-Xylene + m-Xylene	71	11.855	5.424	29.88	4.39	100.00%
Styrene	61	2.018	1.731	10.44	0.78	85.92%
o-Xylene	70	3.880	1.906	9.61	0.92	98.59%
n-Nonane	68	2.475	1.479	12.17	1.39	95.77%
n-Propylbenzene	66	5.051	5.501	46.75	0.81	92.96%
p-Ethyltoluene	64	3.350	1.856	8.96	1.11	90.14%
1,3,5-Trimethylbenzene	56	1.822	0.873	4.36	0.84	78.87%
o-Ethyltoluene	25	1.386	0.544	2.52	0.50	35.21%
1,2,4-Trimethylbenzene	50	4.625	5.655	27.52	0.91	70.42%
1-Decene	61	4.261	2.566	12.70	1.13	85.92%
n-Decane	59	2.782	2.296	11.57	0.97	83.10%
1,2,3-Trimethylbenzene	35	3.761	4.498	22.93	1.43	49.30%
p-Diethylbenzene	20	2.025	1.093	4.92	0.95	28.17%
Tridecene	41	1.280	0.568	3.46	0.77	57.75%
Propyne	10	1.683	0.380	2.34	1.16	14.08%
1-Pentene	51	4.382	6.953	42.92	0.76	71.83%
2-Methyl-1-butene	59	4.800	9.347	67.14	0.68	83.10%
2-Methyl-2-butene	59	6.418	14.570	105.01	0.68	83.10%
Cyclopentene	17	2.761	3.610	14.89	0.95	23.94%
1-Hexene	17	6.588	8.509	36.24	0.95	23.94%
1-Undecene	71	5.682	3.909	23.53	1.58	100.00%
n-Tridecane	17	1.888	2.101	9.48	0.89	23.94%
1-Octene	21	1.544	0.907	4.64	0.77	29.58%
m-Ethyltoluene	37	1.284	0.622	4.15	0.78	52.11%
n-Undecane	64	4.766	11.685	89.75	1.00	90.14%
Dodecene	58	1.618	1.091	8.76	0.81	81.69%
Tetradecene	6	1.268	0.333	1.58	0.74	8.45%
2-Ethyl-1-butene	0	-	-	-	-	0.00%
n-Dodecane	61	0.582	0.909	7.26	0.01	85.92%

Table 11-9. 1991 Summary Statistics for El Paso, TX (ELTX)

	El Paso, TX (EPTX)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	79	24.260	11.697	73.92	1.33	100.00%
Acetylene	79	21.109	11.234	70.13	5.68	100.00%
Ethane	79	28.635	33.911	266.89	5.27	100.00%
Propylene	79	8.820	4.088	26.59	3.25	100.00%
Propane	79	34.310	44.344	281.86	4.59	100.00%
Isobutane	79	10.167	11.704	100.71	2.63	100.00%
1-Butene + Isobutene	79	6.372	2.678	17.32	2.04	100.00%
1,3-Butadiene	76	2.094	0.900	6.20	0.80	96.20%
n-Butane	79	21.566	17.696	105.73	5.70	100.00%
t-2-Butene	76	2.422	1.236	6.99	0.84	96.20%
c-2-Butene	66	1.953	1.097	5.82	0.80	83.54%
Isopentane	79	35.167	18.836	105.89	11.61	100.00%
n-Pentane	79	20.892	14.485	101.45	6.81	100.00%
t-2-Pentene	79	3.533	2.007	11.91	0.98	100.00%
c-2-Pentene	65	1.784	0.955	5.97	0.70	82.28%
Cyclopentane	76	1.856	0.959	5.99	0.83	96.20%
2,3-Dimethylbutane	79	4.016	2.210	13.40	1.32	100.00%
Isohexane	79	12.705	6.626	39.12	4.45	100.00%
3-Methylpentane	79	8.472	4.182	24.80	3.12	100.00%
n-Hexane	78	10.151	5.606	33.14	3.94	98.73%
Methylcyclopentane	79	6.260	3.157	18.89	2.40	100.00%
2,4-Dimethylpentane	79	3.558	2.235	13.33	1.01	100.00%
Benzene	79	16.081	7.644	46.63	6.01	100.00%
Cyclohexane	79	2.540	1.198	7.51	1.05	100.00%
Isoheptane	79	3.981	2.213	13.05	1.16	100.00%
2,3-Dimethylpentane	78	5.004	2.857	17.70	1.59	98.73%
3-Methylhexane	78	5.262	2.783	17.31	1.83	98.73%
1-Heptene	11	3.120	2.943	11.22	1.10	13.92%
2,2,4-Trimethylpentane	77	9.059	4.564	26.47	3.31	97.47%
n-Heptane	79	4.949	2.755	16.62	1.70	100.00%
Methylcyclohexane	79	2.751	1.346	8.56	1.04	100.00%
2,2,3-Trimethylpentane	78	2.159	1.099	6.86	0.84	98.73%
2,3,4-Trimethylpentane	79	3.227	1.646	10.23	1.16	100.00%
Toluene	79	36.877	18.217	117.24	11.93	100.00%
3-Methylheptane	79	2.702	1.385	8.07	0.95	100.00%

Table 11-9. (Continued)

Compound	N	El Paso, TX (EPTX) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	79	2.497	1.405	8.56	0.88	100.00%
Ethylbenzene	79	7.272	3.636	22.55	2.51	100.00%
p-Xylene + m-Xylene	79	24.101	11.937	72.67	8.20	100.00%
Styrene	66	1.705	0.749	4.47	0.74	83.54%
o-Xylene	79	8.472	4.112	22.96	3.03	100.00%
n-Nonane	72	2.858	2.[illegible]5	12.45	0.85	91.14%
n-Propylbenzene	75	2.004	0.8[illegible]5	5.33	0.85	94.94%
p-Ethyltoluene	77	8.153	4.981	26.69	1.45	97.47%
1,3,5-Trimethylbenzene	78	4.674	3.289	18.46	0.92	98.73%
o-Ethyltoluene	71	2.020	1.286	8.21	0.83	89.87%
1,2,4-Trimethylbenzene	33	5.682	5.348	21.50	0.80	41.77%
1-Decene	66	8.214	4.405	27.53	1.17	83.54%
n-Decane	59	2.707	1.553	7.16	0.94	74.68%
1,2,3-Trimethylbenzene	72	3.646	2.494	19.95	0.95	91.14%
p-Diethylbenzene	69	2.971	1.376	8.83	1.15	87.34%
Tridecene	50	1.935	2.152	12.26	0.79	63.29%
Propyne	12	1.155	0.376	1.94	0.77	15.19%
1-Pentene	70	2.407	1.489	11.43	0.89	88.61%
2-Methyl-1-butene	77	3.174	2.282	15.67	0.87	97.47%
2-Methyl-2-butene	78	3.685	2.055	12.09	1.07	98.73%
Cyclopentene	10	1.062	0.301	1.72	0.63	12.66%
1-Hexene	28	1.720	1.191	6.54	0.75	35.44%
1-Undecene	67	3.178	5.708	43.66	0.85	84.81%
n-Tridecane	43	1.174	0.340	1.90	0.61	54.43%
1-Octene	68	1.934	0.961	5.09	0.70	86.08%
m-Ethyltoluene	62	2.082	1.832	14.54	0.70	78.48%
n-Undecane	66	2.888	2.696	14.99	0.80	83.54%
Dodecene	47	5.039	11.029	65.64	0.87	59.49%
Tetradecene	7	1.526	0.733	2.48	0.79	8.86%
2-Ethyl-1-butene	1	8.510	-	8.51	8.51	1.27%
n-Dodecane	52	0.618	0.690	4.60	0.02	65.82%

Table 11-10. 1991 Summary Statistics for Houston, TX (H1TX)

Compound	N	Houston, TX (H1TX) ppbC Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	80	35.040	19.971	92.01	8.64	100.00%
Acetylene	80	16.721	9.784	44.53	1.26	100.00%
Ethane	80	50.973	27.294	162.82	5.18	100.00%
Propylene	80	24.623	24.234	128.12	3.95	100.00%
Propane	80	50.518	54.406	479.25	6.22	100.00%
Isobutane	80	34.090	31.376	219.97	4.57	100.00%
1-Butene + Isobutene	80	10.508	6.277	29.03	2.80	100.00%
1,3-Butadiene	78	4.804	5.081	28.30	0.80	97.50%
n-Butane	80	53.130	57.525	386.54	10.99	100.00%
t-2-Butene	80	4.878	3.719	21.87	1.09	100.00%
c-2-Butene	77	3.672	3.132	20.61	0.85	96.25%
Isopentane	80	96.840	65.771	314.79	22.52	100.00%
n-Pentane	80	35.884	39.643	256.57	5.95	100.00%
t-2-Pentene	80	7.049	4.841	27.54	0.72	100.00%
c-2-Pentene	77	3.396	2.496	14.02	0.92	96.25%
Cyclopentane	80	3.652	2.652	14.08	0.86	100.00%
2,3-Dimethylbutane	80	6.961	5.148	36.03	1.97	100.00%
Isohexane	80	27.299	19.795	110.14	7.46	100.00%
3-Methylpentane	80	17.017	13.169	95.75	4.36	100.00%
n-Hexane	80	18.257	14.166	83.72	3.66	100.00%
Methylcyclopentane	80	8.384	5.664	37.49	1.11	100.00%
2,4-Dimethylpentane	78	2.939	1.972	9.13	0.58	97.50%
Benzene	80	20.780	12.178	59.50	5.45	100.00%
Cyclohexane	78	8.239	13.790	80.21	1.14	97.50%
Isoheptane	80	6.807	5.079	36.04	1.82	100.00%
2,3-Dimethylpentane	71	2.725	1.838	11.76	0.73	88.75%
3-Methylhexane	80	7.655	5.909	45.26	2.26	100.00%
1-Heptene	12	1.600	0.579	2.97	0.81	15.00%
2,2,4-Trimethylpentane	80	13.657	10.622	59.88	3.33	100.00%
n-Heptane	80	7.137	5.398	40.14	1.39	100.00%
Methylcyclohexane	80	5.497	3.386	17.05	1.12	100.00%
2,2,3-Trimethylpentane	79	2.778	1.635	9.41	0.85	98.75%
2,3,4-Trimethylpentane	80	4.970	4.066	24.08	1.26	100.00%
Toluene	80	46.119	25.691	133.22	13.66	100.00%
3-Methylheptane	80	3.338	1.753	8.87	1.16	100.00%

Table 11-10. (Continued)

Compound	N	Houston, TX (H1TX) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	80	3.541	2.089	10.88	1.01	100.00%
Ethylbenzene	80	8.854	4.448	20.87	2.70	100.00%
p-Xylene + m-Xylene	80	31.642	17.680	83.36	9.52	100.00%
Styrene	72	3.130	2.117	12.36	0.81	90.00%
o-Xylene	80	10.333	5.180	24.94	2.15	100.00%
n-Nonane	73	1.898	1.111	6.33	0.66	91.25%
n-Propylbenzene	80	7.551	10.267	59.23	0.90	100.00%
p-Ethyltoluene	77	9.778	5.906	27.76	1.85	96.25%
1,3,5-Trimethylbenzene	79	4.316	2.615	13.96	1.28	98.75%
o-Ethyltoluene	76	2.457	1.454	7.92	0.82	95.00%
1,2,4-Trimethylbenzene	59	7.754	7.225	35.39	1.01	73.75%
1-Decene	64	11.475	7.004	29.04	1.18	80.00%
n-Decane	57	2.702	1.534	8.25	0.90	71.25%
1,2,3-Trimethylbenzene	70	4.292	2.160	11.03	1.47	87.50%
p-Diethylbenzene	67	4.046	2.714	18.18	1.14	83.75%
Tridecene	42	1.748	1.160	6.73	0.62	52.50%
Propyne	5	1.755	1.866	5.09	0.84	6.25%
1-Pentene	78	4.340	3.046	17.08	0.78	97.50%
2-Methyl-1-butene	80	5.510	4.198	23.51	1.21	100.00%
2-Methyl-2-butene	79	7.384	5.583	31.12	1.51	98.75%
Cyclopentene	53	1.805	1.262	6.27	0.69	66.25%
1-Hexene	53	3.896	2.784	14.98	0.78	66.25%
1-Undecene	76	2.864	2.467	19.74	0.77	95.00%
n-Tridecane	44	1.579	2.449	17.19	0.55	55.00%
1-Octene	36	2.896	3.726	22.44	0.99	45.00%
m-Ethyltoluene	68	2.810	2.355	11.65	0.78	85.00%
n-Undecane	62	2.809	3.174	21.60	0.90	77.50%
Dodecene	41	3.296	3.100	20.20	0.86	51.25%
Tetradecene	5	0.908	0.236	1.22	0.66	6.25%
2-Ethyl-1-butene	0	-	-	-	-	0.00%
n-Dodecane	32	0.592	0.699	4.07	0.04	40.00%

Table 11-11. 1991 Summary Statistics for Juarez, Mexico (JUMX)

	Juarez, Mexico (JUMX)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	64	14.146	9.868	44.29	2.01	100.00%
Acetylene	64	12.753	9.669	44.37	2.61	100.00%
Ethane	64	27.607	31.257	193.00	5.32	100.00%
Propylene	63	4.712	3.259	15.33	0.82	98.44%
Propane	64	49.189	40.385	193.41	4.35	100.00%
Isobutane	63	16.125	58.339	407.36	1.12	98.44%
1-Butene + Isobutene	62	3.801	2.961	19.35	0.84	96.88%
1,3-Butadiene	34	1.683	1.180	6.47	0.53	53.13%
n-Butane	63	20.100	13.608	58.19	2.82	98.44%
t-2-Butene	31	2.151	1.271	6.94	0.79	48.44%
c-2-Butene	28	1.627	1.017	6.15	0.69	43.75%
Isopentane	64	47.935	128.907	893.90	2.31	100.00%
n-Pentane	64	39.233	140.710	1032.00	1.56	100.00%
t-2-Pentene	50	3.291	7.369	53.58	0.88	78.13%
c-2-Pentene	26	2.173	3.545	19.40	0.78	40.63%
Cyclopentane	42	4.378	13.506	84.34	0.55	65.63%
2,3-Dimethylbutane	58	2.764	1.840	7.98	0.78	90.63%
Isohexane	64	9.393	7.095	33.00	1.40	100.00%
3-Methylpentane	62	6.720	4.850	23.47	1.59	96.88%
n-Hexane	64	8.711	8.390	43.42	1.05	100.00%
Methylcyclopentane	63	4.359	3.718	18.15	0.69	98.44%
2,4-Dimethylpentane	53	3.023	3.123	20.15	0.54	82.81%
Benzene	64	9.797	6.772	29.80	1.91	100.00%
Cyclohexane	50	3.117	5.508	34.10	0.74	78.13%
Isoheptane	60	3.682	3.741	25.08	0.84	93.75%
2,3-Dimethylpentane	54	3.119	2.478	9.98	0.93	84.38%
3-Methylhexane	63	4.582	5.365	36.45	0.93	98.44%
1-Heptene	7	3.174	2.254	7.60	1.37	10.94%
2,2,4-Trimethylpentane	64	4.176	3.246	13.88	0.83	100.00%
n-Heptane	62	4.877	8.469	65.61	1.00	96.88%
Methylcyclohexane	55	2.786	5.278	39.71	0.72	85.94%
2,2,3-Trimethylpentane	40	1.957	1.931	12.90	0.84	62.50%
2,3,4-Trimethylpentane	52	1.906	1.283	5.40	0.73	81.25%
Toluene	64	42.613	64.083	362.93	2.67	100.00%
3-Methylheptane	53	3.179	5.635	41.00	0.79	82.81%

Table 11-11. (Continued)

Compound	N	Juarez, Mexico (JUMX) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	51	5.129	18.122	131.34	0.55	79.69%
Ethylbenzene	62	8.296	11.737	83.82	1.45	96.88%
p-Xylene + m-Xylene	64	27.575	38.848	268.30	1.69	100.00%
Styrene	25	5.151	7.598	33.62	0.56	39.06%
o-Xylene	64	9.031	13.066	96.63	1.43	100.00%
n-Nonane	50	8.831	43.586	310.34	0.54	78.13%
n-Propylbenzene	61	5.101	17.440	137.74	0.86	95.31%
p-Ethyltoluene	62	10.501	30.015	194.73	0.87	96.88%
1,3,5-Trimethylbenzene	57	7.530	31.089	237.28	0.85	89.06%
o-Ethyltoluene	39	3.900	7.205	41.45	0.74	60.94%
1,2,4-Trimethylbenzene	40	5.173	9.233	58.09	0.78	62.50%
1-Decene	52	13.171	32.922	212.41	0.80	81.25%
n-Decane	40	15.967	70.672	448.04	0.82	62.50%
1,2,3-Trimethylbenzene	57	5.222	10.792	82.56	0.85	89.06%
p-Diethylbenzene	46	5.754	15.061	102.85	0.79	71.88%
Tridecene	35	2.971	4.031	21.23	0.82	54.69%
Propyne	4	1.078	0.099	1.18	0.95	6.25%
1-Pentene	42	2.057	0.711	3.38	0.65	65.63%
2-Methyl-1-butene	48	2.458	1.628	9.18	0.77	75.00%
2-Methyl-2-butene	43	2.780	1.909	10.52	0.79	67.19%
Cyclopentene	3	1.399	0.881	2.42	0.85	4.69%
1-Hexene	5	5.894	6.244	16.59	1.15	7.81%
1-Undecene	62	5.135	10.697	59.20	0.81	96.88%
n-Tridecane	24	4.438	8.611	41.27	0.61	37.50%
1-Octene	19	1.880	1.426	7.17	0.82	29.69%
m-Ethyltoluene	31	4.402	10.146	54.92	0.87	48.44%
n-Undecane	53	15.215	55.331	330.26	0.81	82.81%
Dodecene	40	4.722	10.057	53.86	0.85	62.50%
Tetradecene	9	2.880	2.767	9.25	0.70	14.06%
2-Ethyl-1-butene	1	3.530	-	3.53	3.53	1.56%
n-Dodecane	41	2.453	10.975	70.76	0.03	64.06%

Table 11-12. 1991 Summary Statistics for Ft. Lauderdale, FL (F1FL)

	Ft. Lauderdale, FL (F1FL)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	11	7.53	6.14	17.63	0.25	100.0%
Acetylene	11	7.07	4.10	13.91	1.47	100.0%
Ethane	11	3.79	2.86	11.31	1.26	100.0%
Propylene	10	4.50	3.47	13.11	0.92	90.9%
Propane	11	12.22	10.59	37.04	1.56	100.0%
Isobutane	11	3.96	3.19	10.63	0.93	100.0%
1-Butene + Isobutene	11	2.70	1.40	4.61	0.19	100.0%
1,3-Butadiene	4	1.18	0.31	1.52	0.88	36.4%
n-Butane	11	15.33	10.65	31.23	2.77	100.0%
t-2-Butene	5	1.43	0.50	1.95	0.87	45.5%
c-2-Butene	4	1.66	0.48	2.37	1.34	36.4%
Isopentane	11	28.07	21.30	61.40	4.88	100.0%
n-Pentane	11	8.75	5.89	18.22	1.58	100.0%
t-2-Pentene	8	2.78	1.46	4.91	1.25	72.7%
c-2-Pentene	5	1.65	0.61	2.32	0.94	45.5%
Cyclopentane	4	1.40	0.29	1.69	1.00	36.4%
2,3-Dimethylbutane	7	3.20	1.46	4.87	1.70	63.6%
Isohexane	11	6.61	4.94	14.10	1.32	100.0%
3-Methylpentane	10	4.45	3.11	9.46	0.82	90.9%
n-Hexane	9	4.63	3.04	10.77	0.81	81.8%
Methylcyclopentane	8	2.67	1.10	4.10	1.35	72.7%
2,4-Dimethylpentane	8	1.91	0.79	2.98	1.00	72.7%
Benzene	11	5.90	3.39	10.63	1.43	100.0%
Cyclohexane	2	0.88	0.17	1.00	0.76	18.2%
Isoheptane	8	2.58	0.82	3.55	1.22	72.7%
2,3-Dimethylpentane	7	1.89	0.66	2.79	1.14	63.6%
3-Methylhexane	8	2.71	1.06	4.12	1.38	72.7%
1-Heptene	0	-	-	-	-	0.0%
2,2,4-Trimethylpentane	11	6.97	4.27	12.74	1.55	100.0%
n-Heptane	8	2.20	0.84	3.38	1.16	72.7%
Methylcyclohexane	4	1.89	0.43	2.14	1.25	36.4%
2,2,3-Trimethylpentane	7	1.50	0.50	2.08	0.82	63.6%
2,3,4-Trimethylpentane	9	2.90	1.29	4.38	0.46	81.8%
Toluene	11	23.80	16.59	45.54	4.08	100.0%
3-Methylheptane	6	1.48	0.31	1.89	1.16	54.5%

Table 11-12. (Continued)

Compound	N	Ft. Lauderdale, FL (F1FL) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	5	1.18	0.36	1.81	0.95	45.5%
Ethylbenzene	11	3.22	1.93	5.64	0.65	100.0%
p-Xylene + m-Xylene	11	11.47	6.68	20.83	3.03	100.0%
Styrene	5	2.20	0.89	3.29	1.22	45.5%
o-Xylene	11	0.57	0.31	0.94	0.14	100.0%
n-Nonane	3	1.12	0.19	1.32	0.95	27.3%
n-Propylbenzene	11	2.78	1.63	5.67	0.92	100.0%
p-Ethyltoluene	11	5.18	3.29	10.43	2.12	100.0%
1,3,5-Trimethylbenzene	10	2.55	1.35	4.51	1.16	90.9%
o-Ethyltoluene	10	1.92	1.34	5.28	0.93	90.9%
1,2,4-Trimethylbenzene	5	2.19	1.95	5.26	0.52	45.5%
1-Decene	10	5.68	3.28	10.31	1.67	90.9%
n-Decane	6	1.39	0.47	2.04	0.88	54.5%
1,2,3-Trimethylbenzene	11	0.38	0.25	0.72	0.01	100.0%
p-Diethylbenzene	9	0.57	0.32	0.93	0.07	81.8%
Tridecene	1	1.48	-	1.48	1.48	9.1%
Propyne	0	-	-	-	-	0.0%
1-Pentene	5	2.39	0.89	3.24	0.89	45.5%
2-Methyl-1-butene	8	2.18	1.03	3.79	1.23	72.7%
2-Methyl-2-butene	10	2.98	1.67	5.75	0.89	90.9%
Cyclopentene	3	1.10	0.24	1.38	0.95	27.3%
1-Hexene	1	1.37	-	1.37	1.37	9.1%
1-Undecene	10	1.84	0.65	3.08	0.86	90.9%
n-Tridecane	0	-	-	-	-	0.0%
1-Octene	3	1.16	0.06	1.21	1.10	27.3%
m-Ethyltoluene	8	1.38	0.51	2.10	0.64	72.7%
n-Undecane	5	1.57	0.72	2.42	0.94	45.5%
Dodecene	4	2.28	1.44	3.82	0.91	36.4%
Tetradecene	0	-	-	-	-	0.0%
2-Ethyl-1-butene	0	-	-	-	-	0.0%
n-Dodecane	3	0.51	0.43	0.97	0.12	27.3%

Table 11-13. 1991 Summary Statistics for Newark, NJ (NWNJ)

Compound	N	Newark, NJ (NWNJ) ppbC Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	11	20.08	11.64	49.53	8.82	100.0%
Acetylene	11	11.10	4.70	21.27	5.73	100.0%
Ethane	11	22.72	13.62	53.28	8.66	100.0%
Propylene	11	12.05	7.93	32.49	4.93	100.0%
Propane	11	26.28	15.43	57.43	8.38	100.0%
Isobutane	11	14.03	13.40	53.40	3.80	100.0%
1-Butene + Isobutene	11	5.21	3.72	15.55	2.56	100.0%
1,3-Butadiene	7	1.42	0.69	2.79	0.86	63.6%
n-Butane	11	17.83	11.35	46.83	6.69	100.0%
t-2-Butene	10	1.95	1.87	6.98	0.72	90.9%
c-2-Butene	9	1.65	1.15	4.36	0.74	81.8%
Isopentane	11	31.50	13.27	55.42	10.97	100.0%
n-Pentane	11	10.82	5.23	21.63	3.36	100.0%
t-2-Pentene	11	1.86	1.09	4.06	0.95	100.0%
c-2-Pentene	5	1.35	0.58	2.15	0.82	45.5%
Cyclopentane	5	1.22	0.41	1.80	0.83	45.5%
2,3-Dimethylbutane	11	2.75	1.42	5.43	1.27	100.0%
Isohexane	11	8.38	4.11	16.96	3.83	100.0%
3-Methylpentane	11	5.54	2.62	10.50	2.69	100.0%
n-Hexane	11	6.57	3.62	14.16	3.04	100.0%
Methylcyclopentane	11	3.35	1.51	6.03	1.53	100.0%
2,4-Dimethylpentane	11	1.84	0.90	3.79	0.93	100.0%
Benzene	11	9.35	4.13	17.59	4.61	100.0%
Cyclohexane	5	1.39	0.38	1.91	0.90	45.5%
Isoheptane	11	3.22	1.38	6.18	1.56	100.0%
2,3-Dimethylpentane	11	2.19	0.94	4.13	1.13	100.0%
3-Methylhexane	11	4.01	1.60	7.01	2.16	100.0%
1-Heptene	0	-	-	-	-	0.0%
2,2,4-Trimethylpentane	11	7.09	2.99	13.33	3.84	100.0%
n-Heptane	11	3.64	1.36	6.29	2.15	100.0%
Methylcyclohexane	11	2.11	0.93	3.92	0.93	100.0%
2,2,3-Trimethylpentane	11	1.43	0.54	2.47	0.81	100.0%
2,3,4-Trimethylpentane	11	2.89	1.31	5.71	1.58	100.0%
Toluene	11	43.63	21.02	93.89	17.56	100.0%
3-Methylheptane	10	1.69	0.60	2.85	1.05	90.9%

Table 11-13. (Continued)

Compound	Newark, NJ (NWNJ)					
		ppbC				
	N	Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	9	2.50	1.00	4.09	1.12	81.8%
Ethylbenzene	11	6.71	2.50	11.18	2.63	100.0%
p-Xylene + m-Xylene	11	25.91	10.19	45.10	9.88	100.0%
Styrene	6	1.40	0.38	1.85	0.92	54.5%
o-Xylene	11	1.01	1.44	5.15	0.02	100.0%
n-Nonane	11	2.35	0.84	3.79	1.24	100.0%
n-Propylbenzene	11	2.59	1.05	4.24	1.33	100.0%
p-Ethyltoluene	11	8.29	3.68	15.52	3.59	100.0%
1,3,5-Trimethylbenzene	11	4.67	2.46	9.43	2.36	100.0%
o-Ethyltoluene	10	2.04	1.10	4.71	1.15	90.9%
1,2,4-Trimethylbenzene	3	6.10	4.24	9.71	1.43	27.3%
1-Decene	8	8.45	3.59	15.27	5.44	72.7%
n-Decane	7	2.57	1.04	4.38	1.60	63.6%
1,2,3-Trimethylbenzene	7	0.40	0.13	0.64	0.28	63.6%
p-Diethylbenzene	7	0.69	0.20	0.99	0.39	63.6%
Tridecene	7	1.18	0.34	1.85	0.85	63.6%
Propyne	0	-	-	-	-	0.0%
1-Pentene	6	1.64	0.84	3.14	0.88	54.5%
2-Methyl-1-butene	11	2.75	1.35	4.73	0.73	100.0%
2-Methyl-2-butene	11	2.19	1.36	5.23	1.07	100.0%
Cyclopentene	1	0.73	-	0.73	0.73	9.1%
1-Hexene	0	-	-	-	-	0.0%
1-Undecene	9	3.26	2.44	6.76	0.85	81.8%
n-Tridecane	4	0.92	0.29	1.24	0.55	36.4%
1-Octene	3	1.38	0.30	1.57	1.03	27.3%
m-Ethyltoluene	10	2.10	0.94	4.26	1.20	90.9%
n-Undecane	11	4.04	4.13	16.19	1.99	100.0%
Dodecene	6	2.25	1.17	3.88	0.88	54.5%
Tetradecene	0	-	-	-	-	0.0%
2-Ethyl-1-butene	0	-	-	-	-	0.0%
n-Dodecane	8	0.50	0.34	1.00	0.10	72.7%

Table 11-14. 1991 Summary Statistics for W. Palm Beach, FL (PBFL)

	W. Palm Beach, FL (PBFL)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	11	21.60	14.26	45.26	1.29	100.0%
Acetylene	11	19.18	11.72	40.62	2.65	100.0%
Ethane	11	9.27	9.03	34.53	1.61	100.0%
Propylene	10	10.51	5.17	17.71	2.20	90.9%
Propane	11	52.61	24.84	84.14	6.76	100.0%
Isobutane	11	10.77	6.16	20.81	2.59	100.0%
1-Butene + Isobutene	11	6.97	3.64	12.35	1.43	100.0%
1,3-Butadiene	9	2.62	0.94	3.89	1.36	81.8%
n-Butane	11	36.19	18.89	65.93	8.20	100.0%
t-2-Butene	9	2.91	1.10	4.94	1.27	81.8%
c-2-Butene	9	2.33	0.81	3.65	0.91	81.8%
Isopentane	11	68.07	40.89	143.29	13.98	100.0%
n-Pentane	11	21.36	12.68	44.85	4.49	100.0%
t-2-Pentene	9	6.33	2.33	10.63	3.07	81.8%
c-2-Pentene	9	3.03	1.21	5.49	1.32	81.8%
Cyclopentane	9	2.30	0.95	3.90	1.05	81.8%
2,3-Dimethylbutane	11	6.18	3.75	13.70	1.08	100.0%
Isohexane	11	18.38	11.69	43.56	3.09	100.0%
3-Methylpentane	11	10.40	6.68	24.34	1.85	100.0%
n-Hexane	11	8.16	5.12	18.38	1.94	100.0%
Methylcyclopentane	11	5.15	3.15	11.78	0.86	100.0%
2,4-Dimethylpentane	10	4.57	2.23	9.34	1.02	90.9%
Benzene	11	15.11	9.00	33.17	2.29	100.0%
Cyclohexane	6	1.52	0.56	2.48	0.93	54.5%
Isoheptane	10	5.18	2.43	11.01	2.[illegible]5	90.9%
2,3-Dimethylpentane	10	4.38	2.10	9.06	1.08	90.9%
3-Methylhexane	11	5.63	3.53	13.35	0.93	100.0%
1-Heptene	1	1.78	-	1.78	1.78	9.1%
2,2,4-Trimethylpentane	11	18.43	10.54	40.81	3.68	100.0%
n-Heptane	10	5.49	3.09	12.25	1.12	90.9%
Methylcyclohexane	9	3.25	1.53	6.47	1.56	81.8%
2,2,3-Trimethylpentane	9	3.39	1.50	6.78	1.66	81.8%
2,3,4-Trimethylpentane	11	6.11	3.45	13.46	1.12	100.0%
Toluene	11	45.19	28.55	105.82	8.57	100.0%
3-Methylheptane	9	2.83	1.25	5.55	1.44	81.8%

Table 11-14. (Continued)

Compound	W. Palm Beach, FL (PBFL)					
		ppbC				
	N	Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	9	2.14	0.72	3.33	1.26	81.8%
Ethylbenzene	11	6.97	4.30	15.94	1.29	100.0%
p-Xylene + m-Xylene	11	26.77	15.85	59.72	5.10	100.0%
Styrene	9	1.86	0.85	3.33	0.91	81.8%
o-Xylene	11	1.85	1.87	6.45	0.03	100.0%
n-Nonane	8	1.71	0.53	2.48	0.98	72.7%
n-Propylbenzene	10	3.22	0.70	4.16	2.01	90.9%
p-Ethyltoluene	11	9.53	5.89	18.35	1.73	100.0%
1,3,5-Trimethylbenzene	11	5.15	3.62	12.90	0.96	100.0%
o-Ethyltoluene	9	3.66	1.21	6.36	2.48	81.8%
1,2,4-Trimethylbenzene	4	18.15	12.10	31.22	2.01	36.4%
1-Decene	9	10.76	5.55	21.27	3.27	81.8%
n-Decane	6	1.61	0.49	2.07	0.91	54.5%
1,2,3-Trimethylbenzene	10	1.23	2.04	7.00	0.12	90.9%
p-Diethylbenzene	9	0.56	0.32	0.93	0.02	81.8%
Tridecene	5	2.62	1.56	3.99	0.44	45.5%
Propyne	0	-	-	-	-	0.0%
1-Pentene	9	4.20	1.38	7.05	2.44	81.8%
2-Methyl-1-butene	9	5.18	2.24	8.66	2.16	81.8%
2-Methyl-2-butene	10	7.39	3.76	14.89	1.26	90.9%
Cyclopentene	7	1.48	0.51	2.46	0.93	63.6%
1-Hexene	9	2.44	1.01	4.60	1.12	81.8%
1-Undecene	9	3.15	1.52	6.56	1.46	81.8%
n-Tridecane	7	1.29	0.36	1.75	0.82	63.6%
1-Octene	9	2.14	0.87	3.98	1.18	81.8%
m-Ethyltoluene	9	3.72	2.87	10.69	1.63	81.8%
n-Undecane	9	1.97	0.65	3.22	1.14	81.8%
Dodecene	6	2.91	2.74	7.28	0.26	54.5%
Tetradecene	0	-	-	-	-	0.0%
2-Ethyl-1-butene	0	-	-	-	-	0.0%
n-Dodecane	6	0.57	0.24	0.86	0.17	54.5%

Table 11-15. 1991 Summary Statistics for Plainfield, NJ (PLNJ)

	Plainfield, NJ (PLNJ)					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	10	22.25	10.95	41.69	5.42	100.0%
Acetylene	10	8.83	5.23	21.24	2.87	100.0%
Ethane	10	24.92	13.40	47.14	5.33	100.0%
Propylene	10	6.10	3.24	11.62	1.47	100.0%
Propane	10	12.75	6.18	23.66	2.55	100.0%
Isobutane	10	10.71	5.40	19.59	1.47	100.0%
1-Butene + Isobutene	10	3.62	1.66	6.32	1.19	100.0%
1,3-Butadiene	3	1.04	0.19	1.26	0.92	30.0%
n-Butane	10	11.05	5.10	20.08	2.35	100.0%
t-2-Butene	8	1.75	0.83	3.24	0.96	80.0%
c-2-Butene	7	1.73	0.78	3.30	1.13	70.0%
Isopentane	10	25.76	14.50	52.85	5.05	100.0%
n-Pentane	10	9.02	4.89	18.57	1.33	100.0%
t-2-Pentene	8	2.98	2.16	7.90	1.26	80.0%
c-2-Pentene	5	1.49	0.77	2.69	0.81	50.0%
Cyclopentane	5	1.17	0.63	2.16	0.48	50.0%
2,3-Dimethylbutane	9	2.58	1.59	6.01	1.35	90.0%
Isohexane	10	7.78	5.99	21.97	1.69	100.0%
3-Methylpentane	10	6.01	4.71	16.43	0.94	100.0%
n-Hexane	9	5.27	3.97	14.36	2.47	90.0%
Methylcyclopentane	9	3.08	2.02	7.28	1.52	90.0%
2,4-Dimethylpentane	9	1.71	1.05	4.10	0.87	90.0%
Benzene	10	7.52	4.13	15.87	2.29	100.0%
Cyclohexane	3	2.08	1.87	4.23	0.89	30.0%
Isoheptane	10	2.34	1.61	6.42	0.99	100.0%
2,3-Dimethylpentane	9	1.83	0.94	3.76	0.99	90.0%
3-Methylhexane	9	3.20	2.28	8.65	1.43	90.0%
1-Heptene	0	-	-	-	-	0.0%
2,2,4-Trimethylpentane	10	6.39	3.70	13.13	1.48	100.0%
n-Heptane	9	2.56	1.74	6.54	0.99	90.0%
Methylcyclohexane	8	1.60	0.87	3.38	0.70	80.0%
2,2,3-Trimethylpentane	7	1.40	0.87	2.66	0.21	70.0%
2,3,4-Trimethylpentane	9	2.70	1.29	4.85	1.44	90.0%
Toluene	10	27.33	15.07	57.65	5.04	100.0%
3-Methylheptane	7	1.32	0.79	2.58	0.21	70.0%

Table 11-15. (Continued)

Compound	N	Plainfield, NJ (PLNJ) ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	4	1.18	0.36	1.64	0.81	40.0%
Ethylbenzene	10	3.65	1.94	7.30	0.81	100.0%
p-Xylene + m-Xylene	10	13.98	7.55	27.75	3.45	100.0%
Styrene	4	0.99	0.30	1.28	0.56	40.0%
o-Xylene	10	0.73	0.31	1.30	0.35	100.0%
n-Nonane	5	1.06	0.27	1.47	0.81	50.0%
n-Propylbenzene	10	1.51	0.57	2.47	0.88	100.0%
p-Ethyltoluene	9	4.79	2.29	9.47	2.28	90.0%
1,3,5-Trimethylbenzene	9	1.94	0.70	3.11	1.43	90.0%
o-Ethyltoluene	6	1.60	0.42	2.02	0.88	60.0%
1,2,4-Trimethylbenzene	5	3.20	2.53	6.80	0.27	50.0%
1-Decene	10	3.87	2.64	9.37	1.01	100.0%
n-Decane	5	1.59	0.33	2.07	1.19	50.0%
1,2,3-Trimethylbenzene	8	0.42	0.22	0.79	0.12	80.0%
p-Diethylbenzene	6	0.40	0.30	0.82	0.02	60.0%
Tridecene	2	1.34	0.18	1.46	1.21	20.0%
Propyne	0	-	-	-	-	0.0%
1-Pentene	6	1.48	0.87	2.64	0.22	60.0%
2-Methyl-1-butene	9	1.99	1.07	4.35	1.08	90.0%
2-Methyl-2-butene	9	2.49	1.82	6.50	1.03	90.0%
Cyclopentene	2	1.31	0.35	1.55	1.06	20.0%
1-Hexene	1	2.40	-	2.40	2.40	10.0%
1-Undecene	7	1.27	0.35	1.84	0.85	70.0%
n-Tridecane	2	1.21	0.56	1.60	0.81	20.0%
1-Octene	6	1.19	0.41	1.97	0.94	60.0%
m-Ethyltoluene	5	1.03	0.53	1.55	0.21	50.0%
n-Undecane	7	3.60	5.12	15.17	1.26	70.0%
Dodecene	5	2.73	0.69	3.41	1.65	50.0%
Tetradecene	0	-	-	-	-	0.0%
2-Ethyl-1-butene	0	-	-	-	-	0.0%
n-Dodecane	4	0.67	0.80	1.80	0.07	40.0%

Table 11-16. 1991 Summary Statistics for Raleigh, NC (R1NC)

Compound	Raleigh, NC (R1NC)					
		ppbC				
	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	10	8.88	5.86	22.45	3.76	100.0%
Acetylene	10	5.86	5.16	18.80	1.43	100.0%
Ethane	10	9.14	5.36	19.48	4.20	100.0%
Propylene	10	3.30	2.46	9.35	1.01	100.0%
Propane	10	12.68	9.13	30.81	5.66	100.0%
Isobutane	10	4.28	3.52	12.95	1.11	100.0%
1-Butene + Isobutene	10	2.48	1.86	6.81	1.22	100.0%
1,3-Butadiene	2	1.79	0.53	2.16	1.41	20.0%
n-Butane	10	11.52	9.48	31.52	5.42	100.0%
t-2-Butene	4	1.70	1.05	2.63	0.23	40.0%
c-2-Butene	2	1.89	0.15	1.99	1.78	20.0%
Isopentane	10	19.99	16.94	57.54	7.71	100.0%
n-Pentane	10	7.70	5.48	18.49	3.13	100.0%
t-2-Pentene	7	1.77	1.65	4.40	0.38	70.0%
c-2-Pentene	3	1.62	0.96	2.34	0.54	30.0%
Cyclopentane	3	1.33	0.43	1.72	0.87	30.0%
2,3-Dimethylbutane	9	2.18	1.86	6.26	0.97	90.0%
Isohexane	10	6.09	5.29	18.67	2.09	100.0%
3-Methylpentane	10	4.39	4.50	15.95	1.04	100.0%
n-Hexane	10	8.15	13.11	43.77	1.62	100.0%
Methylcyclopentane	10	2.46	3.09	10.68	0.71	100.0%
2,4-Dimethylpentane	8	1.54	1.44	4.42	0.19	80.0%
Benzene	10	5.38	3.94	15.06	3.06	100.0%
Cyclohexane	3	1.82	0.79	2.44	0.94	30.0%
Isoheptane	9	1.90	1.36	4.68	0.94	90.0%
2,3-Dimethylpentane	6	2.05	1.79	5.07	0.79	60.0%
3-Methylhexane	9	2.09	1.63	5.72	0.99	90.0%
1-Heptene	0	-	-	-	-	0.0%
2,2,4-Trimethylpentane	10	4.78	4.33	15.12	1.91	100.0%
n-Heptane	9	1.58	1.47	5.45	0.65	90.0%
Methylcyclohexane	3	2.11	1.23	3.32	0.86	30.0%
2,2,3-Trimethylpentane	3	1.77	1.02	2.83	0.80	30.0%
2,3,4-Trimethylpentane	10	1.79	1.57	5.64	0.72	100.0%
Toluene	10	27.29	41.25	140.17	4.92	100.0%
3-Methylheptane	2	1.84	0.66	2.30	1.37	20.0%

Table 11-16. (Continued)

Compound	Raleigh, NC (R1NC)					
		ppbC				
	N	Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	4	1.37	0.40	1.81	0.85	40.0%
Ethylbenzene	10	2.21	1.77	6.58	0.76	100.0%
p-Xylene + m-Xylene	10	7.80	6.46	24.08	3.60	100.0%
Styrene	4	1.22	0.26	1.44	0.89	40.0%
o-Xylene	9	0.42	0.31	0.98	0.15	90.0%
n-Nonane	4	1.09	0.33	1.56	0.81	40.0%
n-Propylbenzene	9	7.35	3.95	12.22	1.97	90.0%
p-Ethyltoluene	10	4.29	3.85	12.65	0.86	100.0%
1,3,5-Trimethylbenzene	5	1.94	1.12	3.75	1.02	50.0%
o-Ethyltoluene	4	1.71	0.93	2.95	0.80	40.0%
1,2,4-Trimethylbenzene	8	4.44	2.90	9.40	1.29	80.0%
1-Decene	8	3.93	3.79	12.18	1.16	80.0%
n-Decane	7	1.30	0.56	2.39	0.86	70.0%
1,2,3-Trimethylbenzene	8	0.48	0.27	0.91	0.02	80.0%
p-Diethylbenzene	8	0.54	0.32	0.99	0.06	80.0%
Tridecene	5	1.13	0.64	1.95	0.19	50.0%
Propyne	0	-	-	-	-	0.0%
1-Pentene	5	2.29	0.86	3.25	1.30	50.0%
2-Methyl-1-butene	6	2.17	1.44	4.09	0.85	60.0%
2-Methyl-2-butene	6	2.30	2.31	6.25	0.53	60.0%
Cyclopentene	0	-	-	-	-	0.0%
1-Hexene	1	1.88	-	1.88	1.88	10.0%
1-Undecene	8	4.79	2.64	9.83	1.13	80.0%
n-Tridecane	1	0.97	-	0.97	0.97	10.0%
1-Octene	1	1.48	-	1.48	1.48	10.0%
m-Ethyltoluene	2	1.78	0.52	2.15	1.41	20.0%
n-Undecane	7	1.94	1.32	4.72	0.88	70.0%
Dodecene	8	2.32	1.47	5.53	1.31	80.0%
Tetradecene	0	-	-	-	-	0.0%
2-Ethyl-1-butene	0	-	-	-	-	0.0%
n-Dodecane	3	0.57	0.41	0.93	0.12	30.0%

Table 11-17. 1991 Overall Summary Statistics

	Overall					
		ppbC				
Compound	N	Average	Std Dev	Maximu	Minimum	Frequency
Ethylene	373	26.310	20.621	117.28	1.09	99.73%
Acetylene	374	12.955	10.337	70.13	0.81	100.00%
Ethane	373	36.447	27.713	266.89	2.35	99.73%
Propylene	373	13.005	17.185	160.40	0.82	99.73%
Propane	374	53.289	60.210	572.03	2.08	100.00%
Isobutane	373	25.573	36.302	407.36	1.12	99.73%
1-Butene + Isobutene	371	6.533	5.216	39.97	0.83	99.20%
1,3-Butadiene	288	3.190	3.684	28.30	0.45	77.01%
n-Butane	373	39.761	48.393	462.93	2.82	99.73%
t-2-Butene	316	3.451	3.647	39.04	0.68	84.49%
c-2-Butene	286	2.754	3.119	33.25	0.56	76.47%
Isopentane	374	63.447	81.773	893.90	2.31	100.00%
n-Pentane	374	28.915	63.106	1032.00	1.56	100.00%
t-2-Pentene	344	4.611	6.137	77.73	0.72	91.98%
c-2-Pentene	273	2.554	3.328	41.84	0.70	72.99%
Cyclopentane	340	2.796	5.115	84.34	0.55	90.91%
2,3-Dimethylbutane	366	4.659	4.251	45.98	0.78	97.86%
Isohexane	374	16.228	14.665	120.25	1.40	100.00%
3-Methylpentane	372	10.492	8.939	95.75	0.74	99.47%
n-Hexane	373	13.436	10.622	83.72	1.05	99.73%
Methylcyclopentane	373	6.508	4.798	37.49	0.69	99.73%
2,4-Dimethylpentane	333	2.868	2.431	20.15	0.54	89.04%
Benzene	374	13.812	10.583	77.54	1.91	100.00%
Cyclohexane	350	4.711	7.624	80.21	0.69	93.58%
Isoheptane	369	4.633	3.602	36.04	0.83	98.66%
2,3-Dimethylpentane	307	3.133	2.473	17.70	0.68	82.09%
3-Methylhexane	371	5.105	4.305	45.26	0.38	99.20%
1-Heptene	41	2.396	2.011	11.22	0.81	10.96%
2,2,4-Trimethylpentane	369	8.456	8.337	78.02	0.83	98.66%
n-Heptane	372	5.245	4.947	65.61	0.92	99.47%
Methylcyclohexane	362	4.186	3.631	39.71	0.72	96.79%
2,2,3-Trimethylpentane	306	2.138	1.426	12.90	0.79	81.82%
2,3,4-Trimethylpentane	350	3.029	2.672	24.08	0.55	93.58%
Toluene	374	35.127	32.566	362.93	2.67	100.00%
3-Methylheptane	341	2.610	2.627	41.00	0.64	91.18%

Table 11-17. (Continued)

Compound	N	Overall ppbC Average	Std Dev	Maximu	Minimum	Frequency
n-Octane	357	3.258	7.074	131.34	0.55	95.45%
Ethylbenzene	372	7.381	5.931	83.82	0.91	99.47%
p-Xylene + m-Xylene	374	21.578	20.701	268.30	1.69	100.00%
Styrene	281	2.585	3.178	33.62	0.56	75.13%
o-Xylene	373	7.386	7.043	96.63	0.79	99.73%
n-Nonane	318	3.370	17.365	310.34	0.37	85.03%
n-Propylbenzene	358	4.559	9.204	137.74	0.49	95.72%
p-Ethyltoluene	358	7.312	13.286	194.73	0.87	95.72%
1,3,5-Trimethylbenzene	342	4.163	12.972	237.28	0.75	91.44%
o-Ethyltoluene	267	2.275	3.026	41.45	0.50	71.39%
1,2,4-Trimethylbenzene	244	5.652	6.584	58.09	0.78	65.24%
1-Decene	311	8.304	14.384	212.41	0.80	83.16%
n-Decane	259	4.761	27.959	448.04	0.74	69.25%
1,2,3-Trimethylbenzene	294	4.034	5.298	82.56	0.85	78.61%
p-Diethylbenzene	247	3.717	7.046	102.85	0.79	66.04%
Tridecene	201	1.917	2.237	21.23	0.62	53.74%
Propyne	33	1.387	0.785	5.09	0.77	8.82%
1-Pentene	306	3.204	3.502	42.92	0.52	81.82%
2-Methyl-1-butene	336	3.819	4.818	67.14	0.68	89.84%
2-Methyl-2-butene	333	4.890	7.092	105.01	0.68	89.04%
Cyclopentene	93	1.822	1.870	14.89	0.63	24.87%
1-Hexene	129	3.443	4.116	36.24	0.75	34.49%
1-Undecene	351	4.018	6.045	59.20	0.77	93.85%
n-Tridecane	151	2.002	3.963	41.27	0.55	40.37%
1-Octene	147	2.088	2.088	22.44	0.70	39.30%
m-Ethyltoluene	240	2.388	4.052	54.92	0.70	64.17%
n-Undecane	309	5.412	24.013	330.26	0.80	82.62%
Dodecene	248	3.340	6.962	65.64	0.79	66.31%
Tetradecene	36	1.749	1.553	9.25	0.66	9.63%
2-Ethyl-1-butene	3	4.333	3.839	8.51	0.96	0.80%
n-Dodecane	238	0.925	4.624	70.76	0.01	63.64%

12.0 REFERENCES

1. Compendium Method TO-12, "Determination of Non-Methane Organic Compounds (NMOC) in Ambient Air Using Cryogenic Pre-Concentration and Direct Flame Ionization Detection (PDFID)," Quality Assurance Division, Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC, 27711, May 1988.

2. Radian Corporation. 1991 Nonmethane Organic Compound, Speciated Nonmethane Organic Compound, and Three-Hour Urban Air Toxics Monitoring Programs, Work Plan and Quality Assurance Project Plan. DCN No. 91-262-045-56. Prepared for the U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68D80014.

3. Radian Corporation. 1990 Nonmethane Organic Compound and Three-Hour Air Toxics Monitoring Program. Final Report. Prepared for U. S. Environmental Protection Agency, Research Triangle Park, NC, 27711, DCN No. 91-262-045-04. January 1991.

4. Radian Corporation. 1989 Nonmethane Organic Compound and Three-Hour Air Toxics Monitoring Program. Final Report. Prepared for U. S. Environmental Protection Agency, Research Triangle Park, NC, 27711, EPA-450/4-90-011. May 1990.

5. Radian Corporation. 1988 Nonmethane Organic Compound and Urban Air Toxics Monitoring Program. Final Report. Volume I. U. S. Environmental Protection Agency, Research Triangle Park, NC, 27711, EPA-450/4-89-003. December 1988.

6. Radian Corporation, 1987 Nonmethane Organic Compound and Air Toxics Monitoring Programs. Final Report Volume 1 - Hydrocarbons, U. S. Environmental Protection Agency, Research Triangle Park, NC. EPA-450/4-88-011. August 19, 1988.

7. McAllister, R. A., R. F. Jongleux, D-P. Dayton, P. L. O'Hara, and D. E. Wagoner (Radian Corporation). Nonmethane Organic Compound Monitoring. Final Report. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68-02-3889, July 1987.

8. McAllister, R. A., D-P. Dayton, and D. E. Wagoner (Radian Corporation). Nonmethane Organic Compound Monitoring. Final Project Report. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. No. 68-02-3889, January 1986.

9. Radian Corporation. Nonmethane Organic Compounds Monitoring Assistance for Certain States in EPA Regions III, IV, V, VI, and VII, Phase II. Final Project Report. Prepared for the U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 38-02-3513, February 1985.

APPENDICES

APPENDIX A: SAMPLING SITES FOR 1991 NMOC MONITORING PROGRAM

APPENDIX B: CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID) METHOD

APPENDIX C: 1991 NMOC MONITORING PROGRAM SITE DATA

APPENDIX D: 1991 NMOC MONITORING PROGRAM INVALIDATED AND MISSING SAMPLES

APPENDIX E: PDFID INTEGRATOR PROGRAMMING INSTRUCTIONS

APPENDIX F: 1991 NMOC DAILY CALIBRATION DATA

APPENDIX G: 1991 NMOC IN-HOUSE QUALITY CONTROL SAMPLES

APPENDIX H: MULTIPLE DETECTOR SPECIATED THREE-HOUR SITE DATA SUMMARIES

APPENDIX I: EXTERNAL AUDIT RESULTS LETTER

APPENDIX J: SPECIATED NMOC ANALYSIS METHOD

APPENDIX K: MONTHLY PROPANE CALIBRATION CURVES SPECIATED FLAME IONIZATION DETECTORS

APPENDIX L: DAILY CALIBRATION CHECKS FOR SPECIATED NMOC RESPONSE FACTORS

APPENDIX M: SPECIATED NMOC AUDIT RESULTS

APPENDIX N: SPECIATED NMOC ANALYTICAL RESULTS (Obtain from Neil Berg, U.S. EPA)

APPENDIX A

SAMPLING SITES FOR 1991 NMOC MONITORING PROGRAM

Table A-1

1991 NMOC Monitoring Program Sites

Site No.	U.S. EPA Region	Site Code	City	AIRS Number	NMOC (PDFID)	Speciated (NMOC)	3-Hour Air Tox	Carbonyl
1	II	MNY	New York, NY	36-061-0010	Yes	Yes	No	Yes
2	II	LINY	Long Island, NY	36-059-0005	Yes	Yes	No	Yes
3	II	NWNJ	Newark, NJ	34-013-0011	Yes	Yes	Yes	Yes
4	II	PLNJ	Plainfield, NJ	34-035-1001	Yes	Yes	Yes	Yes
5	IV	RINC	Raleigh, NC	37-183-0015	Yes	Yes	No	No
6	IV	WSNC	Winston-Salem, NC	37-067-0022	Yes	No	No	No
7	IV	FIFL	Ft. Lauderdale, FL	12-011-2003	Yes	Yes	No	No
8	IV	PBFL	West Palm Beach, FL	12-099-1004	Yes	Yes	No	No
9	VI	BRLA	Baton Rouge, LA	22-033-0006	No	Yes	No	No
10	VI	BMTX	Beaumont, TX	48-245-0009	No	Yes	No	No
11	VI	EPTX	El Paso, TX	48-141-0027	No	Yes	No	No
12	VI	HITX	Houston, TX	48-201-1034	No	Yes	No	No
13	a	JUMX	Juarez, CH	80-006-0001	No	Yes	No	No

[a]The site at Ciudad Juarez, State of Chihuahua, Mexico is sponsored by U. S. EPA Region VI.

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (36): NEW YORK

SITE ID	: 36-061-0010	CITY (51000)	: NEW YORK CITY	LATITUDE	: 40:44:22 N	UTM EASTING	: 4510116
CITY POPULATION	: 7,071,639	COUNTY (061)	: NEW YORK CO	LONGITUDE	: 73:59:10 W	DIFF. GMI	: 05
AQCR POPULATION	: 16,525,701	AQCR (043)	: NEW JERSEY-NEW YORK-CONNECTICUT	UTM ZONE	: 18	ELEVATION ABOVE MSL	: 38 M
DATE ESTABLISHED	:	LAND USE (1)	: RESIDENTIAL	UTM NORTHING	: 4510116	RECORD LAST UPDATED	: 91/09/10
DATE TERMINATED	:	LOCATION SETTING (1)	: URBAN AND CENTER CITY	HQ EVAL DATE	: 80/09/23	LAST REQ EVAL	: 80/09/22
SITE ADDRESS	: MABEL DEAN HIGH SCHOOL, ANNEX, 240 2ND AVENUE			DISTANCE CITY	: 003	COMPASS SECTOR	: S
URBAN AREA (5601)	: NEW YORK, NY-NORTHEASTERN NJ			HC IND	: Y	MET DATA	: Y
SUPPORTING AGENCY (001)	: NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSER			MSA (5600)	: NEW YORK, NY		
COMMENTS	: NYS #7093-05, START NO2,03 11/18/76,TSP 10/20,CO 10/3/77,SO2 2/5/78						
SITE-USER-INFO	: 1980 NECRMP,DISC.CO,03 5/25,RESTART 03 9/24/82;ELEV.TSP 102'						

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (36): NEW YORK

SITE ID	:	36-059-0005	CITY (00000)	:	NOT IN A CITY	LATITUDE	:	40:44:43 N	UTM EASTING	:	619300
CITY POPULATION	:	1	COUNTY (059)	:	NASSAU CO	LONGITUDE	:	73:35:13 W	DIFF. GMI	:	05
AQCR POPULATION	:	16,525,701	AQCR (043)	:	NEW JERSEY-NEW YORK-CONNECTICUT	UTM ZONE	:	18	ELEVATION ABOVE MSL	:	27 M
DATE ESTABLISHED	:	71/01/01	LAND USE (2)	:	COMMERCIAL	UTM NORTHING	:	4511200	RECORD LAST UPDATED	:	91/10/31
DATE TERMINATED	:		LOCATION SETTING (2)	:	SUBURBAN	HQ EVAL DATE	:		LAST REQ EVAL	:	
SITE ADDRESS	:	EISENHOWER PARK, MERRICK AV&OLD COUNTRY R				DISTANCE CITY	:	033	COMPASS SECTOR	:	E
URBAN AREA (5601)	:	NEW YORK, NY-NORTHEASTERN NJ				HC IND	:		MET DATA	:	Y
SUPPORTING AGENCY (001)	:	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSER				MSA (5380)	:	NASSAU-SUFFOLK, NY			
COMMENTS	:	NYS #2950-10 START SO2,CO,O3,NO2,TSP'71;NECRMP'80,NO,NO2,03									
SITE-USER-INFO	:	03-#334105002F01 12/82, MIDDLE SCALE, MEETS SITING, NO2-2-025 - 12/86									

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (34): NEW JERSEY

SITE ID	: 34-013-0011	CITY (51000)	: NEWARK	LATITUDE	: 40:43:37 N	UTM EASTING	: 572280
CITY POPULATION	: 329,248	COUNTY (013)	: ESSEX CO	LONGITUDE	: 74:08:39 W	DIFF. GMI	: 05
AQCR POPULATION	: 16,525,701	AQCR (043)	: NEW JERSEY-NEW YORK-CONNECTICUT	UTM ZONE	: 18	ELEVATION ABOVE MSL	: 3 M
DATE ESTABLISHED	: 85/01/01	LAND USE (3)	: INDUSTRIAL	UTM NORTHING	: 4508570	RECORD LAST UPDATED	: 90/12/19
DATE TERMINATED	:	LOCATION SETTING (1)	: URBAN AND CENTER CITY	HQ EVAL DATE	:	LAST REQ EVAL	: 86/05/06
SITE ADDRESS	: ST. CHARLES BETWEEN KOSSUTH & KAMERON STREET			DISTANCE CITY	: 015	COMPASS SECTOR	: SW
URBAN AREA (5601)	: NEW YORK, NY-NORTHEASTERN NJ			HC IND	: Y	MET DATA	: N
SUPPORTING AGENCY (001)	: NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION			MSA (5640)	: NEWARK, NJ		
COMMENTS	: NJ #07142,START 1/1/85,RELOC.FROM 340130008, SITING CRITERIA?						
SITE-USER-INFO	: PM10,DICHOT,START 3/15/86,ELEV.16';03 DOWN 5/16/86-3/25/87						

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (34): NEW JERSEY

SITE ID	:	34-035-1001	CITY (59190)	:	PLAINFIELD	LATITUDE	:	40:36:04 N	UTM EASTING	:	547218
CITY POPULATION	:	45,555	COUNTY (035)	:	SOMERSET CO	LONGITUDE	:	74:26:31 W	DIFF. GMI	:	05
AQCR POPULATION	:	16,525,701	AQCR (043)	:	NEW JERSEY-NEW YORK-CONNECTICUT	UTM ZONE	:	18	ELEVATION ABOVE MSL	:	18 M
DATE ESTABLISHED	:		LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	4494399	RECORD LAST UPDATED	:	90/03/15
DATE TERMINATED	:		LOCATION SETTING (2)	:	SUBURBAND CENTER CITY	HQ EVAL DATE	:		LAST REQ EVAL	:	
SITE ADDRESS	:	WEST THIRD AND BERGEN STREETS				DISTANCE CITY	:		COMPASS SECTOR	:	
URBAN AREA (0000)	:	NOT IN AN URBAN AREA				HC IND	:		MET DATA	:	
SUPPORTING AGENCY (000)	:	******** DESCRIPTION UNKNOWN *********				MSA (5015)	:	MIDDLESEX-SOMERSET-HUNTERDON,NJ			

COMMENTS : NJ #20121,START 5/80; 1980 NE OXIDEANT STUDY,03,NOX;SO2 DISC.5/2/83
SITE-USER-INFO : 03 AS A SLAMS 10/01/84, MEETS SITING

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (37): NORTH CAROLINA

SITE ID	:	37-183-0015	CITY (55000)	:	RALEIGH	LATITUDE	:	35:44:18 N	UTM EASTING : 715034
CITY POPULATION	:	150,255	COUNTY (183)	:	WAKE CO	LONGITUDE	:	78:37:20 W	DIFF. GMI : 05
AQCR POPULATION	:	1,082,284	AQCR (166)	:	EASTERN PIEDMONT	UTM ZONE	:	17	ELEVATION ABOVE MSL : 127 M
DATE ESTABLISHED	:	91/06/06	LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	3957334	RECORD LAST UPDATED : 91/06/19
DATE TERMINATED	:		LOCATION SETTING (1)	:	URBAN AND CENTER CITY	HQ EVAL DATE	:		LAST REQ EVAL :
SITE ADDRESS	:	808 NORTH STATE STREET				DISTANCE CITY	:	002	COMPASS SECTOR :
URBAN AREA (6639)	:	RALEIGH, NC				HC IND	:	Y	MET DATA : N
SUPPORTING AGENCY (001)	:	NORTH CAROLINA DEPT NATURAL RESOURCES&COMMUNITY DEV				MSA (6640)	:	RALEIGH-DURHAM, NC	
COMMENTS	:								
SITE-USER-INFO	:								

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (37): NORTH CAROLINA

SITE ID	:	37-067 0022	CITY (75000)	:	WINSTON-SALEM	LATITUDE	:	36:06:38 N	UTM EASTING	:	569604
CITY POPULATION	:	131,885	COUNTY (067)	:	FORSYTH CO	LONGITUDE	:	80:13:36 W	DIFF. GMI	:	05
AQCR POPULATION	:	1,114,750	AQCR (136)	:	NORTHERN PIEDMONT	UTM ZONE	:	17	ELEVATION ABOVE MSL	:	287 M
DATE ESTABLISHED	:		LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	3996287	RECORD LAST UPDATED	:	90/03/29
DATE TERMINATED	:		LOCATION SETTING (1)	:	URBAN AND CENTER CITY	HQ EVAL DATE	:		LAST REQ EVAL	:	
SITE ADDRESS	:	1300 BLK. HATTIE AVENUE				DISTANCE CITY	:		COMPASS SECTOR	:	
URBAN AREA (9220)	:	WINSTON-SALEM, NC				HC IND	:		MET DATA	:	
SUPPORTING AGENCY (002)	:	FORSYTH COUNTY ENVIRONMENTAL AFFAIRS DEPARTMENT				MSA (3120)	:	GREENSBORO-WINSTON-SALEM-HIGH POINT			
COMMENTS	:	NEXT TO CHURCH SCHOOL. POP EXPOSURE.									
SITE-USER-INFO	:	RJR BAILEY POWER PLANT PT MAX.									

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (12): FLORIDA

SITE ID	: 12-011-2003	CITY (58050)	: POMPANO BEACH	LATITUDE	: 26:17:25 N	UTM EASTING	: 590156
CITY POPULATION	: 52,618	COUNTY (011)	: BROWARD CO	LONGITUDE	: 80:05:49 W	DIFF. GMI	: 05
AQCR POPULATION	: 3,515,388	AQCR (050)	: SOUTHEAST FLORIDA	UTM ZONE	: 17	ELEVATION ABOVE MSL	: 10 M
DATE ESTABLISHED	:	LAND USE (1)	: RESIDENTIAL	UTM NORTHING	: 2907982	RECORD LAST UPDATED	: 90/07/25
DATE TERMINATED	:	LOCATION SETTING (2)	: SUBURBAN	HQ EVAL DATE	:	LAST REQ EVAL	: 83/03/16
SITE ADDRESS	: 1951 NE 48TH STREET			DISTANCE CITY	: 019	COMPASS SECTOR	: NE
URBAN AREA (2680)	: FORT LAUDERDALE-HOLLYWOOD, FL			HC IND	: Y	MET DATA	: Y
SUPPORTING AGENCY (017)	: BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BORAD			MSA (2680)	: FT LAUDERDALE-HOLLYWOOD-POMPANO BE		

COMMENTS : POMPANO HIGHLAND VOLUNTEER FIRE DEPARTMENT
SITE-USER-INFO : BROWARD COUNTY SITE #1

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (12): FLORIDA

SITE ID	:	12-099-1004	CITY (76600)	:	WEST PALM BEACH	LATITUDE	:	26:41:29 N	UTM EASTING : 589524
CITY POPULATION	:	63,305*	COUNTY (099)	:	PALM BEACH CO	LONGITUDE	:	80:06:01 W	DIFF. GMI :
AQCR POPULATION	:	3,515,388	AQCR (050)	:	SOUTHEAST FLORIDA	UTM ZONE	:	17	ELEVATION ABOVE MSL :
DATE ESTABLISHED	:	77/10/06	LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	2952381	RECORD LAST UPDATED : 90/11/07
DATE TERMINATED	:		LOCATION SETTING (2)	:	SUBURBAN	HQ EVAL DATE	:		LAST REQ EVAL :
SITE ADDRESS	:	3700 BELEVEDERE ROAD				DISTANCE CITY	:		COMPASS SECTOR :
URBAN AREA (8959)	:	WEST PALM BEACH, FL				HC IND	:	Y	MET DATA : Y
SUPPORTING AGENCY (016)	:	PALM BEACH COUNTY HEALTH DEPARTMENT				MSA (8960)	:	W PALM BEACH-BOCA RATON-DELRAY BEACH	

COMMENTS :
SITE-USER-INFO :

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (22): LOUISIANA

SITE ID	22-033-0006	CITY (05000)	BATON ROUGE	LATITUDE	30:27:52 N	UTM EASTING	673956
CITY POPULATION	219,419	COUNTY (033)	EAST BATON ROUGE PAR	LONGITUDE	91:11:17 W	DIFF. GMI	06
AQCR POPULATION	3,921,588	AQCR (106)	SOUTHERN LOUISIANA-	UTM ZONE	15	ELEVATION ABOVE MSL	62 M
DATE ESTABLISHED	90/01/03	LAND USE (2)	COMMERCIAL	UTM NORTHING	3371464	RECORD LAST UPDATED	91/07/03
DATE TERMINATED		LOCATION SETTING (1)	URBAN AND CENTER CITY	HQ EVAL DATE		LAST REQ EVAL	
SITE ADDRESS	1600 RIVERSIDE ROAD			DISTANCE CITY		COMPASS SECTOR	
URBAN AREA (0760)	BATON ROUGE, LA			HC IND	N	MET DATA	Y
SUPPORTING AGENCY (001)	LOUISIANA STATE DEPARTMENT OF NATURAL RESOURCES			MSA (0760)	BATON ROUGE, LA		
COMMENTS	CAPITOL SITE - RELOCATION FOR 220330004						
SITE-USER-INFO							

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (48): TEXAS

SITE ID	:	48-245-0009	CITY (07000)	:	BEAUMONT	LATITUDE	:	30:02:22 N	UTM EASTING	:	396381
CITY POPULATION	:	118,102	COUNTY (245)	:	JEFFERSON CO	LONGITUDE	:	94:04:29 W	DIFF. GMI	:	06
AQCR POPULATION	:	3,921,588	AQCR (106)	:	SOUTHERN LOUISIANA-SOUTHEAST T	UTM ZONE	:	15	ELEVATION ABOVE MSL	:	13 M
DATE ESTABLISHED	:		LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	3323462	RECORD LAST UPDATED	:	91/10/17
DATE TERMINATED	:		LOCATION SETTING (2)	:	SUBURBAN	HQ EVAL DATE	:		LAST REQ EVAL	:	
SITE ADDRESS	:	GEORGIA AT CUNNINGHAM, BEAUMONT, TX				DISTANCE CITY	:		COMPASS SECTOR	:	
URBAN AREA (0839)	:	BEAUMONT, TX				HC IND	:		MET DATA	:	
SUPPORTING AGENCY (001)	:	TEXAS AIR CONTROL BOARD				MSA (0640)	:	BEAUMONT-PORT ARTHUR, TX			
COMMENTS	:	MOVED FROM VIRGINA ST									
SITE-USER-INFO	:	LAMAR UNIVERSITY CAMPUS									

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (48): TEXAS

SITE ID	: 48-141-0027	CITY (24000)	: EL PASO	LATITUDE	: 31:45:45 N	UTM EASTING	: 359179
CITY POPULATION	: 425,259	COUNTY (141)	: EL PASO CO	LONGITUDE	: 106:29:13 W	DIFF. GMT	: 07
AQCR POPULATION	: 660,806	AQCR (153)	: EL PASO-LAS CRUCES-ALAMOGORDO	UTM ZONE	: 13	ELEVATION ABOVE MSL	: 1140 M
DATE ESTABLISHED	:	LAND USE (2)	: COMMERCIAL	UTM NORTHING	: 3514886	RECORD LAST UPDATED	: 91/05/15
DATE TERMINATED	:	LOCATION SETTING (1)	: URBAN AND CENTER CITY	HQ EVAL DATE	:	LAST REQ EVAL	:
SITE ADDRESS	: 500 NORTH CAMPBELL ST.			DISTANCE CITY	:	COMPASS SECTOR	:
URBAN AREA (2320)	: EL PASO, TX			HC IND	: Y	MET DATA	:
SUPPORTING AGENCY (001)	: TEXAS AIR CONTROL BOARD			MSA (2320)	: EL PASO, TX		
COMMENTS	: SIP MONITOR						
SITE-USER-INFO	: ACTIVE 11/73						

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (48): TEXAS

SITE ID	:	48-201-1034	CITY (35000)	:	HOUSTON	LATITUDE	:	29:46:17 N	UTM EASTING	:	285150
CITY POPULATION	:	1,595,138	COUNTY (201)	:	HARRIS CO	LONGITUDE	:	95:13:20 W	DIFF. GMI	:	06
AQCR POPULATION	:	3,276,239	AQCR (215)	:	METROPOLITAN HOUSTON-GALVESTON	UTM ZONE	:	15	ELEVATION ABOVE MSL	:	14 M
DATE ESTABLISHED	:		LAND USE (1)	:	RESIDENTIAL	UTM NORTHING	:	3295344	RECORD LAST UPDATED	:	90/01/08
DATE TERMINATED	:		LOCATION SETTING (2)	:	SUBURBAN	HQ EVAL DATE	:		LAST REQ EVAL	:	83/03/03
SITE ADDRESS	:	HARRIS ELEM SCH 1262 MAE DRIVE				DISTANCE CITY	:		COMPASS SECTOR	:	
URBAN AREA (3360)	:	HOUSTON, TX				HC IND	:	Y	MET DATA	:	Y
SUPPORTING AGENCY (001)	:	TEXAS AIR CONTROL BOARD				MSA (3360)	:	HOUSTON, TX			
COMMENTS	:	EMSL TRACE METALS SAMPLING SITE									
SITE-USER-INFO	:										

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (80): COUNTRY OF MEXICO

SITE ID	: 80-006-0001	CITY (01150)	: CIUDAD-JUAREZ	LATITUDE	:	UTM EASTING	:
CITY POPULATION	: 355,555	COUNTY (006)	: CHIHUAHUA STATE	LONGITUDE	:	DIFF. GMT	:
AQCR POPULATION	: 34,923,129	AQCR (250)	: COUNTRY OF MEXICO	UTM ZONE	:	ELEVATION ABOVE MSL	:
DATE ESTABLISHED	: 90/06/04	LAND USE (2)	: COMMERCIAL	UTM NORTHING	:	RECORD LAST UPDATED	: 91/05/02
DATE TERMINATED	:	LOCATION SETTING (1)	: URBAN AND CENTER CITY	HQ EVAL DATE	:	LAST REQ EVAL	:
SITE ADDRESS	: TECHNICAL INSTITUTE						
URBAN AREA (2320)	: EL PASO, TX			DISTANCE CITY	:	COMPASS SECTOR	:
SUPPORTING AGENCY (002)	: SEDUE			HC IND	: N	MET DATA	:
COMMENTS	: SPECIAL EL PASO/JUAREZ MONITORING SITE			MSA (2320)	: EL PASO, TX		
SITE-USER-INFO	:						

APPENDIX B

CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID) METHOD

COMPENDIUM METHOD T0-12

DETERMINATION OF NON-METHANE ORGANIC COMPOUNDS (NMOC) IN AMBIENT AIR USING CRYOGENIC PRE-CONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID)

QUALITY ASSURANCE DIVISION
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
U.S. ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

MAY, 1988

METHOD TO12

METHOD FOR THE DETERMINATION OF NON-METHANE ORGANIC COMPOUNDS (NMOC) IN AMBIENT AIR USING CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID)

1. Scope

1.1 In recent years, the relationship between ambient concentrations of precursor organic compounds and subsequent downwind concentrations of ozone has been described by a variety of photochemical dispersion models. The most important application of such models is to determine the degree of control of precursor organic compounds that is necessary in an urban area to achieve compliance with applicable ambient air quality standards for ozone (1,2).

1.2 The more elaborate theoretical models generally require detailed organic species data obtained by multicomponent gas chromatography The Empirical Kinetic Modeling Approach (EKMA), however, requires only the total non-methane organic compound (NMOC) concentration data; specifically, the average total NMOC concentration from 6 a.m. to 9 a.m. daily at the sampling location. The use of total NMOC concentration data in the EKMA substantially reduces the cost and complexity of the sampling and analysis system by not requiring qualitative and quantitative species identification.

1.3 Method TO1, "Method for The Determination of Volatile Organic Compounds in Ambient Air Using Tenax® Adsorption and Gas Chromatography/Mass Spectrometry (GC/MS)", employs collection of certain volatile organic compounds on Tenax® GC with subsequent analysis by thermal desorption/cryogenic preconcentration and GC/MS identification. This method (TO12) combines the same type of cryogenic concentration technique used in Method TO1 for high sensitivity with the simple flame ionization detector (FID) of the GC for total NMOC measurements, without the GC columns and complex procedures necessary for species separation.

1.4 In a flame ionization detector, the sample is injected into a hydrogen-rich flame where the organic vapors burn producing ionized molecular fragments. The resulting ion fragments are then collected and detected. The FID is nearly a univer detector. However, the detector response varies with t species of [functional group in] the organic compound in an oxy n atmosphere. Because this method employs a helium or argon carrier gas, the detector response is nearly one for all compounds. Thus, the historical short-coming of the FID involving varying detector response to different organic functional groups is minimized.

1.5 The method can be used either for direct, in situ ambient measurements or (more commonly) for analysis of integrated samples collected in specially treated stainless steel canisters. EKMA models generally require 3-hour integrated NMOC measurements over the 6 a.m. to 9 a.m. period and are used by State or local agencies to prepare State Implementation Plans (SIPs) for ozone control to achieve compliance with the National Ambient Air Quality Standards (NAAQS) for ozone. For direct, in situ ambient measurements, the analyst must be presen ring the 6 a.m. to 9 a.m. period, and repeat measurements (a oximately six per hour) must be taken to obtain the 6 a.m. to 9 a.m. average NMOC concentration. The use of sample canisters allows the coll tion of integrated air samples over the 6 a.m. to 9 a.m. period by unattended, automated samplers. This method has incorporated both sampling approaches.

2. Applicable Documents

2.1 ASTM Standards

D1356 - Definition of Terms Related to Atmospheric Sampling and Analysis

E260 - Recommended Practice for General Gas Chromatography Procedures

E355 - Practice for Gas Chromatography Terms and Relationships

2.2 Other Documents

U. S. Environmental Protection Agency Technical Assistance Documents (4,5)

Laboratory and Ambient Air Studies (6-10)

3. Summary of Method

3.1 A whole air sample is either extracted directly from the ambient air and analyzed on site by the GC system or collected into a precleaned sample canister and analyzed off site.

3.2 The analysis requires drawing a fixed-volume portion of the sample air at a low flow rate through a glass-bead filled trap that is cooled to approximately -186°C with liquid argon. The cryogenic trap simultaneously collects and concentrates the NMOC (either via condensation or adsorption) while allowing the methane, nitrogen, oxygen, etc. to pass through the trap without retention. The system is dynamically calibrated so that the volume of sample passing through the trap does not have to be quantitatively measured, but must be precisely repeatable between the calibration and the analytical phases.

3.3 After the fixed-volume air sample has been drawn through the trap, a helium carrier gas flow is diverted to pass through the trap, in the opposite direction to the sample flow, and into an FID. When the residual air and methane have been flushed from the trap and the FID baseline restabilizes, the cryogen is removed and the temperature of the trap is raised to approximately 90°C.

3.4 The organic compounds previously collected in the trap revolatilize due to the increase in temperature and are carried into the FID, resulting in a response peak or peaks from the FID. The area of the peak or peaks is integrated, and the integrated value is translated to concentration units via a previously-obtained calibration curve relating integrated peak areas with known concentrations of propane.

3.5 By convention, concentrations of NMOC are reported in units of parts per million carbon (ppmC), which, for a specific compound, is the concentration by volume (ppmV) multiplied by the number of carbon atoms in the compound.

3.6 The cryogenic trap simultaneously concentrates the NMOC while separating and removing the methane from air samples. The technique is thus direct reading for NMOC and, because of the concentration step, is more sensitive than conventional continuous NMOC analyzers.

4. Significance

4.1 Accurate measurements of ambient concentrations of NMOC are important for the control of photochemical smog because these organic compounds are primary precursors of atmospheric ozone and other oxidants. Achieving and maintaining compliance with the NAAQS for ozone thus depends largely on control of ambient levels of NMOC.

4.2 The NMOC concentrations typically found at urban sites may range up to 5-7 ppmC or higher. In order to determine transport of precursors into an area, measurement of NMOC upwind of the area may be necessary. Upwind NMOC concentrations are likely to be less than a few tenths of 1 ppm.

4.3 Conventional methods that depend on gas chromatography and qualitative and quantitative species evaluation are excessively difficult and expensive to operate and maintain when speciated measurements are not needed. The method described here involves a simple, cryogenic preconcentration procedure with subsequent, direct, flame ionization detection. The method is sensitive and provides accurate measurements of ambient NMOC concentrations where speciated data are not required as applicable to the EKMA.

5. Definitions

[Note: Definitions used in this document and in any user-prepared Standard Operating Procedures (SOPs) should be consistent with ASTM Methods D1356 and E355. All abbreviations and symbols are defined within this document at point of use.]

5.1 Absolute pressure - Pressure measured with reference to absolute zero pressure (as opposed to atmospheric pressure), usually expressed as pounds-force per square inch absolute (psia).

5.2 Cryogen - A substance used to obtain very low trap temperatures in the NMOC analysis system. Typical cryogens are liquid argon (bp -185.7) and liquid oxygen (bp-183.0).

5.3 Dynamic calibration - Calibration of an analytical system with pollutant concentrations that are generated in a dynamic, flowing system, such as by quantitative, flow-rate dilution of a high concentration gas standard with zero gas.

5.4 EKMA - Empirical Kinetics Modeling Approach; an empirical model that attempts to relate morning ambient concentrations of nonmethane organic compounds (NMOC) and NO_x with subsequent peak, downwind ambient ozone concentrations; used by pollution control agencies to estimate the degree of hydrocarbon emission reduction needed to achieve compliance with national ambient air quality standards for ozone.

5.5 Gauge pressure - Pressure measured with reference to atmospheric pressure (as opposed to absolute pressure). Zero gauge pressure (0 psig) is equal to atmospheric pressure, or 14.7 psia (101 kPa).

5.6 *In situ* - In place; *In situ* measurements are obtained by direct, on-the-spot analysis, as opposed to subsequent, remote analysis of a collected sample.

5.7 Integrated sample - A sample obtained uniformly over a specified time period and representative of the average levels of pollutants during the time period.

5.8 NMOC - Nonmethane organic compounds; total organic compounds as measured by a flame ionization detector, excluding methane.

5.9 ppmC - Concentration unit of parts per million carbon; for a specific compound, ppmC is equivalent to parts per million by volume (ppmv) multiplied by the number of carbon atoms in the compound.

5.10 Sampling - The process of withdrawing or isolating a representative portion of an ambient atmosphere, with or without the simultaneous isolation of selected components for subsequent analysis.

6. Interferences

6.1 In field and laboratory evaluation, water was found to cause a positive shift in the FID baseline. The effect of this shift is minimized by carefully selecting the integration termination point and adjusted baseline used for calculating the area of the NMOC peak(s).

6.2 When using helium as a carrier gas, FID response is quite uniform for most hydrocarbon compounds, but the response can vary considerably for other types of organic compounds.

7. Apparatus

7.1 Direct Air Sampling (Figure 1)

7.1.1 Sample manifold or sample inlet line - to bring sample air into the analytical system.

7.1.2 Vacuum pump or blower - to draw sample air through a sample manifold or long inlet line to reduce inlet residence time. Maximum residence time should be no greater than 1 minute.

7.2 Remote Sample Collection in Pressurized Canisters (Figure 2)

7.2.1 Sample canister(s) - stainless steel, Summa®-polished vessel(s) of 4-6 L capacity (Scientific Instrumentation Specialists, Inc., P.O. Box 8941, Moscow, ID 83843), used for automatic collection of 3-hour integrated field air samples. Each canister should have a unique identification number stamped on its frame.

7.2.2 Sample pump - stainless steel, metal bellows type (Model MB-151, Metal Bellows Corp., 1075 Providence Highway, Sharon, MA 02067) capable of 2 atmospheres minimum output pressure. Pump must be free of leaks, clean, and uncontaminated by oil or organic compounds.

7.2.3 Pressure gauge - 0-30 psig (0-240 kPa).

7.2.4 Solenoid valve - special electrically-operated, bistable solenoid valve (Skinner Magnelatch Valve, New Britain,

CT), to control sample flow to the canister with negligible temperature rise (Figure 3). The use of the Skinner Magnelatch valve avoids any substantial temperature rise that would occur with a conventional, normally closed solenoid valve, which would have to be energized during the entire sample period. This temperature rise in the valve could cause outgasing of organics from the Viton valve seat material. The Skinner Magnelatch valve requires only a brief electrical pulse to open or close at the appropriate start and stop times and therefore experiences no temperature increase. The pulses may be obtained with an electronic timer that can be programmed for short (5 to 60 seconds) ON periods or with a conventional mechanical timer and a special pulse circuit. Figure 3 [a] illustrates a simple electrical pulse circuit for operating the Skinner Magnelatch solenoid valve with a conventional mechanical timer. However, with this simple circuit, the valve may operate unpredictably during brief power interruptions or if the timer is manually switched on and off too fast. A better circuit incorporating a time-delay relay to provide more reliable valve operation is shown in Figure 3[b].

7.2.5 Stainless steel orifice (or short capillary) - capable of maintaining a substantially constant flow over the sampling period (see Figure 4).

7.2.6 Particulate matter filter - 2 micron stainless steel sintered in-line type (see Figure 4).

7.2.7 Timer - used for unattended sample collection. Capable of controlling pump(s) and solenoid valve.

7.3 Sample Canister Cleaning (Figure 5)

7.3.1 Vacuum pump - capable of evacuating sample canister(s) to an absolute pressure of <5 mm Hg.

7.3.2 Manifold - stainless steel manifold with connections for simultaneously cleaning several canisters.

7.3.3 Shut off valve(s) - seven required.

7.3.4 Vacuum gauge - capable of measuring vacuum in the manifold to an absolute pressure of 5 mm Hg or less.

7.3.5 Cryogenic trap (2 required) - U-shaped open tubular trap cooled with liquid nitrogen or argon used to prevent contamination from back diffusion of oil from vacuum pump, and to provide clean, zero air to sample canister(s).

7.3.6 Pressure gauge - 0-50 psig (0-345 kPa), to monitor zero air pressure.

7.3.7 Flow control valve - to regulate flow of zero air into canister(s).

7.3.8 Humidifier - water bubbler or other system capable of providing moisture to the zero air supply.

7.4 Analytical System (Figure 1)

7.4.1 FID detector system - including flow controls for the FID fuel and air, temperature control for the FID, and signal processing electronics. The FID burner air, hydrogen, and helium carrier flow rates should be set according to the manufacturer's instructions to obtain an adequate FID response while maintaining as stable a flame as possible throughout all phases of the analytical cycle.

7.4.2 Chart recorder - compatible with the output signal, to record FID response.

7.4.3 Electronic integrator - capable of integrating the area of one or more FID response peaks and calculating peak area corrected for baseline drift. If a separate integrator and chart recorder are used, care must be exercised to be sure that these components do not interfere with each other electrically. Range selector controls on both the integrator and the FID analyzer may not provide accurate range ratios, so individual calibration curves should be prepared for each range to be used. The integrator should be capable of marking the beginning and ending of peaks, constructing the appropriate baseline between the start and end of the integration period, and calculating the peak area.

Note: The FID (7.4.1), chart recorder (7.4.2), integrator (7.4.3), valve heater.(7.4.5), and a trap heating system are conveniently provided by a standard laboratory chromatograph and associated integrator. EPA has adapted two such systems for the PDFID method: a Hewlett-Packard model 5880 (Hewlett-Packard Corp., Avondale, PA) and a Shimadzu model GC8APF (Shimadzu Scientific Instruments Inc., Columbia, MD; see Reference 5). Other similar systems may also be applicable.

7.4.4 Trap - the trap should be carefully constructed from a single piece of chromatographic-grade stainless steel tubing (0.32 cm O.D, 0.21 cm I.D.) as shown in Figure 6. The central portion of the trap (7-10 cm) is packed with 60/80 mesh glass beads, with small glass wool (dimethyldichlorosilane-treated) plugs to retain the beads. The trap must fit conveniently into the Dewar flask (7.4.9), and the arms must be of an appropriate length to allow the beaded portion of the trap to be submerged below the level of liquid cryogen in the Dewar. The trap should connect directly to the six-port valve, if possible, to minimize line length between the trap and the FID. The trap must be mounted to allow the Dewar to be slipped conveniently on and off the trap and also to facilitate heating of the trap (see 7.4.13).

7.4.5 Six-port chromatographic valve - Seiscor Model VIII (Seismograph Service Corp., Tulsa, OK), Valco Model 9110 (Valco Instruments Co., Houston, TX), or equivalent. The six-port valve and as much of the interconnecting tubing as practical should be located inside an oven or otherwise heated to 80 - 90°C to minimize wall losses or adsorption/desorption in the connecting tubing. All lines should be as short as practical.

7.4.6 Multistage pressure regulators - standard two-stage, stainless steel diaphram regulators with pressure gauges, for helium, air, and hydrogen cylinders.

7.4.7 Pressure regulators - optional single stage, stainless steel, with pressure gauge, if needed, to maintain constant helium carrier and hydrogen flow rates.

7.4.8 Fine needle valve - to adjust sample flow rate through trap.

7.4.9 Dewar flask - to hold liquid cryogen to cool the trap, sized to contain submerged portion of trap.

7.4.10 Absolute pressure gauge - 0-450 mm Hg,(2 mm Hg [scale divisions indicating units]), to monitor repeatable volumes of sample air through cryogenic trap (Wallace and Tiernan, Model 61C-ID-0410, 25 Main Street, Belleville, NJ).

7.4.11 Vacuum reservoir - 1-2 L capacity, typically 1 L.

7.4.12 Gas purifiers - gas scrubbers containing Drierite® or silica gel and 5A molecular sieve to remove moisture and organic impurities in the helium, air, and hydrogen gas flows (Alltech Associates, Deerfield, IL). Note: Check purity of gas purifiers prior to use by passing zero-gas through the unit and analyzing according to Section 11.4. Gas purifiers are clean if produce [contain] less than 0.02 ppmC hydrocarbons.

7.4.13 Trap heating system - chromatographic oven, hot water, or other means to heat the trap to 80° to 90°C. A simple heating source for the trap is a beaker or Dewar filled with water maintained at 80-90°C. More repeatable types of heat sources are recommended, including a temperature-programmed chromatograph oven, electrical heating of the trap itself, or any type of heater that brings the temperature of the trap up to 80-90°C in 1-2 minutes.

7.4.14 Toggle shut-off valves (2) - leak free, for vacuum valve and sample valve.

7.4.15 Vacuum pump - general purpose laboratory pump capable of evacuating the vacuum reservoir to an appropriate vacuum that allows the desired sample volume to be drawn through the trap.

7.4.16 Vent - to keep the trap at atmospheric pressure during trapping when using pressurized canisters.

7.4.17 Rotameter - to verify vent flow.

7.4.18 Fine needle valve (optional) - to adjust flow rate of sample from canister during analysis.

7.4.19 Chromatographic-grade stainless steel tubing (Alltech Applied Science, 2051 Waukegan Road, Deerfield, IL, 60015, (312) 948-8600) and stainless steel plumbing fittings - for interconnections. All such materials in contact with the sample, analyte, or support gases prior to analysis should be stainless steel or other inert metal. Do not use plastic or Teflon® tubing or fittings.

7.5 Commercially Available PDFID System (5)

7.5.1 A convenient and cost-effective modular PDFID system suitable for use with a conventional laboratory chromatograph is commercially available (NuTech Corporation, Model 8548, 2806 Cheek Road, Durham, NC, 27704, (919) 682-0402).

7.5.2 This modular system contains almost all of the apparatus items needed to convert the chromatograph into a PDFID analytical system and has been designed to be readily available and easy to assemble.

8. Reagents and Materials

8.1 Gas cylinders of helium and hydrogen - ultrahigh purity grade.

8.2 Combustion air - cylinder containing less than 0.02 ppm hydrocarbons, or equivalent air source.

8.3 Propane calibration standard - cylinder containing 1-100 ppm (3-300 ppmC) propane in air. The cylinder assay should be traceable to a National Bureau of Standards (NBS) Standard Reference Material (SRM) or to a NBS/EPA-approved Certified Reference Material (CRM).

8.4 Zero air - cylinder containing less than 0.02 ppmC hydrocarbons. Zero air may be obtained from a cylinder of zero-grade compressed air scrubbed with Drierite® or silica gel and 5A molecular sieve or activated charcoal, or by catalytic cleanup

of ambient air. All zero air should be passed through a liquid argon cold trap for final cleanup, then passed through a hyrdo-carbon-free water bubbler (or other device) for humidification.

8.5 Liquid cryogen - liquid argon (bp -185.7°C) or liquid oxygen, (bp -183°C) may be used as the cryogen. Experiments have shown no differences in trapping efficiency between liquid argon and liquid oxygen. However, appropriate safety precautions must be taken if liquid oxygen is used. Liquid nitrogen (bp -195°C) should not be used because it causes condensation of oxygen and methane in the trap.

9. Direct Sampling

9.1 For direct ambient air sampling, the cryogenic trapping system draws the air sample directly from a pump-ventilated distribution manifold or sample line (see Figure 1). The connecting line should be of small diameter (1/8" O.D.) stainless steel tubing and as short as possible to minimize its dead volume.

9.2 Multiple analyses over the sampling period must be made to establish hourly or 3-hour NMOC concentration averages.

10. Sample Collection in Pressurized Canister(s)

For integrated pressurized canister sampling, ambient air is sampled by a metal bellows pump through a critical orifice (to maintain constant flow), and pressurized into a clean, evacuated, Summa®-polished sample canister. The critical orifice size is chosen so that the canister is pressurized to approximately one atmosphere above ambient pressure, at a constant flow rate over the desired sample period. Two canisters are connected in parallel for duplicate samples. The canister(s) are then returned to the laboratory for analysis, using the PDFID analytical system. Collection of ambient air samples in pressurized canisters provides the following advantages:

- Convenient integration of ambient samples over a specific time period
- Capability of remote sampling with subsequent central laboratory analysis
- Ability to ship and store samples, if necessary

- o Unattended sample collection
- o Analysis of samples from multiple sites with one analytical system
- o Collection of replicate samples for assessment of measurement precision

With canister sampling, however, great care must be exercised in selecting, cleaning, and handling the sample canister(s) and sampling apparatus to avoid losses or contamination of the samples.

10.1 Canister Cleanup and Preparation

10.1.1 All canisters must be clean and free of any contaminants before sample collection.

10.1.2 Leak test all canisters by pressurizing them to approximately 30 psig [200 kPa (gauge)] with zero air. The use of the canister cleaning system (see Figure 5) may be adequate for this task. Measure the final pressure - close the canister valve, then check the pressure after 24 hours. If leak tight, the pressure should not vary more than ± 2 psig over the 24-hour period. Note leak check result on sampling data sheet, Figure 7.

10.1.3 Assemble a canister cleaning system, as illustrated in Figure 5. Add cryogen to both the vacuum pump and zero air supply traps. Connect the canister(s) to the manifold. Open the vent shut off valve and the canister valve(s) to release any remaining pressure in the canister. Now close the vent shut off valve and open the vacuum shut off valve. Start the vacuum pump and evacuate the canister(s) to ≤ 5.0 mm Hg (for at least one hour). [Note: On a daily basis or more often if necessary, blow-out the cryogenic traps with zero air to remove any trapped water from previous canister cleaning cycles.]

10.1.4 Close the vacuum and vacuum gauge shut off valves and open the zero air shut off valve to pressurize the canister(s) with moist zero air to approximately 30 psig [200 kPa (gauge)]. If a zero gas generator system is used,

the flow rate may need to be limited to maintain the zero air quality.

10.1.5 Close the zero shut off valve and allow canister(s) to vent down to atmospheric pressure through the vent shut off valve. Close the vent shut off valve. Repeat steps 10.1.3 through 10.1.5 two additional times for a total of three (3) evacuation/pressurization cycles for each set of canisters.

10.1.6 As a "blank" check of the canister(s) and cleanup procedure, analyze the final zero-air fill of 100% of the canisters until the cleanup system and canisters are proven reliable. The check can then be reduced to a lower percentage of canisters. Any canister that does not test clean (compared to direct analysis of humidified zero air of less than 0.02 ppmC) should not be utilized.

10.1.7 The canister is then re-evacuated to $\leq$ 5.0 mm Hg, using the canister cleaning system, and remains in this condition until use. Close the canister valve, remove the canister from the canister cleaning system and cap canister connection with a stainless steel fitting. The canister is now ready for collection of an air sample. Attach an identification tag to the neck of each canister for field notes and chain-of-custody purposes.

10.2 Collection of Integrated Whole-Air Samples

10.2.1 Assemble the sampling apparatus as shown in Figure 2. The connecting lines between the sample pump and the canister(s) should be as short as possible to minimize their volume. A second canister is used when a duplicate sample is desired for quality assurance (QA) purposes (see Section 12.2.4). The small auxiliary vacuum pump purges the inlet manifold or lines with a flow of several L/min to minimize the sample residence time. The larger metal bellows pump takes a small portion of this sample to fill and pressurize the sample canister(s). Both pumps should be shock-mounted to minimize vibration. Prior to field use, each sampling system should be leak

tested. The outlet side of the metal bellows pump can be checked for leaks by attaching the 0-30 psig pressure gauge to the canister(s) inlet via connecting tubing and pressurizing to 2 atmospheres or approximately 29.4 psig. If pump and connecting lines are leak free pressure should remain at ± 2 psig for 15 minutes. To check the inlet side, plug the sample inlet and insure that there is no flow at the outlet of the pump.

10.2.2 Calculate the flow rate needed so that the canister(s) are pressurized to approximately one atmosphere above ambient pressure (2 atmospheres absolute pressure) over the desired sample period, utilizing the following equation:

$$F = \frac{(P)(V)(N)}{(T)(60)}$$

where:

F = flow rate (cm^3/min)
P = final canister pressure (atmospheres absolute) $= (P_g/P_a) + 1$
V = volume of the canister (cm^3)
N = number of canisters connected together for simultaneous sample collection
T = sample period (hours)
P_g = gauge pressure in canister, psig (kPa)
P_a = standard atmospheric pressure, 14.7 psig (101 kPa)

For example, if one 6-L canister is to be filled to 2 atmospheres absolute pressure (14.7 psig) in 3 hours, the flow rate would be calculated as follows:

$$F = \frac{2 \times 6000 \times 1}{3 \times 60} = 67 \text{ cm}^3/\text{min}$$

10.2.3 Select a critical orifice or hypodermic needle suitable to maintain a substantially constant flow at the calculated flow rate into the canister(s) over the desired sample period. A 30-gauge hypodermic needle, 2.5 cm

long, provides a flow of approximately 65 cm^3/min with the Metal Bellows Model MBV-151 pump (see Figure 4). Such a needle will maintain approximately constant flow up to a canister pressure of about 10 psig (71 kPa), after which the flow drops with increasing pressure. At 14.7 psig (2 atmospheres absolute pressure), the flow is about 10% below the original flow.

10.2.4 Assemble the 2.0 micron stainless steel in-line particulate filter and position it in front of the critical orifice. A suggested filter-hypodermic needle assembly can be fabricated as illustrated in Figure 4.

10.2.5 Check the sampling system for contamination by filling two evacuated, cleaned canister(s) (See Section 10.1) with humidified zero air through the sampling system. Analyze the canisters according to Section 11.4. The sampling system is free of contamination if the canisters contain less than 0.02 ppmC hydrocarbons, similar to that of humidified zero air.

10.2.6 During the system contamination check procedure, check the critical orifice flow rate on the sampling system to insure that sample flow rate remains relatively constant (±10%) up to about 2 atmospheres absolute pressure (101 kPa). Note: A drop in the flow rate may occur near the end of the sampling period as the canister pressure approaches two atmospheres.

10.2.7 Reassemble the sampling system. If the inlet sample line is longer than 3 meters, install an auxiliary pump to ventilate the sample line, as illustrated in Figure 2.

10.2.8 Verify that the timer, pump(s) and solenoid valve are connected and operating properly.

10.2.9 Verify that the timer is correctly set for the desired sample period, and that the solenoid valve is closed.

10.2.10 Connect a cleaned, evacuated canister(s) (Section 10.1) to the non-contaminated sampling system, by way of the solenoid valve, for sample collection.

10.2.11 Make sure the solenoid valve is closed. Open the canister valve(s). Temporarily connect a small rotameter to the sample inlet to verify that there is no flow. Note: Flow detection would indicate a leaking (or open) solenoid valve. Remove the rotameter after leak detection procedure.

10.2.12 Fill out the necessary information on the Field Data Sheet (Figure 7).

10.2.13 Set the automatic timer to start and stop the pump or pumps to open and close the solenoid valve at the appropriate time for the intended sample period. Sampling will begin at the pre-determined time.

10.2.14 After the sample period, close the canister valve(s) and disconnect the canister(s) from the sampling system. Connect a pressure gauge to the canister(s) and briefly open and close the canister valve. Note the canister pressure on the Field Data Sheet (see Figure 7). The canister pressure should be approximately 2 atmospheres absolute [1 atmosphere or 101 kPa (gauge)]. Note: If the canister pressure is not approximately 2 atmospheres absolute (14.7 psig), determine and correct the cause before next sample. Re-cap canister valve.

10.2.15 Fill out the identification tag on the sample canister(s) and complete the Field Data Sheet as necessary. Note any activities or special conditions in the area (rain, smoke, etc.) that may affect the sample contents on the sampling data sheet.

10.2.16 Return the canister(s) to the analytical system for analysis.

11. Sample Analysis

11.1 Analytical System Leak Check

11.1.1 Before sample analysis, the analytical system is assembl (see Figure 1) and leak checked.

11.1.2 To leak check the analytical system, place the six-port gas valve in the trapping position. Disconnect and cap the absolute pressure gauge. Insert a pressure gauge capable of recording up to 60 psig at the vacuum valve outlet.

11.1.3 Attach a valve and a zero air supply to the sample inlet port. Pressurize the system to about 50 psig (350 kPa) and close the valve.

11.1.4 Wait approximately 3 hrs. and re-check pressure. If the pressure did not vary more than ± 2 psig, the system is considered leak tight.

11.1.5 If the system is leak free, de-pressurize and reconnect absolute pressure gauge.

11.1.6 The analytical system leak check procedure needs to be performed during the system checkout, during a series of analysis or if leaks are suspected. This should be part of the user-prepared SOP manual (see Section 12.

11.2 Sample Volume Determination

11.2.1 The vacuum reservoir and absolute pressure gauge are used to meter a precisely repeatable volume of sample air through the cryogenically-cooled trap, as follows: With the sample valve closed and the vacuum valve open, the reservoir is first evacuated with the vacuum pump to a predetermined pressure (e.g., 100 mm Hg). Then the vacuum valve is closed and the sample valve is opened to allow sample air to be drawn through the cryogenic trap and into the evacuated reservoir until a second predetermined reservoir pressure is reached (e.g., 300 mm Hg). The (fixed) volume of air thus sampled is determined by the pressure rise in the vacuum reservoir (difference between the predetermined pressures) as measured by the absolute pressure gauge (see Section 12.2.1).

11.2.2 The sample volume can be calculated by:

$$V_s = \frac{(\Delta P)(V_r)}{(P_s)}$$

where:

V_s = volume of air sampled (standard cm^3)
ΔP = pressure difference measured by gauge (mm Hg)
V_r = volume of vacuum reservoir (cm^3) usually 1 L
P_s = standard pressure (760 mm Hg)

For example, with a vacuum reservoir of 1000 cm^3 and a pressure change of 200 mm Hg (100 to 300 mm Hg), the volume sampled would be 263 cm^3. [Note: Typical sample volume using this procedure is between 200-300 cm^3.]

11.2.3 The sample volume determination need only be performed once during the system check-out and shall be part of the user-prepared SOP Manual (see Section 12.1).

11.3 Analytical System Dynamic Calibration

11.3.1 Before sample analysis, a complete dynamic calibration of the analytical system should be carried out at five or more concentrations on each range to define the calibration curve. This should be carried out initially and periodically thereafter [may be done only once during a series of analyses]. This should be part of the user-prepared SOP Manual (See Section 12.1). The calibration should be verified with two or three-point calibration checks (including zero) each day the analytical system is used to analyze samples.

11.3.2 Concentration standards of propane are used to calibrate the analytical system. Propane calibration standards may be obtained directly from low concentration cylinder standards or by dilution of high concentration cylinder

standards with zero air (see Section 8.3). Dilution flow rates must be measured accurately, and the combined gas stream must be mixed thoroughly for successful calibration of the analyzer. Calibration standards should be sampled directly from a vented manifold or tee. Note: Remember that a propane NMOC concentration in ppmC is three times the volumetric concentration in ppm.

11.3.3 Select one or more combinations of the following parameters to provide the desired range or ranges (e.g., 0-1.0 ppmC or 0-5.0 ppmC): FID attenuator setting, output voltage setting, integrator resolution (if applicable), and sample volume. Each individual range should be calibrated separately and should have a separate calibration curve. Note: Modern GC integrators may provide automatic ranging such that several decades of concentration may be covered in a single range. The user-prepared SOP manual should address variations applicable to a specific system design (see Section 12.1).

11.3.4 Analyze each calibration standard three times according to the procedure in Section 11.4. Insure that flow rates, pressure gauge start & stop readings, initial cryogen liquid level in the dewar, timing, heating, integrator settings, and other variables are the same as those that will be used during analysis of ambient samples. Typical flow rates for the gases are: hydrogen, 30 cm^3/minute; helium carrier, 30 cm^3/minute; burner air, 400 cm^3/minute.

11.3.5 Average the three analyses for each concentration standard and plot the calibration curve(s) as average integrated peak area reading versus concentration in ppmC. The relative standard deviation for the three analyses should be less

than 3% (except for zero concentration). Linearity should be expected; points that appear to deviate abnormally should be repeated. Response has been shown to be linear over a wide range (0-10,000 ppbC). If nonlinearity is observed, an effort should be made to identify and correct the problem. If the problem cannot be corrected, additional points in the nonlinear region may be needed to define the calibration curve adequately.

11.4 Analysis Procedure

11.4.1 Insure the analytical system has been assembled properly, leaked checked, and properly calibrated through a dynamic standard calibration. Light the FID detector and allow to stabilize.

11.4.2 Check and adjust the helium carrier pressure to provide the correct carrier flow rate for the system. Helium is used to purge residual air and methane from the trap at the end of the sampling phase and to carry the re-volatilized NMOC from the trap into the FID. A single-stage auxiliary regulator between the cylinder and the analyzer may not be necessary, but is recommended to regulate the helium pressure better than the multistage cylinder regulator. When an auxiliary regulator is used, the secondary stage of the two-stage regulator must be set at a pressure higher than the pressure setting of the single-stage regulator. Also check the FID hydrogen and burner air flow rates (see 11.3.4).

11.4.3 Close the sample valve and open the vacuum valve to evacuate the vacuum reservoir to a specific predetermined value (e.g., -100 mm Hg).

11.4.4 With the trap at room temperature, place the six-port valve in the inject position.

11.4.5 Open the sample valve and adjust the sample flow rate needle valve for an appropriate trap flow of 50-100 cm^3/min. Note: The flow will be lower later, when the trap is cold.

11.4.6 Check the sample canister pressure before attaching it to the analytical system and record on Field Data Sheet (see Figure 7). Connect the sample canister or direct sample inlet to the six-port valve, as shown in Figure 1. For a canister, either the canister valve or an optional fine needle valve installed between the canister and the vent is used to adjust the canister flow rate to a value slightly higher than the trap flow rate set by the sample flow rate needle valve. The excess flow exhausts through the vent, which assures that the sample air flowing through the trap is at atmospheric pressure. The vent is connected to a flow indicator such as a rotameter as an indication of vent flow to assist in adjusting the flow control valve. Open the canister valve and adjust the canister valve or the sample flow needle valve to obtain a moderate vent flow as indicated by the rotameter. The sample flow rate will be lower (and hence the vent flow rate will be higher) when the the trap is cold.

11.4.7 Close the sample valve and open the vacuum valve (if t a[illegible]dy op[illegible] to evacuate the vacuum reservoir. [illegible]h t [illegible]ix-p[illegible] va[illegible]ve in the inject position and the [illegible]acuum valve open, open the sample valve for 2-3 minutes [with both valves open, the pressure reading won't change] to flush and condition the inlet lines.

11.4.8 Close the sample valve and evacuate the reservoir to the predetermined sample starting pressure (typically 100 mm Hg) as indicated by the absolute pressure gauge.

11.4.9 Switch the six-port valve to the sample position.

11.4.10 Submerge the trap in the cryogen. Allow a few minutes for the trap to cool completely (indicated when the cryogen stops boiling). Add cryogen to the initial level used during system dynamic calibration. The level of the cryogenic liquid should remain constant with respect to the trap and should completely cover the beaded portion of the trap.

11.4.11 Open the sample valve and observe the increasing pressure on the pressure gauge. When it reaches the specific predetermined pressure (typically 300 mm Hg) representative of the desired sample volume (Section 11.2), close the sample valve.

11.4.12 Add a little cryogen or elevate the Dewar to raise the liquid level to a point slightly higher (3-15 mm) than the initial level at the beginning of the trapping. Note: This insures that organics do not bleed from the trap and are counted as part of the NMOC peak(s).

11.4.13 Switch the 6-port valve to the inject position, keeping the cryogenic liquid on the trap until the methane and upset peaks have deminished (10-20 seconds). Now close the canister valve to conserve the remaining sample in the canister.

11.4.14 Start the integrator and remove the Dewar flask containing the cryogenic liquid from the trap.

11.4.15 Close the GC oven door and allow the GC oven (or alternate trap heating system) to heat the trap at a predetermined rate (typically, 30°C/min) to 90°. Heating the trap volatilizes the concentrated NMOC such that the FID produces integrated peaks. A uniform trap temperature rise rate (above 0°C) helps to reduce variability and facilitates more accurate correction for the moisture-shifted baseline. With a chromatograph oven to heat the trap, the following parameters have been found to be acceptable: initial temperature, 30°C; initial time, 0.20 minutes (following start of the integrator); heat rate, 30°/minute; final temperature, 90°C.

11.4.16 Use the same heating process and temperatures for both calibration and sample analysis. Heating the trap too quickly may cause an initial negative response that could hamper accurate integration. Some initial experimentation may be necessary to determine the optimal heating procedure for each system. Once established, the procedure should be consistent for each analysis as outlined in the user-prepared SOP Manual.

11.4.17 Continue the integration (generally, in the range of 1-2 minutes is adequate) only long enough to include all of the organic compound peaks and to establish the end point FID baseline, as illustrated in Figure 8. The integrator should be capable of marking the beginning and ending of peaks, constructing the appropriate operational baseline between the start and end of the integration period, and calculating the resulting corrected peak area. This ability is necessary because the moisture in the sample, which is also concentrated in the trap, will cause a slight positive baseline shift. This baseline shift starts as the trap warms and continues until all of the moisture is swept from the trap, at which time the baseline returns to its normal level. The shift always continues longer than the ambient organic peak(s). The integrator should be programmed to correct for this shifted baseline by ending the integration at a point after the last NMOC peak and prior to the return of the shifted baseline to normal (see Figure 8) so that the calculated operational baseline effectively compensates for the water-shifted baseline. Electronic integrators either do this automatically or they should be programmed to make this correction. Alternatively, analyses of humidified zero air prior to sample analyses should be performed to determine the water envelope and the proper blank value for correcting the ambient air concentration measurements accordingly. Heating and flushing of the trap should continue after the integration period has ended to insure all water has been removed to prevent buildup of water in the trap. Therefore, be sure that the 6-port valve remains in the inject position until all moisture has purged from the trap (3 minutes or longer).

11.4.18 Use the dynamic calibration curve (see Section 11.3) to convert the integrated peak area reading into concentration units (ppmC). Note that the NMOC peak shape may not be precisely reproducible due to variations in heating the trap, but the total NMOC peak area should be reproducible.

11.4.19 Analyze each canister sample at least twice and report the average NMOC concentration. Problems during an analysis occasionally will cause erratic or inconsistent results. If the first two analyses do not agree within ± 5% relative standard deviation (RSD), additional analyses should be made to identify inaccurate measurements and produce a more accurate average (see also Section 12.2.).

12. Performance Criteria and Quality Assurance

This section summarizes required quality assurance measures and provides guidance concerning performance criteria that should be achieved within each laboratory.

12.1 Standard Operating Procedures (SOPs)

12.1.1 Users should generate SOPs describing and documenting the following activities in their laboratory: (1) assembly, calibration, leak check, and operation of the specific sampling system and equipment used; (2) preparation, storage, shipment, and handling of samples; (3) assembly, leak-check, calibration, and operation of the analytical system, addressing the specific equipment used; (4) canister storage and cleaning; and (5) all aspects of of data recording and processing, including lists of computer hardware and software used.

12.1.2 SOPs should provide specific stepwise instructions and should be readily available to, and understood by, the laboratory personnel conducting the work.

12.2 Method Sensitivity, Accuracy, Precision and Linearity

12.2.1 The sensitivity and precision of the method is proportional to the sample volume. However, ice formation in the trap may reduce or stop the sample flow during trapping if the sample volume exceeds 400 cm³. Sample volumes below about 100-150 cm³ may cause increased measurement variability due to dead volume in lines and valves. For most typical ambient NMOC concentrations, sample volumes in the range of 200-400 cm^3 appear to be appropriate. If a response peak obtained with a 400 cm^3 sample is off scale or exceeds the calibration range, a second analysis can be carried out with a smaller volume. The actual sample volume used need not be accurately known if it is precisely repeatable during both calibration and analysis. Similarly, the actual volume of the vacuum reservoir need not be accurately known. But the reservoir volume should be matched to the pressure range and resolution of the absolute pressure gauge so that the measurement of the pressure change in the reservoir, hence the sample volume, is repeatable within 1%. A 1000 cm^3 vacuum reservoir and a pressure change of 200 mm Hg, measured with the specified pressure gauge, have provided a sampling precision of $\pm$ 1.31 cm^3. A smaller volume reservoir may be used with a greater pressure change to accommodate absolute pressure gauges with lower resolution, and vice versa.

12.2.2 Some FID detector systems associated with laboratory chromatographs may have autoranging. Others may provide attenuator control and internal full-scale output voltage selectors. An appropriate combination should be chosen so that an adequate output level for accurate integration is obtained down to the detection limit; however, the electrometer or integrator must not be driven into saturation at the upper end of the calibration. Saturation of the electrometer may be indicated by flattening of the calibration curve at

high concentrations. Additional adjustments of range and sensitivity can be provided by adjusting the sample volume used, as discussed in Section 12.2.1.

12.2.3 System linearity has been documented (6) from 0 to 10,000 ppbC.

12.2.4 Some organic compounds contained in ambient air are "sticky" and may require repeated analyses before they fully appear in the FID output. Also, some adjustment may have to be made in the integrator off time setting to accommodate compounds that reach the FID late in the analysis cycle. Similarly, "sticky" compounds from ambient samples or from contaminated propane standards may temporarily contaminate the analytical system and can affect subsequent analyses. Such temporary contamination can usually be removed by repeated analyses of humidified zero air.

12.2.5 Simultaneous collection of duplicate samples decreases the possibility of lost measurement data from samples lost due to leakage or contamination in either of the canisters. Two (or more) canisters can be filled simultaneously by connecting them in parallel (see Figure 2(a)) and selecting an appropriate flow rate to accommodate the number of canisters (Section 10.2.2). Duplicate (or replicate) samples also allow assessment of measurement precision based on the differences between duplicate samples (or the standard deviations among replicate samples).

13. Method Modification

13.1 Sample Metering System

13.1.1 Although the vacuum reservoir and absolute pressure gauge technique for metering the sample volume during analysis is efficient and convenient, other techniques should work also.

13.1.2 A constant sample flow could be established with a vacuum pump and a critical orifice, with the six-port valve being switched to the sample position for a measured time period.

A gas volume meter, such as a wet test meter, could also be used to measure the total volume of sample air drawn through the trap. These alternative techniques should be tested and evaluated as part of a user-prepared SOP manual.

13.2 FID Detector System

13.2.1 A variety o. FID detector systems should be adaptable to the method.

13.2.2 The specific flow rates and necessary modifications for the helium carrier for any alternative FID instrument should be evaluated prior to use as part of the user-prepared SOP manual.

13.3 Range

13.3.1 It may be possible to increase the sensitivity of the method by increasing the sample volume. However, limitations may arise such as plugging of the trap by ice.

13.3.2 Any attempt to increase sensitivity should be evaluated as part of the user-prepared SOP manual.

13.4 Sub-Atmospheric Pressure Canister Sampling

13.4.1 Collection and analysis of canister air samples at sub-atmospheric pressure is also possible with minor modifications to the sampling and analytical procedures.

13.4.2 Method TO-14, "Integrated Canister Sampling for Selective Organics: Pressurized and Sub-atmospheric Collection Mechanism," addresses sub-atmospheric pressure canister sampling. Additional information can be found in the literature (11-17).

1. Uses, Limitations, and Technical Basis of Procedures for Quantifying Relationsnips Between Photochemical Oxidants and Precursors, EPA-450/2-77-21a, U.S. Environmental Protection Agency, Research Triangle Park, NC, November 1977.

2. Guidance for Collection of Ambient Non-Methane Organic Compound (NMOC) Data for Use in 1982 Ozone SIP Development, EPA-450/4-80-011, U.S. Environmental Protection Agency, Research Triangle Park, NC, June 1980.

3. H. B. Singh, Guidance for the Collection and Use of Ambient Hydrocarbons Species Data in Development of Ozone Control Strategies, EPA-450/480-008, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1980.

4. R. M. Riggin, Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air, EPA-600/483-027, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1983.

5. M. J. Jackson, et al., Technical Assistance Document for Assembly and Operation of the Suggested Preconcentration Direct Flame Ionization Detection (PDFID) Analytical System, publication scheduled for late 1987; currently available in draft form from the Qualilty Assurance Division, MD-77, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

6. R. K. M. Jayanty, et al., Laboratory Evaluation of Non-Methane Organic Carbon Determination in Ambient Air by Cryogenic Preconcentration and Flame Ionization Detection, EPA-600/54-82-019, U.S. Evironmental Protection Agency, Research Triangle Park, NC, July 1982.

7. R. D. Cox, et al., "Determination of Low Levels of Total Non-Methane Hydrocarbon Content in Ambient Air", Environ. Sci. Technol., 16 (1):57, 1982.

8. F. F. McElroy, et al., A Cryogenic Preconcentration - Direct FID (PDFID) Method for Measurement of NMOC in the Ambient Air, EPA-600/4-85-063, U.S. Environmental Protection Agency, Research Triangle Park, NC, August 1985.

9. F. W. Sexton, et al., A Comparative Evaluation of Seven Automated Ambient Non-Methane Organic Compound Analyzers, EPA-600/5482-046, U.S. Environmental Protection Agency, Research Triangle Park, NC, August 1982.

10. H. G. Richter, Analysis of Organic Compound Data Gathered During 1980 in Northeast Corridor Cities, EPA-450/4-83-017, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1983.

11. Cox, R. D. "Sample Collection and Analytical Techniques for Volatile Organics in Air," presented at APCA Speciality Conference, Chicago, Il, March 22-24, 1983.

12. Rasmussen, R. A. and Khalil, M.A.K. " Atmosp ric Halocarbons: Measurements and Analyses of Selected Trace ases," Proc. NATO ASI on Atmospheric Ozone, 1980, 209-231.

13. Oliver, K. D., Pleil J.D. and McClenny, W.A. "Sample Intergrity of Trace Level Volatile Or ic Compounds in Ambi nt Air Stored in "SUMMA®" Polished nis s," accepted for pu ication in Atmospheric Environment as of nua 1986. Draft availab e from W. A. McClenny, MD-44, EMSL, EPA, Research Triangle Park, NC 27711.

14. McClenny, W. A. Pleil J.D. Holdren, J.W.; and Smith, R.N.; 1984. " Automated Cryogenic Preconcentration and Gas Chromatographic Determination of Volatile Organic Compounds," Anal. Chem. 56:2947.

15. Pleil, J. D. and Oliver, K. D., 1985, "Evaluation of Various Configuratio of Nafion Dr : Water Removal from Air Samples Prior to Gas C matographic A ysis". EPA Contract No. 68-02-4035.

16. Olive K. D.; Pleil, nd McClenny, W. A.; 1986. "Sample Integrity of Trace Level Volatile Organic Compounds in Ambient Air Stored in Summa® Polished Canisters," Atmospheric Environ. 20:1403.

17. Oliver, K. D. Pleil, J. D., 1985, "Automated Cryogenic Sampling and Gas Chromatographic Analysis of Ambient Vapor-Phase Organic Compounds: Procedures and Comparison Tests," EPA Contract No. 68-02-4035, Research Triangle Park, NC, Northrop Services, Inc. - Environmental Sciences.

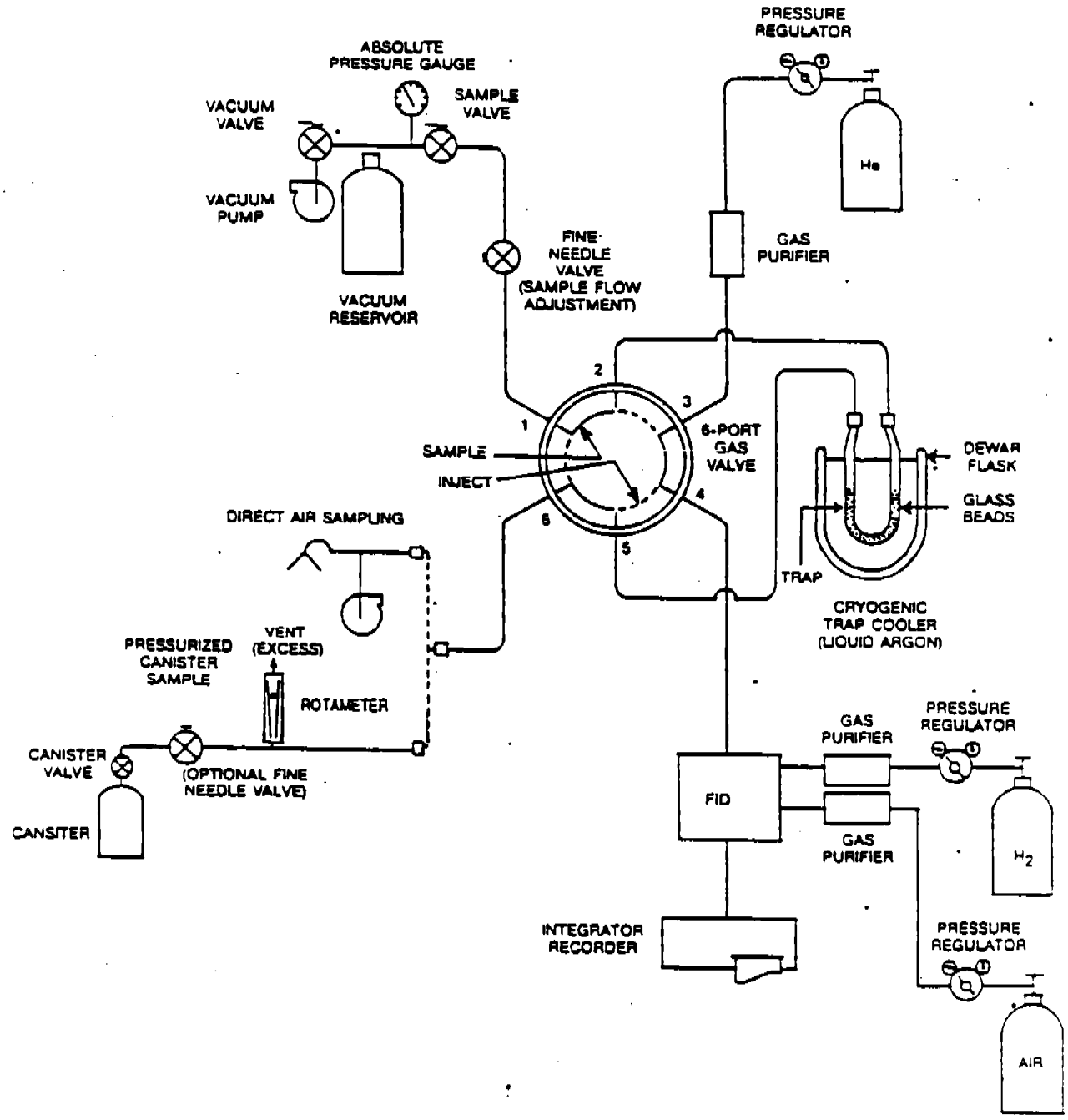


FIGURE 1. SCHEMATIC OF ANALYTICAL SYSTEM FOR NMOC—TWO SAMPLING MODES

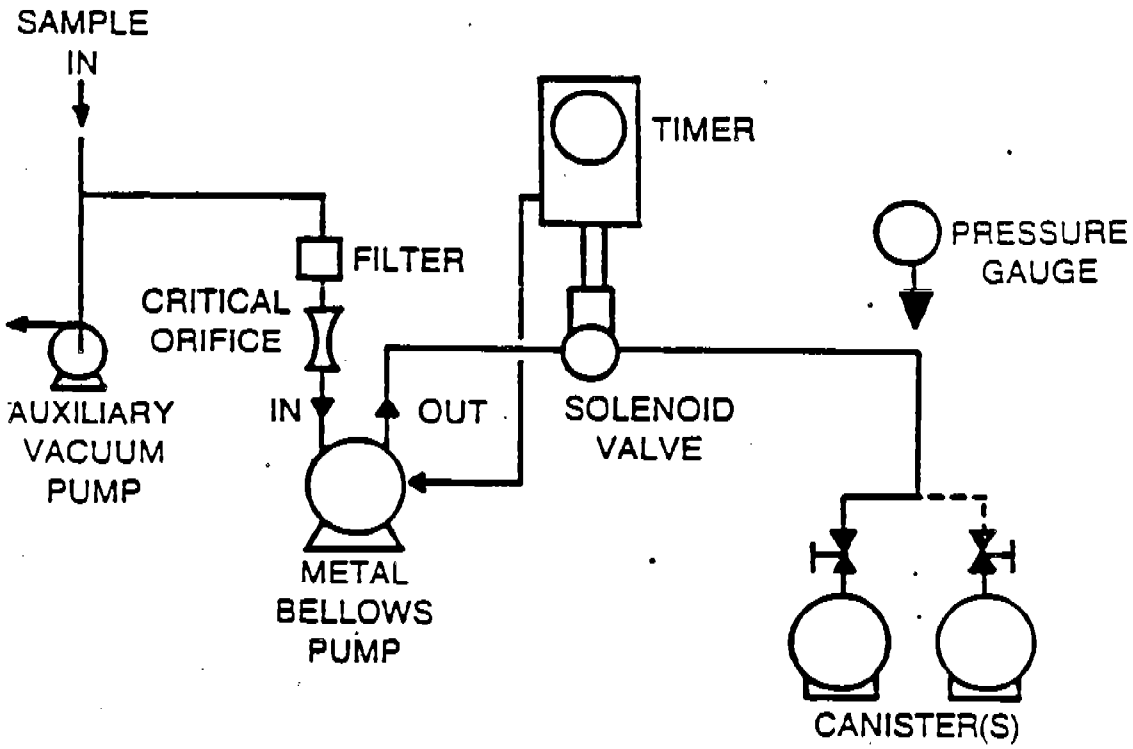
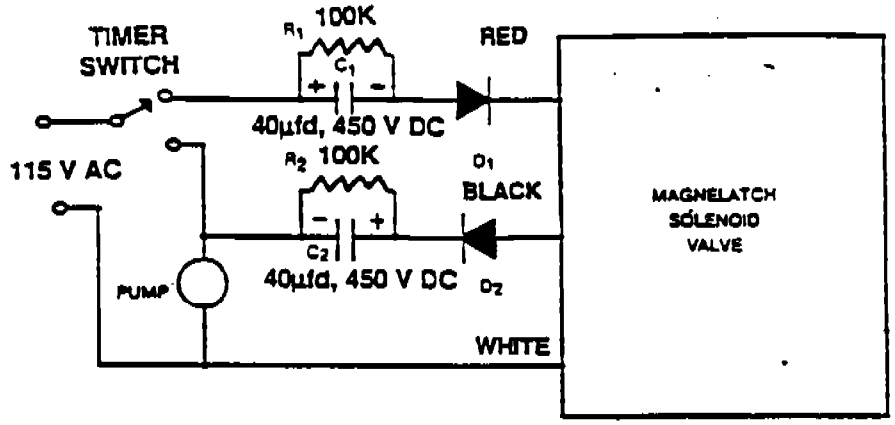
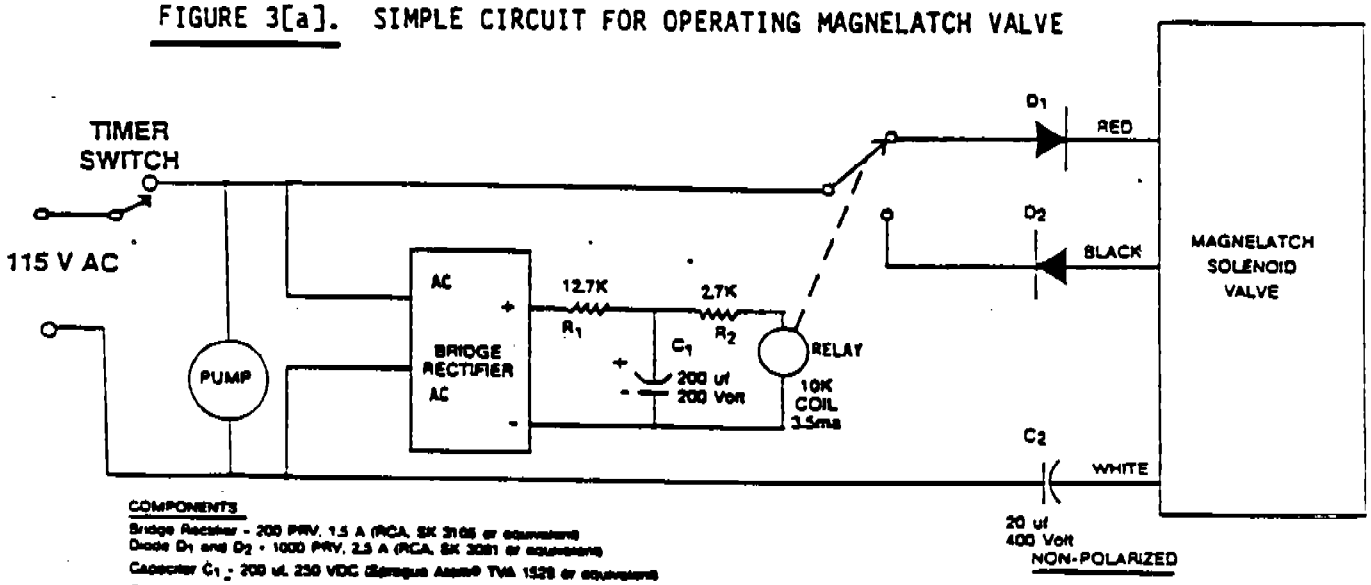


FIGURE 2. SAMPLE SYSTEM FOR AUTOMATIC COLLECTION OF 3-HOUR INTEGRATED AIR SAMPLES



COMPONENTS
Capacitor C_1 and C_2 - 40 ufd 450 VDC (Sprague Atom® TVA 1712 or equivalent)
Resistor R_1 and R_2 - 0.5 watt, 5% tolerance
Diode D_1 and D_2 - 1000 PRV, 2.5 A (RCA, SK 3081 or equivalent)

FIGURE 3[a]. SIMPLE CIRCUIT FOR OPERATING MAGNELATCH VALVE



COMPONENTS
Bridge Rectifier - 200 PRV, 1.5 A (RCA, SK 3105 or equivalent)
Diode D_1 and D_2 - 1000 PRV, 2.5 A (RCA, SK 3081 or equivalent)
Capacitor C_1 - 200 ufd, 250 VDC (Sprague Atom® TVA 1526 or equivalent)
Capacitor C_2 - 20 ufd, 400 VDC Non-Polarized (Sprague Atom® TVAN 1652 or equivalent)
Relay - 10,000 ohm coil, 3.5 ma (AMF Potter and Brumfield, KCP 5, or equivalent)
Resistor R_1 and R_2 - 0.5 watt, 5% tolerance

FIGURE 3[b]. IMPROVED CIRCUIT DESIGNED TO HANDLE POWER INTERRUPTIONS

FIGURE 3. ELECTRICAL PULSE CIRCUITS FOR DRIVING SKINNER MAGNELATCH SOLENOID VALVE WITH A MECHANICAL TIMER

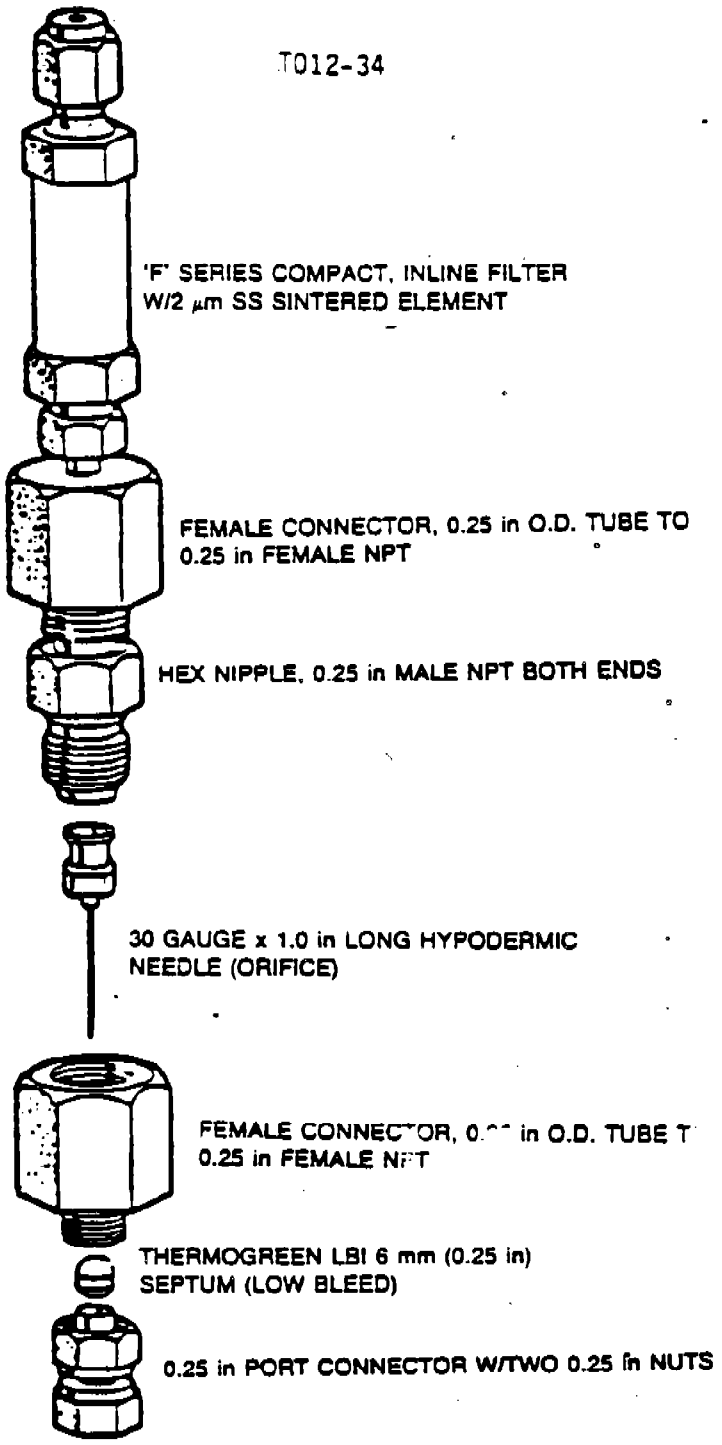


FIGURE 4. FILTER AND HYPODERMIC NEEDLE ASSEMBLY FOR SAMPLE INLET FLOW CONTROL

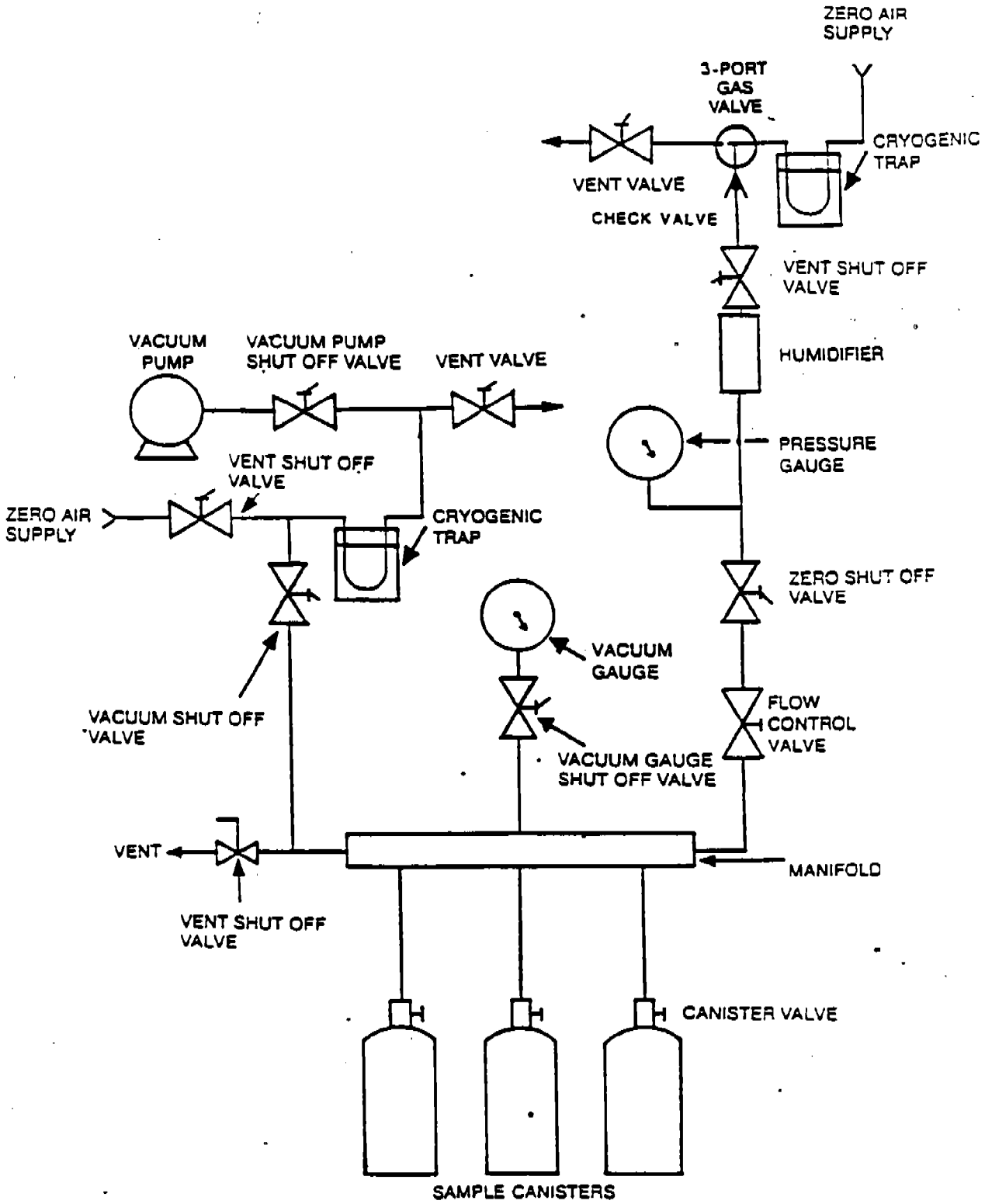


FIGURE 5. CANISTER CLEANING SYSTEM

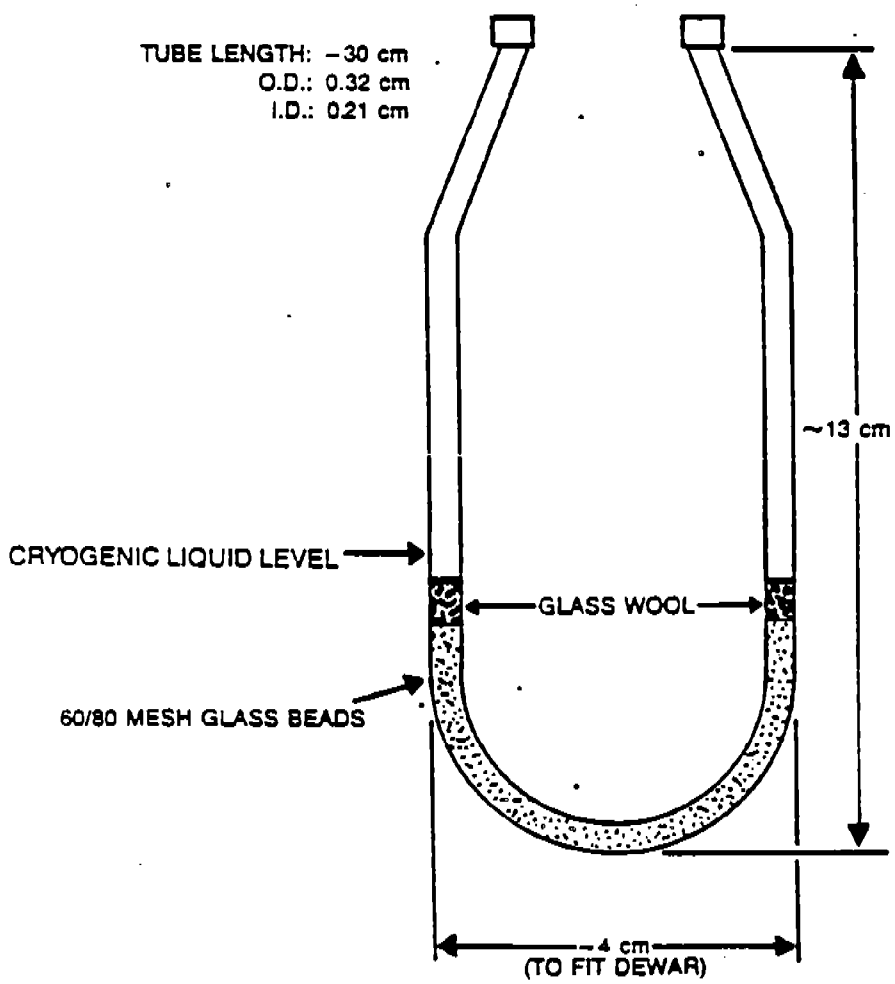


FIGURE 6. CRYOGENIC SAMPLE TRAP DIMENSIONS

PRESSURIZED CANISTER SAMPLING DATA SHEET

GENERAL INFORMATION:

PROJECT: _____
SITE: _____
LOCATION: _____
MONITOR STATION NUMBER: _____
PUMP SERIAL NUMBER: _____

OPERATOR: _____
ORIFICE IDENTIFICATION: _____
FLOW RATE: _____
CALIBRATED BY: _____
LEAK CHECK _____ Pass _____ Fail

FIELD DATA:

Date	Canister Serial Number	Sample Number	Sample Time		Average Atmospheric Conditions			Canister pressure Final, Laboratory		Comments
			Start	Stop	Temperature	Pressure	Relative Humidity			

Date _____ Title _____ Signature _____

FIGURE 7. EXAMPLE SAMPLING DATA SHEET

APPENDIX C

1991 NMOC MONITORING PROGRAM SITE DATA

Ft. Lauderdale, FL
1991 NMOC Program - F1FL

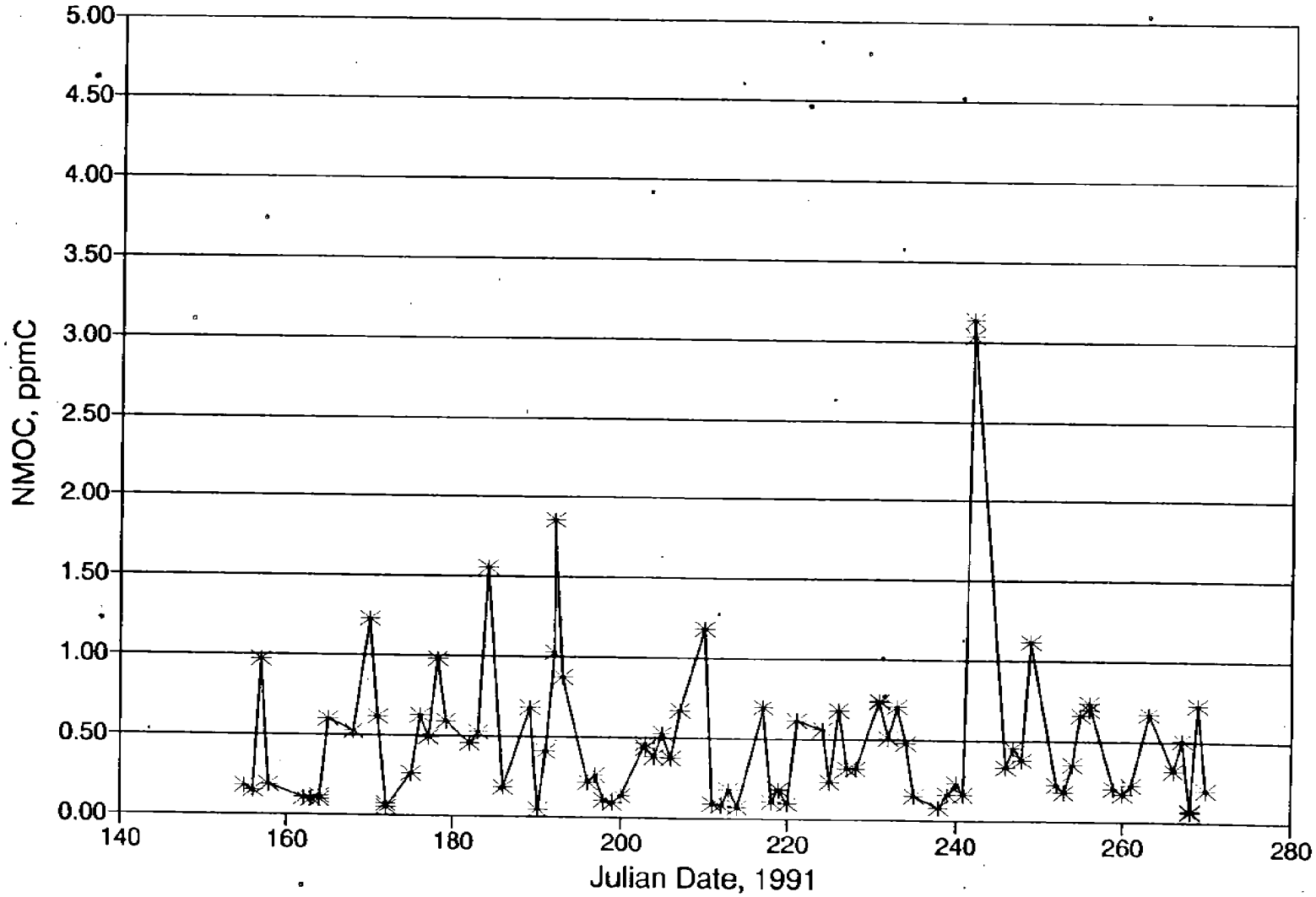


TABLE C-1. SUMMARY OF THE 1991 NMOC DATA FOR FT. LAUDERDALE (F1FL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
04-Jun-91	155	1006	775	18.0	18.0	D	0.178
05-Jun-91	156	1028	803	18.0	18.0	B	0.148
06-Jun-91	157	1034	783	12.0	12.0	D	0.976
07-Jun-91	158	1057	607	18.0	18.0	A	0.187
11-Jun-91	162	1076	815	17.0	18.0	B	0.103
12-Jun-91	163	1088	671	18.0	20.0	C	0.096
13-Jun-91	164	1106	193	18.0	18.0	B	0.112
13-Jun-91	164	1107	663	18.0	18.0	A	0.094
14-Jun-91	165	1121	764	18.0	19.0	A	0.599
17-Jun-91	168	1131	875	18.5	18.0	B	0.526
19-Jun-91	170	1155	48	16.0	16.0	C	1.225
20-Jun-91	171	1173	815	16.0	16.0	A	0.618
21-Jun-91	172	1191	628	8.0	8.0	C	0.071
21-Jun-91	172	1192	685	16.0	17.0	D	0.054
24-Jun-91	175	1211	131	15.0	16.0	C	0.261
25-Jun-91	176	1220	409	16.0	16.0	C	0.623
26-Jun-91	177	1229	50	15.0	16.0	B	0.492
27-Jun-91	178	1246	111	15.0	16.0	C	0.979
28-Jun-91	179	1257	301	15.0	16.0	C	0.589
01-Jul-91	182	1281	907	15.0	16.0	C	0.448
02-Jul-91	183	1290	813	15.0	16.0	B	0.522
03-Jul-91	184	1303	719	15.0	16.0	C	1.553
05-Jul-91	186	1338	37	14.0	15.0	A	0.175
08-Jul-91	189	1339	131	14.0	15.0	C	0.681
09-Jul-91	190	1345	883	16.0	15.0	A	0.042
10-Jul-91	191	1359	724	13.0	14.0	A	0.410
11-Jul-91	192	1367	20	14.0	16.0	B	1.030
11-Jul-91	192	1370	656	14.0	16.0	A	1.853
12-Jul-91	193	1388	630	14.0	16.0	C	0.868
15-Jul-91	196	1409	838	8.0	8.0	A	0.210
16-Jul-91	197	1422	813	6.0	7.0	C	0.256
17-Jul-91	198	1447	897	16.0	16.0	B	0.104
18-Jul-91	199	1459	890	18.0	16.0	C	0.090

TABLE C-1. SUMMARY OF THE 1991 NMOC DATA FOR FT. LAUDERDALE (F1FL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
19-Jul-91	200	1451	690	17.0	18.0	A	0.136
22-Jul-91	203	1481	93	17.0	18.0	C	0.458
22-Jul-91	203	1482	682	17.0	18.0	B	0.431
23-Jul-91	204	1514	74	17.0	16.0	A	0.380
24-Jul-91	205	1522	400	17.0	18.0	B	0.528
25-Jul-91	206	1534	900	17.0	17.0	C	0.366
26-Jul-91	207	1547	722	17.0	17.0	C	0.668
29-Jul-91	210	1560	626	19.0	13.0	C	1.186
30-Jul-91	211	1568	17	16.0	17.0	A	0.084
31-Jul-91	212	1573	762	17.0	18.0	C	0.076
01-Aug-91	213	1591	68	16.0	18.0	A	0.178
02-Aug-91	214	1609	93	17.0	18.0	C	0.065
05-Aug-91	217	1632	651	18.0	18.0	C	0.696
06-Aug-91	218	1653	724	17.0	18.0	C	0.109
07-Aug-91	219	1668	900	17.0	17.0	B	0.191
07-Aug-91	219	1672	36	17.0	17.0	A	0.174
08-Aug-91	220	1688	833	16.0	16.0	C	0.096
09-Aug-91	221	1693	628	17.0	18.0	C	0.620
12-Aug-91	224	1718	131	16.0	17.0	B	0.557
13-Aug-91	225	1727	800	17.0	18.0	B	0.229
14-Aug-91	226	1741	35	16.0	18.0	B	0.679
15-Aug-91	227	1758	707	18.0	20.0	D	0.318
16-Aug-91	228	1768	663	17.0	19.0	A	0.315
19-Aug-91	231	1784	135	11.0	11.0	D	0.744
19-Aug-91	231	1785	93	17.0		C	0.731
20-Aug-91	232	1800	870	16.0	18.0	D	0.503
21-Aug-91	233	1837	850	17.0	17.0	B	0.705
22-Aug-91	234	1839	794	17.0	18.0	D	0.479
23-Aug-91	235	1856	118	16.0	17.0	C	0.146
26-Aug-91	238	1865	789	18.0	18.0	D	0.080
27-Aug-91	239	1906	928	18.0	18.0	A	0.162
28-Aug-91	240	1902	22	18.0	18.0	A	0.233
29-Aug-91	241	1912	668	18.0	18.0	A	0.159

TABLE C-1. SUMMARY OF THE 1991 NMOC DATA FOR FT. LAUDERDALE (F1FL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
30-Aug-91	242	1930	91	18.0	18.0	A	3.032
30-Aug-91	242	1931	93	16.0	19.0	B	3.134
03-Sep-91	246	1942	762	17.0	18.0	B	0.336
04-Sep-91	247	1966	57	16.0	16.0	D	0.454
05-Sep-91	248	1972	853	16.0	16.0	B	0.378
06-Sep-91	249	1989	51	16.0	17.0	D	1.113
09-Sep-91	252	2006	833	17.0	18.0	A	0.223
10-Sep-91	253	2018	122	17.0	18.0	B	0.176
11-Sep-91	254	2029	838	17.0	17.0	B	0.353
12-Sep-91	255	2038	683	18.0	17.0	A	0.658
13-Sep-91	256	2045	642	18.0	20.0	A	0.697
13-Sep-91	256	2046	796	18.0	20.0	B	0.735
16-Sep-91	259	2067	77	17.0	18.0	B	0.201
17-Sep-91	260	2090	718	17.0	18.0	A	0.168
18-Sep-91	261	2097	705	17.0	18.0	A	0.224
20-Sep-91	263	2125	833	16.0	18.0	A	0.671
23-Sep-91	266	2139	671	17.0	18.0	C	0.312
24-Sep-91	267	2153	704	17.0	18.0	A	0.510
25-Sep-91	268	2170	400	17.0	18.0	C	0.072
25-Sep-91	268	2171	400	17.0	17.0	D	0.063
26-Sep-91	269	2204	607	17.0	18.0	A	0.729
27-Sep-91	270	2207	872	16.0	16.0	D	0.195

Long Island, NY
1991 NMOC Program - LINY

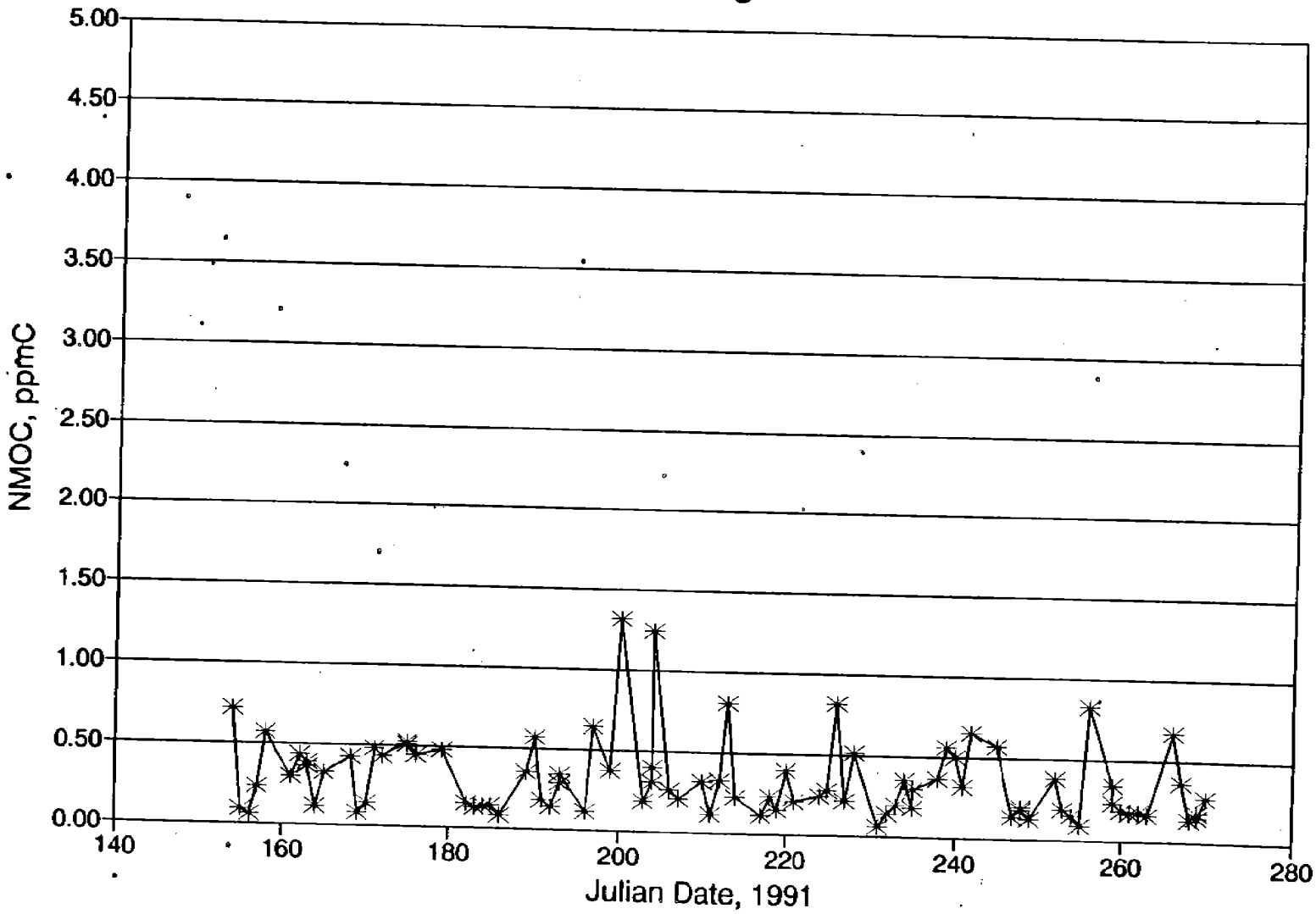


TABLE C-2. SUMMARY OF THE 1991 NMOC DATA FOR LONG ISLAND, NY (LINY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Jun-91	154	1020	675	22.0	22.0	D	0.712
04-Jun-91	155	1024	17	14.3	14.0	C	0.085
05-Jun-91	156	1043	765	16.0	18.0	B	0.062
06-Jun-91	157	1051	697	16.3	18.0	B	0.229
07-Jun-91	158	1045	684	17.0		A	0.567
10-Jun-91	161	1094	921	15.0	16.0	D	0.296
11-Jun-91	162	1098	854	15.0	16.0	D	0.434
12-Jun-91	163	1104	723	18.0	20.0	B	0.386
12-Jun-91	163	1105	176	18.0	20.0	A	0.364
13-Jun-91	164	1091	54	15.0	16.0	C	0.118
14-Jun-91	165	1139	151	15.0	17.0	D	0.323
17-Jun-91	168	1143	659		18.0	B	0.427
18-Jun-91	169	1138	618	16.0	18.0	D	0.081
19-Jun-91	170	1162	871	15.0	17.0	B	0.143
20-Jun-91	171	1209	780	15.0	17.0	D	0.481
21-Jun-91	172	1212	803	16.0	18.0	A	0.432
24-Jun-91	175	1213	36	21.5	22.0	B	0.522
24-Jun-91	175	1218	924	21.5	22.0	B	0.510
25-Jun-91	176	1225	692		6.0	A	0.443
28-Jun-91	179	1277	84	13.0	16.0	D	0.476
01-Jul-91	182	1282	927	14.0	16.0	D	0.149
02-Jul-91	183	1309	137	13.0	14.0	D	0.125
03-Jul-91	184	1304	624	14.0	16.0	A	0.130
04-Jul-91	185	1317	165	13.0	16.0	B	0.138
05-Jul-91	186	1315	634	14.0	16.0	D	0.079
08-Jul-91	189	1351	682	14.0	16.0	B	0.350
09-Jul-91	190	1349	648	14.0	16.0	B	0.568
10-Jul-91	191	1354	686	14.0	16.0	C	0.176
11-Jul-91	192	1391	301	18.0	20.0	D	0.139
12-Jul-91	193	1382	151	18.0	20.0	A	0.287
12-Jul-91	193	1383	143	18.0	18.0	C	0.344
15-Jul-91	196	1404	46	13.5	15.0	D	0.110
16-Jul-91	197	1439	114	13.5	15.0	C	0.641

TABLE C-2. SUMMARY OF THE 1991 NMOC DATA FOR LONG ISLAND, NY (LINY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
18-Jul-91	199	1458	82	13.0	14.0	D	0.365
19-Jul-91	200	1471	77	8.0	9.0	D	1.321
22-Jul-91	203	1509	193	13.5	14.0	B	0.185
23-Jul-91	204	1507	697	19.0	20.0	A	0.302
23-Jul-91	204	1511	656	19.0	20.0	B	0.394
23-Jul-91	204	1524	658	14.0	16.0	A	1.250
25-Jul-91	206	1548	192	13.5	13.0	B	0.257
26-Jul-91	207	1545	704	14.0	14.0	C	0.201
29-Jul-91	210	1557	140	13.0	14.0	D	0.318
30-Jul-91	211	1578	49	13.5	15.0	D	0.116
31-Jul-91	212	1597	813	14.0	16.0	C	0.321
01-Aug-91	213	1592	796	14.0	16.0	B	0.811
02-Aug-91	214	1610	890	13.0	15.0	C	0.222
05-Aug-91	217	1625	628	14.0	16.0	C	0.110
06-Aug-91	218	1674	149	14.0	14.0	B	0.234
07-Aug-91	219	1673	823	14.0	15.0	A	0.150
08-Aug-91	220	1649	607	14.0	16.0	B	0.398
09-Aug-91	221	1701	111		14.0	B	0.209
12-Aug-91	224	1748	788	14.0	16.0	A	0.242
13-Aug-91	225	1731	162	19.0	20.0	C	0.274
13-Aug-91	225	1734	927	19.0	20.0	D	0.283
14-Aug-91	226	1740	129	13.0	14.0	B	0.819
15-Aug-91	227	1765	51	13.0	14.0	D	0.217
16-Aug-91	228	1775	621	14.0	14.0	C	0.513
19-Aug-91	231	1806	890	13.0	14.0	C	0.058
20-Aug-91	232	1815	660	14.0	15.0	B	0.137
21-Aug-91	233	1825	816	13.5	15.0	D	0.196
22-Aug-91	234	1832	84	14.0	15.0	C	0.352
23-Aug-91	235	1846	114	18.0	20.0	B	0.181
23-Aug-91	235	1847	17	18.0	20.0	C	0.298
26-Aug-91	238	1873	878	14.0	16.0	C	0.365
27-Aug-91	239	1881	623	14.0	16.0	D	0.560
28-Aug-91	240	1891	844	13.0	15.0	A	0.496

TABLE C-2. SUMMARY OF THE 1991 NMOC DATA FOR LONG ISLAND, NY (LINY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
29-Aug-91	241	1918	868	14.0	15.0	C	0.312
30-Aug-91	242	1940	796	15.0	16.0	A	0.648
02-Sep-91	245	1943	192	14.0	16.0	B	0.566
04-Sep-91	247	1960	135	13.5	14.0	D	0.129
05-Sep-91	248	1974	658	19.0	20.0	D	0.195
05-Sep-91	248	1975	689	19.0	20.0	C	0.176
06-Sep-91	249	1997	27	13.5	14.0	D	0.127
09-Sep-91	252	2016	794	15.0	16.0	A	0.376
10-Sep-91	253	2019	668	14.0	16.0	C	0.186
11-Sep-91	254	2031	82	13.5	14.0	C	0.150
12-Sep-91	255	2039	762	14.0	12.0	D	0.091
13-Sep-91	256	2047	50	13.5	15.0	D	0.830
16-Sep-91	259	2069	57	18.0	20.0	A	0.344
16-Sep-91	259	2070	707	18.0	20.0	B	0.237
17-Sep-91	260	2088	702	14.0	15.0	B	0.184
18-Sep-91	261	2100	637	14.5	16.0	B	0.173
19-Sep-91	262	2103	825	13.0	14.0	D	0.175
20-Sep-91	263	2136	22	13.5	14.0	D	0.158
23-Sep-91	266	2143	689	16.0	17.0	C	0.669
24-Sep-91	267	2173	793	16.0	18.0	C	0.361
25-Sep-91	268	2191	792	15.0	16.0	B	0.136
26-Sep-91	269	2218	309	17.5	18.0	A	0.175
26-Sep-91	269	2219	902	17.5	18.0	B	0.147
27-Sep-91	270	2225	928	14.5	15.0	B	0.272

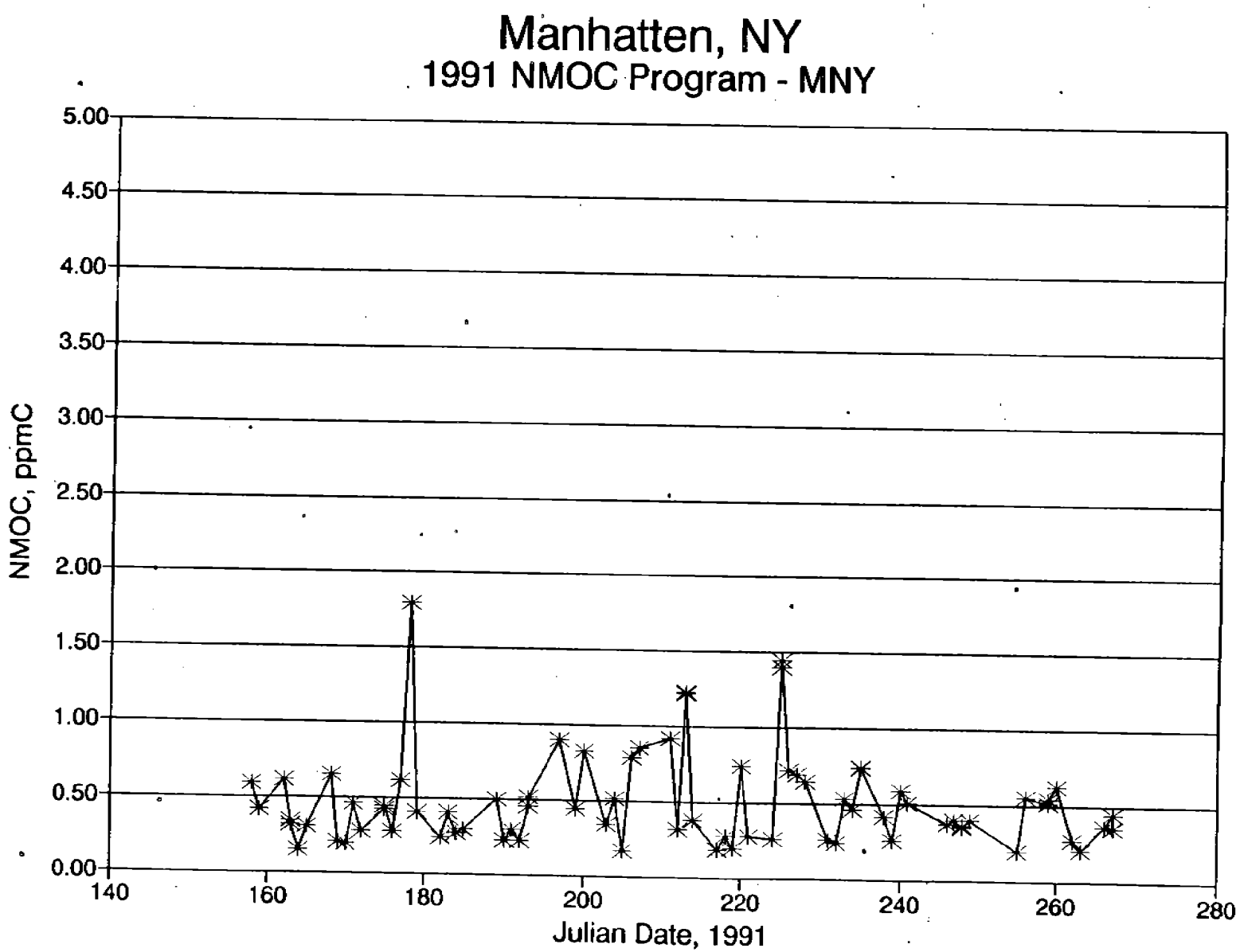

Manhatten, NY
1991 NMOC Program - MNY
NMOC, ppmC
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
140
160
180
200
220
240
260
280
Julian Date, 1991

TABLE C-3. SUMMARY OF THE 1991 NMOC DATA FOR MANHATTEN, NY (MNY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
07-Jun-91	158	1050	871	13.8	16.0	D	0.586
08-Jun-91	159	1058	870	12.3	12.0	C	0.414
11-Jun-91	162	1075	80	12.0	14.0	A	0.615
12-Jun-91	163	1083	883	17.0	20.0	A	0.341
12-Jun-91	163	1089	833	17.5	20.0	D	0.315
13-Jun-91	164	1097	191	14.0	15.0	D	0.155
14-Jun-91	165	1120	20	14.0	16.0	B	0.308
17-Jun-91	168	1133	172	15.0	15.0	A	0.654
18-Jun-91	169	1166	17	14.3	16.0	A	0.201
19-Jun-91	170	1165	677		16.0	B	0.200
20-Jun-91	171	1179	850	14.0	16.0	C	0.458
21-Jun-91	172	1186	35	14.0	15.0	C	0.275
24-Jun-91	175	1198	193	17.0	18.0	D	0.420
24-Jun-91	175	1199	874	17.0	18.0	C	0.439
25-Jun-91	176	1216	800	18.0	20.0	D	0.281
26-Jun-91	177	1231	87	16.0	18.0	C	0.620
27-Jun-91	178	1244	722	18.0	20.0	D	1.790
28-Jun-91	179	1261	676	17.5	20.0	D	0.402
01-Jul-91	182	1276	48	16.0	18.0	A	0.239
02-Jul-91	183	1289	659	18.0	18.0	C	0.404
03-Jul-91	184	1300	649	17.0	18.0	B	0.271
04-Jul-91	185	1320	170	16.5	18.0	C	0.298
08-Jul-91	189	1337	171	16.0	18.0	B	0.493
09-Jul-91	190	1342	409	16.8	19.0	A	0.227
10-Jul-91	191	1363	660	17.5	20.0	B	0.294
11-Jul-91	192	1374	675	18.0	20.0	C	0.225
12-Jul-91	193	1389	635	14.0	16.0	C	0.449
12-Jul-91	193	1390	607	13.0		B	0.512
16-Jul-91	197	1418	626	14.5	16.0	A	0.899
18-Jul-91	199	1457	60	13.0	14.0	A	0.444
19-Jul-91	200	1473	130	13.0	14.0	D	0.827
22-Jul-91	203	1480	638	14.0	15.0	A	0.341
23-Jul-91	204	1513	40	15.5		A	0.518

TABLE C-3. SUMMARY OF THE 1991 NMOC DATA FOR MANHATTEN, NY (MNY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
23-Jul-91	204	1515	766	15.5	14.0	B	0.513
24-Jul-91	205	1521	724	14.5	16.0	B	0.171
25-Jul-91	206	1536	630	14.0	14.0	B	0.787
26-Jul-91	207	1549	833	13.0	13.0	A	0.852
30-Jul-91	211	1576	924	13.0	14.0	C	0.919
31-Jul-91	212	1585	178	13.0	14.0	B	0.316
01-Aug-91	213	1599	777	17.0	19.0	D	1.216
01-Aug-91	213	1600	621	17.0	16.0	D	1.226
02-Aug-91	214	1612	82	14.0	16.0	C	0.382
05-Aug-91	217	1631	77	14.0	15.0	A	0.190
06-Aug-91	218	1652	902	13.5	14.0	D	0.279
07-Aug-91	219	1669	657	14.0	16.0	B	0.196
08-Aug-91	220	1680	189	13.5	14.0	D	0.743
09-Aug-91	221	1698	141	13.0	14.0	A	0.282
12-Aug-91	224	1710	723	14.0	16.0	A	0.261
13-Aug-91	225	1722	104	13.0	14.0	A	1.400
13-Aug-91	225	1723	17	13.0	14.0	B	1.442
14-Aug-91	226	1744	300	16.5	18.0	D	0.718
15-Aug-91	227	1764	118	16.0	18.0	B	0.685
16-Aug-91	228	1771	657	17.0	19.0	B	0.643
19-Aug-91	231	1782	171	16.0	18.0	D	0.256
20-Aug-91	232	1813	638	17.0	18.0	A	0.246
21-Aug-91	233	1824	143	17.0	18.0	C	0.536
22-Aug-91	234	1836	658	17.0	19.0	A	0.460
23-Aug-91	235	1851	500	15.0	16.0	D	0.734
23-Aug-91	235	1852	71	15.0	16.0	A	0.748
26-Aug-91	238	1864	150	14.0	16.0	C	0.416
27-Aug-91	239	1872	51	13.0	15.0	C	0.259
28-Aug-91	240	1900	683	14.0	16.0	D	0.588
29-Aug-91	241	1917	638	14.0	16.0	B	0.510
03-Sep-91	246	1938	870	13.5	15.0	A	0.369
04-Sep-91	247	1959	816	13.0	14.0	C	0.396
05-Sep-91	248	1970	114	15.0	16.0	A	0.356

TABLE C-3. SUMMARY OF THE 1991 NMOC DATA FOR MANHATTEN, NY (MNY)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
05-Sep-91	248	1971	121	15.0	16.0	C	0.350
06-Sep-91	249	1998	48	13.0	14.0	B	0.393
12-Sep-91	255	2041	155	14.0	15.0	A	0.201
12-Sep-91	255	2042	105	14.5	15.0	B	0.198
13-Sep-91	256	2052	626	14.0	14.0	A	0.555
16-Sep-91	259	2075	114	16.0	18.0	A	0.512
16-Sep-91	259	2076	783	16.0		A	0.541
17-Sep-91	260	2091	673	13.0	14.0	C	0.621
19-Sep-91	262	2112	48	12.0	12.0	D	0.270
20-Sep-91	263	2130	137	12.0	14.0	A	0.210
23-Sep-91	266	2138	171	13.0	13.0	D	0.359
24-Sep-91	267	2165	409	15.0	16.0	A	0.440
24-Sep-91	267	2166	885	15.0	16.0	B	0.351

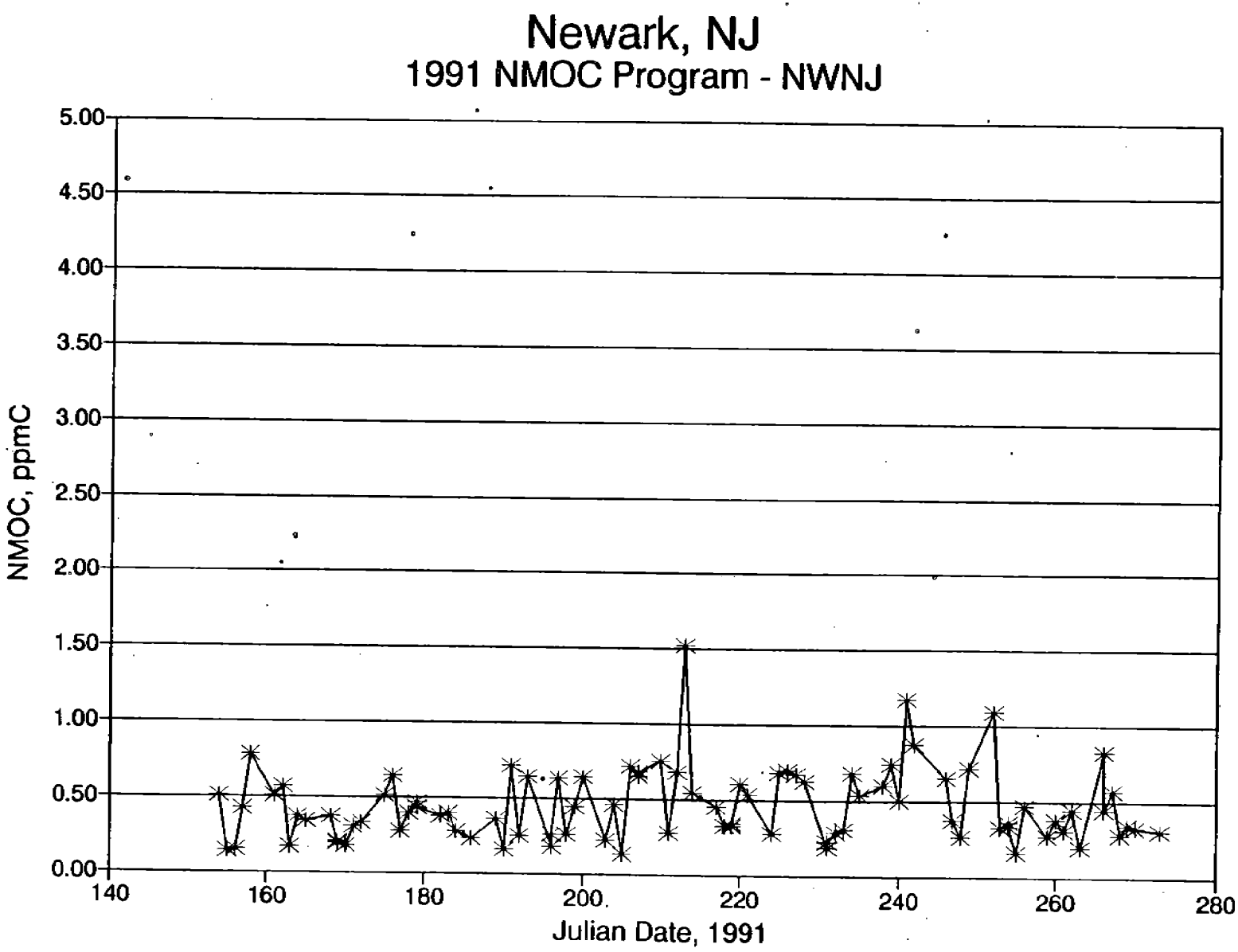

Newark, NJ
1991 NMOC Program - NWNJ
NMOC, ppmC
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
140
160
180
200
220
240
260
280
Julian Date, 1991

TABLE C-4. SUMMARY OF THE 1991 NMOC DATA FOR NEWARK, NJ (NWNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Jun-91	154	1025	676	14.3	14.0	A	0.506
04-Jun-91	155	1026	649	14.0	14.0	D	0.137
05-Jun-91	156	1036	690	14.1	14.0	B	0.152
06-Jun-91	157	1037	635	14.2	14.0	C	0.421
07-Jun-91	158	1062	111	13.8	12.0	B	0.778
10-Jun-91	161	1063	629	14.4	12.0	D	0.502
11-Jun-91	162	1073	674	14.1	15.0	C	0.572
12-Jun-91	163	1124	872	14.2	15.0	C	0.167
13-Jun-91	164	1123	143	12.0	11.0	C	0.365
14-Jun-91	165	1144	672	15.0	16.0	A	0.338
17-Jun-91	168	1145	717	14.0	15.0	B	0.368
18-Jun-91	169	1171	684	17.8	18.0	A	0.198
18-Jun-91	169	1172	765	17.8	18.0	B	0.208
19-Jun-91	170	1177	777	14.0	15.0	B	0.181
20-Jun-91	171	1188	697	14.1	14.0	B	0.304
21-Jun-91	172	1237	883	13.5	14.0	A	0.331
24-Jun-91	175	1238	191	13.5	14.0	B	0.511
25-Jun-91	176	1240	921	13.9	14.0	C	0.539
26-Jun-91	177	1243	792	14.4	16.0	D	0.281
27-Jun-91	178	1259	674	14.3	16.0	A	0.393
28-Jun-91	179	1285	91	17.5	18.0	D	0.470
28-Jun-91	179	1286	860	17.5	18.0	C	0.437
01-Jul-91	182	1310	793	14.2	15.0	C	0.377
02-Jul-91	183	1307	672	16.2	16.0	A	0.400
03-Jul-91	184	1299	49	13.2	14.0	C	0.274
05-Jul-91	186	1321	872	13.2	14.0	D	0.233
08-Jul-91	189	1331	40	13.0	15.0	B	0.357
09-Jul-91	190	1368	885	13.2	14.0	A	0.163
10-Jul-91	191	1369	140	13.2	14.0	C	0.713
11-Jul-91	192	1405	828	13.4	14.0	C	0.248
12-Jul-91	193	1406	674	14.2	14.0	A	0.646
15-Jul-91	196	1419	807	17.5	18.0	C	0.181
15-Jul-91	196	1423	198	17.5	18.0	B	0.260

TABLE C-4. SUMMARY OF THE 1991 NMOC DATA FOR NEWARK, NJ (NWNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
16-Jul-91	197	1445	84	13.7	14.0	B	0.638
17-Jul-91	198	1443	677	14.2	14.0	C	0.262
18-Jul-91	199	1462	624	14.1	14.0	D	0.446
19-Jul-91	200	1510	796	15.0	14.0	A	0.640
22-Jul-91	203	1508	37	13.2	14.0	B	0.219
23-Jul-91	204	1538	850	13.0	13.0	A	0.459
24-Jul-91	205	1535	30	13.3	14.0	D	0.129
25-Jul-91	206	1551	301	14.4	14.0	A	0.712
26-Jul-91	207	1620	113	17.0	18.0	A	0.649
26-Jul-91	207	1621	71	17.0	18.0	D	0.681
29-Jul-91	210	1564	907	13.2	13.0	C	0.752
30-Jul-91	211	1608	684	14.1	14.0	B	0.274
31-Jul-91	212	1607	871	13.2	14.0	C	0.677
01-Aug-91	213	1626	872	13.4	14.0	D	1.520
02-Aug-91	214	1630	681	14.1	15.0	B	0.540
05-Aug-91	217	1627	112	13.2	14.0	C	0.450
06-Aug-91	218	1646	678	14.2	16.0	C	0.326
07-Aug-91	219	1685	850	17.8	18.0	B	0.326
07-Aug-91	219	1686	683	17.8	18.0	A	0.347
08-Aug-91	220	1695	858	13.5	14.0	D	0.608
09-Aug-91	221	1696	924	13.0	14.0	C	0.534
12-Aug-91	224	1753	623	14.1	14.0	C	0.276
13-Aug-91	225	1752	193	13.4	14.0	D	0.682
14-Aug-91	226	1757	642	14.1	15.0	C	0.700
15-Aug-91	227	1780	677	14.0	15.0	A	0.667
16-Aug-91	228	1788	872	14.3	16.0	B	0.627
19-Aug-91	231	1776	902	16.7	18.0	D	0.184
19-Aug-91	231	1777	762	16.7	18.0	C	0.228
20-Aug-91	232	1831	137	13.0	14.0	D	0.284
21-Aug-91	233	1838	108	13.1	14.0	C	0.309
22-Aug-91	234	1863	864	13.6	14.0	C	0.676
23-Aug-91	235	1867	198	13.2	14.0	A	0.535
26-Aug-91	238	1890	113	13.9	14.0	C	0.596

TABLE C-4. SUMMARY OF THE 1991 NMOC DATA FOR NEWARK, NJ (NWNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
27-Aug-91	239	1903	833	13.5	14.0	B	0.744
28-Aug-91	240	1888	775	14.1	15.0	B	0.495
29-Aug-91	241	1926	630	17.5	18.0	A	1.170
29-Aug-91	241	1927	766	17.5	18.0	A	1.173
30-Aug-91	242	1911	927	14.0	15.0	D	0.867
03-Sep-91	246	1955	925	14.5	15.0	A	0.656
04-Sep-91	247	1953	823	13.4	14.0	C	0.371
05-Sep-91	248	2009	828	13.3	13.0	B	0.261
06-Sep-91	249	2011	675	14.2	14.0	A	0.720
09-Sep-91	252	2028	6	13.4	14.0	A	1.089
10-Sep-91	253	2030	704	14.2	14.0	D	0.328
11-Sep-91	254	2054	677	17.0	20.0	A	0.362
11-Sep-91	254	2055	409	1704.0	18.0	B	0.336
12-Sep-91	255	2050	902	13.6	14.0	B	0.159
13-Sep-91	256	2108	690	14.5	14.0	B	0.467
16-Sep-91	259	2116	674	14.3	14.0	A	0.270
17-Sep-91	260	2109	649	15.5	16.0	B	0.375
18-Sep-91	261	2106	883	16.4	17.0	C	0.304
19-Sep-91	262	2120	104	13.0	12.0	B	0.446
20-Sep-91	263	2121	131	13.3	14.0	C	0.194
23-Sep-91	266	2161	176	17.0	17.0	A	0.829
23-Sep-91	266	2162	663	17.0	18.0	B	0.444
24-Sep-91	267	2157	907	13.6	14.0	B	0.569
25-Sep-91	268	2208	927	13.6	13.0	C	0.280
26-Sep-91	269	2226	82	13.0	12.0	C	0.342
27-Sep-91	270	2222	924	13.5	14.0	B	0.326
30-Sep-91	273	2212	115	14.0	14.0	C	0.310

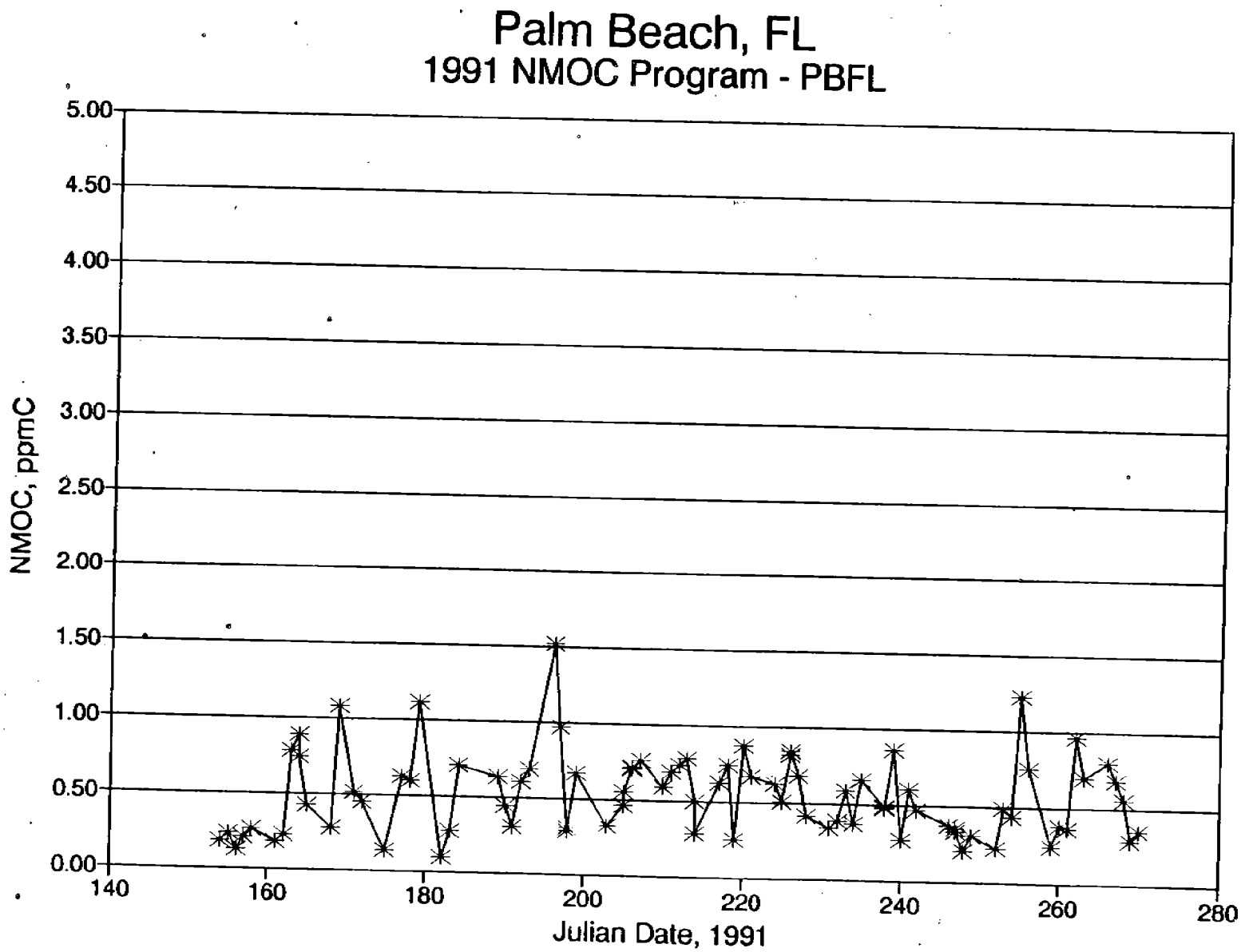

Palm Beach, FL
1991 NMOC Program - PBFL
NMOC, ppmC
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
140
160
180
200
220
240
260
280
Julian Date, 1991

TABLE C-5. SUMMARY OF THE 1991 NMOC DATA FOR PALM BEACH, FL (PBFL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Jun-91	154	1003	60	16.0	13.0	C	0.177
04-Jun-91	155	1010	193	16.0	13.0	B	0.230
05-Jun-91	156	1023	813	17.0	14.0	C	0.123
06-Jun-91	157	1029	764	17.0	14.0	A	0.209
07-Jun-91	158	1046	719	17.0	14.0	A	0.261
10-Jun-91	161	1049	885	17.0	14.0	C	0.174
11-Jun-91	162	1072	780	17.5	14.0	D	0.224
12-Jun-91	163	1080	302	17.0	14.0	B	0.778
13-Jun-91	164	1101	131	19.0	15.0	C	0.887
13-Jun-91	164	1102	793	19.0	15.0	A	0.748
14-Jun-91	165	1122	306	17.0	14.0	D	0.425
17-Jun-91	168	1132	675	17.0	14.0	C	0.274
18-Jun-91	169	1148	106	17.0	14.0	C	1.085
20-Jun-91	171	1163	629		14.0	D	0.512
21-Jun-91	172	1176	121	17.0	13.0	D	0.454
24-Jun-91	175	1201	71	22.0	20.0	B	0.128
26-Jun-91	177	1236	648	17.0	14.0	A	0.624
27-Jun-91	178	1264	660	10.0	4.0	B	0.594
28-Jun-91	179	1262	172	17.0	14.0	B	1.119
01-Jul-91	182	1280	628	17.0	14.0	B	0.094
02-Jul-91	183	1291	878	17.0	12.0	A	0.272
03-Jul-91	184	1295	632	17.0	14.0	D	0.707
08-Jul-91	189	1335	775	17.0	15.0	D	0.636
09-Jul-91	190	1343	925	17.0	14.0	A	0.443
10-Jul-91	191	1357	800	17.0	14.0	A	0.310
11-Jul-91	192	1373	169	12.0	14.0	D	0.609
12-Jul-91	193	1371	618	17.0	14.0	D	0.688
15-Jul-91	196	1403	762	18.0	14.0	C	1.515
16-Jul-91	197	1416	666	17.0	12.0	B	0.975
17-Jul-91	198	1444	68	19.0	16.0	B	0.286
17-Jul-91	198	1450	927	19.0	18.0	A	0.305
18-Jul-91	199	1454	684	17.0	14.0	C	0.675
22-Jul-91	203	1483	871	17.0	14.0	D	0.325

TABLE C-5. SUMMARY OF THE 1991 NMOC DATA FOR PALM BEACH, FL (PBFL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
24-Jul-91	205	1512	651	18.0	14.0	C	0.463
24-Jul-91	205	1528	618	17.0	14.0	C	0.556
25-Jul-91	206	1539	146	19.0	16.0	C	0.711
25-Jul-91	206	1540	674	19.0	16.0	A	0.713
26-Jul-91	207	1546	864	17.0	12.0	D	0.758
29-Jul-91	210	1558	789	19.0	15.0	C	0.591
30-Jul-91	211	1569	305	17.0	14.0	B	0.690
31-Jul-91	212	1586	84	17.0	14.0	A	0.732
01-Aug-91	213	1596	927	17.0	14.0	C	0.776
02-Aug-91	214	1618	658	19.0	16.0	A	0.496
02-Aug-91	214	1619	400	19.0	16.0	B	0.292
05-Aug-91	217	1624	689	19.0	16.0	D	0.625
06-Aug-91	218	1647	638	17.0	14.5	C	0.745
07-Aug-91	219	1663	301	17.0	14.0	A	0.248
08-Aug-91	220	1676	870	17.0	13.0	C	0.868
09-Aug-91	221	1692	108	17.0	14.0	D	0.670
12-Aug-91	224	1711	673	18.0	15.0	A	0.624
13-Aug-91	225	1729	899	17.0	14.0	D	0.510
14-Aug-91	226	1747	82	20.0	16.0	B	0.819
14-Aug-91	226	1750	649	20.0	16.0	A	0.840
15-Aug-91	227	1766	681	17.0	14.0	A	0.682
16-Aug-91	228	1781	871	17.0	14.0	C	0.411
19-Aug-91	231	1787	49		14.0	D	0.345
20-Aug-91	232	1814	30	17.0	13.0	D	0.389
21-Aug-91	233	1822	309	17.0	14.0	D	0.589
22-Aug-91	234	1833	800	17.0	14.0	D	0.369
23-Aug-91	235	1855	678	17.0	13.0	B	0.658
26-Aug-91	238	1861	634	20.0	17.0	A	0.491
26-Aug-91	238	1862	723	20.0	16.0	C	0.477
27-Aug-91	239	1883	165	17.0	13.0	C	0.862
28-Aug-91	240	1896	82	17.0	14.0	D	0.266
29-Aug-91	241	1906	662	17.0	14.0	D	0.606
30-Aug-91	242	1932	621	17.0	14.0	B	0.468

TABLE C-5. SUMMARY OF THE 1991 NMOC DATA FOR PALM BEACH, FL (PBFL)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Sep-91	246	1935	872	19.0	15.0	B	0.366
04-Sep-91	247	1951	84	11.0	10.0	A	0.356
04-Sep-91	247	1952	713	16.0	13.0	B	0.335
05-Sep-91	248	1977	71	18.0	14.0	A	0.202
06-Sep-91	249	1996	718	16.0	12.0	C	0.310
09-Sep-91	252	1986	871	17.0	14.0	C	0.220
10-Sep-91	253	2010	149	18.0	17.0	B	0.492
11-Sep-91	254	2027	875	19.0	14.0	A	0.435
12-Sep-91	255	2043	775	16.0	17.0	B	1.223
13-Sep-91	256	2059	406	18.0	14.0	D	0.749
16-Sep-91	259	2066	872	17.0	14.0	D	0.241
17-Sep-91	260	2087	656	16.0	12.0	D	0.377
18-Sep-91	261	2096	823	18.0	14.0	B	0.363
19-Sep-91	262	2114	695	19.0	16.0	B	0.964
19-Sep-91	262	2115	170	19.0	16.0	A	0.960
20-Sep-91	263	2135	35	17.0	13.0	B	0.700
23-Sep-91	266	2137	698	17.0	14.0	C	0.799
24-Sep-91	267	2158	764	17.0	13.0	D	0.682
25-Sep-91	268	2175	143	18.0	12.0	A	0.550
26-Sep-91	269	2199	807	17.0	13.0	C	0.290
27-Sep-91	270	2217	677	17.0	13.0	A	0.353

Plainfield, NJ
1991 NMOC Program - PLNJ

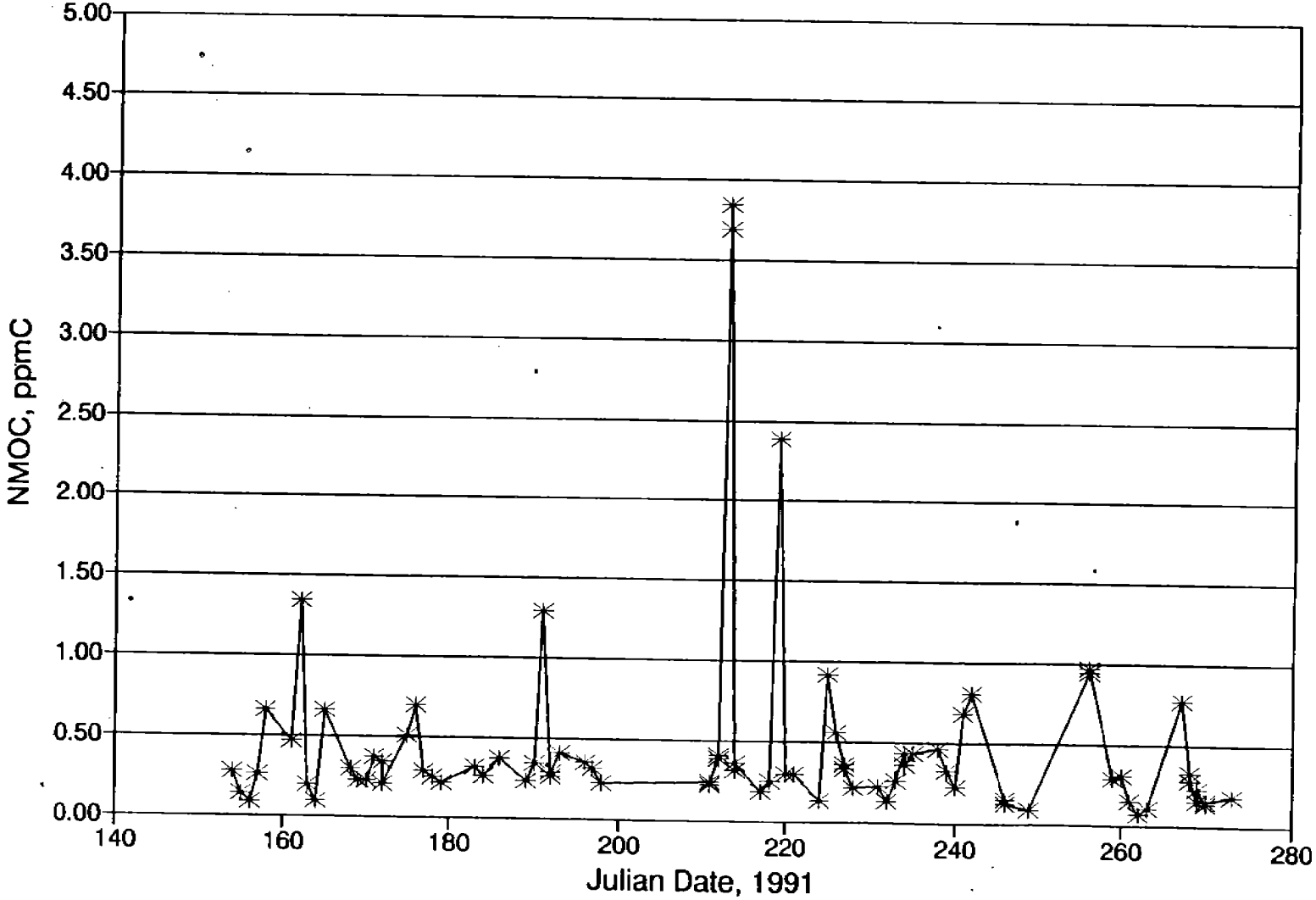


TABLE C-6. SUMMARY OF THE 1991 NMOC DATA FOR PLAINFIELD, NJ (PLNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Jun-91	154	1021	928	21.0	20.0	C	0.280
04-Jun-91	155	1022	618	31.1	20.0	B	0.141
05-Jun-91	156	1018	106	21.0	18.0	C	0.091
06-Jun-91	157	1019	638	22.1	20.0	A	0.259
07-Jun-91	158	1078	678	22.0	20.0	C	0.659
10-Jun-91	161	1077	400	20.7	18.0	D	0.470
11-Jun-91	162	1068	43	22.0	8.0	B	1.347
12-Jun-91	163	1066	500	20.0	18.0	A	0.200
13-Jun-91	164	1137	868	19.9	16.5	D	0.100
14-Jun-91	165	1136	630	22.0	20.0	C	0.664
17-Jun-91	168	1183	666	21.0	19.0	A	0.296
18-Jun-91	169	1180	638	21.9	19.0	B	0.226
19-Jun-91	170	1181	74	20.7	18.0	C	0.228
20-Jun-91	171	1182	649	21.5	19.0	D	0.368
21-Jun-91	172	1196	80	19.9	17.0	B	0.340
21-Jun-91	172	1197	112	19.9	17.0	A	0.204
24-Jun-91	175	1239	28	20.6	19.0	D	0.506
25-Jun-91	176	1265	723	21.8	20.0	C	0.700
26-Jun-91	177	1242	171	20.3	18.0	C	0.283
27-Jun-91	178	1252	162	20.7	20.0	D	0.249
28-Jun-91	179	1275	838	20.4	19.0	C	0.213
02-Jul-91	183	1305	765	20.5	18.0	D	0.319
03-Jul-91	184	1298	500	20.2	17.0	B	0.264
05-Jul-91	186	1322	68	20.0	18.0	A	0.372
08-Jul-91	189	1334	870	20.0	18.0	C	0.236
09-Jul-91	190	1377	803	20.7	19.0	D	0.339
10-Jul-91	191	1379	794	20.2	12.0	B	1.288
11-Jul-91	192	1386	924	18.0	16.0	C	0.256
11-Jul-91	192	1387	780	18.0	16.0	D	0.283
12-Jul-91	193	1441	833	18.2	14.0	A	0.407
15-Jul-91	196	1448	676	18.2	18.0	A	0.352
16-Jul-91	197	1437	137	18.7	16.0	B	0.318
17-Jul-91	198	1438	842	20.7	18.0	D	0.220

TABLE C-6. SUMMARY OF THE 1991 NMOC DATA FOR PLAINFIELD, NJ (PLNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
30-Jul-91	211	1602	91	20.2	18.0	A	0.246
30-Jul-91	211	1603	649	20.2	18.0	B	0.226
31-Jul-91	212	1605	54	19.8	18.0	A	0.410
31-Jul-91	212	1606	686	19.8	18.0	D	0.387
01-Aug-91	213	1641	717	21.8	20.0	D	3.690
01-Aug-91	213	1642	66	21.8	17.0	A	3.842
02-Aug-91	214	1643	671	20.6	19.0	C	0.313
02-Aug-91	214	1644	690	20.6	19.0	D	0.359
05-Aug-91	217	1678	632	19.5	18.0	C	0.188
06-Aug-91	218	1681	885	20.0	18.0	B	0.247
07-Aug-91	219	1689	143	18.2	12.0	A	2.386
08-Aug-91	220	1691	309	20.0	18.0	A	0.292
09-Aug-91	221	1690	38	20.8	18.0	D	0.294
12-Aug-91	224	1724	793	19.5	18.0	D	0.130
13-Aug-91	225	1725	618	21.1	20.0	D	0.919
14-Aug-91	226	1756	50	21.4	20.0	B	0.560
15-Aug-91	227	1759	825	19.6	18.0	D	0.356
15-Aug-91	227	1760	874	19.6	18.0	C	0.338
16-Aug-91	228	1807	807	20.3	19.0	B	0.211
19-Aug-91	231	1804	27	21.3	20.0	C	0.221
20-Aug-91	232	1844	629	20.8	20.0	D	0.132
21-Aug-91	233	1843	860	20.0	19.0	C	0.258
22-Aug-91	234	1849	842	20.0	17.0	A	0.429
22-Aug-91	234	1850	54	20.0	18.0	D	0.359
23-Aug-91	235	1892	60	19.9	20.0	A	0.432
26-Aug-91	238	1895	409	15.1	13.0	B	0.460
27-Aug-91	239	1897	885	20.1	18.0	A	0.328
28-Aug-91	240	1886	151	19.8	17.0	B	0.220
29-Aug-91	241	1916	146		14.0	D	0.677
30-Aug-91	242	1976	825	21.0	20.0	B	0.809
03-Sep-91	246	1968	788	19.9	18.0	A	0.154
03-Sep-91	246	1969	162	19.9	18.0	B	0.119
06-Sep-91	249	2123	685		14.0	A	0.084

TABLE C-6. SUMMARY OF THE 1991 NMOC DATA FOR PLAINFIELD, NJ (PLNJ)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
13-Sep-91	256	2072	676	20.7	18.0	A	0.943
13-Sep-91	256	2073	924	20.7	18.0	B	0.970
16-Sep-91	259	2117	49	20.8	18.0	A	0.288
17-Sep-91	260	2105	800	20.3	18.0	C	0.307
18-Sep-91	261	2156	150	19.8	17.0	C	0.152
19-Sep-91	262	2160	75	20.2	18.0	C	0.068
20-Sep-91	263	2119	45	22.0		B	0.109
24-Sep-91	267	2152	121	21.3	19.0	D	0.770
25-Sep-91	268	2202	681	20.7	18.0	A	0.326
25-Sep-91	268	2203	684	20.7	18.0	B	0.281
26-Sep-91	269	2197	269	20.0	17.0	B	0.153
26-Sep-91	269	2198	626	20.0	3.0	D	0.226
27-Sep-91	270	2220	162	20.2	18.0	A	0.131
27-Sep-91	270	2221	780	20.2	18.0	A	0.155
30-Sep-91	273	2215	302	19.6	18.0	B	0.179

Raleigh, NC
1991 NMOC Program - R1NC

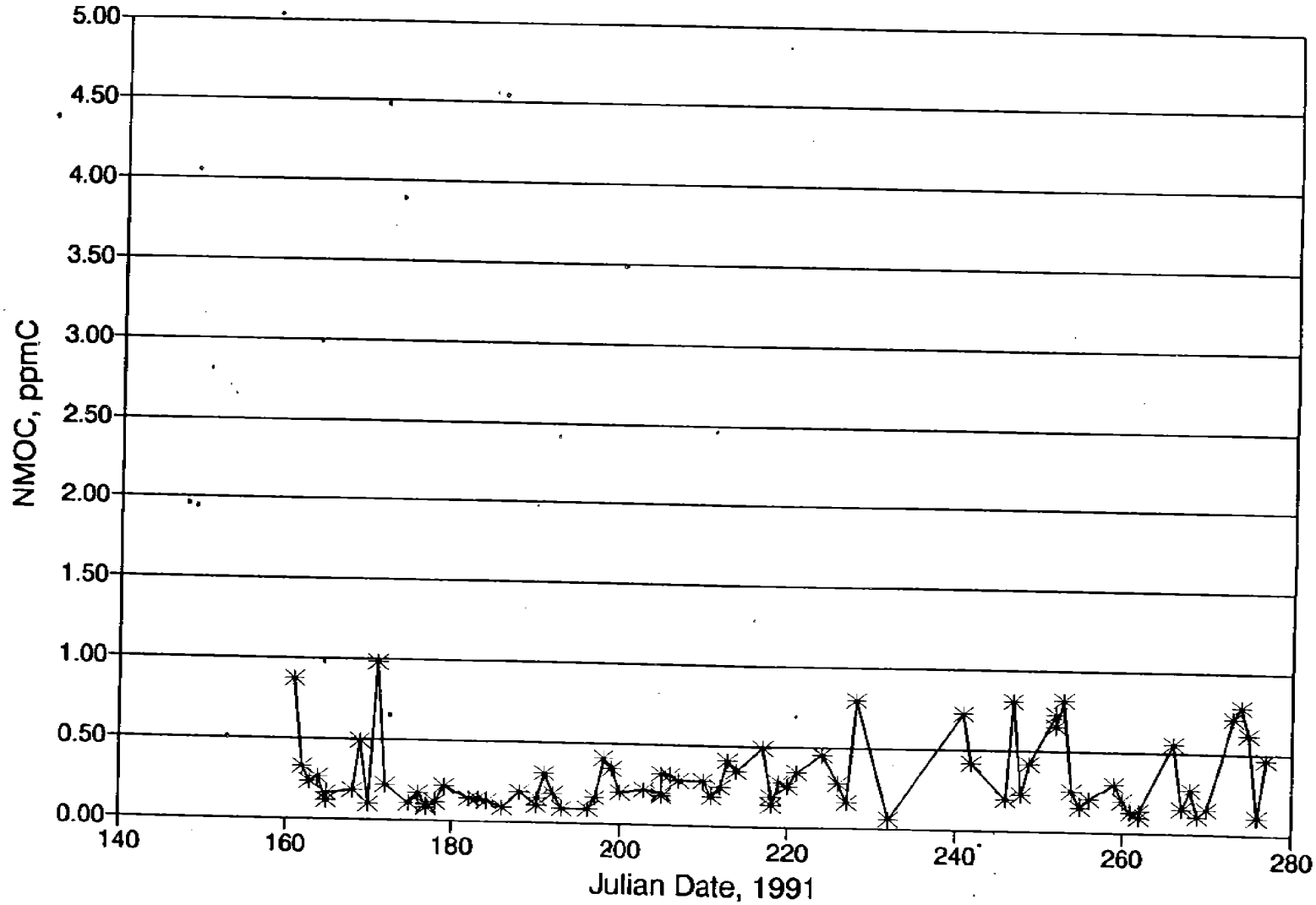


TABLE C-7. SUMMARY OF THE 1991 NMOC DATA FOR RALEIGH, NC (R1NC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
10-Jun-91	161	1064	84	12.0	14.0	B	0.872
11-Jun-91	162	1065	27	12.0	14.0	A	0.324
12-Jun-91	163	1109	68	14.0	14.0	C	0.237
13-Jun-91	164	1112	71	12.5	16.0	C	0.257
14-Jun-91	165	1111	658	16.5	17.0	A	0.111
14-Jun-91	165	1113	776	16.5	8.5	D	0.162
17-Jun-91	168	1110	165	14.0	14.0	D	0.179
18-Jun-91	169	1151	104	14.0	15.0	C	0.485
19-Jun-91	170	1153	113	14.0	15.0	D	0.098
20-Jun-91	171	1152	870	15.0	15.0	D	0.983
21-Jun-91	172	1206	20	14.0	14.0	A	0.214
24-Jun-91	175	1203	143	16.0	14.0	C	0.103
25-Jun-91	176	1207	764		16.0	A	0.169
26-Jun-91	177	1204	833	19.0	20.0	B	0.095
26-Jun-91	177	1205	823	18.0	20.0	D	0.077
27-Jun-91	178	1269	309	15.0	15.0	B	0.111
28-Jun-91	179	1270	666	15.5	16.0	A	0.217
01-Jul-91	182	1272	618	16.0	14.0	A	0.143
02-Jul-91	183	1271	777		14.0	B	0.142
03-Jul-91	184	1327	104	14.0	14.0	B	0.120
05-Jul-91	186	1323	17	14.0	16.0	D	0.084
07-Jul-91	188	1324	638	15.0	16.0	D	0.190
09-Jul-91	190	1325	707	19.0	20.0	C	0.106
09-Jul-91	190	1326	796	19.0	20.0	A	0.155
10-Jul-91	191	1397	111	14.0	15.0	D	0.307
11-Jul-91	192	1398	671	16.0	16.0	C	0.181
12-Jul-91	193	1399	667	15.0	16.0	A	0.089
15-Jul-91	196	1396	146	15.0	15.0	D	0.090
16-Jul-91	197	1395	500	15.5	16.0	B	0.162
17-Jul-91	198	1478	629	16.0	16.0	A	0.410
18-Jul-91	199	1477	793	15.0	14.0	C	0.345
19-Jul-91	200	1476	860	15.0	15.0	A	0.196
22-Jul-91	203	1472	899	34.0	34.0	B	0.213

TABLE C-7. SUMMARY OF THE 1991 NMOC DATA FOR RALEIGH, NC (R1NC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
23-Jul-91	205	1474	112	15.0	14.0	C	0.199
24-Jul-91	205	1517	695	18.0	18.0	C	0.180
24-Jul-91	205	1519	87	18.0	18.0	D	0.319
25-Jul-91	206	1518	169	14.0	14.0	A	0.310
26-Jul-91	207	1584	675	16.0	16.0	A	0.276
29-Jul-91	210	1582	723	18.0	18.0	B	0.276
30-Jul-91	211	1580	172	14.0	13.0	B	0.181
31-Jul-91	212	1581	660	16.0	16.0	A	0.240
01-Aug-91	213	1583	50	16.0	15.0	D	0.405
02-Aug-91	214	1661	130	16.0	16.0	D	0.342
05-Aug-91	217	1660	629	18.0	18.0	C	0.486
06-Aug-91	218	1656	844	18.0	20.0	C	0.186
06-Aug-91	218	1657	925	18.0	20.0	B	0.129
07-Aug-91	219	1659	51	16.0	16.0	D	0.279
08-Aug-91	220	1658	135	16.0	16.0	A	0.254
09-Aug-91	221	1719	150	16.0	16.0	D	0.341
12-Aug-91	224	1721	702	19.0	19.0	B	0.456
14-Aug-91	226	1720	53	16.0	15.0	A	0.282
15-Aug-91	227	1739	302	19.0	19.0	B	0.163
16-Aug-91	228	1738	675	16.5	16.0	A	0.802
20-Aug-91	232	1798	57	16.0	14.0	B	0.056
29-Aug-91	241	1923	667	16.5	17.0	A	0.726
30-Aug-91	242	1921	37	15.5	15.0	B	0.415
03-Sep-91	246	1922	666	18.0	18.0	C	0.195
04-Sep-91	247	1984	35	16.0	15.0	B	0.812
05-Sep-91	248	1981	129	16.0	15.0	C	0.224
06-Sep-91	249	1982	400	16.0	15.0	A	0.412
09-Sep-91	252	1979	854	20.0	20.0	A	0.723
09-Sep-91	252	1980	842	20.0	20.0	B	0.656
10-Sep-91	253	1983	500	16.0	16.0	A	0.813
11-Sep-91	254	2033	678	16.0	14.0	A	0.253
12-Sep-91	255	2032	119	16.0	14.0	C	0.149
13-Sep-91	256	2034	31	15.0		B	0.205

TABLE C-7. SUMMARY OF THE 1991 NMOC DATA FOR RALEIGH, NC (R1NC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
16-Sep-91	259	2064	83	16.0	15.0	C	0.293
17-Sep-91	260	2063	652	16.0	16.0	A	0.196
18-Sep-91	261	2146	812	26.0	26.0	C	0.125
19-Sep-91	262	2148	40	18.0	19.0	D	0.096
19-Sep-91	262	2149	30	18.0	19.0	C	0.133
23-Sep-91	266	2150	762	17.0	17.0	D	0.549
24-Sep-91	267	2147	683	16.0	16.0	D	0.151
25-Sep-91	268	2151	838	15.0	15.0	D	0.266
26-Sep-91	269	2196	723	16.0	16.0	C	0.102
27-Sep-91	270	2194	707	16.0	15.0	D	0.155
30-Sep-91	273	2236	57	16.0	16.0	D	0.714
01-Oct-91	274	2234	113	15.0	15.0	B	0.786
02-Oct-91	275	2233	628	16.0	16.0	A	0.620
03-Oct-91	276	2235	673	16.0	16.0	A	0.102
04-Oct-91	277	2232	129	15.5	15.0	C	0.461

Winston Salem, NC
1991 NMOC Program - WSNC

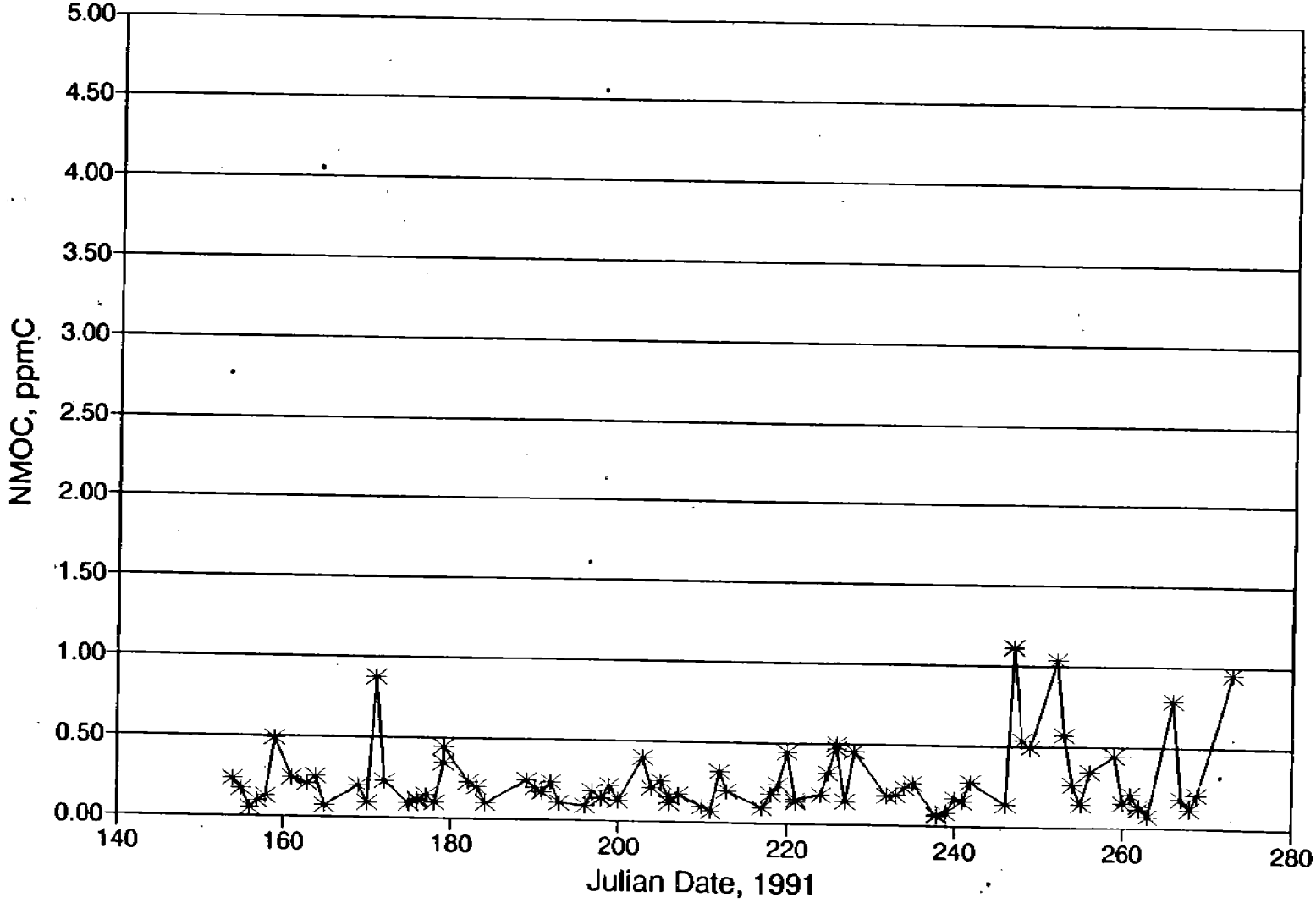


TABLE C-8. SUMMARY OF THE 1991 NMOC DATA FOR WINSTON SALEM, NC (WSNC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
03-Jun-91	154	1000	724	13.0	13.0	C	0.237
04-Jun-91	155	1009	309	12.4	12.0	C	0.166
05-Jun-91	156	1015	626	13.0	13.0	D	0.050
06-Jun-91	157	1033	711	13.0	12.0	B	0.095
07-Jun-91	158	1041	927	14.0	14.0	C	0.122
10-Jun-91	159	1052	762	14.0	12.0	D	0.485
11-Jun-91	161	1074	35	13.4	12.0	B	0.238
12-Jun-91	163	1070	837	13.0	14.0	A	0.209
13-Jun-91	164	1103	724	13.0	14.0	B	0.251
14-Jun-91	165	1096	828	12.0	12.0	C	0.066
18-Jun-91	169	1140	137	12.0	12.0	A	0.196
19-Jun-91	170	1149	719	13.0	14.0	C	0.087
20-Jun-91	171	1161	178	13.0	13.0	A	0.874
21-Jun-91	172	1185	165	13.0	12.0	A	0.224
24-Jun-91	175	1202	118	12.0	12.0	A	0.083
25-Jun-91	176	1214	37	14.0	14.0	A	0.111
25-Jun-91	176	1222	632	14.0	14.0	C	0.104
26-Jun-91	177	1226	176	13.0	13.5	D	0.141
27-Jun-91	178	1250	667	13.0	14.0	C	0.095
28-Jun-91	179	1255	842	13.0	15.0	C	0.346
28-Jun-91	179	1256	828	14.0	15.0	D	0.446
01-Jul-91	182	1253	864	13.0	14.0	A	0.219
02-Jul-91	183	1288	623	14.0	14.0	D	0.197
03-Jul-91	184	1308	626	13.0	14.0	D	0.092
08-Jul-91	189	1316	130	13.0	14.0	B	0.246
09-Jul-91	190	1336	302	13.0	14.0	A	0.199
10-Jul-91	191	1362	723	13.0	14.0	C	0.168
11-Jul-91	192	1372	400	13.0	13.0	C	0.234
12-Jul-91	193	1384	864	13.0	14.0	D	0.103
15-Jul-91	196	1408	900	13.0	13.0	B	0.089
16-Jul-91	197	1420	178	13.0	12.0	D	0.177
17-Jul-91	198	1440	634	14.0	14.0	A	0.131
17-Jul-91	198	1449	17	14.0	14.0	B	0.142

TABLE C-8. SUMMARY OF THE 1991 NMOC DATA FOR WINSTON SALEM, NC (WSNC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
18-Jul-91	199	1452	707	13.0	13.0	B	0.212
19-Jul-91	200	1467	660	13.0	13.0	B	0.125
22-Jul-91	203	1485	794	13.0	13.0	A	0.395
23-Jul-91	204	1506	20	13.0	12.0	D	0.207
24-Jul-91	205	1527	36	12.0	14.0	D	0.249
25-Jul-91	206	1541	22	13.0	12.0	B	0.150
25-Jul-91	206	1542	607	13.0	13.0	D	0.111
26-Jul-91	207	1550	106	12.0	11.0	D	0.170
29-Jul-91	210	1561	783	13.0	12.0	D	0.095
30-Jul-91	211	1574	899	13.0	12.0	D	0.071
31-Jul-91	212	1589	137	12.0	12.0	B	0.318
01-Aug-91	213	1593	74	12.0	13.0	C	0.194
05-Aug-91	217	1633	27	13.0	13.0	D	0.092
06-Aug-91	218	1645	30	12.0	14.0	D	0.175
07-Aug-91	219	1662	816	13.0	14.0	A	0.242
08-Aug-91	220	1684	115	13.0	12.0	C	0.439
09-Aug-91	221	1697	84	13.0	14.0	C	0.131
09-Aug-91	221	1703	792	13.0	13.0	D	0.155
12-Aug-91	224	1712	172	13.0	13.0	A	0.176
13-Aug-91	225	1735	634	13.0	14.0	C	0.317
14-Aug-91	226	1743	113	13.0	14.0	A	0.497
14-Aug-91	226	1745	71	13.0	14.0	C	0.472
15-Aug-91	227	1755	37	12.0	12.0	A	0.144
16-Aug-91	228	1773	875	12.0	13.0	D	0.456
20-Aug-91	232	1811	695	13.0	12.0	A	0.174
21-Aug-91	233	1810	170	12.0	12.0	D	0.184
22-Aug-91	234	1835	685	13.0	13.0	C	0.231
23-Aug-91	235	1853	129	12.0	12.0	C	0.263
26-Aug-91	238	1870	121	13.0	14.0	D	0.062
26-Aug-91	238	1871	111	13.0	14.0	B	0.072
27-Aug-91	239	1882	874	12.0	12.0	C	0.075
28-Aug-91	240	1901	674	13.0	14.0	C	0.170
29-Aug-91	241	1920	777	13.0	13.0	C	0.154

TABLE C-8. SUMMARY OF THE 1991 NMOC DATA FOR WINSTON SALEM, NC (WSNC)

Sample Period: 6:00 a.m. to 9:00 a.m.

Date Sampled	Julian Date Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC
30-Aug-91	242	1913	686	13.0	14.0	C	0.265
03-Sep-91	246	1929	671	13.0	14.0	A	0.135
04-Sep-91	247	1936	705	13.0	14.0	A	1.120
04-Sep-91	247	1937	768	13.0	14.0	B	1.112
05-Sep-91	248	1956	864	12.0	12.0	B	0.534
06-Sep-91	249	1990	111	12.0	13.0	D	0.484
09-Sep-91	252	1985	914	13.0	20.0	C	1.035
10-Sep-91	253	2007	680	13.0	12.0	A	0.567
11-Sep-91	254	2021	198	12.0	13.0	D	0.262
12-Sep-91	255	2026	779	13.0	13.0	B	0.141
13-Sep-91	256	2057	301	13.0	14.0	C	0.345
16-Sep-91	259	2058	302	13.0	14.0	C	0.444
17-Sep-91	260	2065	162	13.0	13.0	B	0.152
18-Sep-91	261	2124	697	13.0	13.0	B	0.205
19-Sep-91	262	2110	680	14.0	14.0	C	0.114
19-Sep-91	262	2111	854	14.0	14.0	D	0.128
20-Sep-91	263	2122	129	13.0	12.0	A	0.069
23-Sep-91	266	2127	178	13.0	12.0	D	0.787
24-Sep-91	267	2140	874	13.0	13.0	C	0.180
25-Sep-91	268	2176	50	12.0	12.0	D	0.113
26-Sep-91	269	2169	676	13.0	13.0	B	0.203
30-Sep-91	273	2216	775	13.0	14.0	D	0.949

APPENDIX D

1991 NMOC MONITORING PROGRAM

INVALIDATED AND MISSING SAMPLES

APPENDIX D

1991 NMOC PROGRAM
VOID OR INVALIDATED SAMPLES - DATE

Site	Date	Description	Assigned
F1FL	03-Jun-91	Power surge	Equipment
F1FL	07-Jun-91	Power outage	Equipment
WSNC	17-Jun-91	No Pressure (Duplicate)	Equipment
F1FL	18-Jun-91	Unknown	Unknown
PBFL	19-Jun-91	No Pressure	Equipment
PBFL	25-Jun-91	No Pressure (Duplicate)	Equipment
LINY	26-Jun-91	Stripped solenoid	Equipment
LINY	27-Jun-91	Stripped solenoid	Equipment
PLNJ	01-Jul-91	Timer malfunctioned	Equipment
MNY	05-Jul-91	Unknown	Unknown
PBFL	05-Jul-91	Unknown	Unknown
WSNC	05-Jul-91	Can leak after receiving	Equipment
MNY	15-Jul-91	Unknown	Unknown
LINY	17-Jul-91	Unknown	Unknown
MNY	17-Jul-91	Canister leak	Equipment
PLNJ	18-Jul-91	Power failure	Equipment
PBFL	19-Jul-91	Power outage	Equipment
PLNJ	19-Jul-91	Power failure	Equipment
PLNJ	22-Jul-91	Timer malfunctioned	Equipment
PBFL	23-Jul-91	Unknown	Unknown
PLNJ	23-Jul-91	Timer malfunctioned	Equipment
PLNJ	24-Jul-91	Timer malfunctioned	Equipment
PLNJ	25-Jul-91	Timer malfunctioned	Equipment
PLNJ	26-Jul-91	Timer malfunctioned	Equipment
MNY	29-Jul-91	Unknown	Unknown
PLNJ	29-Jul-91	Timer malfunctioned (Duplicate)	Equipment
WSNC	02-Aug-91	System leak (Duplicate)	Equipment
R1NC	13-Aug-91	Power surge, timer malfunctioned	Equipment
R1NC	19-Aug-91	Timer misprogrammed	Operator
WSNC	19-Aug-91	Can valve not opened	Operator
R1NC	21-Aug-91	Canister leak	Equipment
R1NC	22-Aug-91	Timer misprogrammed	Operator
R1NC	23-Aug-91	Timer misprogrammed	Operator
R1NC	26-Aug-91	Timer misprogrammed	Operator
R1NC	27-Aug-91	Timer misprogrammed (Duplicate)	Operator

APPENDIX D

1991 NMOC PROGRAM
VOID OR INVALIDATED SAMPLES - DATE

Site	Date	Description	Assigned
WSNC	27-Aug-91	Unknown	Unknown
R1NC	28-Aug-91	Timer misprogrammed	Operator
MNY	30-Aug-91	Timer misprogrammed	Operator
PLNJ	04-Sep-91	Timer malfunctioned	Equipment
PLNJ	05-Sep-91	Timer malfunctioned	Equipment
MNY	09-Sep-91	Site closed for Jewish holiday	
PLNJ	09-Sep-91	Timer malfunctioned	Equipment
MNY	10-Sep-91	Site closed for Jewish holiday	
PLNJ	10-Sep-91	Timer malfunctioned	Equipment
MNY	11-Sep-91	Site closed for Jewish holiday	
PLNJ	11-Sep-91	Timer malfunctioned	Equipment
PLNJ	12-Sep-91	Timer malfunctioned	Equipment
MNY	18-Sep-91	Site closed for Jewish holiday	
F1FL	19-Sep-91	Canister leak	Equipment
R1NC	20-Sep-91	Timer misprogrammed	Operator
PLNJ	23-Sep-91	Unknown	Unknown
MNY	25-Sep-91	Canister leak (Duplicate)	Equipment
MNY	26-Sep-91	System leak	Equipment
MNY	27-Sep-91	System leak (Duplicate)	Equipment

APPENDIX E

PDFID INTEGRATOR PROGRAMMING INSTRUCTIONS

INTEGRATOR PROGRAMMING INSTRUCTIONS

Instructions for programming the integrators are as follows. Be sure to press **ENTER** after each key sequence.

Control Integrator

Oven Temp 90
Oven Temp Limit 405
Oven Temp ON
Oven Temp OFF
List Oven Temp
(A listing should say OvenTemp X°C Setpt 90°C Limit 405°C)
Oven Temp Initial Time 0.20
Oven Temp Initial Value 90
Oven Temp Pgrm Rate 30.00
Oven Temp Final Value 90.00
Oven Temp Final Time 4.00
Oven Temp Equil Time 1.00

Detector A ON
Signal A
Chart speed 4.00
%Offset 10
Zero
Attn 2^ 4

Run Time Annotation ON
Run Table Annotation ON
Clock Table Annotation OFF
Program Annotation OFF
Oven Temp Annotation OFF
Report Annotation OFF

Slave Integrator

Detector B ON
Signal B
Chart speed 4.00
%Offset 10
Zero
Attn 2^ 4

Run Time Annotation ON
Run Table Annotation ON
Clock Table Annotation OFF
Program Annotation OFF
Oven Temp Annotation OFF
(should say ***Warning***Oven Temp now owned by Chnl 2)
Report Annotation OFF

INTEGRATOR PROGRAMMING INSTRUCTIONS (Continued)

Control Integrator

Oven Temp Annotation OFF
(should say ***Warning***Oven Temp now owned by Chnl 1)
Run Time 0.01 Intg OFF
Run Time 0.01 Valve 5 ON
Run Time 0.01 Page
Run Time 0.02 List Attn2^
Run Time 0.04 Oven Temp ON
Run Time 0.20 Valve 2 ON
Run Time 0.21 Valve 2 OFF
Run Time 0.22 Intg ON
Run Time 0.23 Set BL
Run Time 0.23 List Intg
Rum Time 1.87 Set BL
Run Time 1.88 Intg OFF
Run Time 1.89 List Intg
Run Time 1.90 Chart Spped 1.5
Run Time 3.44 Valve 2 ON
Run Time 3.45 Valve 2 OFF
Run Time 3.46 Valve 2 ON
Run Time 3.47 Valve 2 OFF
Run Time 3.48 Valve 2 ON
Run Time 3.49 Valve 2 OFF
Run Time 3.50 STOP

Slave Integrator

Run Time 0.01 Intg OFF
Run Time 0.01 Page
Run Time 0.02 List Attn2^
Run Time 0.22 Intg ON
Run Time 0.23 Set BL
Run Time 0.23 List Intg
Rum Time 1.87 Set BL
Run Time 1.88 Intg OFF
Run Time 1.89 List Intg
Run Time 1.90 Chart Spped 1.5
Run Time 3.50 STOP

Control Integrator

Det 1 Temp 250
Det 1 Temp Limit 405
Inj 1 Temp 31
Inj 1 Temp Limit 405
Aux 1 Temp 90
Aux 1 Temp Limit 405
Flow A 30
Flow A Limit 500

INTEGRATOR PROGRAMMING INSTRUCTIONS (Continued)

Slave Integrator

Flow B 30
Flow B Limit 500

Control Integrator

Valve 1 OFF
Valve 2 OFF
Valve 3 OFF
Valve 4 OFF
Valve 5 ON
Valve 6 OFF
Valve 7 OFF
Valve 8 OFF
Valve 9 OFF
Valve 10 OFF
Valve 11 OFF
Valve 12 OFF

Threshold 1
Peak Width 0.04

Slave Integrator

Threshold 1
Peak Width 0.04

Control Integrator

20 Valve 5 OFF
25 List Valve 5
30 Oven Temp Initial Value 30
35 Oven Temp OFF
40 Wait 2
60 Start
70 Oven Temp 90
80 Vale 5 ON

Sync ON

APPENDIX F

1991 NMOC DAILY CALIBRATION DATA

Table F-1. Daily Calibration Data Summary (Channel A)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
06/04/91	155	3.495	3.495	0.000955	0.000955	0.000273	0.000273	0.000000	0.000000
06/05/91	156	3.345	3.345	0.000905	0.000905	0.000271	0.000271	0.000000	0.000000
06/06/91	157	3.360	3.685	0.000897	0.001035	0.000267	0.000281	-0.000014	-5.229151
06/07/91	158	0.855	10.685	0.000230	0.002823	0.000269	0.000264	0.000005	1.796053
06/10/91	161	1.450	3.230	0.000387	0.000876	0.000267	0.000271	-0.000004	-1.572907
06/11/91	162	3.095	20.225	0.000834	0.005527	0.000269	0.000273	-0.000004	-1.464304
06/12/91	163	4.370	6.175	0.001162	0.001651	0.000266	0.000267	-0.000001	-0.506360
06/13/91	164	1.892	5.065	0.000505	0.001365	0.000267	0.000270	-0.000003	-0.953594
06/14/91	165	4.015	3.400	0.001080	0.000899	0.000269	0.000265	0.000004	1.621500
06/17/91	168	18.445	9.255	0.004987	0.002556	0.000270	0.000276	-0.000006	-2.161977
06/18/91	169	4.775	3.105	0.001277	0.000831	0.000267	0.000268	-0.000000	-0.125690
06/19/91	170	5.630	3.885	0.001503	0.001045	0.000267	0.000269	-0.000002	-0.752638
06/20/91	171	7.085	2.285	0.001878	0.000615	0.000265	0.000269	-0.000004	-1.528721
06/21/91	172	6.370	5.730	0.001687	0.001570	0.000265	0.000274	-0.000009	-3.496006
06/24/91	175	6.380	5.265	0.001712	0.001486	0.000268	0.000282	-0.000014	-5.169891
06/25/91	176	8.190	5.675	0.002184	0.001535	0.000267	0.000270	-0.000004	-1.452863
06/26/92	177	2.665	2.535	0.000717	0.000688	0.000269	0.000272	-0.000002	-0.913201
06/27/91	178	3.820	7.150	0.001026	0.001920	0.000269	0.000269	0.000000	0.041955
06/28/91	179	0.365	0.365	0.000097	0.000097	0.000267	0.000267	0.000000	0.000000
07/01/91	182	4.835	2.715	0.001307	0.000737	0.000270	0.000271	-0.000001	-0.368569
07/02/91	183	5.695	6.145	0.001551	0.001659	0.000272	0.000270	0.000002	0.857966
07/03/91	184	3.675	7.495	0.000983	0.002012	0.000268	0.000268	-0.000001	-0.301257
07/05/91	186	3.325	0.485	0.000914	0.000133	0.000275	0.000275	0.000000	0.101076
07/08/91	189	3.510	3.540	0.000965	0.000973	0.000275	0.000275	0.000000	0.056209
07/09/91	190	2.070	2.070	0.000574	0.000574	0.000277	0.000277	0.000000	0.000000
07/10/91	191	6.130	4.410	0.001704	0.001195	0.000278	0.000271	0.000007	2.496840
07/11/91	192	1.825	3.990	0.000503	0.001110	0.000276	0.000278	-0.000003	-0.981426
07/12/91	193	1.395	5.275	0.000386	0.001429	0.000276	0.000271	0.000006	2.003300
07/15/91	196	3.275	3.275	0.000904	0.000896	0.000276	0.000273	0.000003	0.934939
07/16/91	197	4.225	4.770	0.001173	0.001372	0.000278	0.000288	-0.000010	-3.626310
07/17/91	198	5.630	5.390	0.001552	0.001443	0.000276	0.000268	0.000008	2.872038
07/18/91	199	1.180	5.585	0.000326	0.001580	0.000276	0.000283	-0.000007	-2.395814
07/19/91	200	3.300	1.930	0.000910	0.000522	0.000276	0.000270	0.000005	1.927846
07/22/91	203	0.900	1.465	0.000258	0.000400	0.000287	0.000273	0.000014	5.013921

Table F-1. Daily Calibration Data Summary (Channel A)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
07/23/91	204	3.810	3.005	0.001055	0.000829	0.000277	0.000276	0.000001	0.318786
07/24/91	205	4.580	0.515	0.001238	0.000141	0.000270	0.000273	-0.000003	-0.944925
07/25/91	206	3.755	5.485	0.001008	0.001533	0.000269	0.000280	-0.000011	-4.090776
07/26/91	207	3.775	5.965	0.001050	0.001738	0.000278	0.000291	-0.000013	-4.820184
07/29/91	210	3.360	2.880	0.000915	0.000788	0.000272	0.000274	-0.000001	-0.443352
07/[illegible]/91	211	4.940	6.810	0.001346	0.001869	0.000272	0.000274	-0.000002	-0.742563
07/31/91	212	3.535	4.410	0.000989	0.001230	0.000280	0.000279	0.000001	0.304828
08/01/91	213	3.550	6.230	0.000979	0.001719	0.000276	0.000276	-0.000000	-0.005806
08/02/91	214	3.985	5.760	0.001120	0.001563	0.000281	0.000271	0.000010	3.430207
08/05/91	217	5.520	5.190	0.001549	0.001449	0.000281	0.000279	0.000001	0.503415
08/06/91	218	3.405	3.405	0.000946	0.000946	0.000278	0.000278	0.000000	0.000000
08/07/91	219	2.885	2.885	0.000806	0.000806	0.000279	0.000279	0.000000	0.000000
08/08/91	220	4.240	4.240	0.001174	0.001174	0.000277	0.000277	0.000000	0.000000
08/09/91	221	3.600	3.600	0.000994	0.000994	0.000276	0.000276	0.000000	0.000000
08/12/91	224	3.780	3.780	0.001048	0.001048	0.000277	0.000277	0.000000	0.000000
08/13/91	225	6.240	6.240	0.001739	0.001739	0.000279	0.000279	0.000000	0.000000
08/14/91	226	1.270	1.270	0.000362	0.000362	0.000285	0.000285	0.000000	0.000000
08/15/91	227	2.985	2.985	0.000838	0.000838	0.000281	0.000281	0.000000	0.000000
08/16/91	228	1.280	1.280	0.000369	0.000369.	0.000288	0.000288	0.000000	0.000000
08/19/91	231	3.955	2.920	0.001125	0.000824	0.000284	0.000282	0.000002	0.718026
08/20/91	232	2.230	4.385	0.000633	0.001247	0.000284	0.000284	-0.000000	-0.169633
08/21/91	233	3.695	4.230	0.001053	0.001211	0.000285	0.000286	-0.000001	-0.459771
08/22/91	234	4.920	2.475	0.001423	0.000708	0.000289	0.000286	0.000003	1.173376
08/23/91	235	2.665	5.650	0.000768	0.001633	0.000288	0.000289	-0.000001	-0.312613
08/26/91	238	3.635	6.955	0.001031	0.001990	0.000284	0.000286	-0.000002	-0.826654
08/27/91	239	2.085	4.860	0.000596	0.001378	0.000286	0.000283	0.000003	0.880798
08/28/91	240	2.670	2.670	0.000760	0.000760	0.000285	0.000285	0.000000	0.000000
08/29/91	241	6.175	4.960	0.001747	0.001422	0.000283	0.000287	-0.000004	-1.336185
08/30/91	242	5.420	2.125	0.001567	0.000614	0.000289	0.000289	0.000000	0.031811
09/03/91	246	6.630	2.285	0.001890	0.000653	0.000285	0.000286	-0.000001	-0.294124
09/04/61	247	2.020	9.055	0.000567	0.002583	0.000281	0.000285	-0.000005	-1.613568
09/05/61	248	3.715	7.905	0.001027	0.002200	0.000277	0.000278	-0.000002	-0.645800
09/06/91	249	6.290	3.630	0.001785	0.001025	0.000284	0.000282	0.000001	0.433631
09/09/91	252	7.590	3.370	0.002141	0.000961	0.000282	0.000285	-0.000003	-1.056879

Table F-1. Daily Calibration Data Summary (Channel A)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
09/10/91	253	5.990	8.925	0.001717	0.002537	0.000287	0.000284	0.000002	0.841657
09/11/91.	254	2.080	2.540	0.000583	0.000713	0.000280	0.000281	-0.000000	-0.084922
09/12/91	255	3.335	0.855	0.000934	0.000238	0.000280	0.000279	0.000002	0.546148
09/13/91	256	0.890	4.535	0.000248	0.001276	0.000279	0.000281	-0.000002	-0.836534
09/16/91	259	1.630	0.245	0.000458	0.000069	0.000281	0.000281	0.000001	0.197185
09/17/91	260	2.570	4.585	0.000720	0.001284	0.000280	0.000280	0.000000	0.072791
09/18/91	261	1.755	6.525	0.000492	0.001832	0.000281	0.000281	-0.000000	-0.106180
09/19/91	262	0.610	0.875	0.000170	0.000248	0.000279	0.000283	-0.000004	-1.481946
09/20/91	263	2.400	3.945	0.000680	0.001100	0.000283	0.000279	0.000005	1.686835
09/23/91	266	5.050	5.050	0.001419	0.001419	0.000281	0.000281	0.000000	0.000000
09/24/91	267	3.320	1.265	0.000912	0.000348	0.000275	0.000275	-0.000001	-0.186095
09/25/91	268	7.210	4.875	0.001974	0.001323	0.000274	0.000271	0.000002	0.866386
09/26/91	269	3.505	2.385	0.000939	0.000655	0.000268	0.000275	-0.000007	-2.523075
09/27/91	270	1.805	4.280	0.000494	0.001241	0.000274	0.000290	-0.000016	-5.864901
09/30/91	273	7.885	1.515	0.002161	0.000418	0.000274	0.000276	-0.000002	-0.697414
10/01/91	274	1.460	5.400	0.000403	0.001486	0.000276	0.000275	0.000001	0.413873
10/02/91	275	4.430	2.775	0.001205	0.000755	0.000272	0.000272	-0.000000	-0.043991
10/03/91	276	3.440	3.105	0.000934	0.000847	0.000271	0.000273	-0.000001	-0.462722
10/04/91	277	2.130	1.665	0.000577	0.000459	0.000271	0.000276	-0.000005	-1.877170
10/07/91	280	4.125	6.280	0.001109	0.001724	0.000269	0.000274	-0.000006	-2.117916
10/08/91	281	2.580	2.220	0.000701	0.000606	0.000272	0.000273	-0.000001	-0.535894
10/09/91	282	2.715	2.715	0.000738	0.000738	0.000272	0.000272	0.000000	0.000000
10/10/91	283	2.580	2.580	0.000700	0.000700	0.000271	0.000271	0.000000	0.000000
10/11/91	284	1.430	1.430	0.000384	0.000384	0.000269	0.000269	0.000000	0.000000
10/14/91	287	4.915	1.770	0.001329	0.000488	0.000270	0.000276	-0.000005	-1.886816
10/15/91	288	1.430	5.275	0.000391	0.001453	0.000273	0.000276	-0.000002	-0.815008
10/16/91	289	2.085	3.740	0.000565	0.001014	0.000271	0.000271	0.000000	0.036128
10/17/91	290	1.430	2.455	0.000384	0.000669	0.000268	0.000272	-0.000004	-1.523438
10/18/91	291	2.070	2.070	0.000560	0.000560	0.000270	0.000270	0.000000	0.000000
10/21/91	294	3.750	0.450	0.001022	0.000122	0.000273	0.000271	0.000001	0.442262
10/22/91	295	1.240	1.240	0.000338	0.000338	0.000273	0.000273	0.000000	0.000000
10/23/91	296	0.895	0.895	0.000245	0.000245	0.000274	0.000274	0.000000	0.000000

Table F-2. Daily Calibration Data Summary (Channel B)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
06/04/91	155	3.605	3.605	0.000981	0.000981	0.000272	0.000272	0.000000	0.000000
06/05/91	156	1.130	1.130	0.000308	0.000308	0.000273	0.000273	0.000000	0.000000
06/06/91	157	2.445	2.810	0.000663	0.000803	0.000271	0.000286	-0.000014	-5.316479
06/07/91	158	0.250	3.435	0.000069	0.000924	0.000276	0.000269	0.000007	2.571970
06/10/91	161	3.715	2.020	0.001033	0.000580	0.000278	0.000287	-0.000009	-3.261762
06/11/91	162	5.615	7.670	0.001527	0.002115	0.000272	0.000276	-0.000004	-1.388114
06/12/91	163	4.090	4.860	0.001111	0.001319	0.000272	0.000271	0.000000	0.101874
06/13/91	164	1.470	0.640	0.000406	0.000175	0.000276	0.000273	0.000003	1.091911
06/14/91	165	4.105	4.895	0.001128	0.001369	0.000275	0.000280	-0.000005	-1.815224
06/17/91	168	14.470	10.605	0.004005	0.002943	0.000277	0.000278	-0.000001	-0.263034
06/18/91	169	2.155	4.505	0.000590	0.001235	0.000274	0.000274	-0.000000	-0.161160
06/19/91	170	3.240	2.335	0.000886	0.000636	0.000274	0.000273	0.000001	0.378080
06/20/91	171	4.590	1.285	0.001260	0.000353	0.000275	0.000274	0.000000	0.078225
06/21/91	172	6.395	4.330	0.001742	0.001186	0.000272	0.000274	-0.000001	-0.525899
06/24/91	175	4.870	4.540	0.001321	0.001231	0.000271	0.000271	0.000000	0.074417
06/25/91	176	5.600	3.015	0.001529	0.000812	0.000273	0.000269	0.000004	1.397716
06/26/91	177	3.325	3.080	0.000907	0.000846	0.000273	0.000275	-0.000002	-0.762464
06/27/91	178	5.010	3.585	0.001372	0.000981	0.000274	0.000274	0.000000	0.041922
06/28/91	179	0.940	0.940	0.000255	0.000255	0.000271	0.000271	0.000000	0.000000
07/01/91	182	5.920	1.910	0.001634	0.000523	0.000276	0.000274	0.000002	0.837948
07/02/91	183	5.440	3.295	0.001492	0.000905	0.000274	0.000275	-0.000001	-0.211105
07/03/91	184	2.580	5.715	0.000704	0.001571	0.000273	0.000275	-0.000002	-0.762661
07/05/91	186	1.305	2.565	0.000359	0.000704	0.000275	0.000275	0.000000	0.176190
07/08/91	189	6.765	3.090	0.001892	0.000866	0.000280	0.000280	-0.000001	-0.270059
07/09/91	190	1.635	1.635	0.000460	0.000460	0.000281	0.000281	0.000000	0.000000
07/10/91	191	4.895	5.695	0.001369	0.001583	0.000280	0.000278	0.000002	0.595878
07/11/91	192	2.855	0.780	0.000800	0.000223	0.000280	0.000286	-0.000006	-1.968134
07/12/91	193	1.770	5.585	0.000498	0.001563	0.000281	0.000280	0.000002	0.556723
07/15/91	196	3.235	3.235	0.000905	0.000904	0.000280	0.000280	0.000000	0.093346
07/16/91	197	4.770	2.690	0.001349	0.000785	0.000283	0.000292	-0.000009	-3.253731
07/17/91	198	4.860	7.345	0.001352	0.002038	0.000278	0.000278	0.000001	0.215720
07/18/91	199	0.630	2.580	0.000176	0.000724	0.000280	0.000281	-0.000000	-0.178316

Table F-2. Daily Calibration Data Summary (Channel B)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
07/19/91	200	3.500	2.775	0.000980	0.000770	0.000280	0.000278	0.000002	0.810424
07/22/91	203	1.035	3.975	0.000301	0.001105	0.000291	0.000278	0.000013	4.327538
07/23/91	204	0.370	5.670	0.000105	0.001595	0.000283	0.000281	0.000002	0.698447
07/24/91	205	3.120	3.290	0.000866	0.000905	0.000277	0.000275	0.000002	0.855446
07/25/91	206	4.285	3.990	0.001176	0.001130	0.000274	0.000283	-0.000009	-3.263170
07/26/91	207	3.605	6.270	0.001011	0.001848	0.000280	0.000295	-0.000014	-5.095550
07/29/91	210	2.425	2.670	0.000673	0.000736	0.000277	0.000276	0.000002	0.582481
07/30/91	211	4.405	1.625	0.001222	0.000449	0.000277	0.000276	0.000001	0.305951
07/31/91	212	2.745	1.675	0.000786	0.000478	0.000286	0.000286	0.000001	0.193853
08/01/91	213	2.410	1.435	0.000675	0.000404	0.000280	0.000281	-0.000001	-0.469391
08/02/91	214	3.210	2.800	0.000901	0.000786	0.000281	0.000281	-0.000000	-0.023356
08/05/91	217	5.540	4.050	0.001589	0.001144	0.000287	0.000282	0.000004	1.531526
08/06/91	218	1.660	1.660	0.000467	0.000467	0.000282	0.000282	0.000000	0.000000
08/07/91	219	4.055	4.055	0.001157	0.001157	0.000285	0.000285	0.000000	0.000000
08/08/91	220	2.050	2.050	0.000579	0.000579	0.000282	0.000282	0.000000	0.000000
08/09/91	221	2.505	2.505	0.000703	0.000703	0.000281	0.000281	0.000000	0.000000
8/12/91	224	1.615	1.615	0.000456	0.000456	0.000282	0.000282	0.000000	0.000000
8/13/91	225	5.420	5.420	0.001548	0.001548	0.000286	0.000286	0.000000	0.000000
8/14/91	226	0.910	0.910	0.000263	0.000263	0.000289	0.000289	0.000000	0.000000
8/15/91	227	1.645	1.645	0.000474	0.000474	0.000288	0.000288	0.000000	0.000000
8/16/91	228	0.705	0.705	0.000208	0.000208	0.000295	0.000295	0.000000	0.000000
8/19/91	231	0.915	0.885	0.000264	0.000256	0.000289	0.000289	-0.000000	-0.112755
8/20/91	232	3.395	1.570	0.000981	0.000454	0.000289	0.000289	-0.000000	-0.055275
8/21/91	233	4.555	2.945	0.001324	0.000854	0.000291	0.000290	0.000001	0.226715
8/22/91	234	1.195	6.085	0.000348	0.001765	0.000292	0.000290	0.000002	0.533801
8/23/91	235	1.845	5.390	0.000541	0.001562	0.000293	0.000290	0.000003	1.182028
8/26/91	238	1.895	4.740	0.000557	0.001378	0.000294	0.000291	0.000003	1.105221
8/27/91	239	1.465	6.695	0.000421	0.001932	0.000287	0.000289	-0.000001	-0.474584
8/28/91	240	3.020	3.020	0.000874	0.000874	0.000289	0.000289	0.000000	0.000000
8/29/91	241	2.915	7.490	0.000833	0.002144	0.000286	0.000286	-0.000000	-0.121639
8/30/91	242	6.420	3.825	0.001842	0.001097	0.000287	0.000287	0.000000	0.024860
9/3/91	246	4.190	3.695	0.001200	0.001072	0.000286	0.000290	-0.000004	-1.305099

Table F-2. Daily Calibration Data Summary (Channel B)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
9/4/91	247	2.250	12.035	0.000644	0.003421	0.000286	0.000284	0.000002	0.625284
9/5/91	248	1.350	6.865	0.000383	0.001943	0.000283	0.000283	0.000000	0.131980
9/6/91	249	7.310	3.630	0.002081	0.001046	0.000285	0.000288	-0.000003	-1.218646
9/9/91	252	5.800	4.360	0.001662	0.001254	0.000287	0.000288	-0.000001	-0.388258
9/10/91	253	5.180	4.895	0.001478	0.001416	0.000285	0.000289	-0.000004	-1.380164
9/11/91	254	1.085	4.980	0.000307	0.001412	0.000283	0.000283	-0.000001	-0.288726
9/12/91	255	5.380	3.350	0.001513	0.000944	0.000281	0.000282	-0.000001	-0.233180
9/13/91	256	2.385	4.695	0.000669	0.001328	0.000281	0.000283	-0.000002	-0.827040
9/16/91	259	5.045	0.210	0.001429	0.000059	0.000283	0.000281	0.000002	0.704039
9/17/91	260	3.480	5.255	0.000982	0.001493	0.000282	0.000284	-0.000002	-0.668856
9/18/91	261	2.685	5.070	0.000760	0.001441	0.000283	0.000284	-0.000001	-0.434678
9/19/91	262	3.975	0.300	0.001136	0.000084	0.000286	0.000280	0.000006	2.021485
9/20/91	263	1.985	6.265	0.000558	0.001782	0.000281	0.000284	-0.000003	-1.133423
9/23/91	266	5.350	5.350	0.001481	0.001481	0.000277	0.000277	0.000000	0.000000
9/24/91	267	1.835	7.795	0.000526	0.002166	0.000287	0.000278	0.000009	3.139053
9/25/91	268	4.200	6.595	0.001164	0.001802	0.000277	0.000273	0.000004	1.436287
9/26/91	269	1.535	1.425	0.000419	0.000395	0.000273	0.000277	-0.000004	-1.418258
9/27/91	270	0.500	6.420	0.000136	0.001804	0.000273	0.000281	-0.000008	-2.940290
9/30/91	273	6.260	4.595	0.001726	0.001271	0.000276	0.000277	-0.000001	-0.337725
10/1/91	274	2.315	7.070	0.000633	0.001979	0.000273	0.000280	-0.000006	-2.343404
10/2/91	275	0.875	0.650	0.000240	0.000178	0.000274	0.000274	0.000001	0.301203
10/3/91	276	2.175	1.020	0.000600	0.000281	0.000276	0.000275	0.000000	0.142117
10/4/91	277	0.335	1.310	0.000092	0.000364	0.000276	0.000278	-0.000002	-0.695947
10/7/91	280	0.970	7.570	0.000265	0.002102	0.000273	0.000278	-0.000005	-1.704441
10/8/91	281	5.095	4.190	0.001387	0.001156	0.000272	0.000276	-0.000004	-1.311290
10/9/91	282	1.260	1.260	0.000346	0.000346	0.000274	0.000274	0.000000	0.000000
10/10/91	283	5.475	5.475	0.001485	0.001485	0.000271	0.000271	0.000000	0.000000
10/11/91	284	4.975	4.975	0.001351	0.001351	0.000272	0.000272	0.000000	0.000000
10/14/91	287	7.180	3.570	0.001944	0.000988	0.000271	0.000277	-0.000006	-2.166470
10/15/91	288	0.400	3.405	0.000110	0.000944	0.000276	0.000277	-0.000001	-0.397666
10/16/91	289	3.365	6.005	0.000913	0.001636	0.000271	0.000272	-0.000001	-0.395022
10/17/91	290	1.880	2.865	0.000507	0.000790	0.000270	0.000276	-0.000006	-2.196348

Table F-2. Daily Calibration Data Summary (Channel B)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
10/18/91	291	4.650	4.650	0.001267	0.001267	0.000272	0.000272	0.000000	0.000000
10/21/91	294	0.935	1.865	0.000256	0.000506	0.000274	0.000271	0.000002	0.912382
10/22/91	295	1.020	1.020	0.000279	0.000279	0.000274	0.000274	0.000000	0.000000
10/23/91	296	0.730	0.730	0.000201	0.000201	0.000275	0.000275	0.000000	0.000000

Table F-3. Daily Calibration Data Summary (Channel C)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
06/04/91	155	5.26	5.26	0.001423	0.001423	0.000271	0.000271	0.000000	0.000000
06/05/91	156	0.00	0.00	0.000000	0.000000	0.000268	0.000268	0.000000	0.000000
06/06/91	157	0.00	0.00	0.000000	0.000000	0.000267	0.000274	-0.000007	-2.775474
06/07/91	158	2.42	5.48	0.000648	0.001501	0.000268	0.000274	-0.000006	-2.061374
06/10/91	161	1.33	5.04	0.000356	0.001354	0.000269	0.000269	-0.000000	-0.038714
06/11/91	162	2.30	3.82	0.000622	0.001028	0.000271	0.000270	0.000001	0.381310
06/12/91	163	1.50	3.36	0.000401	0.000898	0.000269	0.000267	0.000001	0.524519
06/13/91	164	0.00	1.58	0.000000	0.000426	0.000270	0.000270	0.000000	0.156881
06/14/91	165	2.16	0.82	0.000580	0.000221	0.000269	0.000271	-0.000002	-0.785185
06/17/91	168	4.12	0.00	0.001098	0.000000	0.000267	0.000269	-0.000002	-0.808773
06/18/91	169	1.55	0.00	0.000414	0.000000	0.000267	0.000276	-0.000009	-3.278237
06/19/91	170	3.98	0.00	0.001065	0.000000	0.000268	0.000268	-0.000001	-0.189387
06/20/91	171	2.01	0.00	0.000533	0.000000	0.000266	0.000267	-0.000001	-0.263268
06/21/91	172	2.30	0.00	0.000609	0.000000	0.000266	0.000275	-0.000009	-3.494352
06/24/91	175	3.34	2.63	0.000880	0.000730	0.000263	0.000278	-0.000014	-5.353187
06/25/91	176	2.90	0.00	0.000774	0.000000	0.000267	0.000268	-0.000000	-0.085500
06/26/91	177	1.02	0.00	0.000271	0.000000	0.000267	0.000267	0.000000	0.008887
06/27/91	178	2.62	0.00	0.000724	0.000000	0.000277	0.000273	0.000004	1.310428
06/28/91	179	0.15	0.15	0.000039	0.000039	0.000266	0.000266	0.000000	0.000000
07/01/91	182	2.07	0.00	0.000549	0.000000	0.000265	0.000266	-0.000001	-0.321225
07/02/91	183	0.86	1.79	0.000230	0.000476	0.000268	0.000266	0.000001	0.505878
07/03/91	184	0.87	2.13	0.000231	0.000550	0.000268	0.000259	0.000009	3.298883
07/05/91	186	1.34	0.00	0.000360	0.000000	0.000269	0.000281	-0.000012	-4.630212
07/08/91	189	0.98	1.20	0.000263	0.000323	0.000268	0.000271	-0.000002	-0.805510
07/09/91	190	1.45	1.45	0.000393	0.000393	0.000271	0.000271	0.000000	0.000000
07/10/91	191	0.65	0.56	0.000177	0.000150	0.000274	0.000268	0.000006	2.057773
07/11/91	192	0.00	0.90	0.000000	0.000243	0.000270	0.000270	0.000000	0.009645
07/12/91	193	1.19	1.13	0.000324	0.000305	0.000272	0.000270	0.000002	0.596299
07/15/91	196	1.27	1.27	0.000339	0.000339	0.000268	0.000268	0.000000	0.000000
07/16/91	197	3.24	0.93	0.000871	0.000249	0.000269	0.000269	-0.000000	-0.085995
07/17/91	198	2.80	1.96	0.000751	0.000510	0.000268	0.000261	0.000007	2.632636
07/18/91	199	0.00	0.00	0.000000	0.000000	0.000268	0.000269	-0.000001	-0.418183

Table F-3. Daily Calibration Data Summary (Channel C)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
07/19/91	200	1.74	0.06	0.000466	0.000015	0.000268	0.000269	-0.000001	-0.480157
07/22/91	203	2.87	0.43	0.000767	0.000116	0.000267	0.000269	-0.000002	-0.666369
07/23/91	204	2.32	1.53	0.000623	0.000409	0.000269	0.000268	0.000000	0.100518
07/24/91	205	2.93	0.00	0.000790	0.000000	0.000270	0.000269	0.000001	0.488262
07/25/91	206	1.16	4.93	0.000312	0.001320	0.000269	0.000268	0.000001	0.478772
07/26/91	207	3.68	0.00	0.001001	0.000000	0.000273	0.000279	-0.000007	-2.464787
07/29/91	210	4.31	0.00	0.001148	0.000000	0.000267	0.000270	-0.000004	-1.369255
07/30/91	211	2.46	1.37	0.000661	0.000369	0.000269	0.000270	-0.000002	-0.692767
07/31/91	212	3.82	1.67	0.001020	0.000447	0.000267	0.000268	-0.000001	-0.369529
08/01/91	213	0.00	0.89	0.000000	0.000244	0.000272	0.000274	-0.000002	-0.750310
08/02/91	214	1.08	0.00	0.000295	0.000000	0.000273	0.000271	0.000002	0.872873
08/05/91	217	2.30	2.37	0.000629	0.000647	0.000274	0.000273	0.000001	0.467267
08/06/91	218	0.00	0.00	0.000000	0.000000	0.000272	0.000272	0.000000	0.000000
08/07/91	219	0.00	0.00	0.000000	0.000000	0.000274	0.000274	0.000000	0.000000
08/08/91	220	1.33	1.33	0.000363	0.000363	0.000273	0.000273	0.000000	0.000000
08/09/91	221	0.82	0.82	0.000222	0.000222	0.000271	0.000271	0.000000	0.000000
08/12/91	224	1.64	1.64	0.000446	0.000446	0.000273	0.000273	0.000000	0.000000
08/13/91	225	1.65	1.65	0.000450	0.000450	0.000273	0.000273	0.000000	0.000000
08/14/91	226	0.60	0.60	0.000168	0.000168	0.000279	0.000279	0.000000	0.000000
08/15/91	227	1.29	1.29	0.000354	0.000354	0.000275	0.000275	0.000000	0.000000
08/16/91	228	3.11	3.11	0.000877	0.000877	0.000282	0.000282	0.000000	0.000000
08/19/91	231	2.02	1.95	0.000567	0.000546	0.000281	0.000280	0.000002	0.545707
08/20/91	232	1.06	0.00	0.000298	0.000000	0.000281	0.000278	0.000003	1.008109
08/21/91	233	0.90	4.51	0.000250	0.001269	0.000280	0.000281	-0.000002	-0.546903
08/22/91	234	0.51	3.33	0.000142	0.000940	0.000281	0.000283	-0.000002	-0.685119
08/23/91	235	0.00	5.84	0.000000	0.001666	0.000281	0.000285	-0.000004	-1.456182
08/26/91	238	0.47	0.52	0.000131	0.000146	0.000281	0.000283	-0.000002	-0.688243
08/27/91	239	0.00	4.09	0.000000	0.001148	0.000280	0.000281	-0.000001	-0.243947
08/28/91	240	0.00	0.00	0.000000	0.000000	0.000282	0.000282	0.000000	0.000000
08/29/91	241	4.50	0.00	0.001247	0.000000	0.000277	0.000280	-0.000002	-0.884779
08/30/91	242	0.49	0.00	0.000135	0.000000	0.000279	0.000279	0.000000	0.004514
09/03/91	246	0.48	0.37	0.000133	0.000103	0.000280	0.000282	-0.000003	-0.974144

Table F-3. Daily Calibration Data Summary (Channel C)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
09/04/61	247	2.73	3.73	0.000763	0.001048	0.000279	0.000281	-0.000002	-0.708698
09/05/91	248	0.63	6.87	0.000179	0.001907	0.000284	0.000278	0.000006	2.208787
09/06/91	249	3.37	2.10	0.000946	0.000592	0.000281	0.000282	-0.000001	-0.406166
09/09/91	252	4.60	0.00	0.001288	0.000000	0.000280	0.000284	-0.000004	-1.430956
09/10/91	253	4.14	5.99	0.001159	0.001697	0.000280	0.000283	-0.000003	-1.103587
09/11/91	254	0.04	0.84	0.000010	0.000234	0.000277	0.000279	-0.000002	-0.839626
09/12/91	255	1.90	4.49	0.000528	0.001246	0.000279	0.000278	0.000001	0.394424
09/13/91	256	0.17	5.88	0.000046	0.001711	0.000276	0.000291	-0.000015	-5.460043
09/16/91	259	1.06	0.98	0.000293	0.000276	0.000277	0.000283	-0.000006	-2.138533
09/17/91	260	0.00	0.39	0.000000	0.000108	0.000275	0.000281	-0.000005	-1.993946
09/18/91	261	2.42	4.21	0.000670	0.001186	0.000277	0.000282	-0.000005	-1.889495
09/19/91	262	0.89	4.57	0.000253	0.001262	0.000285	0.000277	0.000008	2.854092
09/20/91	263	2.20	3.39	0.000609	0.000945	0.000278	0.000279	-0.000001	-0.405339
09/23/91	266	3.50	3.50	0.000973	0.000973	0.000278	0.000278	0.000000	0.000000
09/24/91	267	0.38	0.48	0.000107	0.000133	0.000282	0.000276	0.000006	2.073647
09/25/91	268	3.19	4.95	0.000871	0.001339	0.000274	0.000271	0.000003	1.066177
09/26/91	269	3.97	1.04	0.001075	0.000281	0.000271	0.000271	-0.000000	-0.130847
09/27/91	270	0.00	5.12	0.000000	0.001397	0.000273	0.000273	0.000000	0.166215
09/30/91	273	4.62	4.73	0.001245	0.001294	0.000270	0.000274	-0.000004	-1.567992
10/01/91	274	0.29	0.32	0.000078	0.000087	0.000270	0.000277	-0.000007	-2.723781
10/02/91	275	0.24	0.72	0.000065	0.000192	0.000269	0.000269	-0.000000	-0.001145
10/03/91	276	0.07	0.00	0.000018	0.000000	0.000279	0.000271	0.000008	3.003981
10/04/91	277	1.20	0.23	0.000326	0.000061	0.000271	0.000273	-0.000001	-0.489255
10/07/91	280	0.63	3.95	0.000167	0.001070	0.000267	0.000271	-0.000004	-1.658457
10/08/91	281	5.76	0.00	0.001535	0.000000	0.000266	0.000271	-0.000004	-1.670511
10/09/91	282	3.89	3.89	0.001037	0.001037	0.000267	0.000267	0.000000	0.000000
10/10/91	283	3.06	3.06	0.000814	0.000814	0.000266	0.000266	0.000000	0.000000
10/11/91	284	0.85	0.85	0.000227	0.000227	0.000267	0.000267	0.000000	0.000000
10/14/91	287	4.53	0.73	0.001207	0.000199	0.000266	0.000273	-0.000007	-2.450062
10/15/91	288	3.07	0.37	0.000824	0.000099	0.000268	0.000272	-0.000004	-1.494307
10/16/91	289	3.28	1.30	0.000872	0.000347	0.000266	0.000268	-0.000002	-0.688608
10/17/91	290	0.00	0.00	0.000000	0.000000	0.000264	0.000269	-0.000005	-2.031339

Table F-3. Daily Calibration Data Summary (Channel C)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
10/18/91	291	2.88	2.88	0.000760	0.000760	0.000264	0.000264	0.000000	0.000000
10/21/91	294	0.84	2.86	0.000222	0.000766	0.000264	0.000268	-0.000003	-1.309816
10/22/91	295	0.17	0.17	0.000044	0.000044	0.000267	0.000267	0.000000	0.000000
10/23/91	296	2.68	2.68	0.000724	0.000724	0.000270	0.000270	0.000000	0.000000
						0.000263		100	100

Table F-4. Daily Calibration Data Summary (Channel D)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
06/04/91	155	4.915	4.915	0.001319	0.001319	0.000268	0.000268	0.000000	0.000000
06/05/91	156	0.000	0.000	0.000000	0.000000	0.000268	0.000268	0.000000	0.000000
06/06/91	157	0.000	0.000	0.000000	0.000000	0.000268	0.000286	-0.000019	-6.919095
06/07/91	158	0.000	5.635	0.000000	0.001520	0.000274	0.000270	0.000004	1.376493
06/10/91	161	0.750	3.400	0.000204	0.000933	0.000272	0.000274	-0.000002	-0.815452
06/11/91	162	0.000	4.915	0.000000	0.001250	0.000273	0.000254	0.000019	6.814088
06/12/91	163	0.785	3.450	0.000212	0.000933	0.000270	0.000270	-0.000001	-0.238552
06/13/91	164	0.000	0.000	0.000000	0.000000	0.000272	0.000273	-0.000001	-0.536973
06/14/91	165	7.440	0.000	0.002019	0.000000	0.000271	0.000259	0.000012	4.430359
06/17/91	168	10.900	3.320	0.002968	0.000897	0.000272	0.000270	0.000002	0.784763
06/18/91	169	3.970	0.000	0.001064	0.000000	0.000268	0.000283	-0.000015	-5.591284
06/19/91	170	2.195	1.585	0.000589	0.000427	0.000268	0.000270	-0.000001	-0.412242
06/20/91	171	1.125	0.000	0.000302	0.000000	0.000269	0.000269	-0.000000	-0.061458
06/21/91	172	2.270	0.000	0.000605	0.000000	0.000267	0.000270	-0.000004	-1.323790
06/24/91	175	0.845	1.870	0.000226	0.000513	0.000268	0.000274	-0.000007	-2.562673
06/25/91	176	3.210	3.780	0.000858	0.001021	0.000267	0.000270	-0.000003	-1.054972
06/26/91	177	0.955	0.680	0.000258	0.000183	0.000270	0.000270	0.000000	0.002430
06/27/91	178	2.260	3.965	0.000635	0.001109	0.000281	0.000280	0.000001	0.504749
06/28/91	179	0.440	0.440	0.000118	0.000118	0.000269	0.000269	0.000000	0.000000
07/01/91	182	0.935	0.000	0.000250	0.000000	0.000268	0.000268	-0.000000	-0.185437
07/02/91	183	0.000	0.000	0.000000	0.000000	0.000269	0.000269	-0.000000	-0.050218
07/03/91	184	0.570	1.195	0.000151	0.000314	0.000265	0.000263	0.000002	0.803068
07/05/91	186	2.275	0.000	0.000602	0.000000	0.000265	0.000267	-0.000002	-0.834616
07/08/91	189	0.960	4.360	0.000263	0.001214	0.000274	0.000279	-0.000005	-1.825097
07/09/91	190	0.370	0.370	0.000101	0.000101	0.000274	0.000274	0.000000	0.000000
07/10/91	191	1.405	0.000	0.000386	0.000000	0.000275	0.000276	-0.000001	-0.433208
07/11/91	192	0.435	0.000	0.000119	0.000000	0.000273	0.000275	-0.000002	-0.590911
07/12/91	193	1.180	1.385	0.000324	0.000382	0.000274	0.000275	-0.000001	-0.459474
07/15/91	196	1.935	1.935	0.000524	0.000529	0.000271	0.000273	-0.000003	-0.927856
07/16/91	197	2.795	0.360	0.000762	0.000098	0.000273	0.000273	-0.000001	-0.322558
07/17/91	198	1.610	1.460	0.000438	0.000398	0.000272	0.000272	-0.000001	-0.199140
07/18/91	199	2.030	0.000	0.000555	0.000000	0.000273	0.000269	0.000004	1.460210

Table F-4. Daily Calibration Data Summary (Channel D)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
07/19/91	200	0.845	1.415	0.000229	0.000403	0.000272	0.000285	-0.000013	-4.877682
07/22/91	203	3.445	0.000	0.000940	0.000000	0.000273	0.000273	-0.000000	-0.121041
07/23/91	204	1.690	0.000	0.000459	0.000000	0.000272	0.000272	-0.000000	-0.019547
07/24/91	205	3.800	4.545	0.001030	0.001257	0.000271	0.000277	-0.000006	-2.067594
07/25/91	207	0.235	0.830	0.000064	0.000225	0.000271	0.000271	-0.000001	-0.186257
07/26/91	208	0.730	1.640	0.000199	0.000474	0.000272	0.000289	-0.000017	-6.196966
07/29/91	210	0.340	0.000	0.000092	0.000000	0.000271	0.000270	0.000000	0.178619
07/30/91	211	2.235	3.045	0.000606	0.000832	0.000271	0.000273	-0.000002	-0.855884
07/31/91	212	0.000	0.000	0.000000	0.000000	0.000270	0.000270	0.000000	0.118082
08/01/91	213	0.685	1.150	0.000189	0.000319	0.000276	0.000277	-0.000001	-0.300101
08/02/91	214	3.065	0.000	0.000845	0.000000	0.000276	0.000276	0.000000	0.007506
08/05/91	217	1.190	2.515	0.000336	0.000694	0.000282	0.000276	0.000006	2.210641
08/06/91	218	0.000	0.000	0.000000	0.000000	0.000277	0.000277	0.000000	0.000000
08/07/91	219	0.920	0.920	0.000254	0.000254	0.000276	0.000276	0.000000	0.000000
08/08/91	220	0.000	0.000	0.000000	0.000000	0.000275	0.000275	0.000000	0.000000
08/09/91	221	1.760	1.760	0.000482	0.000482	0.000274	0.000274	0.000000	0.000000
08/12/91	224	2.135	2.135	0.000588	0.000588	0.000275	0.000275	0.000000	0.000000
08/13/91	225	8.005	8.005	0.002213	0.002213	0.000276	0.000276	0.000000	0.000000
08/14/91	226	0.695	0.695	0.000196	0.000196	0.000282	0.000282	0.000000	0.000000
08/15/91	227	1.520	1.520	0.000418	0.000418	0.000275	0.000275	0.000000	0.000000
08/16/91	228	0.000	0.000	0.000000	0.000000	0.000285	0.000285	0.000000	0.000000
08/19/91	231	1.205	0.940	0.000342	0.000266	0.000284	0.000283	0.000001	0.276091
08/20/91	232	1.625	0.000	0.000459	0.000000	0.000283	0.000283	-0.000000	-0.076791
08/21/91	233	0.000	0.945	0.000000	0.000269	0.000283	0.000285	-0.000002	-0.565348
08/22/91	234	0.000	1.475	0.000000	0.000421	0.000283	0.000286	-0.000003	-0.922232
08/23/91	235	0.000	3.235	0.000000	0.000935	0.000285	0.000289	-0.000004	-1.497816
08/26/91	238	2.065	3.225	0.000587	0.000917	0.000284	0.000284	-0.000000	-0.069935
08/27/91	239	0.000	5.860	0.000000	0.001668	0.000283	0.000285	-0.000001	-0.426095
08/28/91	240	2.825	2.825	0.000808	0.000808	0.000286	0.000286	0.000000	0.000000
08/29/91	241	0.800	0.000	0.000225	0.000000	0.000282	0.000286	-0.000004	-1.482606
08/30/91	242	1.975	1.360	0.000559	0.000385	0.000283	0.000283	0.000000	0.005815
09/03/91	246	0.000	2.355	0.000000	0.000676	0.000282	0.000287	-0.000004	-1.587122

Table F-4. Daily Calibration Data Summary (Channel D)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
09/04/91	247	2.560	5.000	0.000723	0.001427	0.000283	0.000285	-0.000003	-1.006044
09/05/91	248	2.825	7.390	0.000812	0.002084	0.000288	0.000282	0.000006	1.937993
09/06/91	249	2.165	6.325	0.000612	0.001795	0.000283	0.000284	-0.000001	-0.314254
09/09/91	252	6.090	0.935	0.001707	0.000267	0.000280	0.000285	-0.000005	-1.780959
09/10/91	253	4.435	5.235	0.001247	0.001491	0.000281	0.000285	-0.000004	-1.284678
09/11/91	254	2.150	3.960	0.000600	0.001114	0.000279	0.000281	-0.000002	-0.887309
09/12/91	255	4.050	0.000	0.001131	0.000000	0.000279	0.000280	-0.000001	-0.339386
09/13/91	256	0.710	4.950	0.000198	0.001494	0.000279	0.000302	-0.000023	-8.378289
09/16/91	259	0.495	2.385	0.000138	0.000695	0.000279	0.000291	-0.000012	-4.374304
09/17/91	260	7.240	6.305	0.002017	0.001769	0.000279	0.000281	-0.000002	-0.696811
09/18/91	261	1.815	3.040	0.000506	0.000900	0.000279	0.000296	-0.000017	-6.149403
09/19/91	262	2.935	0.270	0.000849	0.000075	0.000289	0.000279	0.000011	3.634292
09/20/91	263	4.940	7.750	0.001384	0.002203	0.000280	0.000284	-0.000004	-1.503687
09/23/91	266	4.825	4.825	0.001386	0.001386	0.000287	0.000287	0.000000	0.000000
09/24/91	267	7.360	2.395	0.002116	0.000655	0.000287	0.000273	0.000014	4.913782
09/25/91	268	3.235	4.215	0.000891	0.001152	0.000275	0.000273	0.000002	0.718028
09/26/91	269	5.490	0.235	0.001511	0.000065	0.000275	0.000277	-0.000001	-0.534316
09/27/91	270	2.640	3.510	0.000739	0.000960	0.000280	0.000274	0.000007	2.344159
09/30/91	273	5.595	1.580	0.001523	0.000437	0.000272	0.000277	-0.000004	-1.639177
10/01/91	274	2.445	2.470	0.000666	0.000707	0.000272	0.000286	-0.000014	-4.989827
10/02/91	275	4.595	7.400	0.001256	0.002030	0.000273	0.000274	-0.000001	-0.352335
10/03/91	276	3.805	2.185	0.001103	0.000599	0.000290	0.000274	0.000016	5.385211
10/04/91	277	3.085	0.490	0.000853	0.000136	0.000276	0.000277	-0.000000	-0.157487
10/07/91	280	1.190	3.905	0.000321	0.001078	0.000270	0.000276	-0.000006	-2.213049
10/08/91	281	1.235	1.105	0.000331	0.000301	0.000268	0.000273	-0.000005	-1.838212
10/09/91	282	0.000	0.000	0.000000	0.000000	0.000269	0.000269	0.000000	0.000000
10/10/91	283	3.550	3.550	0.000964	0.000964	0.000272	0.000272	0.000000	0.000000
10/11/91	284	0.000	0.000	0.000000	0.000000	0.000270	0.000270	0.000000	0.000000
10/14/91	287	6.820	2.645	0.001839	0.000734	0.000270	0.000277	-0.000008	-2.884991
10/15/91	288	3.350	0.835	0.000905	0.000231	0.000270	0.000276	-0.000006	-2.290819
10/16/91	289	0.090	3.225	0.000024	0.000883	0.000270	0.000274	-0.000004	-1.573025
10/17/91	290	4.885	4.445	0.001302	0.001185	0.000266	0.000267	-0.000000	-0.032465

Table F-4. Daily Calibration Data Summary (Channel D)

Cal Date	Julian Cal Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Cal Factor	Final Cal Factor	Cal Factor Drift	Cal Factor % Drift
10/22/91	295	1.250	1.250	0.000337	0.000337	0.000269	0.000269	0.000000	0.000000
10/23/91	296	0.350	0.350	0.000095	0.000095	0.000272	0.000272	0.000000	0.000000

APPENDIX G

1991 NMOC IN-HOUSE QUALITY CONTROL SAMPLES

Table G-1. NMOC In-house Quality Control Samples (Channel A)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
05-Jun-91	156	1004	0.389	0.419	0.030	7.712
05-Jun-91	156	1005	0.068	0.065	-0.003	-4.412
11-Jun-91	162	1039	0.894	0.806	-0.088	-9.843
11-Jun-91	162	1039	0.894	0.770	-0.124	-13.870
14-Jun-91	165	1090	0.803	0.751	-0.052	-6.476
17-Jun-91	168	1114	0.667	0.702	0.035	5.247
18-Jun-91	169	1127	1.228	1.260	0.032	2.606
20-Jun-91	171	1154	0.482	0.525	0.043	8.921
21-Jun-91	172	1169	0.911	0.977	0.066	7.245
24-Jun-91	175	1184	3.042	2.730	-0.312	-10.256
25-Jun-91	176	1195	0.980	0.891	-0.089	-9.082
26-Jun-91	177	1208	0.900	0.902	0.002	0.222
27-Jun-91	178	1223	0.000	0.004	0.004	
28-Jun-91	179	1241	0.944	0.931	-0.013	-1.377
01-Jul-91	182	1251	0.910	0.920	0.010	1.099
02-Jul-91	183	1268	0.742	0.747	0.005	0.674
03-Jul-91	184	1273	0.758	0.762	0.004	0.528
08-Jul-91	189	1311	0.628	0.644	0.016	2.548
09-Jul-91	190	1312	0.681	0.709	0.028	4.112
10-Jul-91	191	1329	0.536	0.569	0.033	6.157
11-Jul-91	192	1340	0.745	0.716	-0.029	-3.893
18-Jul-91	199	1410	0.331	0.365	0.034	10.272
19-Jul-91	200	1426	0.460	0.498	0.038	8.261
22-Jul-91	203	1460	0.464	0.512	0.048	10.345
23-Jul-91	204	1461	0.435	0.461	0.026	5.977
24-Jul-91	205	1479	0.467	0.481	0.014	2.998
25-Jul-91	206	1499	0.478	0.473	-0.005	-1.046
26-Jul-91	207	1516	0.722	0.804	0.082	11.357
29-Jul-91	210	1529	0.392	0.406	0.014	3.571
30-Jul-91	211	1543	0.373	0.412	0.039	10.456
31-Jul-91	212	1556	0.441	0.474	0.033	7.483
01-Aug-91	213	1565	0.346	0.380	0.034	9.827
02-Aug-91	214	1579	0.473	0.548	0.075	15.856
05-Aug-91	217	1590	0.000	0.002	0.002	

Table G-1. NMOC In-house Quality Control Samples (Channel A)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
11-Sep-91	254	1999	0.446	0.474	0.028	6.278
12-Sep-91	255	2012	0.432	0.471	0.039	9.028
13-Sep-91	256	2022	0.442	0.481	0.039	8.824
17-Sep-91	260	2044	0.514	0.533	0.019	3.696
18-Sep-91	261	2071	0.529	0.567	0.038	7.183
19-Sep-91	262	2078	0.562	0.612	0.050	8.897
23-Sep-91	266	2079	0.492	0.519	0.027	5.488
25-Sep-91	268	2145	0.466	0.501	0.035	7.511
26-Sep-91	269	2167	0.479	0.489	0.010	2.088
01-Oct-91	274	2193	0.469	0.464	-0.005	-1.066
02-Oct-91	275	2227	0.472	0.476	0.004	0.847
03-Oct-91	276	2230	0.469	0.504	0.035	7.463
08-Oct-91	281	2237	0.531	0.539	0.008	1.507

Table G-2. NMOC In-house Quality Control Samples (Channel B)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
05-Jun-91	156	1004	0.389	0.409	0.020	5.141
05-Jun-91	156	1005	0.068	0.058	-0.010	-14.118
11-Jun-91	162	1039	0.894	0.788	-0.106	-11.857
14-Jun-91	165	1090	0.803	0.840	0.037	4.608
17-Jun-91	168	1114	0.667	0.705	0.038	5.697
18-Jun-91	169	1127	1.228	1.340	0.112	9.121
20-Jun-91	171	1154	0.482	0.537	0.055	11.411
24-Jun-91	175	1184	3.042	2.810	-0.232	-7.627
25-Jun-91	176	1195	0.980	0.903	-0.077	-7.857
26-Jun-91	177	1208	0.900	0.904	0.004	0.444
27-Jun-91	178	1223	0.000	0.001	0.001	
28-Jun-91	179	1241	0.944	0.932	-0.012	-1.271
01-Jul-91	182	1251	0.910	0.925	0.015	1.648
02-Jul-91	183	1268	0.742	0.752	0.010	1.348
03-Jul-91	184	1273	0.758	0.765	0.007	0.923
08-Jul-91	189	1311	0.628	0.656	0.028	4.459
09-Jul-91	190	1312	0.681	0.701	0.020	2.937
10-Jul-91	191	1329	0.536	0.566	0.030	5.597
11-Jul-91	192	1340	0.745	0.710	-0.035	-4.698
18-Jul-91	199	1410	0.331	0.362	0.031	9.366
19-Jul-91	200	1426	0.460	0.495	0.035	7.609
22-Jul-91	203	1460	0.464	0.502	0.038	8.190
23-Jul-91	204	1461	0.435	0.457	0.022	5.057
24-Jul-91	205	1479	0.467	0.483	0.016	3.426
25-Jul-91	206	1499	0.478	0.492	0.014	2.929
26-Jul-91	207	1516	0.722	0.780	0.058	8.033
29-Jul-91	210	1529	0.392	0.411	0.019	4.847
30-Jul-91	211	1543	0.373	0.416	0.043	11.528
31-Jul-91	212	1556	0.441	0.478	0.037	8.390
01-Aug-91	213	1565	0.346	0.377	0.031	8.960
02-Aug-91	214	1579	0.473	0.539	0.066	13.953
05-Aug-91	217	1590	0.000	0.001	0.001	
11-Sep-91	254	1999	0.446	0.482	0.036	8.072
12-Sep-91	255	2012	0.432	0.466	0.034	7.870

Table G-2. NMOC In-house Quality Control Samples (Channel B)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
13-Sep-91	256	2022	0.442	0.477	0.035	7.919
17-Sep-91	260	2044	0.514	0.528	0.014	2.724
18-Sep-91	261	2071	0.529	0.570	0.041	7.750
19-Sep-91	262	2078	0.562	0.628	0.066	11.744
23-Sep-91	266	2079	0.492	0.505	0.013	2.642
25-Sep-91	268	2145	0.466	0.510	0.044	9.442
26-Sep-91	269	2167	0.479	0.489	0.010	2.088
01-Oct-91	274	2193	0.469	0.457	-0.012	-2.559
02-Oct-91	275	2227	0.472	0.475	0.003	0.636
03-Oct-91	276	2230	0.469	0.499	0.030	6.397
04-Oct-91	277	2231	0.391	0.414	0.023	5.882
08-Oct-91	281	2237	0.531	0.548	0.017	3.202

Table G-3. NMOC In-house Quality Control Samples (Channel C)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
05-Jun-91	156	1004	0.389	0.375	-0.014	-3.599
05-Jun-91	156	1005	0.068	0.064	-0.004	-5.441
14-Jun-91	165	1090	0.803	0.846	0.043	5.355
17-Jun-91	168	1114	0.667	0.693	0.026	3.898
18-Jun-91	169	1127	1.228	1.243	0.015	1.221
19-Jun-91	171	1135	0.816	0.914	0.098	12.010
20-Jun-91	171	1154	0.482	0.542	0.060	12.448
24-Jun-91	175	1184	3.042	2.780	-0.262	-8.613
25-Jun-91	176	1195	0.980	0.895	-0.085	-8.673
26-Jun-91	177	1208	0.900	0.896	-0.004	-0.444
27-Jun-91	178	1223	0.000	0.003	0.003	
28-Jun-91	179	1241	0.944	0.950	0.006	0.646
01-Jul-91	182	1251	0.910	0.879	-0.031	-3.407
02-Jul-91	183	1268	0.742	0.740	-0.002	-0.270
03-Jul-91	184	1273	0.758	0.763	0.005	0.660
08-Jul-91	189	1311	0.628	0.635	0.007	1.115
09-Jul-91	190	1312	0.681	0.688	0.007	1.028
10-Jul-91	191	1329	0.536	0.558	0.022	4.104
11-Jul-91	192	1340	0.745	0.712	-0.033	-4.430
12-Jul-91	193	1366	0.764	0.795	0.031	4.058
17-Jul-91	198	1400	1.198	1.223	0.025	2.087
18-Jul-91	199	1410	0.331	0.356	0.025	7.553
19-Jul-91	200	1426	0.460	0.498	0.038	8.261
22-Jul-91	203	1460	0.464	0.469	0.005	1.078
23-Jul-91	204	1461	0.435	0.448	0.013	2.989
24-Jul-91	205	1479	0.467	0.476	0.009	1.927
25-Jul-91	206	1499	0.478	0.494	0.016	3.347
26-Jul-91	207	1516	0.722	0.785	0.063	8.726
29-Jul-91	210	1529	0.392	0.406	0.014	3.571
30-Jul-91	211	1543	0.373	0.418	0.045	12.064
31-Jul-91	212	1556	0.441	0.452	0.011	2.494
01-Aug-91	213	1565	0.346	0.380	0.034	9.827
02-Aug-91	214	1579	0.473	0.525	0.052	10.994
05-Aug-91	217	1590	0.000	0.002	0.002	

Table G-3. NMOC In-house Quality Control Samples (Channel C)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
11-Sep-91	254	1999	0.446	0.474	0.028	6.278
12-Sep-91	255	2012	0.432	0.439	0.007	1.620
13-Sep-91	256	2022	0.442	0.474	0.032	7.240
17-Sep-91	260	2044	0.514	0.514	0.000	0.000
18-Sep-91	261	2071	0.529	0.565	0.036	6.805
19-Sep-91	262	2078	0.562	0.621	0.059	10.498
23-Sep-91	266	2079	0.492	0.514	0.022	4.472
25-Sep-91	268	2145	0.466	0.527	0.061	13.090
26-Sep-91	269	2167	0.479	0.481	0.002	0.418
01-Oct-91	274	2193	0.469	0.469	0.000	0.000
03-Oct-91	276	2230	0.469	0.511	0.042	8.955
04-Oct-91	277	2231	0.391	0.407	0.016	4.092
08-Oct-91	281	2237	0.531	0.560	0.029	5.461

Table G-4. NMOC In-house Quality Control Samples (Channel D)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
05-Jun-91	156	1004	0.389	0.371	-0.018	-4.627
05-Jun-91	156	1005	0.068	0.062	-0.006	-8.971
11-Jun-91	162	1039	0.894	0.816	-0.078	-8.725
14-Jun-91	165	1090	0.803	0.830	0.027	3.362
17-Jun-91	168	1114	0.667	0.702	0.035	5.247
18-Jun-91	169	1127	1.228	1.230	0.002	0.163
19-Jun-91	171	1135	0.816	0.931	0.115	14.093
20-Jun-91	171	1154	0.482	0.544	0.062	12.863
24-Jun-91	175	1184	3.042	2.860	-0.182	-5.983
25-Jun-91	176	1195	0.980	0.882	-0.098	-10.000
26-Jun-91	177	1208	0.900	0.898	-0.002	-0.222
27-Jun-91	178	1223	0.000	0.002	0.002	
28-Jun-91	179	1241	0.944	1.034	0.090	9.534
01-Jul-91	182	1251	0.910	0.875	-0.035	-3.846
02-Jul-91	183	1268	0.742	0.732	-0.010	-1.348
03-Jul-91	184	1273	0.758	0.760	0.002	0.264
08-Jul-91	189	1311	0.628	0.635	0.007	1.115
09-Jul-91	190	1312	0.681	0.683	0.002	0.294
10-Jul-91	191	1329	0.536	0.545	0.009	1.679
11-Jul-91	192	1340	0.745	0.714	-0.031	-4.161
12-Jul-91	193	1366	0.764	0.792	0.028	3.665
17-Jul-91	198	1400	1.198	1.234	0.036	3.005
17-Jul-91	198	1410	0.331	0.361	0.030	9.063
19-Jul-91	200	1426	0.460	0.493	0.033	7.174
22-Jul-91	203	1460	0.464	0.473	0.009	1.940
23-Jul-91	204	1461	0.435	0.444	0.009	2.069
24-Jul-91	205	1479	0.467	0.470	0.003	0.642
25-Jul-91	206	1499	0.478	0.488	0.010	2.092
26-Jul-91	207	1516	0.722	0.771	0.049	6.787
29-Jul-91	210	1529	0.392	0.406	0.014	3.571
30-Jul-91	211	1543	0.373	0.418	0.045	12.064
31-Jul-91	212	1556	0.441	0.443	0.002	0.454
01-Aug-91	213	1565	0.346	0.378	0.032	9.249
02-Aug-91	214	1579	0.473	0.520	0.047	9.937

Table G-4. NMOC In-house Quality Control Samples (Channel D)

Date Analyzed	Julian Date Analyzed	QC ID Number	Calculated NMOC ppmC	Measured NMOC ppmC	NMOC Bias ppmC	NMOC Percent Bias
05-Aug-91	217	1590	0.000	0.000	0.000	
11-Sep-91	254	1999	0.446	0.464	0.018	4.036
12-Sep-91	255	2012	0.432	0.430	-0.002	-0.463
13-Sep-91	256	2022	0.442	0.465	0.023	5.204
17-Sep-91	260	2044	0.514	0.510	-0.004	-0.778
18-Sep-91	261	2071	0.529	0.558	0.029	5.482
19-Sep-91	262	2078	0.562	0.632	0.070	12.456
25-Sep-91	268	2145	0.466	0.513	0.047	10.086
26-Sep-91	269	2167	0.479	0.489	0.010	2.088
01-Oct-91	274	2193	0.469	0.470	0.001	0.213
02-Oct-91	275	2227	0.472	0.476	0.004	0.847
03-Oct-91	276	2230	0.469	0.523	0.054	11.514
04-Oct-91	277	2231	0.391	0.404	0.013	3.325
08-Oct-91	281	2237	0.531	0.539	0.008	1.507

APPENDIX H

MULTIPLE DETECTOR SPECIATED THREE-HOUR SITE DATA SUMMARIES

TABLE H-1. MULTIPLE DETECTOR SPECIATED UATMP DATA SUMMARY FOR NWNJ

Sample Date	6/25/91		7/02/91		7/18/91		8/05/91		8/13/91	
Sample ID	1240		1307		1462		1627		1752	
Compound	Concentration, ppbv									
Acetylene	87.64	(L)	<1.00		<1.00		36.0	(L)	<1.00	
Propylene	8.90	(L)	<0.10		<0.10		<0.10		<0.10	
Chloromethane	0.95	(L)	4.75	(L)	2.83	(L)	0.37	(L)	0.49	(L)
Vinyl Chloride	<0.20		<0.20		<0.20		<0.20		<0.20	
1,3-Butadiene	<0.10		<0.10		<0.10		<0.10		<0.10	
Bromomethane	<0.20		<0.20		<0.20		<0.20		<0.20	
Chloroethane	<0.10		<0.10		<0.10		<0.10		<0.10	
Methylene Chloride	<0.11		<0.11		<0.11		<0.11		<0.11	
trans-1,2-Dichloroethylene	0.13	(L)	<0.04		<0.04		<0.04		<0.04	
1,1-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Chloroprene	2.45	(H)	<0.06		4.48	(M)	<0.06		<0.06	
Bromochloromethane	<0.003		<0.003		<0.003		<0.003		<0.003	
Chloroform	<0.006		<0.006		<0.006		<0.006		<0.006	
1,2-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,1-Trichloroethane	2.16	(H)	3.59	(M)	2.74	(H)	1.18	(M)	2.87	(H)
Benzene	1.76	(H)	0.97	(H)	1.44	(H)	0.78	(H)	1.93	(H)
Carbon tetrachloride	0.29	(L)	0.26	(L)	0.30	(M)	0.29	(H)	0.28	(M)
1,2-Dichloropropane	<0.04		<0.04		<0.04		<0.04		<0.04	
Bromodichloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
Trichloroethylene	0.55	(L)	0.12	(L)	0.49	(L)	0.17	(L)	0.10	(L)
cis-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
trans-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,2-Trichloroethane	<0.04		<0.04		<0.04		<0.04		0.14	(H)
Toluene	6.19	(H)	4.29	(H)	5.64	(H)	2.73	(H)	7.65	(H)
Dibromochloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
n-Octane	0.46	(L)	<0.03		0.27	(M)	0.15	(L)	0.37	(L)
Tetrachloroethylene	0.83	(M)	0.37	(L)	0.54	(L)	0.34	(L)	1.03	(M)
Chlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
Ethylbenzene	0.90	(L)	0.60	(M)	0.71	(L)	0.37	(L)	1.06	(M)
m/p-Xylene/Bromoform	4.02	(L)	2.54	(L)	3.27	(L)	1.58	(L)	5.17	(L)
Styrene	1.20	(L)	0.52	(H)	1.25	(L)	0.48	(L)	0.64	(H)
o-Xylene/1,1,2,2-Tetrachloroethane	1.90	(L)	1.19	(L)	1.59	(L)	0.76	(L)	2.16	(L)
m-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
p-Dichlorobenzene	<0.09		<0.09		<0.09		<0.09		<0.09	
o-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
n-Octane/Tetrachloroethylene	<0.10		<0.10		<0.10		<0.10		<0.10	

(H) High confidence level (M) Medium confidence level (L) Low confidence level

(Continued)

TABLE H-1. NWNJ (Continued)

Sample Date	8/29/91		9/06/91		9/17/91		9/23/91		9/23/91	
Sample ID	1927		2011		2109		2161D		2161R	
Compound	Concentration, ppbv									
Acetylene	135.69	(L)	83.51	(L)	24.37	(L)	137.82	(L)	124.27	(L)
Propylene	<0.10		<0.10		<0.10		<0.10		<0.10	
Chloromethane	2.56	(L)	<0.20		<0.20		<0.20		<0.20	
Vinyl Chloride	<0.20		<0.20		<0.20		<0.20		<0.20	
1,3-Butadiene	<0.10		0:34	(H)	<0.10		3.90	(M)	2.28	(H)
Bromomethane	<0.20		<0.20		<0.20		<0.20		<0.20	
Chloroethane	<0.10		<0.10		<0.10		<0.10		<0.10	
Methylene Chloride	<0.11		<0.11		<0.11		<0.11		<0.11	
trans-1,2-Dichloroethylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Chloroprene	<0.06		<0.06		<0.06		<0.06		<0.06	
Bromochloromethane	<0.003		<0.003		<0.003		<0.003		<0.003	
Chloroform	<0.006		<0.006		<0.006		<0.006		<0.006	
1,2-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,1-Trichloroethane	2.95	(L)	2.67	(H)	1.39	(H)	1.59	(H)	0.98	(L)
Benzene	2.38	(H)	1.50	(H)	0.99	(M)	2.33	(M)	2.67	(L)
Carbon tetrachloride	0.28	(L)	0.30	(L)	0.27	(M)	0.27	(L)	0.24	(L)
1,2-Dichloropropane	<0.04		<0.04		<0.04		<0.04		<0.04	
Bromodichloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
Trichloroethylene	1.27	(M)	0.16	(L)	0.48	(M)	1.14	(M)	1.10	(M)
cis-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
trans-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,2-Trichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Toluene	13.49	(H)	9.30	(H)	4.30	(H)	7.54	(H)	7.44	(H)
Dibromochloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
n-Octane	0.43	(L)	0.46	(L)	0.38	(L)	0.38	(L)	<0.03	
Tetrachloroethylene	1.30	(M)	0.85	(L)	0.39	(M)	0.30	(H)	0.25	(L)
Chlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
Ethylbenzene	1.33	(L)	1.24	(M)	0.80	(L)	1.04	(L)	0.99	(L)
m/p-Xylene/Bromoform	6.85	(L)	6.28	(L)	3.98	(L)	5.06	(L)	5.05	(L)
Styrene	0.67	(L)	0.68	(M)	0.61	(L)	0.52	(L)	0.44	(L)
o-Xylene/1,1,2,2-Tetrachloroethane	3.18	(L)	2.65	(L)	1.77	(L)	2.29	(L)	2.30	(L)
m-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
p-Dichlorobenzene	<0.09		<0.09		<0.09		<0.09		<0.09	
o-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
n-Octane/Tetrachloroethylene	<0.10		<0.10		<0.10		<0.10		<0.10	

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
R Replicate analysis D Duplicate sample

TABLE H-1. NWNJ (Continued)

Sample Date	9/23/91	
Sample ID	2162D	
Compound	Concentration, ppbv	
Acetylene	116.85	(L)
Propylene	<0.10	
Chloromethane	<0.20	
Vinyl Chloride	<0.20	
1,3-Butadiene	3.19	(H)
Bromomethane	<0.20	
Chloroethane	<0.10	
Methylene Chloride	4.38	(H)
trans-1,2-Dichloroethylene	<0.04	
1,1-Dichloroethane	<0.04	
Chloroprene	<0.06	
Bromochloromethane	<0.003	
Chloroform	<0.006	
1,2-Dichloroethane	<0.04	
1,1,1-Trichloroethane	1.62	(H)
Benzene	2.28	(H)
Carbon tetrachloride	0.28	(L)
1,2-Dichloropropane	<0.04	
Bromodichloromethane	<0.001	
Trichloroethylene	1.15	(M)
cis-1,3-Dichloropropylene	<0.04	
trans-1,3-Dichloropropylene	<0.04	
1,1,2-Trichloroethane	<0.04	
Toluene	7.53	(H)
Dibromochloromethane	<0.001	
n-Octane	0.38	(L)
Tetrachloroethylene	0.30	(L)
Chlorobenzene	<0.02	
Ethylbenzene	1.03	(L)
m/p-Xylene/Bromoform	5.07	(L)
Styrene	0.48	(M)
o-Xylene/1,1,2,2-Tetrachloroethane	2.22	(L)
m-Dichlorobenzene	<0.02	
p-Dichlorobenzene	<0.09	
o-Dichlorobenzene	<0.02	
n-Octane/Tetrachloroethylene	<0.10	

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate analysis

TABLE H-2. MULTIPLE DETECTOR SPECIATED UATMP DATA SUMMARY FOR PLNJ

Sample Date	6/24/91		7/02/91		8/05/91		8/13/91		8/29/91	
Sample ID	1239		1305		1678		1725		1916	
Compound	Concentration, ppbv									
Acetylene	95.16	(L)	81.15	(L)	<1.00		169.74	(L)	126.26	(L)
Propylene	<0.10		<0.10		<0.10		<0.10		<0.10	
Chloromethane	<0.20		<0.20		<0.20		<0.20		<0.20	
Vinyl Chloride	<0.20		<0.20		<0.20		<0.20		<0.20	
1,3-Butadiene	<0.10		<0.10		<0.10		<0.10		<0.10	
Bromomethane	<0.20		<0.20		<0.20		<0.20		<0.20	
Chloroethane	<0.10		<0.10		<0.10		<0.10		<0.10	
Methylene Chloride	4.46	(H)	<0.11		<0.11		<0.11		<0.11	
trans-1,2-Dichloroethylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Chloroprene	<0.06		<0.06		<0.06		<0.06		<0.06	
Bromochloromethane	<0.003		<0.003		<0.003		<0.003		<0.003	
Chloroform	<0.006		<0.006		<0.006		<0.006		<0.006	
1,2-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,1-Trichloroethane	1.61	(M)	1.04	(L)	0.58	(H)	1.79	(M)	1.51	(H)
Benzene	1.46	(H)	1.74	(L)	0.77	(H)	2.83	(M)	1.97	(H)
Carbon tetrachloride	0.26	(L)	0.27	(L)	0.28	(L)	0.24	(L)	0.28	(H)
1,2-Dichloropropane	<0.04		<0.04		<0.04		<0.04		<0.04	
Bromodichloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
Trichloroethylene	<0.004		<0.004		0.05	(L)	0.21	(L)	<0.004	
cis-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
trans-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,2-Trichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Toluene	5.08	(H)	3.30	(H)	2.65	(H)	9.85	(H)	7.08	(H)
Dibromochloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
n-Octane	<0.03		<0.03		<0.03		<0.03		0.20	(L)
Tetrachloroethylene	<0.07		<0.07		0.56	(M)	<0.07		0.61	(L)
Chlorobenzene	<0.02		<0.02		<0.02		0.69	(L)	<0.02	
Ethylbenzene	0.57	(L)	0.41	(L)	0.34	(L)	0.92	(L)	0.81	(M)
m/p-Xylene/Bromoform	2.34	(L)	1.89	(L)	1.37	(L)	4.46	(L)	4.00	(L)
Styrene	0.41	(L)	0.67	(L)	0.47	(M)	1.71	(L)	0.42	(M)
o-Xylene/1,1,2,2-Tetrachloroethane	1.19	(L)	0.89	(L)	0.74	(L)	0.96	(L)	1.98	(L)
m-Dichlorobenzene	<0.02		<0.02		0.15	(M)	<0.02		<0.02	
p-Dichlorobenzene	<0.09		<0.09		0.07	(L)	<0.09		<0.09	
o-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
n-Octane/Tetrachloroethylene	<0.10		<0.10		<0.10		<0.10		<0.10	

(H) High confidence level (M) Medium confidence level (L) Low confidence level

(Continued)

TABLE H-2. PLNJ (Continued)

Sample Date	9/16/91		9/20/91		9/25/91		9/25/91		9/25/91	
Sample ID	2117		2119		2202D		2202R		2203D	
Compound	Concentration, ppbv									
Acetylene	<1.00		25.25	(L)	65.45	(L)	<1.00		69.37	(L)
Propylene	<0.10		<0.10		<0.10		<0.10		<0.10	
Chloromethane	0.50	(L)	<0.20		<0.20		<0.20		<0.20	
Vinyl Chloride	<0.20		<0.20		<0.20		<0.20		<0.20	
1,3-Butadiene	<0.10		<0.10		<0.10		0.54	(M)	0.69	(H)
Bromomethane	<0.20		<0.20		<0.20		<0.20		<0.20	
Chloroethane	<0.10		<0.10		<0.10		<0.10		<0.10	
Methylene Chloride	<0.11		<0.11		<0.11		<0.11		1.47	(H)
trans-1,2-Dichloroethylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Chloroprene	<0.06		<0.06		2.08	(L)	<0.06		<0.06	
Bromochloromethane	<0.003		<0.003		<0.003		<0.003		<0.003	
Chloroform	<0.006		<0.006		<0.006		<0.006		<0.006	
1,2-Dichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,1-Trichloroethane	1.57	(H)	0.38	(M)	1.81	(H)	1.86	(H)	10.83	(M)
Benzene	0.88	(H)	0.34	(M)	0.85	(H)	0.81	(H)	0.76	(H)
Carbon tetrachloride	0.25	(H)	0.27	(L)	0.28	(H)	0.26	(H)	0.24	(L)
1,2-Dichloropropane	<0.04		<0.04		<0.04		<0.04		<0.04	
Bromodichloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
Trichloroethylene	<0.004		<0.004		<0.004		0.05	(L)	0.04	(L)
cis-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
trans-1,3-Dichloropropylene	<0.04		<0.04		<0.04		<0.04		<0.04	
1,1,2-Trichloroethane	<0.04		<0.04		<0.04		<0.04		<0.04	
Toluene	3.5	(H)	0.87	(M)	5.18	(H)	5.12	(H)	3.58	(H)
Dibromochloromethane	<0.001		<0.001		<0.001		<0.001		<0.001	
n-Octane	0.10	(L)	0.40	(L)	0.27	(L)	0.28	(L)	<0.03	
Tetrachloroethylene	0.24	(L)	0.20	(L)	0.38	(M)	0.36	(H)	0.42	(M)
Chlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
Ethylbenzene	0.33	(H)	0.14	(L)	0.46	(L)	0.46	(L)	0.42	(L)
m/p-Xylene/Bromoform	1.56	(L)	0.61	(L)	2.20	(L)	2.10	(L)	1.90	(L)
Styrene	0.33	(M)	0.25	(L)	0.35	(M)	0.37	(L)	0.44	(L)
o-Xylene/1,1,2,2-Tetrachloroethane	0.79	(L)	0.29	(L)	1.15	(L)	1.20	(L)	0.95	(L)
m-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
p-Dichlorobenzene	<0.09		<0.09		<0.09		<0.09		<0.09	
o-Dichlorobenzene	<0.02		<0.02		<0.02		<0.02		<0.02	
n-Octane/Tetrachloroethylene	<0.10		<0.10		<0.10		<0.10		<0.10	

(H) High confidence level (M) Medium confidence level (L) Low confidence level
R Replicate analysis D Duplicate sample

APPENDIX I

EXTERNAL AUDIT RESULTS LETTER

Phyllis O'Hara
Radian

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ATMOSPHERIC RESEARCH AND EXPOSURE ASSESSMENT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

October 4, 1991

MEMORANDUM

SUBJECT: NMOC Audit Sample Results (Radian Corp.)

FROM: Howard Crist HC
QASB/QATSD/AREAL (MD-77B)

TO: Neil Berg
OAQPS (MD-14)

The results on the attached sheet were provided by Radian Corp. from their analyses of NMOC audit samples prepared by ManTech Environmental Technology. The audit canisters were analyzed on September 12, 18 and 25, 1991. The percent differences were calculated using ManTech's analytical values rather than the theoretical figures obtained by dilution of a known cylinder concentration. Although three of the samples agree well, the fourth canister (722) shows a significantly larger bias. ManTech's analysis of this sample yielded a figure 13% higher than the theoretical value. A control sample analyzed at the same time was also 9.5% higher than expected.

Attachment

cc: W. J. Mitchell
Phyllis O'Hara, Radian
K. Caviston, ManTech
R. Bousquet, ManTech

NMOC AUDIT CANISTER RESULTS

Propane, PPMC

Canister No.	Conc. Spiked	Channel Results A	B	C	D
014	1.515	1.544	1.551	1.553	1.553
625	1.527	1.550	1.542	1.539	1.529
185	1.095	1.166	1.192	1.178	1.161
722	2.157	1.801	1.835	1.820	1.800

Percent Differences

Canister No.	A	B	C	D
014	1.9	2.4	2.5	2.5
625	1.5	1.0	0.8	0.1
185	6.5	8.9	7.6	6.0
722	-16	-15	-16	-17

APPENDIX J

SPECIATED NMOC ANALYSIS METHOD

ASRL-ACPD-RPM 002 September 1986

RESEARCH PROTOCOL METHOD FOR ANALYSIS OF C2-C12 HYDROCARBONS IN AMBIENT AIR BY GAS CHROMATOGRAPHY WITH CRYOGENIC CONCENTRATION

Approvals

Robert L. Sella — Nov 26, 1986
Robert L. Sella
Author - User
Date

William A. Lonneman — Nov. 26, 1986
William A. Lonneman
Date

Ronald K. Patterson — Jan. 9, 1987
Ronald K. Patterson
ASRL QA Officer
Date

RESEARCH PROTOCOL METHOD FOR ANALYSIS OF C2-C12 HYDROCARBONS IN AMBIENT AIR BY GAS CHROMATOGRAPHY WITH CRYOGENIC CONCENTRATION

1.0 PROCEDURAL

1.1 Scope and Application

This method is intended for analysis of C2-C12 hydrocarbons in ambient air. The method's minimum quantification limit (MQL) is 0.12 ppb carbon; the method's minimum detection limit (MDL) is 0.04 ppb carbon. The MQL and MDL were determined by the method described by Knoll (reference 1).

1.2 Summary of Method

A known volume of sample is passed through a trap cooled with liquid oxygen or liquid argon. This traps out C2 and heavier hydrocarbons (without trapping methane). The trap is warmed with a hot water bath, which causes the injection of the trap contents into a gas chromatograph for separation of the C2-C12 hydrocarbons. The resultant peaks are detected by a flame-ionization detector (FID) and quantified by an electronic integrator.

1.3 Definitions

This RPM uses no definitions that are unique to this document.

1.4 Interferences

Any compound that elutes with the same retention time as any of the C2-C12 hydrocarbons and responds to flame ionization detection will interfere.

1.5 Personnel Requirements

The researcher using this procedure is expected to be familiar with gas chromatographic practices and procedures.

1.6 Facilities Requirements

No special laboratory facilities are required.

1.7 Safety Requirements

1.7.1 Compressed Gases

See pages F14 through F18 of the EPA/RTP Safety Manual (ref. 2) for precautions.

1.7.1.1 Hydrogen

Hydrogen gas cylinders (used for FID fuel) are not permitted in the RTP Tech Center. Hydrogen cylinders and their regulators must be secured outside the building, and a pressure line run into the laboratory.

1.7.2 Vacuum Systems

See page G3 of the EPA/RTP Safety Manual (ref. 2) for precautions.

1.7.3 Heated Surfaces

The GC injection ports, column, column oven, and detectors are maintained at temperatures high enough to cause burns. The researcher should exercise caution to avoid contact with these surfaces.

1.7.4 Immersion Heater

WARNING - The immersion heater must always be used in water. Operation in air will cause very high temperatures to be reached and possible ignition of combustible materials. In addition, operation of the immersion heater in air greatly reduces its life.

1.7.5 Cryogenic Liquids

See pages F18 through F20 of the EPA/RTP Safety Manual (reference 2) for precautions.

1.7.5.1 Liquid Oxygen (if used)

WARNING - Strong oxidant. Vigorously promotes combustion. Avoid contact with all flammable materials. Containers, lines, valves, and vents must be free of oil and grease.

WARNING - Cryogenic fluid. May cause severe frostbite. Wear eye and hand protection.

1.7.5.2 Liquid Nitrogen and Liquid Argon (if used)

WARNING - Cryogenic fluid. May cause severe frostbite. Wear eye and hand protection. Use with adequate room ventilation. Keep contact with air to a minimum to avoid buildup of liquid oxygen (see above).

1.8 Apparatus

1.8.1 Gas Chromatograph

Gas Chromatograph with temperature-programmed oven, flame ionization detector (FID), and electronic integrator.

1.3.2 Inlet System (Figure 1)

The inlet system is illustrated in Figure 1. The automatic six-port gas sampling valves (V4 and V5) are located on an aluminum block which is temperature-regulated. All other valves are at ambient temperature.

1.3.2.1 Trap

The sampling trap is made of clean, chromatographic grade 3.2 mm (1/8 in) OD stainless steel tubing, 15 cm in length, which is bent into a U-shape approximately 7 cm from each end so that the U is approximately 2.2 cm in width. Clean, untreated 60/80 mesh glass beads are poured in the U to a height of approximately 3 cm. Silanized glass wool is added as a plug to the last cm of both ends. Swagelok (TM) 1/16"-1/8" unions are added to each end for connection to the gas sampling valve.

1.3.2.2 Mass Flow Meter

A thermal conductivity mass flow meter (M1) (TYLAN Corp model FM 360, 0 to 500 standard cm^3/min or equivalent, with readout box) is used to measure the flow into the cryogenic trap.

1.3.2.3 Pressure Gauge

A precision Bourdon gauge (P1), range 0 to 200 Torr, is used. A gauge with a range of 0 to 400 Torr is also acceptable.

1.3.2.4 Connection of Inlet System to Column

A 10" length of 1/16-in OD stainless steel is used to connect the gas sampling valve to the column. At one end of the tubing is a

1/16-in Swagelok SS union; at the other end is a 1/16-in Swagelok chromatographic union (cat. # SS-1F0-6GC) which is bored through so that the fused silica column can be pushed through about 1 mm with a snug fit. Vespel® ferrules are used.

1.3.3 Gas Chromatograph Column

Type: fused silica capillary column.
Diameter: 0.32 mm ID.
Length: 60 m.
Liquid Phase: DB-1 bonded liquid phase.
Liquid Phase Thickness: 1.0 um.

1.3.4 Vacuum Pump

An oil-less diaphragm pump (such as Thomas model 2106CA13-515-2) is used to evacuate the inlet system.

CAUTION: Due to the possibility of contamination, oil-sealed vacuum pumps should not be used.

1.3.5 Tubing and Connectors

- All tubing is chromatographic grade stainless steel.
- All connections are stainless steel compression tube fittings (Swagelok or equivalent).

1.3.6 Regulators

Carrier gas, hydrogen, and air delivery pressures are controlled by two-stage regulators mounted at the tank.

CAUTION: Due to the possibility of contamination by organic materials, only regulators with stainless-steel diaphragms should be used.

1.8.7 Immersion Heater and SS Dewar

An immersion heater is used to heat a water bath which is placed around the trap to volatilize the trap contents. We use a 9-in Thermajust Model 94/8 (Cole-Palmer cat. #C-3050-60). We use a 1040 mL capacity Aladdin SS Dewar as the water bath.

1.9 Reagents/Materials

1.9.1 Helium Carrier Gas: High purity (H.P. grade, minimum purity 99.995 percent) helium carrier gas.

1.9.2 Detector Air

Linde zero grade (total hydrocarbons <1 ppm; H_2O <3ppm) or equivalent.

1.9.3 Detector Hydrogen

Prepurified grade 99.99 percent pure or equivalent.

WARNING - Fire hazard. See safety precautions.

1.9.4 Detector Makeup Nitrogen

Prepurified grade 99.99 percent pure (or equivalent).

1.9.5 Liquid Nitrogen (for He purification)

WARNING - Cryogenic liquid - see safety precautions.

1.9.6 Liquid Oxygen (for trap cooling)

WARNING - Strong oxidant - see safety precautions.

WARNING - Cryogenic liquid - see safety precautions.

1.9.7 Liquid Argon (for trap cooling)

WARNING - Cryogenic liquid - see safety precautions.

Liquid argon may be used instead of liquid oxygen for trap cooling. Although liquid argon is more expensive, it is inert, and its use eliminates the oxidant hazard associated with liquid oxygen.

1.9.8 Propane in Air (for calibration)

National Bureau of Standards (NBS) Standard Reference Material (SRM) 1665, 3 ppm (nominal) propane in air. (See section 2.2.)

1.9.9 Instrument Air Vacuum

The six-port gas sampling valves require clean filtered air at 350 kPa (35 psig) and vacuum at approximately 20 in Hg (500 Torr) for operation. These are obtained from the building (RTP Tech Center) supplies.

1.10 Sample/Sampling Procedure

This RPM is limited to the laboratory analysis. Field sampling procedure is covered separately. (See reference 3.)

1.11 Calibration and Standardization

1.11.1 Determination of Retention Times

A propane in air sample should be analyzed. Adjust the carrier gas linear velocity such that the propane peak elutes at 3.105 min (3 min 6 sec) following injection. Using the column and temperatures

specified in this document, these compounds should elute in the order and at the retention times given in Table 2. The actual elution times should be determined by preparing and analyzing known samples of each compound.

1.11.2 Calibration

The response of the FID is linear with respect to the number of carbon atoms present in the detected compound (reference 3). Thus, it is convenient to measure concentration (conc.) in terms of parts-per-billion-carbon (ppbC) where

Conc., ppbC = (number of carbon atoms in compound)(Conc., ppb).

For a fixed sample volume, the concentration is proportional to the area under the chromatographic peak:

$$\text{Conc., ppbC} = (k)(\text{Area})$$

where: Area is in integrator counts and k is an experimentally determined calibration constant (ppbC/count). The same value of k is used for all compounds.

The calibration constant k is determined by analysis of an NBS SRM propane in air standard (see section 1.9.8). Three to five determinations are made and the median value taken. The value of k is then given by

$$k(\text{ppbC/count}) = \frac{3(\text{Conc. of NBS Standard Propane, ppm})(1000\ \text{ppbC/ppmC})}{\text{Median Area Count}}.$$

1.12 Analysis Procedures

The analysis procedure is divided into two stages: preparation, and sample concentration and analysis.

1.12.1 Preparation

A. Adjustment of Flow Rates (except carrier gas)

1) Turn off the FID and FID heater - allow to cool to room temperature.

2) Attach the detector output (see instrument instruction manual) to the soap film flow meter.

3) Set the carrier gas pressure to 200 kPa (29 psia).

4) Set the hydrogen pressure to 250 kPa (35 psia).
WARNING - Hydrogen delivery pressure should be less than detector air pressure.

Adjust the hydrogen flow to 28-30 cm^3/min.

5) Set the detector air pressure to 300 kPa (~45 psia).
Adjust the detector flow to 430 cm^3/min ± 10 cm^3/min.

6) Set the makeup nitrogen pressure to 300 kPa (45 psia).
Adjust the total makeup and carrier gas flow rate to 30 cm^3/min.

NOTE: The above flow rates were optimized for the given column on an HP 5880A gas chromatograph with FID. If another gas chromatograph is used, adjust the flow rates to obtain maximum sensitivity according to the instructions for that instrument.

B. Adjustment of Carrier Gas Flow Rate

Verify that the carrier gas pressure is at 29 kPa. Refer to Section 1.11.1 for fine tuning of the carrier gas flow rate. Flow rate is dependent upon the column head pressure.

C. Set Up Detector

With the flow rates adjusted as in Step A, remove the adapter from the FID chimney and set the detector temperature to 250°C. Light the detector with the ignitor.

D. System Temperatures

Detector = 250°C.

Initial Oven Temperature = -50°C.

Oven Temperature Programming Rate = 8°C/min (temperature programming started 2 minutes after time of injection).

Final Oven Temperature = 250°C.

Six-Port Valve Temperature = 60°C.

1.12.2 Sample Concentration and Injection

Preconcentration and injection of the sample is carried out as follows. Initial conditions are these: V2 is closed, vacuum pump is on, valves V3 and V6 are closed, gas sampling valves V4 and V5 are in the off position (Figure 1). Attach the canister to be analyzed to the inlet line. Open valves V3 and V6 to evacuate the system. When the vacuum gauge (P1) reaches 50 torr or below, close valve V6. The system should remain at or very near 50 torr. A rising pressure indicates a leak in the system.

The trap is immersed in a Dewar flask containing liquid oxygen sufficient to cover the "U" but placed so that the compression fittings are neither inside the flask nor touching the liquid oxygen. If the fittings are inside the flask, sample will condense in the fittings instead of on the trap. This could result in either plugged carrier gas flow due to ice forming in the fitting and/or improper sample plug injection of the trapped hydrocarbons. Open valve V2 and adjust valve V1 to a flow of 100 cm^3/min, using mass flowmeter M1. When P1 is at 50 Torr, actuate valve V4 (see Figure 2). Adjust flow rate back to 100 cm^3/min, using valve V1, if necessary. When P1 reads 140 Torr,

inject sample onto column by actuating valve V5, removing liquid oxygen flask from trap, immersing the U-trap in the hot water bath, and pressing start button on electronic integrator (and GC, if needed); deactuate valve V4 (see Figure 3).

> CAUTION: It is extremely important that V5 be actuated before removing the liquid oxygen flask from the trap. Failure to observe this sequence will permit light hydrocarbons to be vented before injection.

At a time of 2 minutes into the run, deactuate valve V5. Stop the run manually or automatically after approximately 35 minutes or when the last compound of interest elutes. Identify sample peaks by their retention times, as determined in Section 1.11.1. An example chromatograph is shown as Figure 4.

1.13 Calculations

Using the calibration constant (k) determined in section 1.11.2, the concentration of each compound (peak) can be calculated as follows:

$$\text{Concentration, ppbC} = (k)(\text{Area})$$

where the area is in integrator counts. Most integrators may be programmed to perform this calculation and present results directly in units of concentration.

1.14 Data Reporting

The concentration of each C2-12 hydrocarbon should be reported. The integrator chart of sample and calibration standard should be saved as a record of analysis.

1.15 Corrective Action

Corrective action should be taken whenever any of the following are observed:

- Variation of retention times.
- Poor or ill-shaped peaks.
- Fused or combined peaks.
- Presence of peaks which elute with the compounds of interest (C2-12 hydrocarbons).
- Integrator failure to correctly recognize start time, stop time, or to correctly determine baseline and peak areas.
- Variation of response, as shown by more than a ± 15 percent change in calibration constant.

Determination of the proper corrective action requires a knowledge of chromatographic principles and instrumentation beyond the scope of this document.

1.16 Method Precision and Accuracy

Based on repeated analysis of NBS SRM propane in air standards over a one year period, the variation of the calibration constant (k) was found to be within ± 15 percent of the initial value. Replicate analysis of ambient air samples for total nonmethane organic compounds (NMOC) using a similar technique (reference 2) showed an analytical precision of approximately ± 12 percent. The precision for C2 hydrocarbons should be similar. Due to the lack of suitable NBS standards, the accuracy for analysis of C2-12 hydrocarbons cannot be directly determined using the propane standard.

2.0 QUALITY CONTROL

2.1 QC Checks and Frequency

One sample of NBS SRM propane in air is analyzed each day that a sample is run. The NBS SRM certification must be current.

2.2 Control Charts

The percent deviation of the daily NBS SRM propane sample (Section 1.9.8) from the NBS certified value is plotted on a control chart (Figure 5). The deviation should not exceed ± 15 percent. If this occurs, the system should be checked for proper operation. If the condition persists, the detector should be cleaned and checked for correct operation. If the response remains outside the control limit (± 15 percent), then the instrument should be recalibrated.

2.3 Calibration and Maintenance of Components

Components such as the pressure gauge, the mass flow controller, and the soap bubble flowmeter should have a manufacturer's certificate of calibration at the time of purchase. The performance of these components is periodically checked and maintenance or replacement performed. Chromatographic columns and sample traps are replaced when, in the analyst's opinion, they have degraded.

3.0 REFERENCES

1. Knoll, J. E., Journal of Chromatographic Sciences, Vol. 23, p. 422, September 1985.

2. EPA/RTP Safety Manual, Support Services Office, Environmental Research Center, Research Triangle Park, NC 27711.

3. Dietz, W. A., Journal of Gas Chromatography, Vol. 5, pp. 68-71 (1967).

TABLE 1. LEGEND FOR FIGURES 1, 2, AND 3

V_1	= stainless steel needle valve
V_2, V_3, and V_6	= shut-off valves (a)
V_4 and V_5	= 6-port electrically actuated gas sampling valve (attached to HP 5880A Gas Chromatograph)(b)
M_1	= 0 to 500 cm^3/min mass flow meter
P_1	= 0 to 200 Torr Wallace and Tierman Bourdon Gauge

(a) V2 is a stainless steel bellows valve on the canister. V3 and V6 are toggle valves; they may be stainless steel or brass.

(b) The gas sampling valve used should be capable of holding a vacuum down to 10 Torr for proper operation.

TABLE 2. HYDROCARBON IDENTIFICATIONS AND RETENTION TIMES

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
0	0.000	0	9.000	0.3000	0	Uncalibrated
101	2.013	1	9.000	0.3000	0	ETHANE
102	1.830	1	9.000	0.3000	0	ETHYLENE
103	1.960	1	9.000	0.3000	0	ACETYLENE
104	2.988	1	9.000	0.3000	0	PROPENE
105	3.105	1	9.000	0.3000	0	PROPANE
106	3.373	1	9.000	0.3000	0	Unknown
107	3.540	1	9.000	0.3000	0	PARAFFIN
108	4.017	1	9.000	0.3000	0	OLEFIN
109	4.450	1	9.000	0.3000	0	OLEFIN
110	5.105	1	9.000	0.3000	1	ISOBUTANE
111	5.423	1	9.000	0.3000	0	Unknown
112	5.661	1	9.000	0.3000	0	Unknown
113	6.115	1	9.000	0.3000	0	2-METHYL PROPYLENE
114	6.236	1	9.000	0.3000	0	BUTENE-1
115	6.462	1	9.000	0.3000	1	n-BUTANE
116	6.937	1	9.000	0.3000	0	t-2-BUTENE
117	7.500	1	9.000	0.3000	0	c-2-BUTENE
118	8.739	1	9.000	0.3000	0	C4 OLEFIN
119	9.398	1	9.000	0.3000	1	ISOPENTANE
120	9.652	1	9.000	0.3000	0	C5 OLEFIN
121	10.000	1	9.000	0.3000	0	1-PENTENE
122	10.086	1	9.000	0.3000	0	C5 OLEFIN
123	10.272	1	9.000	0.3000	0	2-METHYL-1-BUTENE
124	10.410	1	9.000	0.3000	1	n-PENTANE
125	10.560	1	9.000	0.3000	0	ISOPRENE
126	10.[illegible]7	1	9.000	0.3000	0	t-2-PENTENE
127	11.008	1	9.000	0.3000	0	C5 OLEFIN
128	11.116	1	9.000	0.3000	0	C5 OLEFIN
129	11.172	1	9.000	0.3000	0	c-2-PENTENE
130	11.256	1	9.000	0.3000	0	C5 OLEFIN
131	11.305	1	9.000	0.3000	0	C5 PARAFFIN
132	11.351	1	9.000	0.3000	0	C5 PARAFFIN
133	11.572	1	9.000	0.3000	0	2,2-DIMETHYLBUTANE
134	11.994	1	9.000	0.3000	0	C5 OLEFIN
135	12.252	1	9.000	0.3000	0	C5 OLEFIN
136	12.436	1	9.000	0.3000	0	C5 PARAFFIN
137	12.490	1	9.000	0.3000	0	C5 OLEFIN
138	12.631	1	9.000	0.3000	0	CYCLOPENTANE
139	12.761	1	9.000	0.3000	0	2,3-DIMETHYLBUTANE
140	12.848	1	9.000	0.3000	0	C5 OLEFIN
141	12.957	1	9.000	0.3000	1	2-METHYLPENTANE
142	13.031	1	9.000	0.3000	0	C5 OLEFIN
143	13.097	1	9.000	0.3000	0	C5 OLEFIN
144	13.369	1	9.000	0.3000	0	C5 OLEFIN
145	13.440	1	9.000	0.3000	0	3-METHYLPENTANE
146	13.643	1	9.000	0.3000	0	C5 OLEFIN
147	13.850	1	9.000	0.3000	0	C5 OLEFIN
148	14.062	1	9.000	0.3000	1	n-HEXANE
149	14.164	1	9.000	0.3000	0	C7 PARAFFIN
150	14.240	1	9.000	0.3000	0	C7 OLEFIN

TABLE 2. (continued)

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
151	14.317	1	9.000	0.3000	0	C7 OLEFIN
152	14.406	1	9.000	0.3000	0	C7 OLEFIN
153	14.543	1	9.000	0.3000	0	C7 OLEFIN
154	14.605	1	9.000	0.3000	0	C7 OLEFIN
155	14.750	1	9.000	0.3000	0	C7 OLEFIN
156	14.898	1	9.000	0.3000	0	METHYLCYCLOPENTANE
157	15.085	1	9.000	0.3000	0	2,4-DIMETHYLPENTANE
158	15.177	1	9.000	0.3000	0	C7 PARAFFIN
159	15.281	1	9.000	0.3000	0	C7 OLEFIN
160	15.523	1	9.000	0.3000	0	C7 OLEFIN
161	15.657	1	9.000	0.3000	0	C7 PARAFFIN
162	15.681	1	9.000	0.3000	1	BENZENE
163	15.878	1	9.000	0.3000	0	3,3-DIMETHYLPENTANE
164	15.980	1	9.000	0.3000	0	CYCLOHEXANE
165	16.056	1	9.000	0.3000	0	C7 OLEFIN
166	16.220	1	9.000	0.3000	0	2-METHYLHEXANE
167	16.358	1	9.000	0.3000	0	2,3-DIMETHYLPENTANE
168	16.437	1	9.000	0.3000	0	C7 PARAFFIN
169	16.507	1	9.000	0.3000	0	C7 OLEFIN
170	16.592	1	9.000	0.3000	0	3-METHYLHEXANE
171	16.785	1	9.000	0.3000	0	C7 PARAFFIN
172	16.916	1	9.000	0.3000	0	C7 PARAFFIN
173	17.007	1	9.000	0.3000	0	2,2,4-TRIMETHYLPENTANE
174	17.316	1	9.000	0.3000	0	C8 OLEFIN
175	17.358	1	9.000	0.3000	0	n-HEPTANE
176	17.507	1	9.000	0.3000	0	C8 PARAFFIN
177	17.667	1	9.000	0.3000	0	C8 OLEFIN
178	17.762	1	9.000	0.3000	0	C8 OLEFIN
179	17.984	1	9.000	0.3000	0	METHYLCYCLOHEXANE
180	18.343	1	9.000	0.3000	0	C8 PARAFFIN
181	18.407	1	9.000	0.3000	0	C8 PARAFFIN
182	18.602	1	9.000	0.3000	0	C8 PARAFFIN
183	18.816	1	9.000	0.3000	0	C8 PARAFFIN
184	18.897	1	9.000	0.3000	0	2,3,4-TRIMETHYLPENTANE
185	19.022	1	9.000	0.3000	1	TOLUENE
186	19.170	1	9.000	0.3000	0	C8 PARAFFIN
187	19.202	1	9.000	0.3000	0	C8 PARAFFIN
188	19.257	1	9.000	0.3000	0	C8 PARAFFIN
189	19.361	1	9.000	0.3000	0	C8 PARAFFIN
190	19.408	1	9.000	0.3000	0	C8 PARAFFIN
191	19.585	1	9.000	0.3000	0	C8 PARAFFIN
192	19.701	1	9.000	0.3000	0	C8 PARAFFIN
193	19.905	1	9.000	0.3000	0	C8 PARAFFIN
194	20.001	1	9.000	0.3000	0	C8 PARAFFIN
195	20.109	1	9.000	0.3000	0	C8 PARAFFIN
196	20.180	1	9.000	0.3000	0	C8 PARAFFIN
197	20.250	1	9.000	0.3000	0	C8 PARAFFIN
198	20.320	1	9.000	0.3000	0	n-OCTANE
199	20.377	1	9.000	0.3000	0	C9 PARAFFIN
200	20.470	1	9.000	0.3000	0	C9 PARAFFIN
201	20.562	1	9.000	0.3000	0	C9 PARAFFIN

TABLE 2. (continued)

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
202	20.827	1	9.000	0.3000	0	C9 PARAFFIN
203	20.949	1	9.000	0.3000	0	C9 OLEFIN
204	21.009	1	9.000	0.3000	0	C9 PARAFFIN
205	21.123	1	9.000	0.3000	0	C9 PARAFFIN
206	21.172	1	9.000	0.3000	0	C9 PARAFFIN
207	21.223	1	9.000	0.3000	0	C9 PARAFFIN
208	21.277	1	9.000	0.3000	0	C9 PARAFFIN
209	21.369	1	9.000	0.3000	0	C9 PARAFFIN
210	21.425	1	9.000	0.3000	0	C9 PARAFFIN
211	21.524	1	9.000	0.3000	0	C9 PARAFFIN
212	21.596	1	9.000	0.3000	0	C9 PARAFFIN
213	21.744	1	9.000	0.3000	0	ETHYLBENZENE
214	21.842	1	9.000	0.3000	0	C9 PARAFFIN
215	21.973	1	9.000	0.3000	1	m&p-XYLENE
216	22.140	1	9.000	0.3000	0	C9 PARAFFIN
217	22.235	1	9.000	0.3000	0	C9 PARAFFIN
218	22.322	1	9.000	0.3000	0	C9 PARAFFIN
219	22.415	1	9.000	0.3000	0	C9 PARAFFIN
220	22.462	1	9.000	0.3000	0	C9 OLEFIN
221	22.518	1	9.000	0.3000	0	C9 PARAFFIN
222	22.601	1	9.000	0.3000	0	o-XYLENE
223	22.688	1	9.000	0.3000	0	C9 PARAFFIN
224	22.733	1	9.000	0.3000	0	C9 PARAFFIN
225	22.785	1	9.000	0.3000	0	C9 PARAFFIN
226	22.860	1	9.000	0.3000	0	C9 PARAFFIN
227	22.940	1	9.000	0.3000	0	C9 PARAFFIN
228	23.034	1	9.000	0.3000	0	n-NONANE
229	23.174	1	9.000	0.3000	0	C10 PARAFFIN
230	23.243	1	9.000	0.3000	0	C10 PARAFFIN
231	23.305	1	9.000	0.3000	0	C10 PARAFFIN
232	23.455	1	9.000	0.3000	0	C10 PARAFFIN
233	23.540	1	9.000	0.3000	0	C10 PARAFFIN
234	23.625	1	9.000	0.3000	0	C10 PARAFFIN
235	23.706	1	9.000	0.3000	0	C10 PARAFFIN
236	23.824	1	9.000	0.3000	0	C10 PARAFFIN
237	23.883	1	9.000	0.3000	0	C10 PARAFFIN
238	23.940	1	9.000	0.3000	0	C10 PARAFFIN
239	24.007	1	9.000	0.3000	0	C10 OLEFIN
240	24.107	1	9.000	0.3000	0	C10 OLEFIN
241	24.177	1	9.000	0.3000	0	C10 PARAFFIN
242	24.212	1	9.000	0.3000	0	n-PROPYLBENZENE
243	24.310	1	9.000	0.3000	0	C10 PARAFFIN
244	24.386	1	9.000	0.3000	0	p-ETHYLTOLUENE
245	24.447	1	9.000	0.3000	0	m-ETHYLTOLUENE
246	24.573	1	9.000	0.3000	0	C9 AROMATIC
247	24.632	1	9.000	0.3000	0	C10 PARAFFIN
248	24.694	1	9.000	0.3000	0	C10 PARAFFIN
249	24.852	1	9.000	0.3000	0	o-ETHYLTOLUENE
250	24.979	1	9.000	0.3000	0	C9 AROMATIC
251	25.051	1	9.000	0.3000	0	C10 PARAFFIN
252	25.122	1	9.000	0.3000	0	C10 OLEFIN

TABLE 2. (continued)

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
253	25.217	1	9.000	0.3000	0	1,2,4-TRIMETHYLBENZENE
254	25.320	1	9.000	0.3000	0	C9 AROMATIC
255	25.408	1	9.000	0.3000	0	C10 PARAFFIN
256	25.520	1	9.000	0.3000	0	n-DECANE
257	25.597	1	9.000	0.3000	0	C9 AROMATIC
258	25.661	1	9.000	0.3000	0	C9 AROMATIC
259	25.770	1	9.000	0.3000	0	C9 AROMATIC
260	25.909	1	9.000	0.3000	0	1,2,3-TRIMETHYLBENZENE
261	25.972	1	9.000	0.3000	0	C11 PARAFFIN
262	26.043	1	9.000	0.3000	0	C11 PARAFFIN
263	26.103	1	9.000	0.3000	0	C11 PARAFFIN
264	26.218	1	9.000	0.3000	0	C10 AROMATIC
265	26.379	1	9.000	0.3000	0	C10 AROMATIC
266	26.497	1	9.000	0.3000	0	C10 AROMATIC
267	26.567	1	9.000	0.3000	0	C10 AROMATIC
268	26.710	1	9.000	0.3000	0	C10 AROMATIC
269	26.807	1	9.000	0.3000	0	C10 AROMATIC
270	26.842	1	9.000	0.3000	0	C10 AROMATIC
271	26.877	1	9.000	0.3000	0	C11 PARAFFIN
272	26.960	1	9.000	0.3000	0	C10 AROMATIC
273	27.023	1	9.000	0.3000	0	C11 PARAFFIN
274	27.142	1	9.000	0.3000	0	C11 PARAFFIN
275	27.181	1	9.000	0.3000	0	C10 AROMATIC
276	27.227	1	9.000	0.3000	0	1,2-DIMETHYL-4-ETHYLBENZENE
277	27.363	1	9.000	0.3000	0	C10 AROMATIC
278	27.421	1	9.000	0.3000	0	C10 AROMATIC
279	27.601	1	9.000	0.3000	0	C11 PARAFFIN
280	27.680	1	9.000	0.3000	0	C10 AROMATIC
281	27.759	1	9.000	0.3000	0	C10 AROMATIC
282	27.809	1	9.000	0.3000	0	1,2-DIMETHYL-3-ETHYLBENZENE
283	27.953	1	9.000	0.3000	0	C10 AROMATIC
284	28.040	1	9.000	0.3000	0	1,2,4,5-TETRAMETHYLBENZENE
285	28.116	1	9.000	0.3000	0	1,2,3,5-TETRAMETHYLBENZENE
286	28.193	1	9.000	0.3000	0	C10 AROMATIC
287	28.244	1	9.000	0.3000	0	C11 PARAFFIN
288	28.360	1	9.000	0.3000	0	C10 AROMATIC
289	28.761	1	9.000	0.3000	0	C9 PARAFFIN
290	28.623	1	9.000	0.3000	0	C11 AROMATIC
291	28.662	1	9.000	0.3000	0	C11 AROMATIC
292	28.730	1	9.000	0.3000	0	C11 AROMATIC
293	28.845	1	9.000	0.3000	0	C11 AROMATIC
294	28.922	1	9.000	0.3000	0	C11 AROMATIC
295	29.056	1	9.000	0.3000	0	C11 AROMATIC
296	29.120	1	9.000	0.3000	0	C11 AROMATIC
297	29.199	1	9.000	0.3000	0	C11 AROMATIC
298	29.270	1	9.000	0.3000	0	C11 AROMATIC
299	29.350	1	9.000	0.3000	0	C11 AROMATIC
300	29.570	1	9.000	0.3000	1	C11 AROMATIC
301	29.695	1	9.000	0.3000	0	C11 AROMATIC
302	29.840	1	9.000	0.3000	0	C11 AROMATIC
303	29.888	1	9.000	0.3000	0	C11 AROMATIC

TABLE 2. (continued)

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
304	29.939	1	9.000	0.3000	0	C12 PARAFFIN
305	30.077	1	9.000	0.3000	0	C11 AROMATIC
306	30.159	1	9.000	0.3000	0	C11 AROMATIC
307	30.210	1	9.000	0.3000	0	C11 AROMATIC
308	30.283	1	9.000	0.3000	0	C11 AROMATIC
309	30.367	1	9.000	0.3000	0	C11 AROMATIC
310	30.598	1	9.000	0.3000	0	C11 AROMATIC
311	30.727	1	9.000	0.3000	0	C11 AROMATIC
312	30.770	1	9.000	0.3000	0	C12 PARAFFIN
313	30.821	1	9.000	0.3000	0	C11 AROMATIC
314	30.908	1	9.000	0.3000	0	C12 AROMATIC
315	31.070	1	9.000	0.3000	0	C12 AROMATIC
316	31.162	1	9.000	0.3000	0	C12 AROMATIC
[illegible]	31.253	1	9.000	0.3000	0	C12 AROMATIC
[illegible]	31.305	1	9.000	0.3000	0	C12 AROMATIC
[illegible]	31.383	1	9.000	0.3000	0	C12 AROMATIC
320	31.471	1	9.000	0.3000	0	C12 AROMATIC
321	31.617	1	9.000	0.3000	0	C12 AROMATIC
322	31.667	1	9.000	0.3000	0	C12 AROMATIC
323	31.924	1	9.000	0.3000	0	C12 AROMATIC
324	31.983	1	9.000	0.3000	0	C12 AROMATIC
325	32.095	1	9.000	0.3000	0	C12 AROMATIC
326	32.210	1	9.000	0.3000	0	C12 AROMATIC
327	32.340	1	9.000	0.3000	0	C12 AROMATIC
328	32.380	1	9.000	0.3000	0	C13 PRAFFIN
329	[illegible].530	1	9.000	0.3000	0	C12 AROMATIC
330	[illegible].623	1	9.000	0.3000	0	C12 AROMATIC
331	32.713	1	9.000	0.3000	0	C12 AROMATIC
332	32.821	1	9.000	0.3000	0	C12 AROMATIC
333	32.921	1	9.000	0.3000	0	C12 AROMATIC
334	33.060	1	9.000	0.3000	0	C12 AROMATIC
335	33.098	1	9.000	0.3000	0	C13 PARAFFIN
336	33.147	1	9.000	0.3000	0	C12 AROMATIC
337	33.450	1	9.000	0.3000	0	C12 AROMATIC
338	33.302	1	9.000	0.3000	0	C12 AROMATIC
339	33.617	1	9.000	0.3000	0	C12 AROMATIC
340	36.057	1	9.000	0.3000	0	C12 AROMATIC
341	7.340	1	9.000	0.3000	0	C4 OLEFIN
342	8.227	1	9.000	0.3000	0	C4 OLEFIN
343	8.350	1	9.000	0.3000	0	C4 OLEFIN
344	12.673	1	9.000	0.3000	0	C5 OLEFIN
345	15.493	1	9.000	0.3000	0	C7 OLEFIN
346	16.156	1	9.000	0.3000	0	C7 OLEFIN
347	16.637	1	9.000	0.3000	0	C7 PARAFFIN
348	17.196	1	9.000	0.3000	0	C7 OLEFIN
349	17.399	1	9.000	0.3000	0	C3 OLEFIN
350	17.560	1	9.000	0.3000	0	C3 OLEFIN
351	18.260	1	9.000	0.3000	0	C3 OLEFIN
352	19.472	1	9.000	0.3000	0	C3 PARAFFIN
353	20.063	1	9.000	0.3000	0	C3 PARAFFIN
354	20.343	1	9.000	0.3000	0	C3 OLEFIN

TABLE 2. (continued)

HP5880 Calibration Table

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
355	27.487	1	9.000	0.3000	0	C11 OLEFIN
356	27.550	1	9.000	0.3000	0	C10 AROMATIC
357	28.505	1	9.000	0.3000	0	C10 AROMATIC
358	30.307	1	9.000	0.3000	0	C11 AROMATIC
359	30.444	1	9.000	0.3000	0	C11 AROMATIC
360	30.660	1	9.000	0.3000	0	C11 AROMATIC
361	30.980	1	9.000	0.3000	0	C12 AROMATIC
362	31.752	1	9.000	0.3000	0	C12 AROMATIC
363	31.877	1	9.000	0.3000	0	C12 AROMATIC
364	15.617	1	9.000	0.3000	0	C7 OLEFIN
365	15.860	1	9.000	0.3000	0	C7 PARAFFIN
366	18.080	1	9.000	0.3000	0	C8 PARAFFIN
367	22.170	1	9.000	0.3000	0	C9 PARAFFIN
369	13.310	1	9.000	0.3000	0	C6 PARAFFIN
370	28.970	1	9.000	0.3000	0	C10 AROMATIC
371	15.020	1	9.000	0.3000	0	C7 OLEFIN
372	22.150	1	9.000	0.3000	0	C9 PARAFFIN
373	27.125	1	9.000	0.3000	0	C10 AROMATIC
374	28.460	1	9.000	0.3000	0	C10 AROMATIC
375	3.926	1	9.000	0.3000	0	C4 OLEFIN
376	13.520	1	9.000	0.3000	0	C6 OLEFIN
377	29.413	1	9.000	0.3000	0	C11 AROMATIC
378	35.220	1	9.000	0.3000	0	C12 AROMATIC
379	28.550	1	9.000	0.3000	0	C11 AROMATIC
380	29.032	1	9.000	0.3000	0	C11 AROMATIC
381	33.376	1	9.000	0.3000	0	C12 AROMATIC
382	3.293	1	9.000	0.3000	0	C3 PARAFFIN
383	4.377	1	9.000	0.3000	0	C2 PARAFFIN
384	7.206	1	9.000	0.3000	0	C4 PARAFFIN
385	12.409	1	9.000	0.3000	0	C5 PARAFFIN
386	14.953	1	9.000	0.3000	0	C7 PARAFFIN
387	15.780	1	9.000	0.3000	0	C7 OLEFIN
388	19.150	1	9.000	0.3000	0	C8 PARAFFIN
389	20.760	1	9.000	0.3000	0	C9 PARAFFIN
390	34.410	1	9.000	0.3000	0	C12 AROMATIC
391	7.580	1	9.000	0.3000	0	C4 PARAFFIN
392	8.850	1	9.000	0.3000	0	C4 OLEFIN
393	9.700	1	9.000	0.3000	0	C5 OLEFIN
394	10.120	1	9.000	0.3000	0	C5 OLEFIN
395	11.790	1	9.000	0.3000	0	C5 OLEFIN
396	12.150	1	9.000	0.3000	0	C5 OLEFIN
397	13.650	1	9.000	0.3000	0	C6 PARAFFIN
398	21.460	1	9.000	0.3000	0	C9 PARAFFIN
399	21.890	1	9.000	0.3000	0	C9 PARAFFIN
400	23.770	1	9.000	0.3000	0	C10 PARAFFIN
401	26.630	1	9.000	0.3000	0	C10 AROMATIC
402	27.310	1	9.000	0.3000	0	C10 AROMATIC
403	27.850	1	9.000	0.3000	0	C10 AROMATIC
404	32.460	1	9.000	0.3000	0	C12 AROMATIC
405	34.590	1	9.000	0.3000	0	C12 AROMATIC
406	35.370	1	9.000	0.3000	0	C12 AROMATIC

TABLE 2. (continued)

HP5880 Calibration Table Report

CAL#	Retention Time	Level	Amount	Area Amount	REF	Compound Name
407	12.140	1	9.000	0.3000	0	C6 PARAFFIN
408	25.830	1	9.000	0.3000	0	C9 AROMATIC
409	30.530	1	9.000	0.3000	0	C11 AROMATIC
410	33.270	1	9.000	0.3000	0	C12 AROMATIC
411	34.310	1	9.000	0.3000	0	C12 AROMATIC
412	9.580	1	9.000	0.3000	0	C5 OLEFIN
413	10.890	1	9.000	0.3000	0	C5 OLEFIN
414	31.710	1	9.000	0.3000	0	C12 AROMATIC
415	15.480	1	9.000	0.3000	0	C7 OLEFIN
416	30.280	1	9.000	0.3000	0	C11 AROMATIC

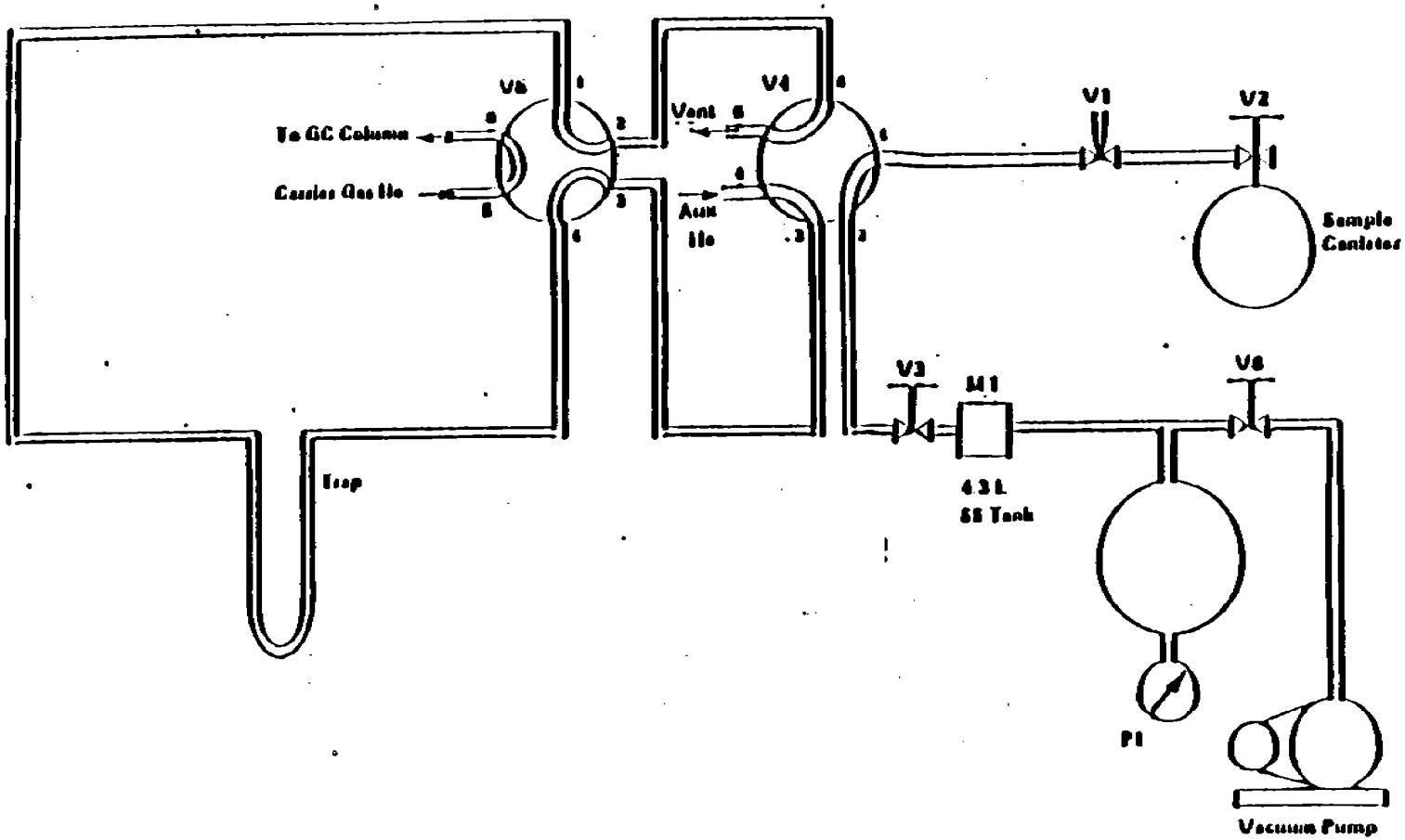


Figure 1. Inlet system—purge position.

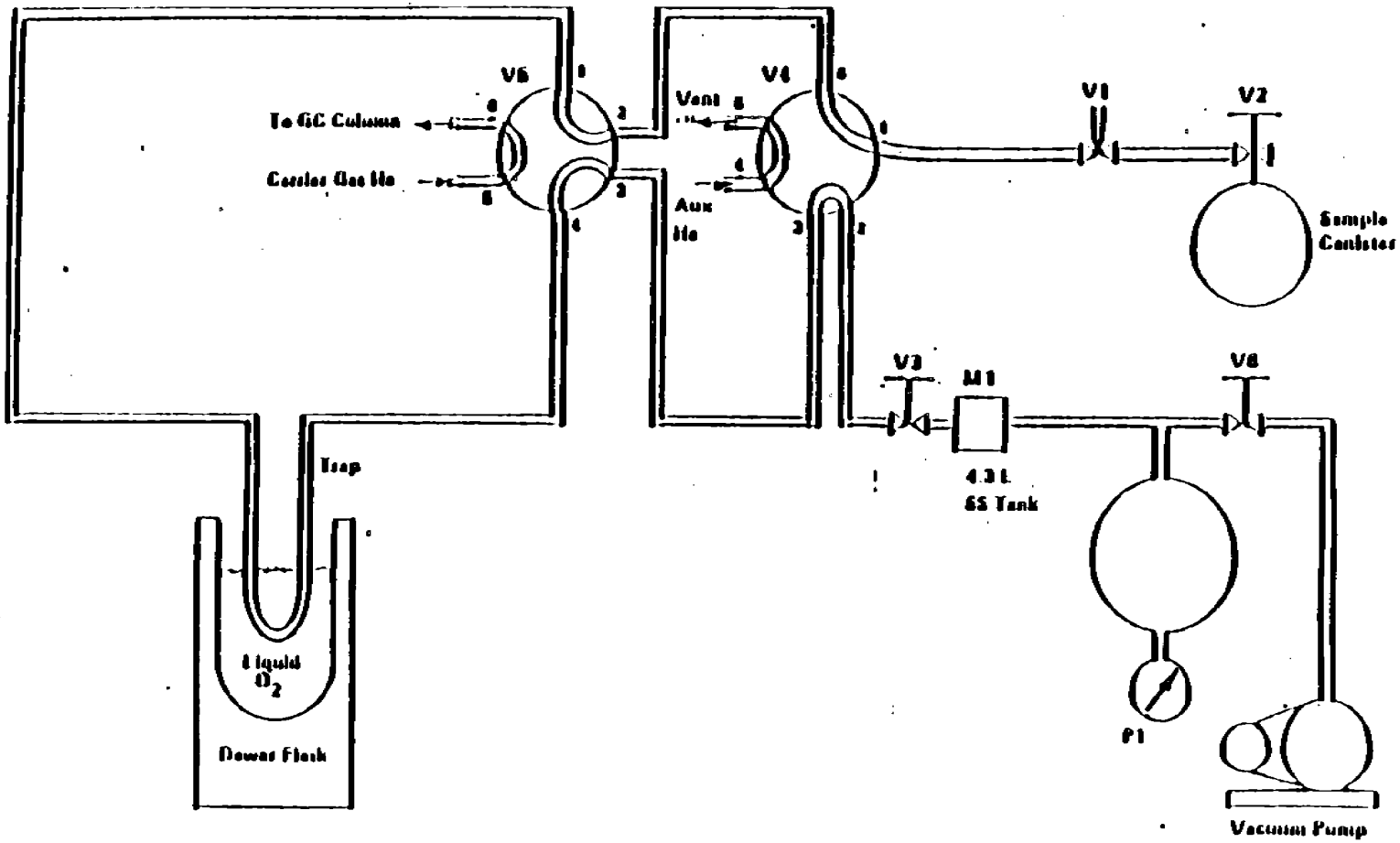


Figure 2. Inlet system–sample trapping position.

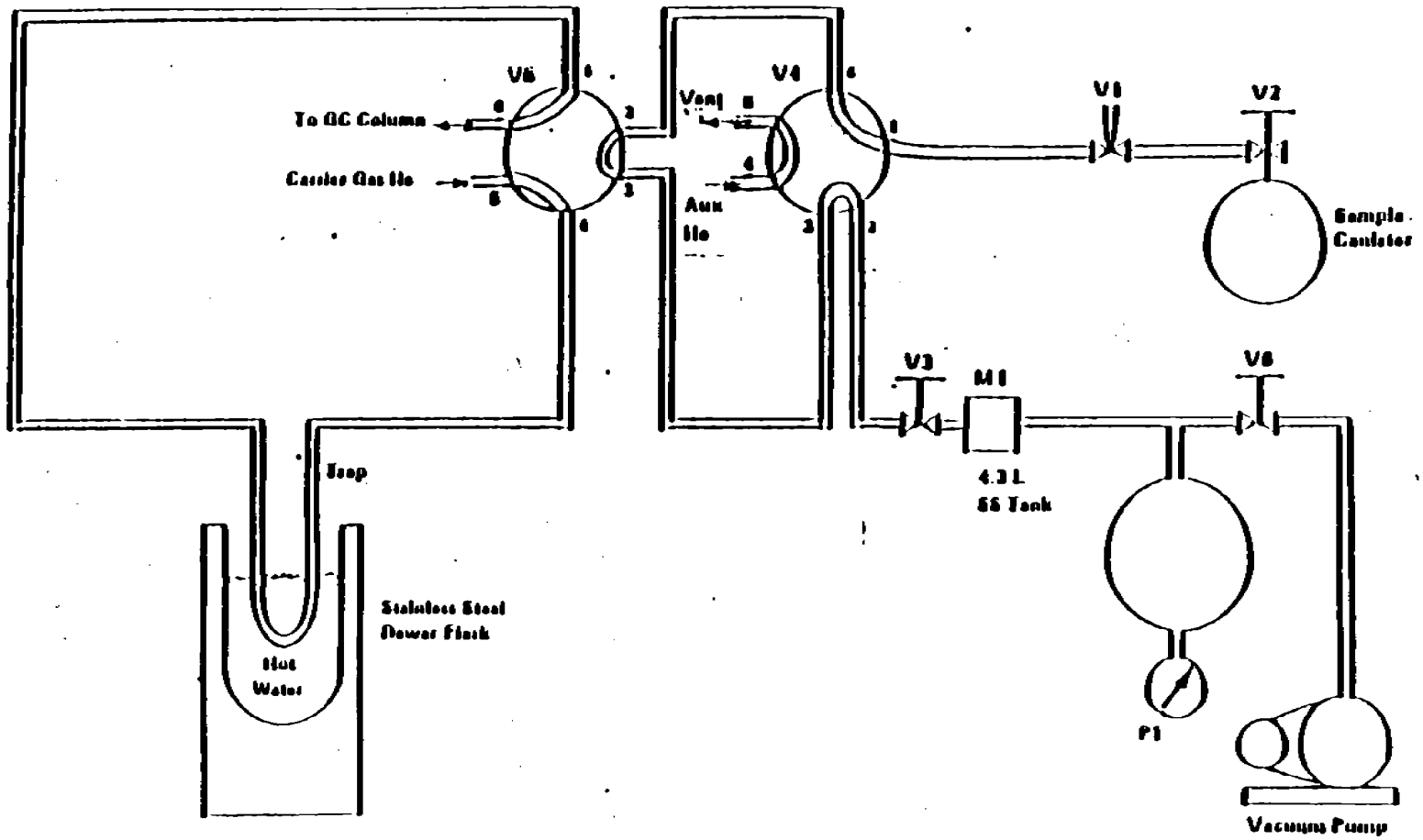


Figure 3. Inlet system—injection position.

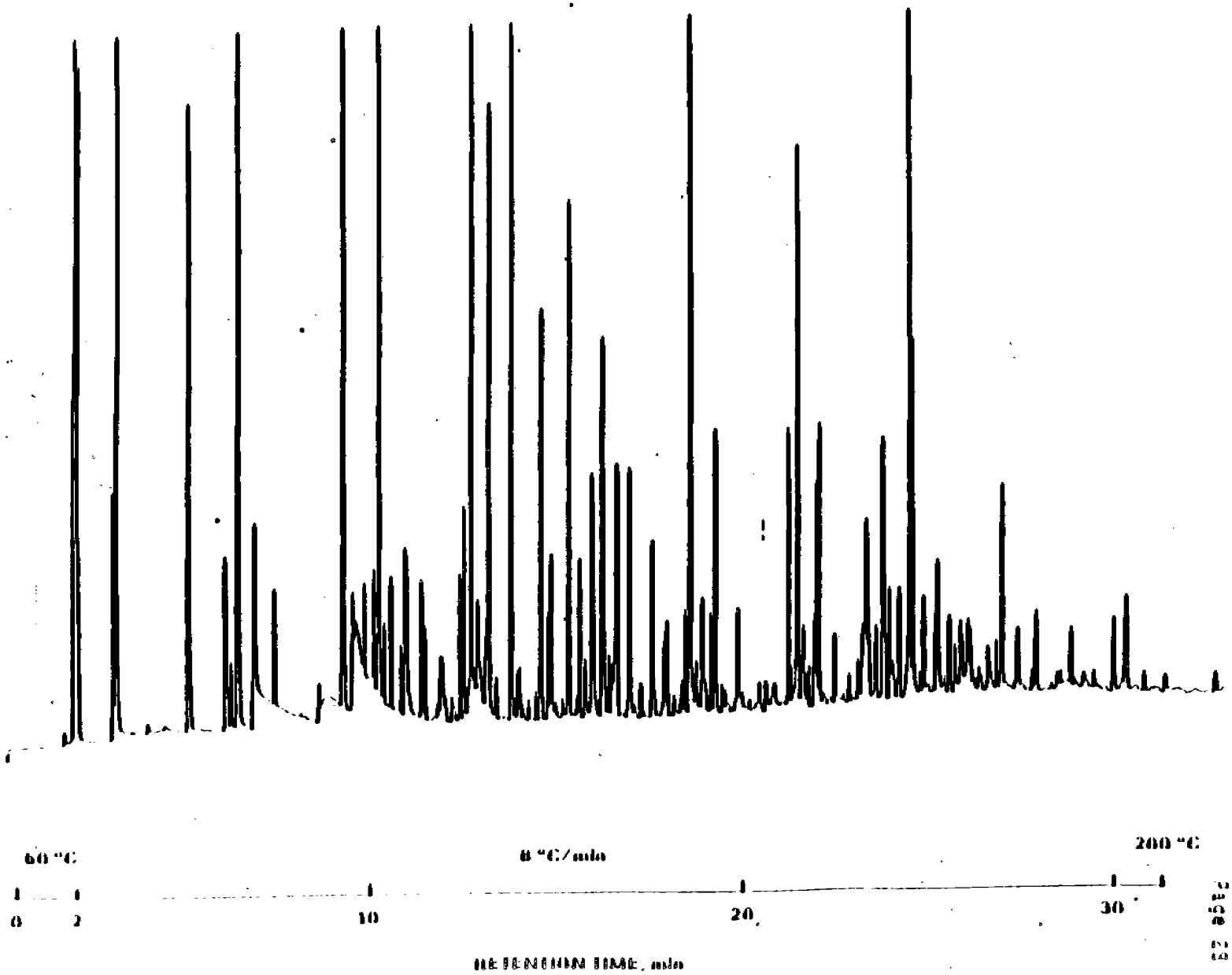


Figure 4. Gas chromatogram of ambient air C-2 to C-12 hydrocarbons

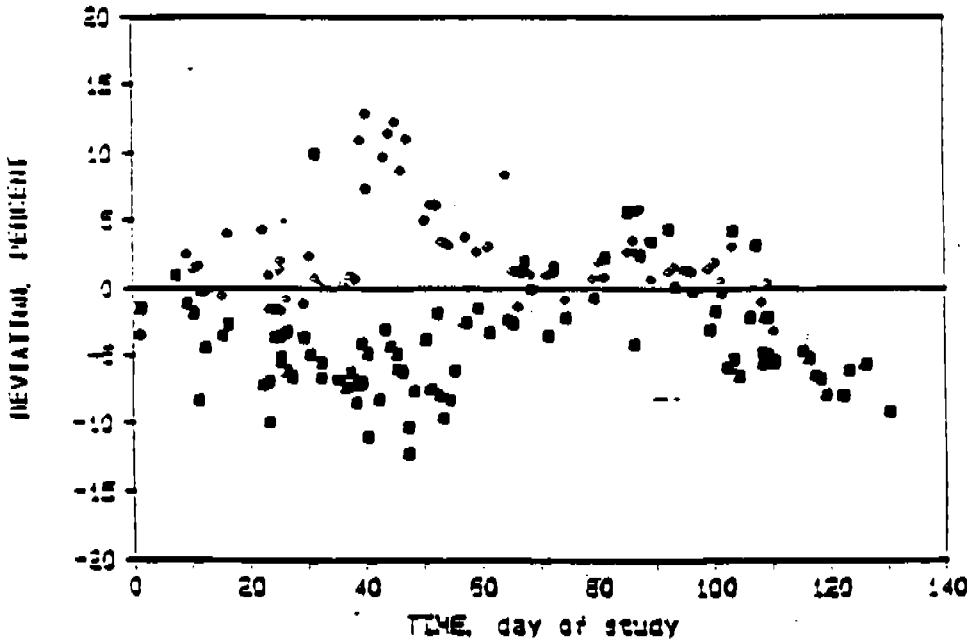
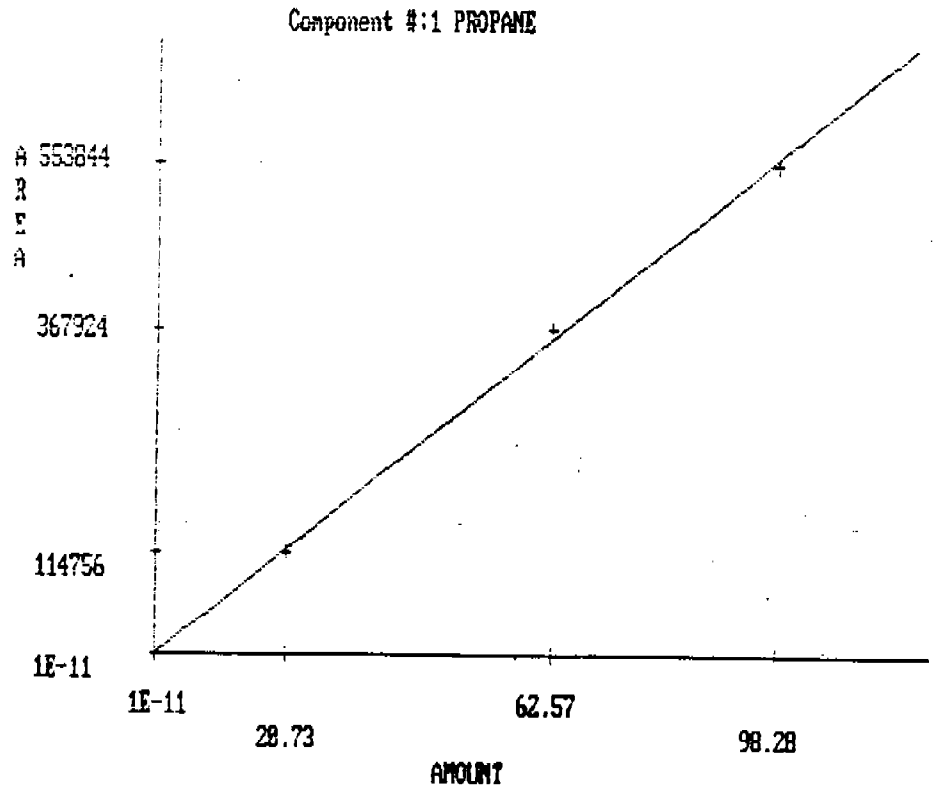


Figure 5. Deviation of measured NBS propane sample response from certified value (■) 1984 and (◇) 1985.

APPENDIX K

MONTHLY PROPANE CALIBRATION CURVES SPECIATED
FLAME IONIZATION DETECTORS

Sample SYSTEM #2
Operator 2914
Run date 06-06-1991 10:11:50 version: 219
Printed on 06-06-1991 AT 10:12:17
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	28.73	114756
3	62.57	367924
4	98.28	553844

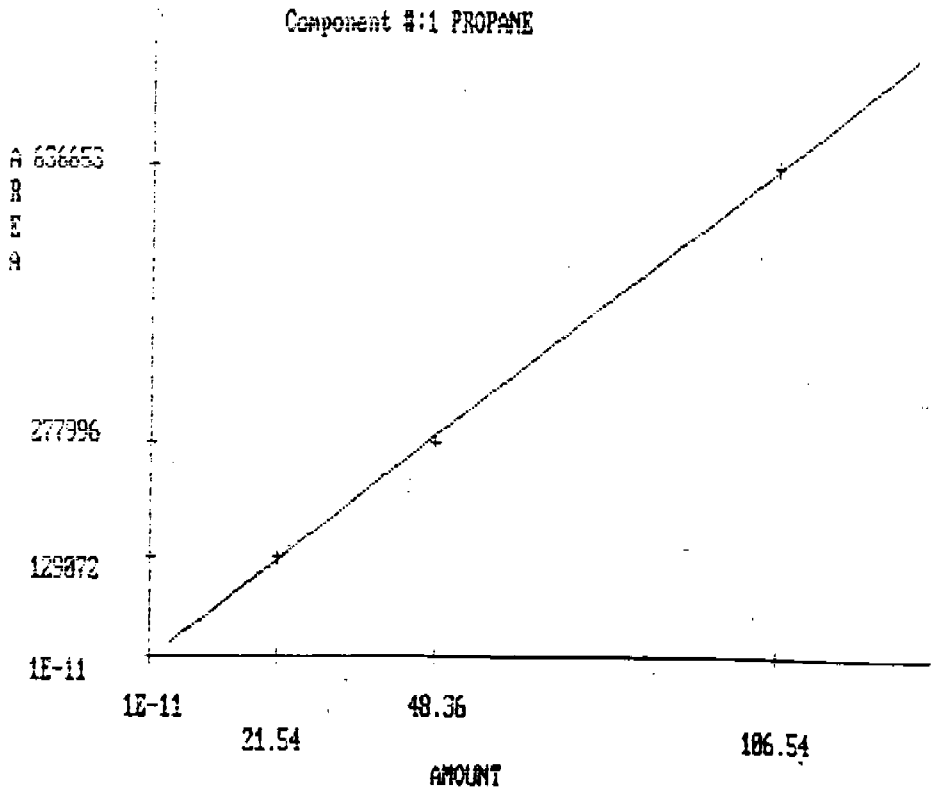
Y = SLOPE * X + INTERCEPT

Area = 5.6899E+02 * Amount + 8.3884E+02
Amount = 1.7575E-04 * Area + -1.4743E-01
R squared = 0.9990

Propane RF = 5689.9 AC/nl
Carbon RF = 1896.6 AC/nl-C

Figure K-1. Speciated FID Detector A, calibration curve for June 1991.

Operator 3914
Run date 07-05-1991 10:06:34 version: TCD
Printed on 07-05-1991 AT 10:07:36
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	21.54	129072
3	48.36	277996
4	106.54	636653

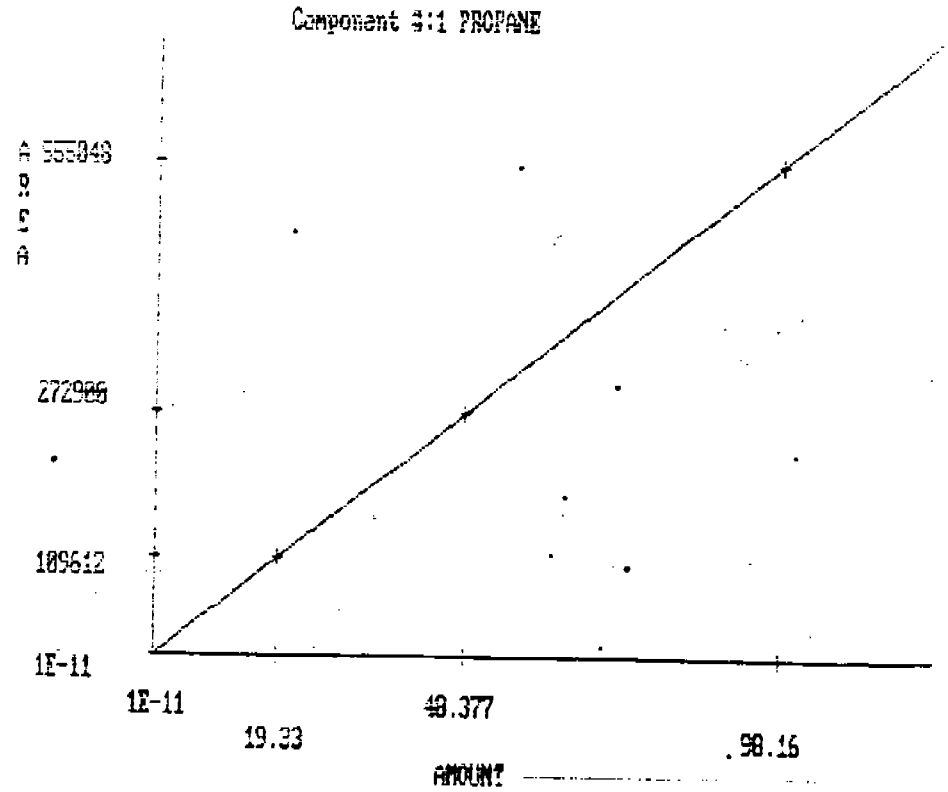
Y = SLOPE * X + INTERCEPT

Area = 3.9671E+03 * Amount + -2.2798E+03
Amount = 1.6758E-04 * Area + 3.2206E-01
r squared = 0.9996

$5967.1/3 = 1989.03$ AC/ml-C

Figure K-2. Speciated FID Detector A, calibration curve for July 1991.

Sample SYSTEM #2
Operator 3914
Plot date 08-09-1991 14:00:11 version: 3C3
Printed on 08-09-1991 AT 14:03:03
Straight Line Fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	19.33	109612
3	48.38	272986
4	98.16	565048

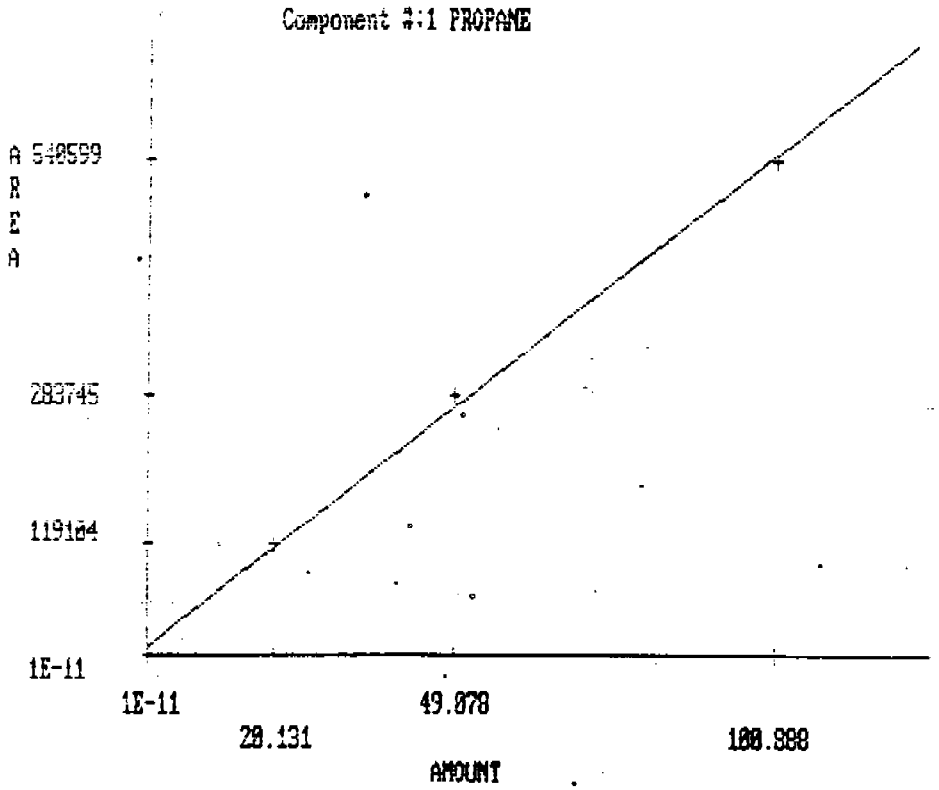
Y = SLOPE * X + INTERCEPT

Area = 5.6524E-03 * Amount + 1.3063E+00
Amount = 1.7691E-04 * Area + -2.3110E-04
r squared = 1.0000

Slope = 5652.4 ac/nl / 3 c/molecule = 1884.1$\overline{3}$

Figure K-3. Speciated FID Detector A, calibration curve for August 1991.

Operator 3914
Run date 08-29-1991 16:46:51 version: 325
Printed on 08-29-1991 AT 16:48:16
Straight Line Fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	20.13	119104
3	49.88	283745
4	100.89	540599

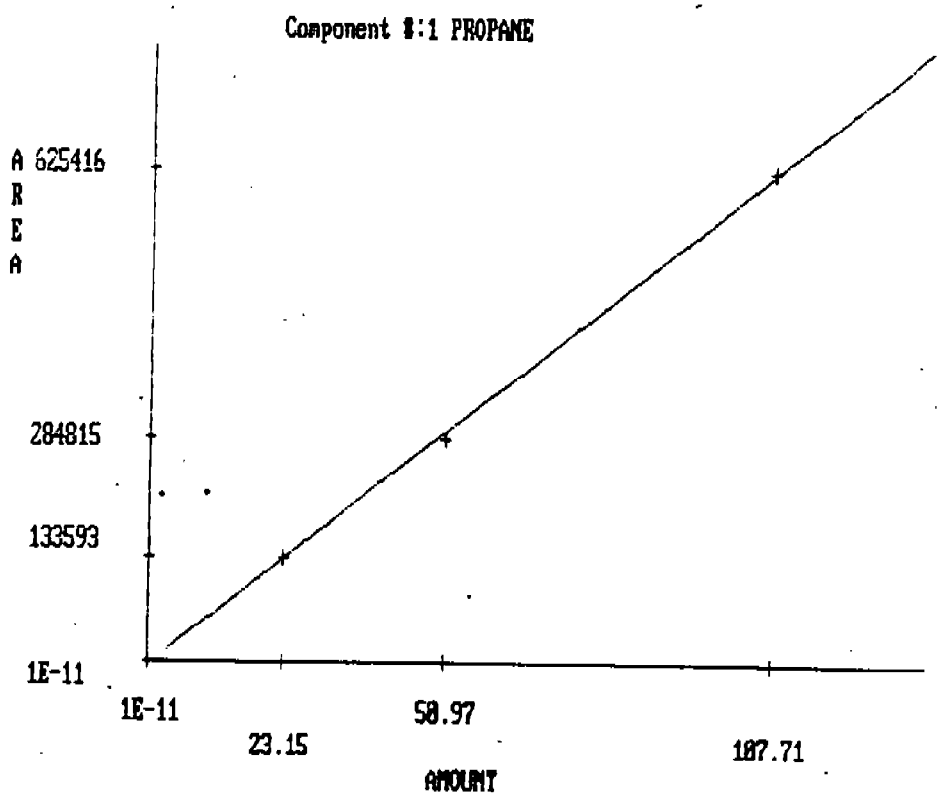
Y = SLOPE * X + INTERCEPT

Area = 5.3384E+03 * Amount + 8.8524E+03
Amount = 1.8732E-04 * Area + -1.6583E+00
R squared = 0.9982

RF = 1779.47 AC/ng-C

Figure K-4. Speciated FID Detector A, calibration curve for September 1991.

Samole SYSTEM #2
Operator 3914
Run date 10-03-1991 16:22:32 version: 327
Printed on 10-03-1991 AT 16:23:41
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	23.15	133593
3	50.97	284815
4	107.71	625416

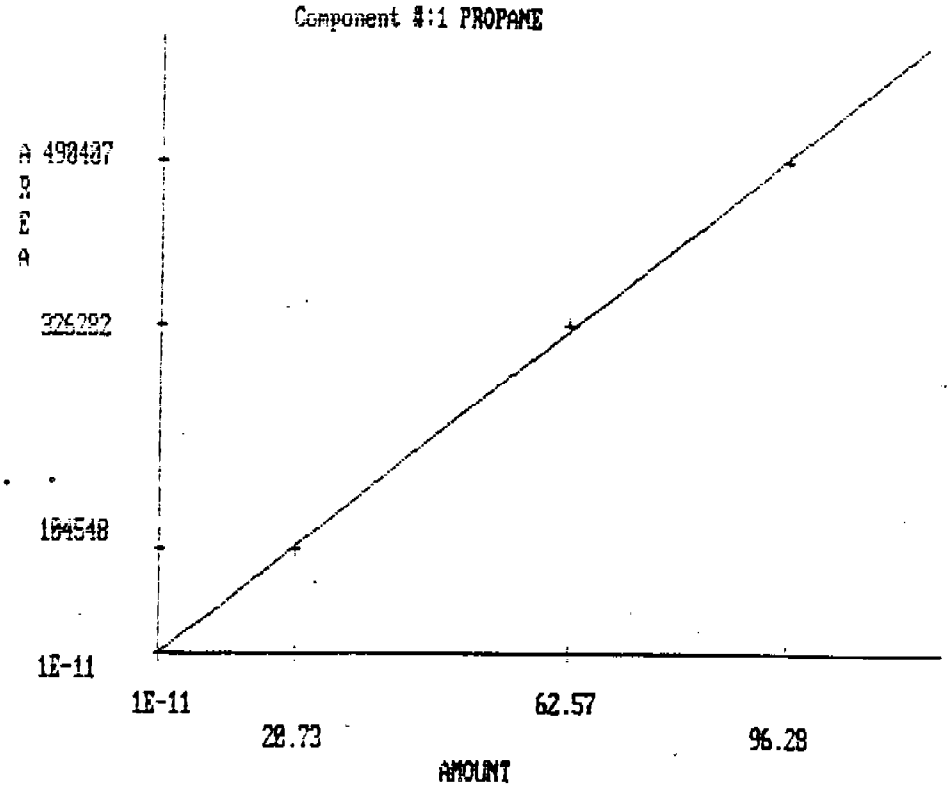
Y = SLOPE * X + INTERCEPT

Area = 5.7998E+03 * Amount + -2.6902E+03
Amount = 1.7242E-04 * Area + 4.6384E-01
R squared = 0.9996

RF= 1933.27 AC/ml·C

Figure K-5. Speciated FID Detector A, calibration curve for October 1991.

Sample SYSTEM #1
Operator 3914
Run date 06-06-1991 10:15:24 version: 220
Printed on 06-06-1991 AT 10:15:44
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	20.73	104548
3	62.57	326292
4	96.28	490407

Y = SLOPE * X + INTERCEPT

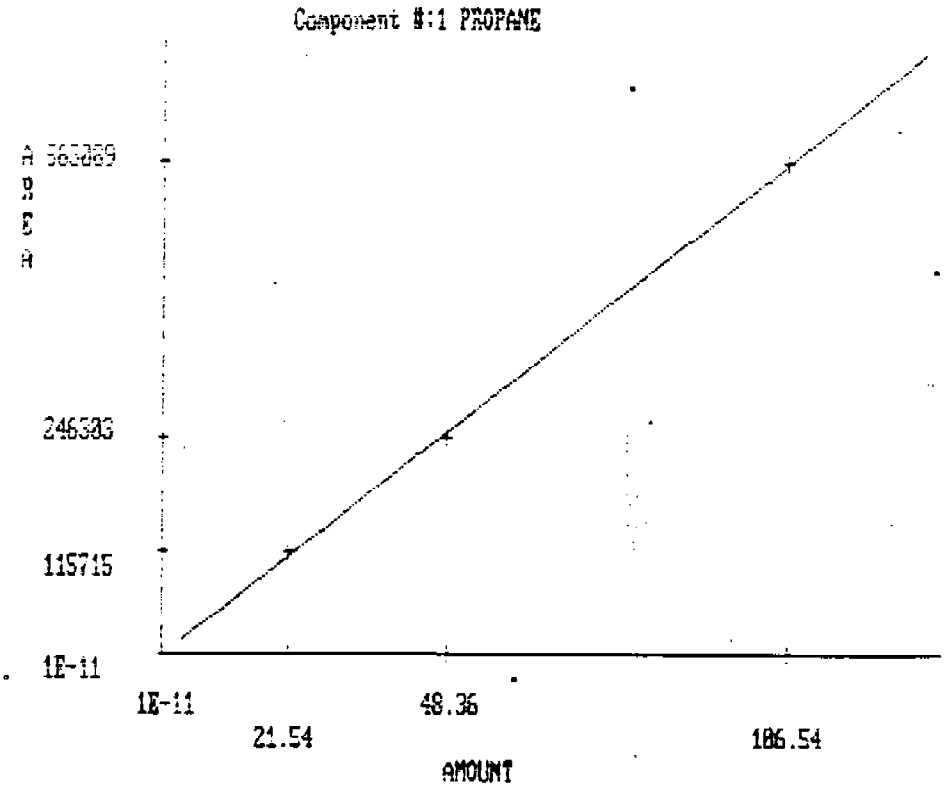
Area = 5.1222E+03 * Amount + 3.4776E+02
Amount = 1.9522E-04 * Area + -6.7892E-02
R squared = 0.9997

Propane RF = 5122.2 AC/nl

Carbon RF = 1707.4 AC/nl-C

Figure K-6. Speciated FID Detector B, calibration curve for June 1991.

Sample SYSTEM #1
Operator 7914
Run date 07-05-1991 10:07:04 version: 223
Printed on 07-05-1991 AT 10:08:37
Straight Line Fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	21.54	115715
3	48.36	246303
4	106.54	563089

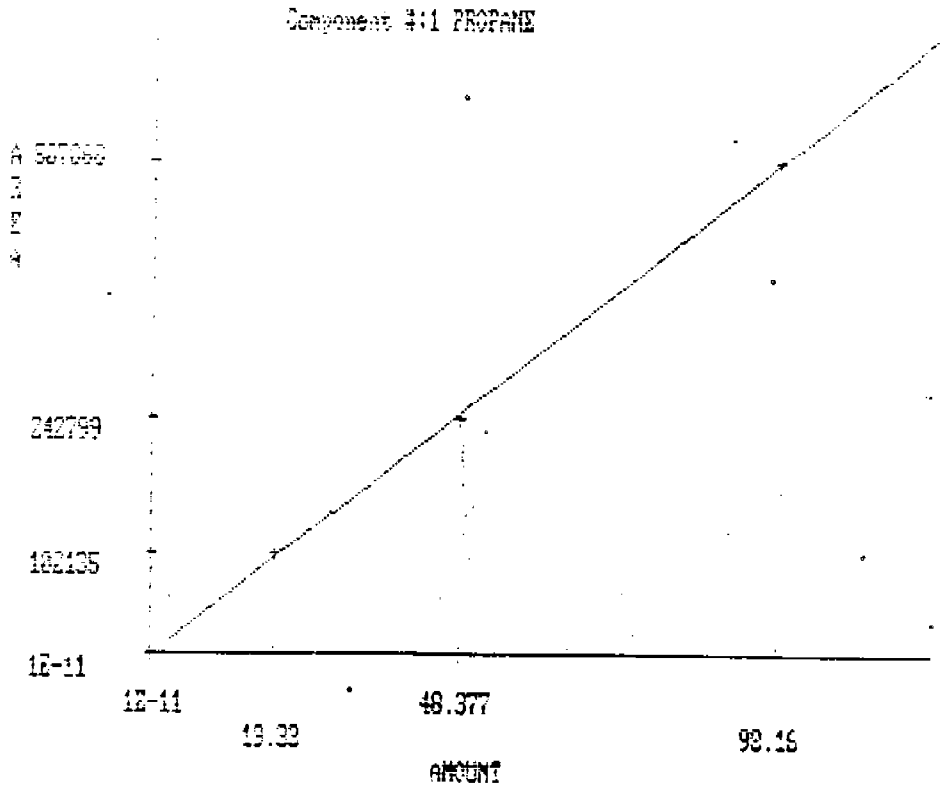
Y = SLOPE * X + INTERCEPT

Area = 5.3724E+03 * Amount + -1.2892E+03
Amount = 1.8967E-04 * Area + 2.4452E-01
R squared = 0.9996

$272.4 / 3 = 1757.47$ AC/ml-C

Figure K-7. Speciated FID Detector B, calibration curve for July 1991.

Operator DF14
Run date 08-09-1991 14:02:12 version: 2.04
Printed on 08-09-1991 AT 14:04:24
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	[illegible]	0
2	[illegible]	102135
3	[illegible]	242799
4	98.16	507062

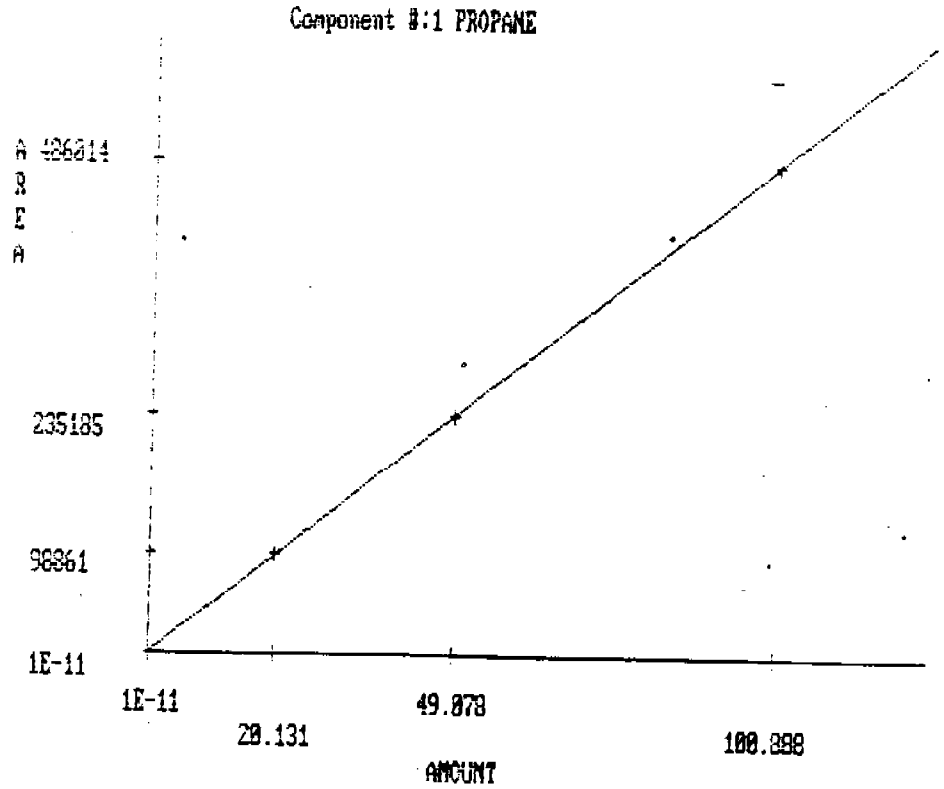
Y = SLOPE * X + INTERCEPT

Area = 5.1475E+02 * Amount + -4.5073E-02
Amount = 1.9427E-04 * Area + 8.7562E-02
r squared = 0.9997

$$\text{Slope} = \frac{5147.5\ \text{AC}/\text{mol}}{3\ \text{C}/\text{molecule}} = 1715.8\overline{3}\ \text{AC}/\text{mol-C}$$

Figure K-8. Speciated FID Detector B, calibration curve for August 1991.

Sample SYSTEM #2
Operator I914
Run date 08-29-1991 16:47:56 version: 2.2
Printed on 08-29-1991 AT 16:49:29
Straight Line Fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	20.13	98361
3	49.08	235185
4	100.09	486014

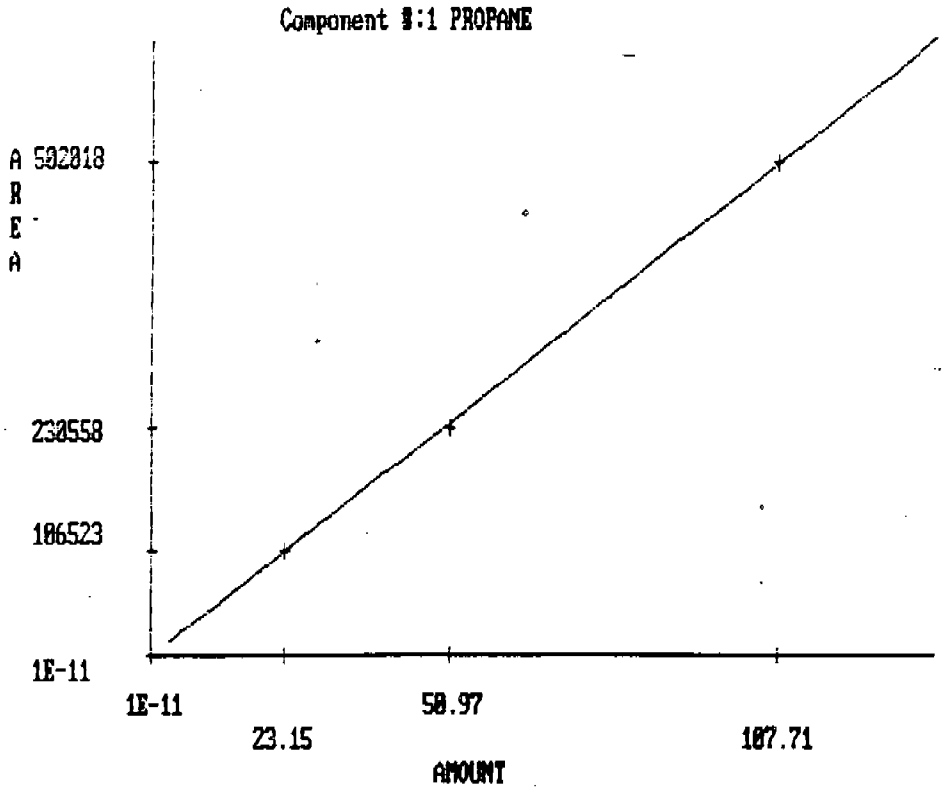
Y = SLOPE * X + INTERCEPT

Area = 4.8086E+03 * Amount + 5.3168E+02
Amount = 2.0796E-04 * Area + -1.1057E-01
R squared = 1.0000

RF = 1602.87 AC/µl-C

Figure K-9. Speciated FID Detector B, calibration curve for September 1991.

Method BSCOTT
Sample SYSTEM #2
Operator 3914
Run date 10-03-1991 16:27:18 version: 230
Printed on 10-03-1991 AT 16:27:46
Straight Line fit



Component 1 = PROPANE
EXTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	AREA
1	0.00	0
2	23.15	106523
3	50.97	230558
4	107.71	502018

Y = SLOPE * X + INTERCEPT

Area = 4.6596E+03 * Amount + -2.0392E+03
Amount = 2.1461E-04 * Area + 4.3763E-01
R squared = 0.9998

RF = 1553.20 AC/nl-C

Figure K-10. Speciated FID Detector B, calibration curve for October 1991.

APPENDIX L

DAILY CALIBRATION CHECKS FOR SPECIATED NMOC RESPONSE FACTORS

Table L-1. Daily Calibration Checks for Speciated NMOC Response Factor, FID A, June 1991.

DETECTOR A:
Monthly Response: 1896.6 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
6/6/91	1845.2	1845.20	1845.20		-2.71
6/6/91	1960.1	1740.16	2065.14	81.25	3.35
6/6/91	1878.5	1776.36	2012.84	59.12	-0.95
6/6/91	1706.1	1635.69	2059.26	105.89	-10.04
6/7/91	1859.6	1666.17	2033.63	91.86	-1.95
6/10/91	1879.4	1688.73	2020.91	83.04	-0.91
6/11/91	1832.3	1699.03	2004.17	76.28	-3.39
6/12/91	1789.2	1695.82	1991.78	73.99	-5.66
6/13/91	1773.4	1689.81	1982.14	73.08	-6.50
6/14/91	1883.1	1699.70	1981.68	70.50	-0.71
6/17/91	1769.9	1693.85	1974.66	70.20	-6.68
6/18/91	1820.3	1698.98	1967.20	67.06	-4.02
6/19/91	1793.4	1699.76	1960.31	65.14	-5.44
6/20/91	1792.0	1700.52	1954.13	63.40	-5.52
6/21/91	1773.5	1698.42	1949.05	62.66	-6.49
6/24/91	1740.0	1690.40	1946.60	64.05	-8.26
6/25/91	1776.4	1690.32	1941.73	62.85	-6.34
6/26/91	1762.5	1688.52	1937.58	62.27	-7.07
6/27/91	1711.5	1678.02	1937.39	64.84	-9.76
6/28/91	1752.4	1676.32	1933.56	64.31	-7.60
6/29/91	1722.3	1670.55	1931.46	65.23	-9.19
6/30/91	1693.5	1660.81	1931.43	67.66	-10.71
7/1/91	1769.6	1662.30	1927.63	66.33	-6.70
7/2/91	1773.6	1664.04	1924.11	65.02	-6.49
7/3/91	1819.1	1667.38	1922.77	63.85	-4.09

Table L-2. Daily Calibration Checks for Speciated NMOC Response Factor, FID B, June 1991.

DETECTOR B:
Monthly Response: 1707.4 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	2s RANGE High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
6/6/91	1681.1	1681.10	1681.10		-1.54
6/6/91	1738.2	1628.90	1790.40	40.38	1.80
6/6/91	1697.9	1647.04	1764.42	29.34	-0.56
6/6/91	1596.2	1558.79	1797.91	59.78	-6.51
6/7/91	1682.9	1575.64	1782.88	51.81	-1.43
6/10/91	1656.8	1581.04	1769.99	47.24	-2.96
6/11/91	1626.5	1574.65	1762.38	46.93	-4.74
6/12/91	1652.0	1578.76	1754.14	43.84	-3.24
6/13/91	1638.9	1579.34	1747.44	42.03	-4.01
6/14/91	1715.2	1582.82	1754.32	42.88	0.46
6/17/91	1637.3	1582.22	1749.24	41.76	-4.11
6/18/91	1628.5	1580.15	1745.10	41.24	-4.62
6/19/91	1649.9	1582.37	1740.92	39.64	-3.37
6/20/91	1610.7	1577.12	1738.90	40.44	-5.66
6/21/91	1624.6	1575.95	1735.61	39.92	-4.85
6/24/91	1562.3	1559.75	1740.12	45.09	-8.50
6/25/91	1604.8	1557.26	1737.31	45.01	-6.01
6/26/91	1598.8	1554.31	1734.86	45.14	-6.36
6/27/91	1582.5	1549.08	1733.56	46.12	-7.32
6/28/91	1582.4	1544.81	1731.94	46.78	-7.32
6/29/91	1574.0	1539.88	1730.74	47.71	-7.81
6/30/91	1556.1	1532.64	1730.77	49.53	-8.86
7/1/91	1618.8	1534.21	1728.08	48.47	-5.19
7/2/91	1599.0	1534.10	1725.52	47.85	-6.35
7/3/91	1645.2	1536.53	1724.32	46.95	-3.64

Table L-3. Daily Calibration Checks for Speciated NMOC Response Factor, FID A, July 1991.

DETECTOR A:
Monthly Response: 1989.03 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
7/3/91	1802.00	1802.00	1802.00		-9.40
7/3/91	1997.40	1623.36	2176.04	138.17	0.42
7/5/91	1916.16	1708.86	2101.51	98.16	-3.66
7/5/91	1991.91	1744.62	2109.12	91.13	0.14
7/8/91	1869.30	1749.33	2081.38	83.01	-6.02
7/9/91	1989.00	1767.42	2087.84	80.10	-0.00
7/10/91	1909.26	1778.10	2071.91	73.45	-4.01
7/11/91	1837.50	1764.64	2063.49	74.71	-7.62
7/12/91	1793.80	1739.57	2061.84	80.57	-9.82
7/15/91	1942.40	1750.68	2059.06	77.10	-2.34
7/16/91	1904.70	1758.58	2051.14	73.14	-4.24
7/17/91	1938.60	1766.84	2048.49	70.41	-2.54
7/18/91	1875.90	1769.25	2041.20	67.99	-5.69
7/19/91	1933.00	1775.73	2038.69	65.74	-2.82
7/22/91	1945.10	1781.53	2037.94	64.10	-2.21
7/23/91	1901.70	1785.31	2033.15	61.96	-4.39
7/24/91	1856.80	1783.50	2028.80	61.33	-6.65
7/25/91	1787.30	1768.03	2031.07	65.76	-10.14
7/26/91	1830.40	1764.21	2027.60	65.85	-7.98
7/29/91	1835.70	1761.92	2023.87	65.49	-7.71
7/30/91	1845.20	1761.28	2019.97	64.67	-7.23
7/31/91	1833.20	1759.43	2016.60	64.29	-7.83
8/1/91	1867.10	1761.18	2013.03	62.96	-6.13
8/2/91	1918.90	1764.59	2012.27	61.92	-3.53
8/3/91	1994.20	1764.26	2021.07	64.20	0.26
8/5/91	1841.70	1763.31	2018.09	63.69	-7.41
8/6/91	1771.90	1753.28	2019.32	66.51	-10.92
8/7/91	1801.30	1748.83	2017.70	67.22	-9.44
8/8/91	1804.80	1745.37	2015.75	67.59	-9.26

Table L-4. Daily Calibration Checks for Speciated NMOC Response Factor, FID B, July 1991.

DETECTOR B:
Monthly Response: 1757.47 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
7/3/91	1616.40	1616.40	1616.40		-8.03
7/3/91	1790.70	1457.05	1950.05	123.25	1.89
7/5/91	1697.70	1527.17	1876.03	87.22	-3.40
7/5/91	1761.75	1562.03	1871.24	77.30	0.24
7/8/91	1678.80	1570.97	1847.17	69.05	-4.48
7/9/91	1671.80	1575.64	1830.07	63.61	-4.87
7/10/91	1706.05	1587.16	1819.47	58.08	-2.93
7/11/91	1654.93	1584.42	1810.12	56.43	-5.83
7/12/91	1736.40	1592.88	1810.35	54.37	-1.20
7/15/91	1733.50	1600.32	1809.29	52.24	-1.36
7/16/91	1720.20	1606.65	1805.76	49.78	-2.12
7/17/91	1750.10	1611.61	1808.11	49.12	-0.42
7/18/91	1707.60	1615.61	1803.76	47.04	-2.84
7/19/91	1726.20	1620.05	1801.68	45.41	-1.78
7/22/91	1748.90	1623.72	1803.09	44.84	-0.49
7/23/91	1707.70	1626.35	1799.74	43.35	-2.83
7/24/91	1670.10	1624.03	1797.01	43.24	-4.97
7/25/91	1619.60	1611.25	1799.68	47.11	-7.84
7/26/91	1637.80	1605.22	1798.59	48.34	-6.81
7/29/91	1608.20	1594.21	1800.24	51.51	-8.49
7/30/91	1658.00	1593.50	1797.21	50.93	-5.66
7/31/91	1636.60	1590.18	1795.19	51.25	-6.88
8/1/91	1661.60	1590.35	1792.32	50.49	-5.46
8/2/91	1701.70	1592.91	1790.62	49.43	-3.17

Table L-5. Daily Calibration Checks for Speciated NMOC Response Factor, FID A, August 1991.

DETECTOR A:
Monthly Response: 1884.1 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
8/9/91	1890.2	1890.19	1890.19		0.32
8/9/91	1880.4	1871.36	1899.18	6.95	-0.20
8/9/91	1884.8	1875.28	1894.97	4.92	0.04
8/9/91	1875.2	1869.87	1895.42	6.39	-0.47
8/12/91	1753.2	1740.45	1973.06	58.15	-6.95
8/13/91	1610.2	1589.06	2042.27	113.30	-14.54
8/14/91	1941.5	1605.96	2061.32	113.84	3.05
8/15/91	1867.2	1625.71	2049.96	106.06	-0.90
8/16/91	1872.3	1641.92	2041.42	99.88	-0.62
8/19/91	1701.6	1619.54	2035.79	104.06	-9.69
8/20/91	1808.1	1628.09	2023.68	98.90	-4.03
8/21/91	1844.1	1638.52	2016.29	94.44	-2.12
8/22/91	1852.9	1647.97	2010.76	90.70	-1.66
8/23/91	1838.0	1655.64	2004.32	87.17	-2.45
8/26/91	1688.4	1637.32	2003.76	91.61	-10.39
8/27/91	1838.8	1644.44	1998.92	88.62	-2.40

Table L-6. Daily Calibration Checks for Speciated NMOC Response Factor, FID B, August 1991.

DETECTOR B:
Monthly Response: 1715.8 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
8/9/91	1761.3	1761.25	1761.25		2.65
8/9/91	1673.0	1592.25	1841.96	62.43	-2.50
8/9/91	1721.9	1630.25	1807.17	44.23	0.36
8/9/91	1656.9	1608.19	1798.32	47.53	-3.43
8/12/91	1648.1	1596.25	1788.20	47.99	-3.95
8/13/91	1678.6	1603.39	1776.52	43.28	-2.17
8/14/91	1745.4	1608.43	1787.32	44.72	1.73
8/15/91	1679.1	1611.66	1779.40	41.93	-2.14
8/16/91	1680.7	1614.81	1772.95	39.54	-2.04
8/19/91	1736.4	1618.88	1777.40	39.63	1.20
8/20/91	1671.3	1618.78	1772.61	38.46	-2.59
8/21/91	1659.9	1616.52	1768.91	38.10	-3.26
8/22/91	1648.6	1612.38	1766.26	38.47	-3.92
8/23/91	1672.0	1613.58	1762.59	37.25	-2.55
8/26/91	1665.7	1613.88	1759.31	36.36	-2.92
8/27/91	1647.3	1611.19	1757.08	36.47	-3.99

DETECTOR B:
Monthly Response: 1602.87 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
8/29/91	1637.0	1636.97	1636.97		2.13
8/29/91	1597.4	1561.14	1673.18	28.01	-0.34
8/29/91	1605.8	1571.64	1655.11	20.87	0.18
8/30/91	1487.8	1451.87	1712.09	65.06	-7.18
9/3/91	1520.2	1444.12	1695.12	62.75	-5.16
9/4/91	1576.2	1458.34	1683.09	56.19	-1.67
9/5/91	1588.6	1469.80	1676.74	51.74	-0.89
9/6/91	1558.9	1475.14	1667.81	48.17	-2.74
9/9/91	1569.4	1481.12	1661.36	45.06	-2.09
9/10/91	1582.3	1487.09	1657.60	42.63	-1.28
9/11/91	1595.1	1492.38	1656.45	41.02	-0.48
9/12/91	1609.4	1496.55	1658.12	40.39	0.41
9/13/91*	1435.6	1456.14	1676.72	55.14	-10.44
9/16/91	1511.2	1452.49	1672.48	55.00	-5.72
9/17/91	1539.9	1454.34	1667.61	53.32	-3.93
9/18/91	1516.8	1452.86	1663.58	52.68	-5.37
9/19/91	1476.1	1443.87	1662.90	54.76	-7.91

Table L-7. Daily Calibration Checks for Speciated NMOC Response Factor, FID A, September 1991.

DETECTOR A:
Monthly Response: 1779.47 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
8/29/91	1972.2	1972.25	1972.25		10.83
8/29/91	1927.2	1885.96	2013.46	31.87	8.30
8/29/91	1786.1	1701.00	2089.37	97.09	0.37
8/30/91	1837.9	1712.28	2049.44	84.29	3.28
9/3/91	1834.8	1719.95	2023.35	75.85	3.11
9/4/91	1933.0	1737.24	2026.52	72.32	8.63
9/5/91	1945.3	1750.47	2031.41	70.24	9.32
9/6/91	1899.5	1761.82	2022.20	65.10	6.75
9/9/91	1927.2	1771.90	2019.94	62.01	8.30
9/10/91	1942.5	1779.99	2021.16	60.29	9.16
9/11/91	1959.3	1786.17	2025.67	59.88	10.11
9/12/91	1964.4	1791.72	2029.86	59.53	10.39
9/13/91*	1723.8	1742.28	2050.53	77.06	-3.13
9/16/91	1850.1	1742.97	2043.23	75.07	3.97
9/17/91	1891.5	1748.32	2037.66	72.34	6.30
9/18/91	1868.3	1751.14	2031.76	70.16	4.99
9/19/91	1823.0	1747.57	2027.28	69.93	2.45
9/20/91	2047.7	1741.03	2051.62	77.65	15.07
9/23/91	1882.5	1744.54	2046.65	75.53	5.79
9/24/91	1867.4	1746.62	2041.75	73.78	4.94
9/25/91	1794.5	1739.18	2039.71	75.13	0.84
9/27/91	1796.9	1733.37	2037.10	75.93	0.98
9/30/91	1817.2	1731.22	2033.33	75.53	2.12
10/1/91	1824.2	1730.23	2029.49	74.81	2.51
10/2/91	1848.1	1731.56	2025.61	73.51	3.86

* See explanation included in daily QC folder with chromatogr

Table L-8. Daily Calibration Checks for Speciated NMOC Response Factor, FID B, September 1991.

DETECTOR B:
Monthly Response: 1602.87 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
8/29/91	1637.0	1636.97	1636.97		2.13
8/29/91	1597.4	1561.14	1673.18	28.01	-0.34
8/29/91	1605.8	1571.64	1655.11	20.87	0.18
8/30/91	1487.8	1451.87	1712.09	65.06	-7.18
9/3/91	1520.2	1444.12	1695.12	62.75	-5.16
9/4/91	1576.2	1458.34	1683.09	56.19	-1.67
9/5/91	1588.6	1469.80	1676.74	51.74	-0.89
9/6/91	1558.9	1475.14	1667.81	48.17	-2.74
9/9/91	1569.4	1481.12	1661.36	45.06	-2.09
9/10/91	1582.3	1487.09	1657.60	42.63	-1.28
9/11/91	1595.1	1492.38	1656.45	41.02	-0.48
9/12/91	1609.4	1496.55	1658.12	40.39	0.41
9/13/91*	1435.6	1456.14	1676.72	55.14	-10.44
9/16/91	1511.2	1452.49	1672.48	55.00	-5.72
9/17/91	1539.9	1454.34	1667.61	53.32	-3.93
9/18/91	1516.8	1452.86	1663.58	52.68	-5.37
9/19/91	1476.1	1443.87	1662.90	54.76	-7.91
9/20/91	1445.7	1429.65	1665.15	58.87	-9.81
9/23/91	1529.1	1431.70	1661.18	57.37	-4.60
9/24/91	1502.4	1430.84	1657.64	56.70	-6.27
9/25/91	1476.0	1426.52	1655.46	57.24	-7.92
9/27/91	1455.1	1419.52	1654.65	58.78	-9.22
9/30/91	1499.0	1419.47	1651.38	57.98	-6.48
10/1/91	1488.80	1418.49	1648.48	57.50	-7.12
10/2/91	1516.5	1420.03	1645.58	56.39	-5.39

* See explanation included in daily QC folder with chromatogr

Table L-9. Daily Calibration Checks for Speciated NMOC Response Factor, FID A, October 1991.

DETECTOR A:
Monthly Response: 1933.3 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	2s RANGE High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
10/3/91	1923.6	1923.59	1923.59		-0.50
10/3/91	1862.6	1806.90	1979.32	43.11	-3.66
10/3/91	1935.5	1829.06	1985.41	39.09	0.11
10/4/91	1786.7	1740.71	2013.50	68.20	-7.58
10/7/91	1999.0	1740.74	2062.23	80.37	3.40
10/8/91	1839.9	1738.90	2043.53	76.16	-4.83
10/9/91	1901.1	1753.39	2031.87	69.62	-1.67
10/11/91	1914.9	1765.54	2025.29	64.94	-0.95
10/14/91	1955.2	1774.20	2029.91	63.93	1.13
10/15/91	1940.6	1782.93	2028.90	61.49	0.38
10/16/91	1917.5	1790.08	2023.85	58.44	-0.82
10/18/91	1916.3	1796.17	2019.32	55.79	-0.88
10/21/91	1884.5	1798.36	2013.55	53.80	-2.52
10/25/91	1881.3	1799.98	2008.41	52.11	-2.69
10/28/91	1899.0	1803.39	2004.31	50.23	-1.77
10/29/91	1861.5	1801.87	2000.54	49.67	-3.71

Table L-10. Daily Calibration Checks for Speciated NMOC Response Factor, FID B, October 1991.

DETECTOR B:
Monthly Response: 1553.2 AC/nl-C

DATES	DAILY RESPONSE (AC/nl-C)	2s RANGE Low	High	CUMULATIVE STD.DEV.	RF %DIFF From Monthly
10/3/91	1533.8	1533.81	1533.81		-1.25
10/3/91	1507.8	1484.02	1557.59	18.39	-2.92
10/3/91	1553.6	1485.79	1577.69	22.98	0.03
10/4/91	1454.3	1426.33	1598.43	43.02	-6.37
10/7/91	1625.4	1409.40	1660.57	62.79	4.65
10/8/91	1495.0	1411.34	1645.30	58.49	-3.75
10/9/91	1541.9	1422.98	1637.54	53.64	-0.73
10/11/91	1562.9	1432.37	1636.31	50.98	0.62
10/14/91	1578.4	1439.43	1639.04	49.90	1.62
10/15/91	1572.1	1446.16	1638.88	48.18	1.22
10/16/91	1544.0	1451.24	1634.08	45.71	-0.59
10/18/91	1548.2	1455.89	1630.34	43.61	-0.32
10/21/91	1497.0	1452.23	1626.91	43.67	-3.62
10/25/91	1505.7	1451.31	1623.00	42.92	-3.06
10/28/91	1532.5	1454.08	1619.60	41.38	-1.33
10/29/91	1513.9	1454.64	1616.18	40.39	-2.53

APPENDIX M

SPECIATED NMOC AUDIT RESULTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ATMOSPHERIC RESEARCH AND EXPOSURE ASSESSMENT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Mail Drop 84
Phone: (919) 541-2829

January 29, 1992

Ms. Terri Sampson
Radian Corporation
3200 E. Chapel Hill Rd.
P. O. Box 13000
Research Triangle Park, NC 27709

Dear Terri:

Enclosed is a table that contains your results for the analysis of the audit mixture prepared in canister 01534 using the NIST traceable mixture from cylinder CC83778. Also included are the results obtained on our gc system (GKPRB) and those obtained by another laboratory (Lab B) that likewise analyzed this audit mixture. With the possible exception of the n-octane results reported by Lab B, all laboratories compared quite well.

If you have any questions, please call. At your convenience, I would like to receive your speciated results for the nine NMOC 91 samples analyzed by our laboratory in November 1991.

Sincerely yours,

Bill Lonneman

William A. Lonneman
Research Chemist
Gas Kinetics & Photochemistry Research Branch

Enclosure

ANALYSIS RESULTS FOR AUDIT CANISTER 01534
COMPOUND CONCENTRATIONS ppbC

COMPOUND	AUDIT Conc.	GKPRB 7/10/91	RADIAN 7/23/91	Lab B 9/10/91	GKPRB 10/26/91
ETHANE	9.4	10.7	8.0	10.9	10.5
PROPANE	15.3	16.1	16.2	17.9	15.5
ISOBUTANE	20.4	21.2	21.5	22.9	20.4
n-BUTANE	20.8	21.0	28.3	22.7	20.1
ISOPENTANE	25.5	25.5	26.0	27.3	25.2
n-PENTANE	25.5	25.8	28.1	27.0	24.6
3-METHYLPENTANE	30.0	29.8	30.8	31.1	27.4
n-HEXANE	30.0	29.5	32.0	29.4	28.5
BENZENE	31.2	30.3	30.8	29.5	29.4
n-HEPTANE	35.0	34.3	36.0	31.3	32.6
TOLUENE	35.0	33.7	35.4	29.4	32.9
n-OCTANE	40.0	37.7	40.4	28.6	36.1
o-XYLENE	38.4	34.5	36.5	34.0	32.4

RADIAN
CORPORATION

MEMORANDUM

TO: Howard Crist
U.S. Environmental Protection Agency
RMEB/QAD/AREAL (MD-77B)

FROM: Terri L. Sampson
Radian Corporation

DATE: March 6, 1992

SUBJECT: GC/FID results for 1991 Non-Methane Hydrocarbon analytical audits.

The results for 2 audits done during the 1991 sampling season are attached. Results for several compounds are being reported at unexpectedly low levels (<1 ppbV species). I suspect something happened during the audit preparation.

Please send me the spiked values or contact me with any questions regarding these results.

Attachments

cc: Neil Berg (EPA)
Bob McAllister (Radian)
Ray Merrill (Radian)
Phyllis O'Hara (Radian)

RADIAN CORPORATION

VOC AIR CANISTER ANALYSIS
SPECIATED NMOC

SITE CODE:	CB4 AUDIT	DATE SAMPLED:	NA
SAMPLE ID:	#1	DATE ANALYZED:	10/18/91
CANISTER NO.:	063	SAMPLE FOOTNOTES:	None

COMPOUND	CONCENTRATION (ppbV-C)	(ppbV)
ETHANE	38.9	19.5
PROPANE	61.3	20.4
ISOBUTANE	81.4	20.4
N-BUTANE	80.5	20.1
ISOPENTANE	99.9	20.0
N-PENTANE	99.0	19.8
3-METHYLPENTANE	119	20
N-HEXANE	120	20
BENZENE	120	20
N-HEPTANE	138	20
TOLUENE	136	19
N-OCTANE	154	19
P-XYLENE + M-XYLENE	3.0	0.4
O-XYLENE	138	17
UNIDENTIFIED VOC	2.2	0.4
N-PROPYLBENZENE	3.2	0.4
M-ETHYLTOLUENE	10.0	1.1
P-ETHYLTOLUENE	3.7	0.4
1,3,5-TRIMETHYLBENZENE	7.2	0.8
O-ETHYLTOLUENE	4.9	0.5
1,2,4-TRIMETHYLBENZENE	12.6	1.4
N-DECANE	1.7	0.2
1,2,3-TRIMETHYLBENZENE	1.9	0.2
1-UNDECENE	1.4	0.1
N-UNDECANE	3.2	0.3
DODECENE	0.8	0.1
N-DODECANE	1.3	0.1
N-TRIDECANE	1.5	0.1
TNMHC	1440	

RADIAN CORPORATION

VOC AIR CANISTER ANALYSIS
SPECIATED NMOC

SITE CODE:	CB4 AUDIT	DATE SAMPLED:	10/16/91
SAMPLE ID:	#2	DATE ANALYZED:	10/25/91
CANISTER NO.:	883	SAMPLE FOOTNOTES:	None

COMPOUND	CONCENTRATION (ppbv-C)	(ppbV)
ISOPENTANE	24.4	4.9
3-METHYLPENTANE	28.6	4.8
BENZENE	28.7	4.8
TOLUENE	33.7	4.8
P-XYLENE + M-XYLENE	66.2	8.3
O-XYLENE	33.4	4.2
UNIDENTIFIED VOC	0.9	0.1
N-PROPYLBENZENE	1.7	0.2
M-ETHYLTOLUENE	9.7	1.1
1,3,5-TRIMETHYLBENZENE	4.2	0.5
O-ETHYLTOLUENE	2.9	0.3
1,2,4-TRIMETHYLBENZENE	7.0	0.8
N-DECANE	0.9	0.1
1,2,3-TRIMETHYLBENZENE	0.9	0.1
1-UNDECENE	1.0	0.1
N-UNDECANE	2.1	0.2
N-TRIDECANE	2.5	0.2
UNIDENTIFIED VOC	6.6	1.1
TETRADECENE	5.1	0.4
N-TETRADECANE	7.7	0.6
TNMHC	268	

(Radian)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ATMOSPHERIC RESEARCH AND EXPOSURE ASSESSMENT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

March 16, 1992

MEMORANDUM

SUBJECT: UATMP Audit Canister Results

FROM: Howard L. Crist
Quality Assurance Support Branch
QATSD, AREAL (MD-77B)

TO: Neil J. Berg Jr.
Office of Air Quality Planning and Standards (MD-14)

The attached tables lists the data from two audits of the UATMP in 1991 using selected VOCS in 6 ℓ canisters. All results were well within the expected accuracy for the analyses.

cc: W. Mitchell
T. Sampson (Radian)
K. Caviston (ManTech)
R. Bousquet (ManTech)

UATMP Audit Canister Results

I.D. # 1
Canister No. 063
Date Analyzed 10/18/91

Compound	Conc. Spiked (ppbv)	Conc. Reported (ppbv)	Differences, %
Ethane	18.9	19.5	3.2
Propane	20.5	20.4	-0.5
Isobutane	20.4	20.4	0.0
n-Butane	20.9	20.1	-3.8
Isopentane	20.3	20.0	-1.5
n-Pentane	20.4	19.8	-2.9
3-Methylpentane	20.0	20	0.0
n-Hexane	20.0	20	0.0
Benzene	20.7	20	-3.4
n-Heptane	20.0	20	0.0
n-Octane	19.8	19	-4.0
Toluene	19.9	19	-4.5
o-Xylene	19.3	17	-12

UATMP Audit Canister Results

I.D. # 2
Canister No. 883
Date Analyzed 10/25/91

Compound	Concen. Spiked (ppbv)	Concen. Reported (ppbv)	Difference, %
Isopentane	5.0	4.9	-2.0
3-Methylpentane	4.8	4.8	0.0
Benzene	5.0	4.8	-4.0
Toluene	4.7	4.8	2.1
m-Xylene	5.0	8.3[1]	-14
p-Xylene	4.6		
o-Xylene	4.9	4.2	-14

1 - reported as p-Xylene + m-Xylene

APPENDIX N

SPECIALTED NMOC ANALYTICAL RESULTS
(Obtain from Neil Berg, U.S. EPA)

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-454-R-92-010	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE 1991 Nonmethane Organic Compound, Speciated Nonmethane Organic Compound, and Three-Hour Air Toxics Monitoring Program		5. REPORT DATE January 1992
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Radian Corporation Research Triangle Park, NC 27709		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. 68D80014
12. SPONSORING AGENCY NAME AND ADDRESS Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

In certain areas of the country where the National Ambient Air Quality Standard (NAAQS) for ozone is being exceeded, additional measurements of ambient nonmethane organic compounds (NMOC) are needed to assist the affected States in developing revised ozone control strategies. Because of previous difficulty in obtaining accurate NMOC measurements, the U.S. Environmental Protection Agency (EPA) has provided monitoring and analytical assistance to these States, beginning in 1984 and continuing through the 1991 NMOC Monitoring Program.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Ozone Control Strategies National Ambient Air Quality Standards Nonmethane Organic Compound Monitoring Analysis 1991 NMOC Monitoring Program		

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES 448
	20. SECURITY CLASS *(This page)*	22. PRICE

EPA Form 2220-1 (9-73)