

**MIDLOTHIAN, TEXAS AMBIENT AIR COLLECTION  
AND CHEMICAL ANALYSIS**

**DATA REPORT FOR THE FIRST SAMPLING ROUND:  
DECEMBER 6 – 10, 2008**

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## 1.0 Introduction

This report presents the analytical results for 35 chemicals measured in ambient air samples collected in Midlothian, TX, during December 6 – 10, 2008. The sampling and chemical analyses were conducted as part of a special study funded by the Texas Commission on Environmental Quality (TCEQ) to investigate citizen's concerns about air quality in Midlothian. This was the first of four 5-day sampling rounds planned for this study. Future sampling rounds are scheduled for the first, second, and third quarters of 2009.

One hundred percent of the ambient air samples planned for this sampling round were collected and analyzed. No significant problems were encountered; however, field blank levels for several metals measured in PM<sub>10</sub> samples were found to be significantly greater than the respective detection limits and in three cases were also greater than 20% of the reported average ambient air concentration. Field blank levels should be taken into account when interpreting the ambient air measurements.

## 2.0 Project Description and Schedule

The levels of 60 volatile organic compounds (VOCs) and 22 metals in the PM<sub>10</sub> size fraction, including both total chromium and hexavalent chromium (Cr<sup>6+</sup>), are measured in air samples collected periodically at multiple sites. The samples are analyzed offsite by a NELAC accredited laboratory under the Texas laboratory accreditation program using methods approved by the U.S. Environmental Protection Agency (EPA) and TCEQ. The 60 VOCs that are measured include a core group of thirteen chemicals that were discussed at length in the December 2007 Draft Health Consultation Report conducted by the U.S. Department of Health and Human Services and the Texas Department of State Health Services. The other 47 VOCs are common constituents of ambient air that are measured by the laboratory as part of its routine VOC analysis and are being provided in a spreadsheet file supplementary to this report. Table 2-1 lists the core set of chemicals of interest. Wind speed, wind direction, outdoor temperature, atmospheric pressure, and rainfall are monitored continuously at each site during each sampling episode to aid in the data interpretation.

Once each calendar quarter, air samples are collected at five sampling stations during five consecutive 24-hour periods (except during extended periods of rainfall or wind stagnation). Four fixed sampling stations will remain in place long enough to sample during four consecutive quarters. The fixed sampling sites are roughly oriented in the predominantly downwind direction from local stationary emissions sources (Figure 2-1). Another sampling station is moved at the end of each quarter so that it eventually samples for one 5-day sequence at each of four centrally located city parks and schools. During the first sampling round, the fifth site was operated in Triangle Park (Figure 2-2). Street addresses and coordinates of the sampling sites are given in Table 2-2.

**Table 2-1. List of Target Compounds, Analytical Methods and Reporting Units**

Target Compounds	Sampling/Analysis Methods	Reporting Units
Benzene; 1,3-Butadiene; Carbon tetrachloride; Chloroform; 1,2-Dibromoethane; 1,2-Dichloroethane Methylene chloride; 1,1,2,2-Tetrachloroethane; 1,1,2-Trichloroethane; 1,2,4-Trimethylbenzene; 1,3,5-Trimethylbenzene; Vinyl chloride; m&p-Xylene	EPA Compendium Method TO-15: whole air sampling in passivated stainless steel canister with analysis using gas chromatography with mass spectrometry detection (GC/MS)	Parts per billion by volume (ppb-v)
Hexavalent chromium	Modified CARB Method 039: particle collection on NaHCO <sub>3</sub> -impregnated cellulose filters using a low volume sampler equipped with a Teflon® coated PM <sub>10</sub> cyclone inlet; analysis is by ion chromatography (IC)	nanograms per cubic meter (ng/m <sup>3</sup> )
Antimony; Arsenic; Beryllium; Cadmium; Chromium; Cobalt; Lead; Manganese; Mercury; Nickel; Selenium; Aluminum; Barium; Copper; Molybdenum; Silver; Thallium; Thorium; Uranium; Vanadium; Zinc	EPA Compendium Method IO-3.5: Particle collection on quartz fiber filters using high volume samplers equipped with PM <sub>10</sub> inlets; analysis is by inductively coupled plasma/mass spectrometry (ICP/MS)	ng/m <sup>3</sup>

**Table 2-2. Sampling Sites**

Site No.	Site Name	Street Address	Latitude	Longitude
<b>Fixed Sites</b>				
1	CAMS 52 Collocated	2725 Old Fort Worth Rd.	32.4822	-97.0269
2	Wyatt Rd.(N. of Gerdau Ameristeel)	1291 E. Wyatt Rd.	32.4696	97.0372
4	Jaycee Park	1711 Meadow Ln.	32.5030	-96.9976
5	Water Treatment Plant (N. of Ash Grove)	440 Tayman Dr.	32.5301	-96.9918
<b>Temporary Sites</b>				
3a	Triangle Park	200 E Ave. G	32.4823	-96.9917

Figure 2-1. Fixed Sampling Sites (Squares) and Stationary Emissions Sources (Circles)

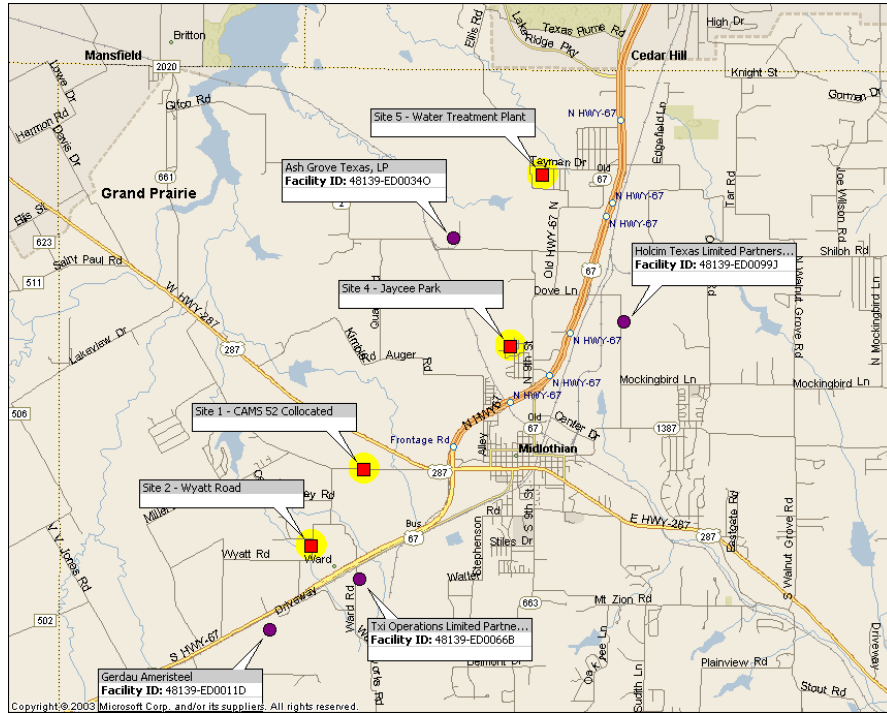
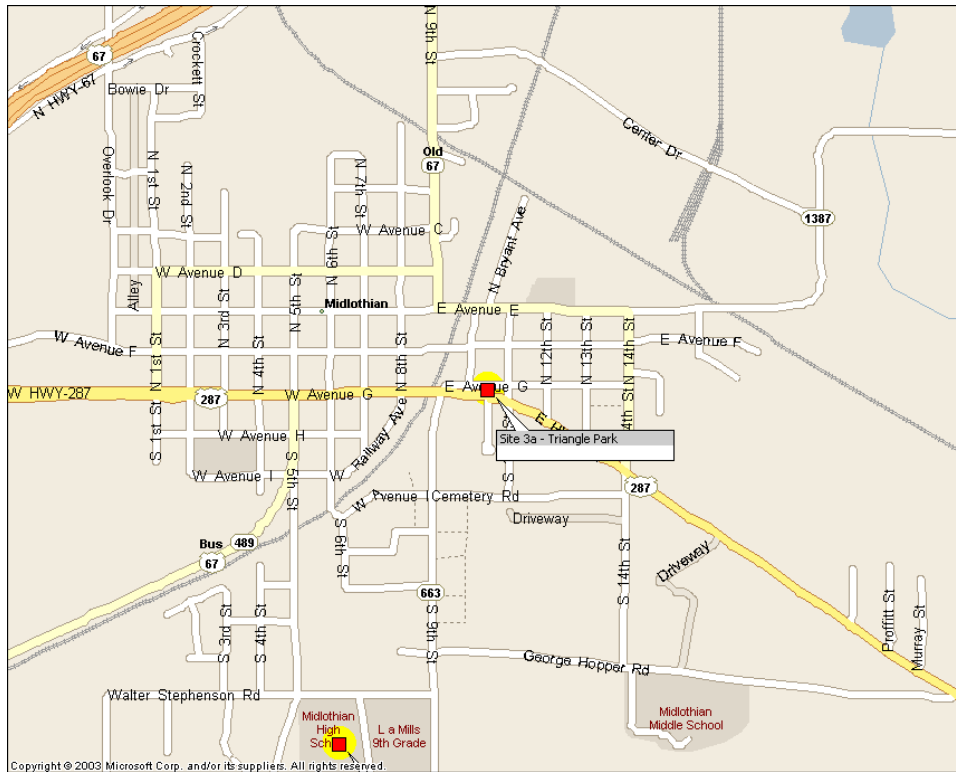


Figure 2-2. Triangle Park Sampling Site



### 3.0 First Round Results

Tables 3-1 and 3-2 give the mean concentrations for VOCs and metals, respectively, for samples collected at each site over the 5-day period (VOC results are given here for just the 13-core species; results for the 40 supplemental VOCs are provided to TCEQ in a Microsoft Excel spreadsheet). Five of the core VOCs (1,2-dibromoethane; 1,2-dichloroethane; 1,1,2,2-tetrachloroethane; 1,1,2-trichloroethane; and vinyl chloride) were not detected in any of the samples. For these and all other chemicals that had levels below the lower limit of detection, mean concentrations were estimated by substituting one-half the respective average detection limit.

The sampling results for each 24-hour period are given in a series of 10 tables that follow Table 2. The first five of the series (Tables 3-3 through 3-7) give the measurement results for one sampling site for all five days. The next five (Tables 3-8 through 3-12) give the sampling results for one day for all five sites.

**Table 3-1. VOC Mean Concentrations**

VOC	Mean Concentration over 5 Sampling Days (ppb-v)				
	CAMS 52	Wyatt Road <sup>a</sup>	Triangle Park	Jaycee Park	Water Treatment Plant
Benzene	0.205	--	0.228	0.189	0.190
1,3-Butadiene	0.011	--	0.031	0.012	0.010
Carbon Tetrachloride	0.122	--	0.112	0.120	0.121
Chloroform	0.019	--	0.019	0.019	0.030
1,2-Dibromoethane	0.004	--	0.004	0.004	0.004
1,2-Dichloroethane	0.005	--	0.005	0.005	0.005
Dichloromethane	0.075	--	0.116	0.075	0.100
1,1,2,2-Tetrachloroethane	0.005	--	0.005	0.005	0.005
1,1,2-Trichloroethane	0.004	--	0.004	0.004	0.004
1,2,4-Trimethylbenzene	0.013	--	0.027	0.019	0.018
1,3,5-Trimethylbenzene	0.006	--	0.009	0.007	0.007
Vinyl chloride	0.003	--	0.003	0.003	0.003
m/p-Xylene	0.037	--	0.062	0.042	0.039

<sup>a</sup> VOC samples are not collected at the Ward Road site.

**Table 3-2. Metal Mean Concentrations**

Metal	Mean Concentration over 5 Sampling Days (ng/m <sup>3</sup> )				
	CAMS 52	Wyatt Road	Triangle Park	Jaycee Park	Water Treatment Plant
Aluminum	142.4	309.5	57.0	64.0	88.5
Antimony	0.625	0.701	0.583	0.614	0.476
Arsenic	0.812	1.307	0.470	0.791	0.506
Barium	10.94	14.69	10.64	8.95	8.30
Beryllium	0.008	0.016	0.004	0.004	0.006
Cadmium	0.198	0.398	0.254	0.218	0.166
Chromium (total)	2.97	5.95	1.57	2.08	1.79
Chromium (6+)	0.097	0.112	0.017	0.022	0.021
Cobalt	0.130	0.291	0.065	0.084	0.100
Copper	11.9	23.9	7.9	8.6	29.4
Lead	5.53	12.12	2.67	3.98	3.70
Manganese	24.6	80.7	6.9	9.8	11.5
Mercury	0.046	0.072	0.065	0.036	0.010
Molybdenum	0.522	1.098	0.303	0.518	0.322
Nickel	1.243	2.828	0.764	1.251	0.811
Selenium	0.733	0.712	0.495	0.576	0.633
Silver	0.005	0.029	0.001	0.006	0.006
Thallium	0.010	0.012	0.007	0.009	0.009
Thorium	0.022	0.037	0.014	0.016	0.021
Uranium	0.036	0.079	0.016	0.018	0.026
Vanadium	1.521	2.796	0.697	0.796	0.917
Zinc	42.2	107.9	26.9	38.8	25.7

**Table 3-3. CAMS 52 Daily Sampling Results**

	12/6/08	12/7/08	12/8/08	12/9/08	12/10/08	Mean	Max	MDL
<b>VOCs (ppb-v)</b>								
Benzene	0.225	0.202	0.231	0.214	0.151	0.205	0.231	0.010
1,3-Butadiene	0.020	0.015	0.007	0.012	ND	0.011	0.020	0.005
Carbon Tetrachloride	0.132	0.129	0.138	0.129	0.081	0.122	0.138	0.004
Chloroform	0.024	0.017	0.019	0.019	0.018	0.019	0.024	0.007
1,2-Dibromoethane	ND	ND	ND	ND	ND	0.004	0.004	0.007
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
Dichloromethane	0.084	0.073	0.072	0.082	0.066	0.075	0.084	0.018
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.004	0.004	0.008
1,2,4-Trimethylbenzene	0.021	0.014	0.008	0.014	0.009	0.013	0.021	0.016
1,3,5-Trimethylbenzene	0.010	0.005	0.003	0.006	0.005	0.006	0.010	0.016
Vinyl chloride	ND	ND	ND	ND	ND	0.003	0.003	0.005
m/p-Xylene	0.056	0.042	0.014	0.049	0.026	0.037	0.056	0.019
<b>Metals (ng/m<sup>3</sup>)</b>								
Aluminum	182	187	166	131	46	142.4	187.0	1.590
Antimony	1.2	0.864	0.396	0.435	0.232	0.625	1.200	0.007
Arsenic	1.31	0.969	0.767	0.848	0.164	0.812	1.310	0.009
Barium	19	11.7	7.37	10.5	6.12	10.94	19.0	0.169
Beryllium	0.01	0.009	0.009	0.009	ND	0.008	0.010	0.007
Cadmium	0.331	0.192	0.194	0.201	0.072	0.198	0.331	0.029
Chromium (total)	3.39	3.49	3.95	2.23	1.79	2.97	3.95	0.165
Chromium (6+)	0.0677	0.257	0.152	0.0043	0.0015	0.0965	0.257	0.0065
Cobalt	0.179	0.139	0.129	0.141	0.06	0.130	0.179	0.049
Copper	21.3	8.17	8.19	12.4	9.19	11.9	21.3	0.142
Lead	11.7	4.49	4.9	5.3	1.28	5.53	11.70	0.056
Manganese	34.4	32.9	36	14.7	4.78	24.6	36.0	0.057
Mercury	0.146	0.033	0.032	ND	ND	0.046	0.146	0.017
Molybdenum	0.646	0.522	0.577	0.618	0.248	0.522	0.646	0.012
Nickel	1.11	1.09	1.73	1.66	0.623	1.243	1.730	0.152
Selenium	0.463	1	1.46	0.603	0.137	0.733	1.46	0.013
Silver	ND	ND	0.008	0.009	ND	0.005	0.009	0.006
Thallium	0.013	0.012	0.012	0.008	0.004	0.010	0.013	0.001
Thorium	0.034	0.028	0.019	0.017	0.012	0.022	0.034	0.001
Uranium	0.056	0.041	0.033	0.027	0.023	0.036	0.056	0.002
Vanadium	1.35	2.03	2.63	1.08	0.516	1.521	2.63	0.014
Zinc	66.9	33.9	47.2	41.4	21.7	42.2	66.9	3.010

**Table 3-4. Wyatt Road Daily Sampling Results**

	12/6/08	12/7/08	12/8/08	12/9/08	12/10/08	Mean	Max	MDL
<b>Metals (ng/m<sup>3</sup>)</b>								
Aluminum	653	390	303	166	35.3	309.5	653.0	1.590
Antimony	0.989	0.928	0.663	0.676	0.248	0.701	0.989	0.007
Arsenic	1.73	1.12	1.48	2.02	0.184	1.307	2.020	0.009
Barium	27.4	17.2	12.4	11.1	5.33	14.69	27.4	0.169
Beryllium	0.039	0.017	0.013	0.011	ND	0.016	0.039	0.007
Cadmium	0.443	0.341	0.751	0.372	0.082	0.398	0.751	0.029
Chromium (total)	9.73	6.65	7.96	3.62	1.79	5.95	9.73	0.165
Chromium (6+)	0.379	0.16	0.0192	0.0003	ND	0.11235	0.379	0.0065
Cobalt	0.663	0.271	0.22	0.251	0.051	0.291	0.663	0.049
Copper	30.6	24.5	29.4	28.9	5.85	23.9	30.6	0.142
Lead	14.7	9.7	24.6	10.3	1.3	12.12	24.60	0.056
Manganese	161	92.4	120	26.1	3.98	80.7	161.0	0.057
Mercury	0.036	ND	0.276	0.021	ND	0.072	0.276	0.017
Molybdenum	1.44	0.719	1.45	1.66	0.222	1.098	1.660	0.012
Nickel	3.3	3.29	2.91	4.05	0.591	2.828	4.050	0.152
Selenium	0.488	0.98	1.24	0.721	0.129	0.712	1.24	0.013
Silver	0.012	0.009	0.033	0.069	0.02	0.029	0.069	0.006
Thallium	0.024	0.012	0.011	0.009	0.004	0.012	0.024	0.001
Thorium	0.084	0.045	0.027	0.018	0.009	0.037	0.084	0.001
Uranium	0.207	0.101	0.045	0.03	0.013	0.079	0.207	0.002
Vanadium	5.2	3.3	3.61	1.37	0.499	2.796	5.20	0.014
Zinc	88.7	84.5	277	62.4	27.1	107.9	277.0	3.010

**Table 3-5. Triangle Park Daily Sampling Results**

	12/6/08	12/7/08	12/8/08	12/9/08	12/10/08	Mean	Max	MDL
<b>VOCs (ppb-v)</b>								
Benzene	0.37	0.239	0.209	0.171	0.15	0.228	0.370	0.010
1,3-Butadiene	0.094	0.03	0.005	0.012	0.015	0.031	0.094	0.005
Carbon Tetrachloride	0.097	0.093	0.139	0.138	0.093	0.112	0.139	0.004
Chloroform	0.021	0.021	0.022	0.016	0.016	0.019	0.022	0.007
1,2-Dibromoethane	ND	ND	ND	ND	ND	0.004	0.004	0.007
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
Dichloromethane	0.072	0.164	0.217	0.065	0.063	0.116	0.217	0.018
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.004	0.004	0.008
1,2,4-Trimethylbenzene	0.05	0.038	0.018	0.019	0.012	0.027	0.050	0.016
1,3,5-Trimethylbenzene	0.016	0.011	0.005	0.007	0.004	0.009	0.016	0.016
Vinyl chloride	ND	ND	ND	ND	ND	0.003	0.003	0.005
m/p-Xylene	0.137	0.073	0.028	0.035	0.035	0.062	0.137	0.019
<b>Metals (ng/m<sup>3</sup>)</b>								
Aluminum	90.8	42.3	41.4	60.1	50.3	57.0	90.8	1.590
Antimony	1.44	0.432	0.421	0.335	0.289	0.583	1.440	0.007
Arsenic	0.767	0.531	0.557	0.296	0.2	0.470	0.767	0.009
Barium	24.1	6.99	7.27	8.33	6.49	10.64	24.1	0.169
Beryllium	0.007	ND	ND	ND	ND	0.004	0.007	0.007
Cadmium	0.324	0.092	0.131	0.136	0.589	0.254	0.589	0.029
Chromium (total)	1.94	1.28	1.35	1.61	1.65	1.57	1.94	0.165
Chromium (6+)	0.0305	ND	0.0081	0.0206	0.0209	0.01667	0.0305	0.0065
Cobalt	0.108	ND	ND	0.071	0.058	0.065	0.108	0.049
Copper	18.5	4.48	4.8	5.41	6.06	7.9	18.5	0.142
Lead	5.98	1.62	2.05	2.46	1.26	2.67	5.98	0.056
Manganese	15.1	3.51	4.32	6.93	4.86	6.9	15.1	0.057
Mercury	0.213	0.04	0.028	0.023	0.022	0.065	0.213	0.017
Molybdenum	0.571	0.199	0.252	0.247	0.248	0.303	0.571	0.012
Nickel	0.772	0.5	0.962	0.666	0.92	0.764	0.962	0.152
Selenium	0.306	0.499	1.16	0.361	0.149	0.495	1.16	0.013
Silver	ND	ND	ND	ND	ND	0.001	0.003	0.006
Thallium	0.011	0.003	0.005	0.006	0.008	0.007	0.011	0.001
Thorium	0.022	0.012	0.009	0.015	0.011	0.014	0.022	0.001
Uranium	0.027	0.012	0.011	0.016	0.016	0.016	0.027	0.002
Vanadium	0.609	0.554	1.41	0.47	0.442	0.697	1.41	0.014
Zinc	45.7	14.8	31.1	26.9	16.2	26.9	45.7	3.010

**Table 3-6. Jaycee Park Daily Sampling Results**

	12/6/08	12/7/08	12/8/08	12/9/08	12/10/08	Mean	Max	MDL
<b>VOCs (ppb-v)</b>								
Benzene	0.237	0.194	0.22	0.151	0.145	0.189	0.237	0.010
1,3-Butadiene	0.03	0.011	ND	0.007	0.011	0.012	0.030	0.005
Carbon Tetrachloride	0.102	0.116	0.129	0.13	0.123	0.120	0.130	0.004
Chloroform	0.024	0.018	0.019	0.018	0.016	0.019	0.024	0.007
1,2-Dibromoethane	ND	ND	ND	ND	ND	0.004	0.004	0.007
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
Dichloromethane	0.083	0.092	0.071	0.058	0.072	0.075	0.092	0.018
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.004	0.004	0.008
1,2,4-Trimethylbenzene	0.03	0.026	0.016	0.013	0.01	0.019	0.030	0.016
1,3,5-Trimethylbenzene	0.011	0.008	0.006	0.006	0.005	0.007	0.011	0.016
Vinyl chloride	ND	ND	ND	ND	ND	0.003	0.003	0.005
m/p-Xylene	0.083	0.043	0.028	0.026	0.028	0.042	0.083	0.019
<b>Metals (ng/m<sup>3</sup>)</b>								
Aluminum	69.9	58.4	36.2	66.5	88.8	64.0	88.8	1.590
Antimony	0.858	0.739	0.3	0.263	0.912	0.614	0.912	0.007
Arsenic	0.493	1.12	0.547	0.256	1.54	0.791	1.540	0.009
Barium	12.5	9.17	5.61	5.65	11.8	8.95	12.5	0.169
Beryllium	ND	ND	ND	ND	ND	0.004	0.005	0.007
Cadmium	0.3	0.177	0.118	0.233	0.262	0.218	0.300	0.029
Chromium (total)	1.87	1.41	1.48	1.87	3.76	2.08	3.76	0.165
Chromium (6+)	0.0179	0.0024	0.0024	0.0226	0.0638	0.02182	0.0638	0.0065
Cobalt	0.082	0.065	ND	0.069	0.162	0.084	0.162	0.049
Copper	8.83	4.7	2.38	5.51	21.7	8.6	21.7	0.142
Lead	5.46	3.12	1.7	1.94	7.7	3.98	7.70	0.056
Manganese	10.7	6.12	4.02	6.68	21.3	9.8	21.3	0.057
Mercury	0.037	0.019	ND	ND	0.102	0.036	0.102	0.017
Molybdenum	0.378	0.264	0.249	0.208	1.49	0.518	1.490	0.012
Nickel	0.647	0.68	0.658	2.22	2.05	1.251	2.220	0.152
Selenium	0.319	0.82	1.23	0.359	0.153	0.576	1.23	0.013
Silver	ND	ND	ND	0.01	0.011	0.006	0.011	0.006
Thallium	0.011	0.008	0.006	0.01	0.012	0.009	0.012	0.001
Thorium	0.019	0.017	0.009	0.015	0.018	0.016	0.019	0.001
Uranium	0.021	0.018	0.011	0.015	0.027	0.018	0.027	0.002
Vanadium	0.547	0.734	1.54	0.472	0.687	0.796	1.54	0.014
Zinc	35.7	19.3	14.7	24.1	100	38.8	100.0	3.010

**Table 3-7. Water Treatment Plant Daily Sampling Results**

	12/6/08	12/7/08	12/8/08	12/9/08	12/10/08	Mean	Max	MDL
<b>VOCs (ppb-v)</b>								
Benzene	0.194	0.245	0.211	0.154	0.148	0.190	0.245	0.010
1,3-Butadiene	0.015	0.023	ND	ND	0.009	0.010	0.023	0.005
Carbon Tetrachloride	0.119	0.11	0.142	0.131	0.101	0.121	0.142	0.004
Chloroform	0.059	0.037	0.021	0.017	0.018	0.030	0.059	0.007
1,2-Dibromoethane	ND	ND	ND	ND	ND	0.004	0.004	0.007
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
Dichloromethane	0.072	0.117	0.159	0.063	0.09	0.100	0.159	0.018
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.005	0.005	0.009
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.004	0.004	0.008
1,2,4-Trimethylbenzene	0.021	0.027	0.013	0.013	0.015	0.018	0.027	0.016
1,3,5-Trimethylbenzene	0.007	0.01	0.006	0.005	0.007	0.007	0.010	0.016
Vinyl chloride	ND	ND	ND	ND	ND	0.003	0.003	0.005
m/p-Xylene	0.015	0.115	0.008	0.028	0.03	0.039	0.115	0.019
<b>Metals (ng/m<sup>3</sup>)</b>								
Aluminum	85.6	148	84.6	47.9	76.5	88.5	148.0	1.590
Antimony	0.857	0.74	0.307	0.172	0.302	0.476	0.857	0.007
Arsenic	0.502	0.749	0.607	0.17	0.503	0.506	0.749	0.009
Barium	11.3	11.4	6.04	4.85	7.9	8.30	11.4	0.169
Beryllium	ND	0.009	ND	ND	ND	0.006	0.009	0.007
Cadmium	0.229	0.16	0.212	0.054	0.175	0.166	0.229	0.029
Chromium (total)	1.91	2	1.64	1.59	1.82	1.79	2.00	0.165
Chromium (6+)	0.0472	0.0281	0.0038	0.021	ND	0.02067	0.0472	0.0065
Cobalt	0.099	0.146	0.102	0.057	0.097	0.100	0.146	0.049
Copper	29.5	13.3	4.4	88.6	11	29.4	88.6	0.142
Lead	6.84	4.42	2.38	1.3	3.55	3.698	6.84	0.056
Manganese	14	18.9	11	3.8	9.86	11.5	18.9	0.057
Mercury	0.02	ND	ND	ND	ND	0.010	0.020	0.017
Molybdenum	0.417	0.363	0.246	0.228	0.357	0.322	0.417	0.012
Nickel	0.681	0.999	0.912	0.501	0.964	0.811	0.999	0.152
Selenium	0.373	0.809	1.24	0.138	0.604	0.633	1.24	0.013
Silver	0.007	0.007	ND	ND	0.007	0.006	0.007	0.006
Thallium	0.011	0.013	0.009	0.004	0.01	0.009	0.013	0.001
Thorium	0.024	0.038	0.019	0.011	0.013	0.021	0.038	0.001
Uranium	0.026	0.042	0.029	0.016	0.018	0.026	0.042	0.002
Vanadium	0.669	0.759	1.77	0.393	0.996	0.917	1.77	0.014
Zinc	41.4	27.3	17.5	10.4	32.1	25.7	41.4	3.010

**Table 3-8. December 6, 2008, Sampling Results**

	CAMS 52	Wyatt Rd.	Triangle Park	Jaycee Park	Water Treat. Plant
<b>VOCs (ppb-v)</b>					
Benzene	0.225	--	0.37	0.237	0.194
1,3-Butadiene	0.020	--	0.094	0.03	0.015
Carbon Tetrachloride	0.132	--	0.097	0.102	0.119
Chloroform	0.024	--	0.021	0.024	0.059
1,2-Dibromoethane	ND	--	ND	ND	ND
1,2-Dichloroethane	ND	--	ND	ND	ND
Dichloromethane	0.084	--	0.072	0.083	0.072
1,1,2,2-Tetrachloroethane	ND	--	ND	ND	ND
1,1,2-Trichloroethane	ND	--	ND	ND	ND
1,2,4-Trimethylbenzene	0.021	--	0.05	0.03	0.021
1,3,5-Trimethylbenzene	0.010	--	0.016	0.011	0.007
Vinyl chloride	ND	--	ND	ND	ND
m/p-Xylene	0.056	--	0.137	0.083	0.015
<b>Metals (ng/m<sup>3</sup>)</b>					
Aluminum	182	653	90.8	69.9	85.6
Antimony	1.2	0.989	1.44	0.858	0.857
Arsenic	1.31	1.73	0.767	0.493	0.502
Barium	19	27.4	24.1	12.5	11.3
Beryllium	0.01	0.039	0.007	ND	ND
Cadmium	0.331	0.443	0.324	0.3	0.229
Chromium (total)	3.39	9.73	1.94	1.87	1.91
Chromium z (6+)	0.0677	0.379	0.0305	0.0179	0.0472
Cobalt	0.179	0.663	0.108	0.082	0.099
Copper	21.3	30.6	18.5	8.83	29.5
Lead	11.7	14.7	5.98	5.46	6.84
Manganese	34.4	161	15.1	10.7	14
Mercury	0.146	0.036	0.213	0.037	0.02
Molybdenum	0.646	1.44	0.571	0.378	0.417
Nickel	1.11	3.3	0.772	0.647	0.681
Selenium	0.463	0.488	0.306	0.319	0.373
Silver	ND	0.012	ND	ND	0.007
Thallium	0.013	0.024	0.011	0.011	0.011
Thorium	0.034	0.084	0.022	0.019	0.024
Uranium	0.056	0.207	0.027	0.021	0.026
Vanadium	1.35	5.2	0.609	0.547	0.669
Zinc	66.9	88.7	45.7	35.7	41.4

**Table 3-9. December 7, 2008, Sampling Results**

	CAMS 52	Wyatt Rd.	Triangle Park	Jaycee Park	Water Treat. Plant
<b>VOCs (ppb-v)</b>					
Benzene	0.202	--	0.239	0.194	0.245
1,3-Butadiene	0.015	--	0.03	0.011	0.023
Carbon Tetrachloride	0.129	--	0.093	0.116	0.11
Chloroform	0.017	--	0.021	0.018	0.037
1,2-Dibromoethane	ND	--	ND	ND	ND
1,2-Dichloroethane	ND	--	ND	ND	ND
Dichloromethane	0.073	--	0.164	0.092	0.117
1,1,2,2-Tetrachloroethane	ND	--	ND	ND	ND
1,1,2-Trichloroethane	ND	--	ND	ND	ND
1,2,4-Trimethylbenzene	0.014	--	0.038	0.026	0.027
1,3,5-Trimethylbenzene	0.005	--	0.011	0.008	0.01
Vinyl chloride	ND	--	ND	ND	ND
m/p-Xylene	0.042	--	0.073	0.043	0.115
<b>Metals (ng/m<sup>3</sup>)</b>					
Aluminum	187	390	42.3	58.4	148
Antimony	0.864	0.928	0.432	0.739	0.74
Arsenic	0.969	1.12	0.531	1.12	0.749
Barium	11.7	17.2	6.99	9.17	11.4
Beryllium	0.009	0.017	ND	ND	0.009
Cadmium	0.192	0.341	0.092	0.177	0.16
Chromium (total)	3.49	6.65	1.28	1.41	2
Chromium (6+)	0.257	0.16	ND	0.0024	0.0281
Cobalt	0.139	0.271	ND	0.065	0.146
Copper	8.17	24.5	4.48	4.7	13.3
Lead	4.49	9.7	1.62	3.12	4.42
Manganese	32.9	92.4	3.51	6.12	18.9
Mercury	0.033	ND	0.04	0.019	ND
Molybdenum	0.522	0.719	0.199	0.264	0.363
Nickel	1.09	3.29	0.5	0.68	0.999
Selenium	1	0.98	0.499	0.82	0.809
Silver	ND	0.009	ND	ND	0.007
Thallium	0.012	0.012	0.003	0.008	0.013
Thorium	0.028	0.045	0.012	0.017	0.038
Uranium	0.041	0.101	0.012	0.018	0.042
Vanadium	2.03	3.3	0.554	0.734	0.759
Zinc	33.9	84.5	14.8	19.3	27.3

**Table 3-10. December 8, 2008, Sampling Results**

	CAMS 52	Wyatt Rd.	Triangle Park	Jaycee Park	Water Treat. Plant
<b>VOCs (ppb-v)</b>					
Benzene	0.231	--	0.209	0.22	0.211
1,3-Butadiene	0.007	--	0.005	ND	ND
Carbon Tetrachloride	0.138	--	0.139	0.129	0.142
Chloroform	0.019	--	0.022	0.019	0.021
1,2-Dibromoethane	ND	--	ND	ND	ND
1,2-Dichloroethane	ND	--	ND	ND	ND
Dichloromethane	0.072	--	0.217	0.071	0.159
1,1,2,2-Tetrachloroethane	ND	--	ND	ND	ND
1,1,2-Trichloroethane	ND	--	ND	ND	ND
1,2,4-Trimethylbenzene	0.008	--	0.018	0.016	0.013
1,3,5-Trimethylbenzene	0.003	--	0.005	0.006	0.006
Vinyl chloride	ND	--	ND	ND	ND
m/p-Xylene	0.014	--	0.028	0.028	0.008
<b>Metals (ng/m<sup>3</sup>)</b>					
Aluminum	166	303	41.4	36.2	84.6
Antimony	0.396	0.663	0.421	0.3	0.307
Arsenic	0.767	1.48	0.557	0.547	0.607
Barium	7.37	12.4	7.27	5.61	6.04
Beryllium	0.009	0.013	ND	ND	ND
Cadmium	0.194	0.751	0.131	0.118	0.212
Chromium (total)	3.95	7.96	1.35	1.48	1.64
Chromium (6+)	0.152	0.0192	0.0081	0.0024	0.0038
Cobalt	0.129	0.22	ND	ND	0.102
Copper	8.19	29.4	4.8	2.38	4.4
Lead	4.9	24.6	2.05	1.7	2.38
Manganese	36	120	4.32	4.02	11
Mercury	0.032	0.276	0.028	ND	ND
Molybdenum	0.577	1.45	0.252	0.249	0.246
Nickel	1.73	2.91	0.962	0.658	0.912
Selenium	1.46	1.24	1.16	1.23	1.24
Silver	0.008	0.033	ND	ND	ND
Thallium	0.012	0.011	0.005	0.006	0.009
Thorium	0.019	0.027	0.009	0.009	0.019
Uranium	0.033	0.045	0.011	0.011	0.029
Vanadium	2.63	3.61	1.41	1.54	1.77
Zinc	47.2	277	31.1	14.7	17.5

**Table 3-11. December 9, 2008, Sampling Results**

	CAMS 52	Wyatt Rd.	Triangle Park	Jaycee Park	Water Treat. Plant
<b>VOCs (ppb-v)</b>					
Benzene	0.214	--	0.171	0.151	0.154
1,3-Butadiene	0.012	--	0.012	0.007	ND
Carbon Tetrachloride	0.129	--	0.138	0.13	0.131
Chloroform	0.019	--	0.016	0.018	0.017
1,2-Dibromoethane	ND	--	ND	ND	ND
1,2-Dichloroethane	ND	--	ND	ND	ND
Dichloromethane	0.082	--	0.065	0.058	0.063
1,1,2,2-Tetrachloroethane	ND	--	ND	ND	ND
1,1,2-Trichloroethane	ND	--	ND	ND	ND
1,2,4-Trimethylbenzene	0.014	--	0.019	0.013	0.013
1,3,5-Trimethylbenzene	0.006	--	0.007	0.006	0.005
Vinyl chloride	ND	--	ND	ND	ND
m/p-Xylene	0.049	--	0.035	0.026	0.028
<b>Metals (ng/m<sup>3</sup>)</b>					
Aluminum	131	166	60.1	66.5	47.9
Antimony	0.435	0.676	0.335	0.263	0.172
Arsenic	0.848	2.02	0.296	0.256	0.17
Barium	10.5	11.1	8.33	5.65	4.85
Beryllium	0.009	0.011	ND	ND	ND
Cadmium	0.201	0.372	0.136	0.233	0.054
Chromium (total)	2.23	3.62	1.61	1.87	1.59
Chromium (6+)	0.0043	0.0003	0.0206	0.0226	0.021
Cobalt	0.141	0.251	0.071	0.069	0.057
Copper	12.4	28.9	5.41	5.51	88.6
Lead	5.3	10.3	2.46	1.94	1.3
Manganese	14.7	26.1	6.93	6.68	3.8
Mercury	ND	0.021	0.023	ND	ND
Molybdenum	0.618	1.66	0.247	0.208	0.228
Nickel	1.66	4.05	0.666	2.22	0.501
Selenium	0.603	0.721	0.361	0.359	0.138
Silver	0.009	0.069	ND	0.01	ND
Thallium	0.008	0.009	0.006	0.01	0.004
Thorium	0.017	0.018	0.015	0.015	0.011
Uranium	0.027	0.03	0.016	0.015	0.016
Vanadium	1.08	1.37	0.47	0.472	0.393
Zinc	41.4	62.4	26.9	24.1	10.4

**Table 3-12. December 10, 2008, Sampling Results**

	CAMS 52	Wyatt Rd.	Triangle Park	Jaycee Park	Water Treat. Plant
<b>VOCs (ppb-v)</b>					
Benzene	0.151	--	0.15	0.145	0.148
1,3-Butadiene	ND	--	0.015	0.011	0.009
Carbon Tetrachloride	0.081	--	0.093	0.123	0.101
Chloroform	0.018	--	0.016	0.016	0.018
1,2-Dibromoethane	ND	--	ND	ND	ND
1,2-Dichloroethane	ND	--	ND	ND	ND
Dichloromethane	0.066	--	0.063	0.072	0.09
1,1,2,2-Tetrachloroethane	ND	--	ND	ND	ND
1,1,2-Trichloroethane	ND	--	ND	ND	ND
1,2,4-Trimethylbenzene	0.009	--	0.012	0.01	0.015
1,3,5-Trimethylbenzene	0.005	--	0.004	0.005	0.007
Vinyl chloride	ND	--	ND	ND	ND
m/p-Xylene	0.026	--	0.035	0.028	0.03
<b>Metals (ng/m<sup>3</sup>)</b>					
Aluminum	46	35.3	50.3	88.8	76.5
Antimony	0.232	0.248	0.289	0.912	0.302
Arsenic	0.164	0.184	0.2	1.54	0.503
Barium	6.12	5.33	6.49	11.8	7.9
Beryllium	ND	ND	ND	ND	ND
Cadmium	0.072	0.082	0.589	0.262	0.175
Chromium (total)	1.79	1.79	1.65	3.76	1.82
Chromium (6+)	0.0015	ND	0.0209	0.0638	ND
Cobalt	0.06	0.051	0.058	0.162	0.097
Copper	9.19	5.85	6.06	21.7	11
Lead	1.28	1.3	1.26	7.7	3.55
Manganese	4.78	3.98	4.86	21.3	9.86
Mercury	ND	ND	0.022	0.102	ND
Molybdenum	0.248	0.222	0.248	1.49	0.357
Nickel	0.623	0.591	0.92	2.05	0.964
Selenium	0.137	0.129	0.149	0.153	0.604
Silver	ND	0.02	ND	0.011	0.007
Thallium	0.004	0.004	0.008	0.012	0.01
Thorium	0.012	0.009	0.011	0.018	0.013
Uranium	0.023	0.013	0.016	0.027	0.018
Vanadium	0.516	0.499	0.442	0.687	0.996
Zinc	21.7	27.1	16.2	100	32.1

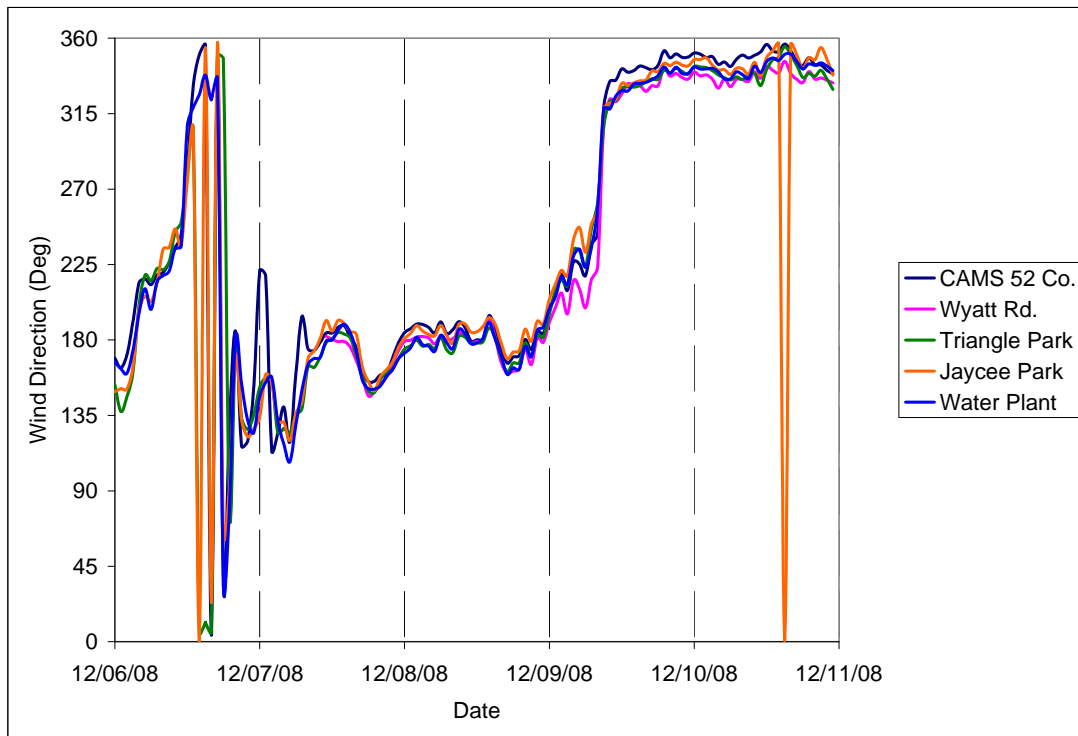
## 4.0 Weather Summary

Table 4-1 gives the predominant wind directions on each day that samples were collected. The winds were primarily from the southwest (SW), south (S), and south-southeast (SSE) on the first three days of the sampling round (6-Dec-08, 7-Dec-08, and 8-Dec-08) but began to shift at around 12:00 a.m. on 9-Dec-08 with the passage of a cold front. The winds were northerly or north-northwesterly following the front, from about 10:00 a.m. on 9-Dec-08 through the remainder of the sampling round. Time series graphs of 1-hour resultant wind directions are given in Figure 4-1. Daily wind roses from each site are given in Appendix A.

**Table 4-1. Predominant Wind Directions**

	Predominant Wind Direction				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	SW	No Data	SW	SSE, SSW	SW, SSE
7-Dec-08	S, SSE	Insufficient Data	S, SSE	S, SSE	S, SSE
8-Dec-08	S	S	S	S	S
9-Dec-08	NNW	NNW	NNW	NNW	NNW
10-Dec-08	NNW, N	NNW	NNW	NNW, N	NNW

**Figure 4-1. Time Series of 1-Hour Wind Direction Resultants**

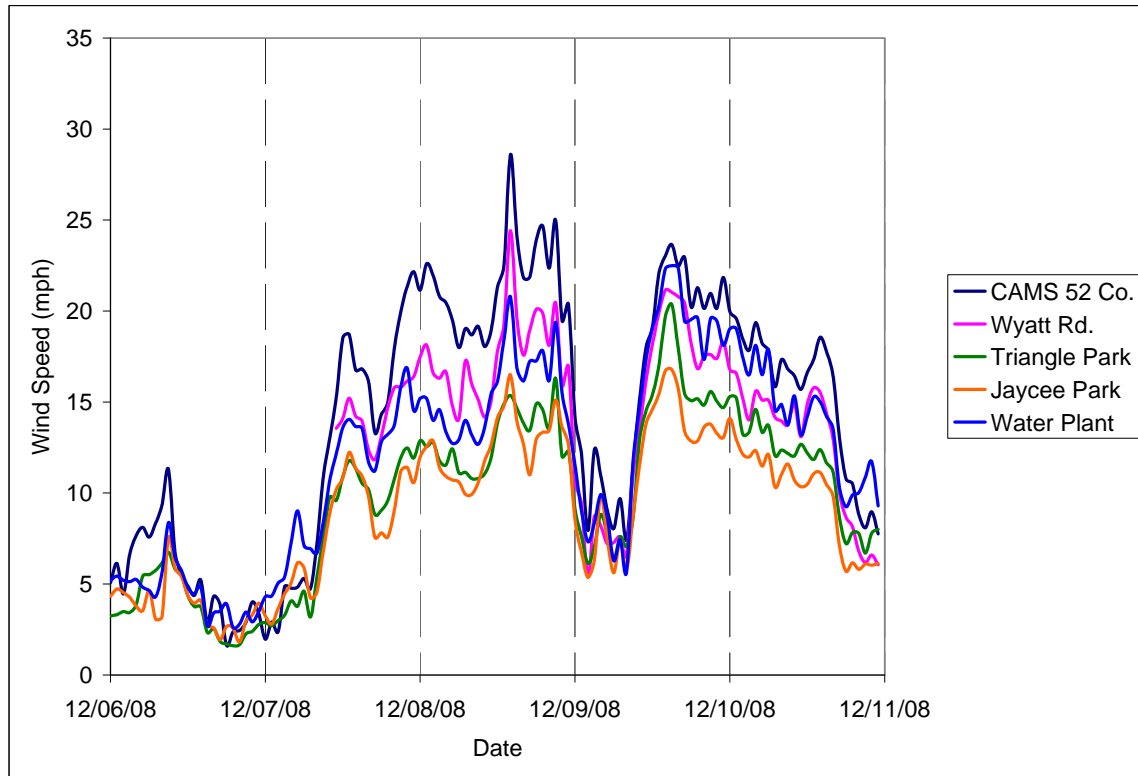


Wind speeds averaged 4 to 5 miles per hour (mph) on 6-Dec-08 and increased to greater than 12 miles per hour at all the sites on 8-Dec-08, ahead of the front. Daily average wind speeds remained between 10 mph and 16 miles per hour behind the front for the last two days of sampling (Table 4-2 and Figure 4-2). For comparison, the average wind speed for December 2008 reported for Dallas-Fort Worth by the National Weather Service was 12.8 mph.

**Table 4-2. Average Wind Speeds**

	Average Wind Speed				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	5.4	No Data	3.7	3.8	4.5
7-Dec-08	12.0	Insufficient Data	7.9	7.8	10.5
8-Dec-08	21.4	17.5	12.9	12.5	15.5
9-Dec-08	16.4	14.1	12.5	11.2	14.9
10-Dec-08	15.3	12.7	11.4	9.9	14.2

**Figure 4-2. Time Series of 1-Hour Wind Speed Averages**

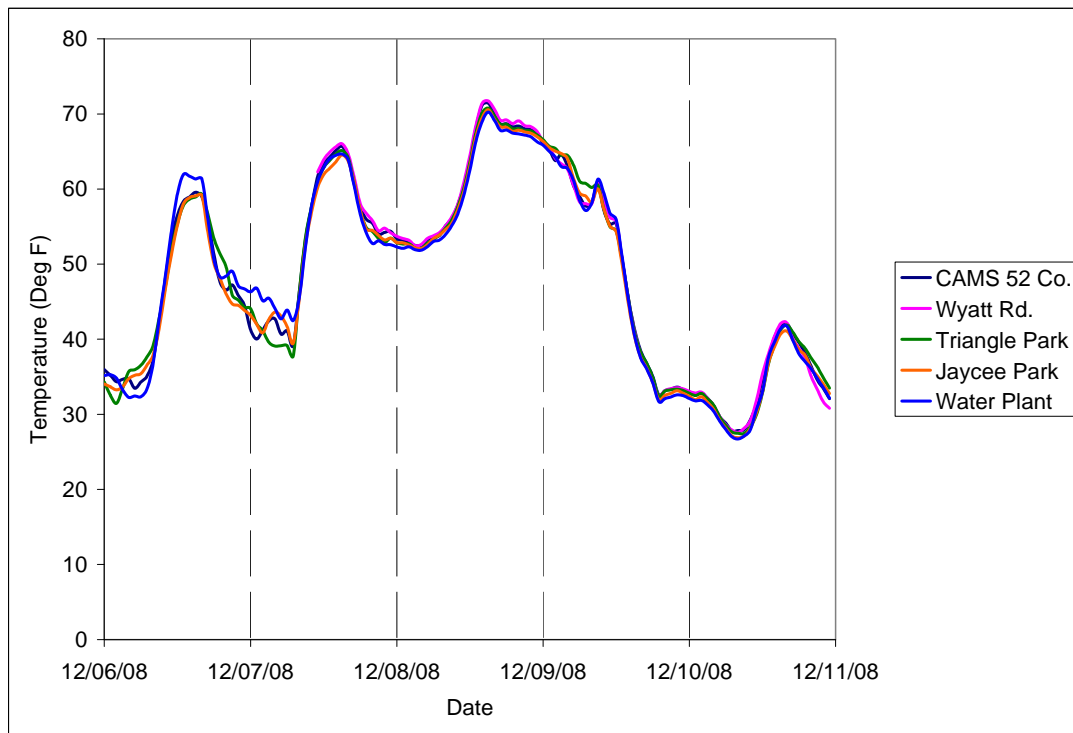


Daily maximum temperatures ranged from 59° - 72° on the three days preceding the frontal passage. Temperatures dropped throughout the day on 9-Dec-08 after a 12:00 a.m. high of about 66°. On 10-Dec-08 the peak temperatures ranged from 41° - 42° (Table 4-3 and Figure 4-3). The normal daytime high for the Dallas-Fort Worth area in December is 56.5°. Total rainfall was less than 0.1 inches at all the sites (Table 4-4). Most of the rainfall, 0.04 – 0.07 inches, fell between 11:00 p.m. on 8-Dec-08 and 02:00 a.m. on 9-Dec-08 (Figure 4-4). Barometric pressures ranged from highs of about 995 – 1000 millibars (mb) on 7-Dec-08 and 10-Dec-08 to lows of about 975 – 980 mb near the time of the frontal passage (Figure 4-5).

**Table 4-3. Daily Peak Temperatures**

	Peak Temperature				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	59.6	No Data	59.3	59.1	62.0
7-Dec-08	65.7	66.0	65.1	64.5	64.7
8-Dec-08	71.4	71.7	70.8	70.6	70.3
9-Dec-08	66.1	66.3	66.6	66.4	65.8
10-Dec-08	42.1	42.2	41.9	41.1	41.7

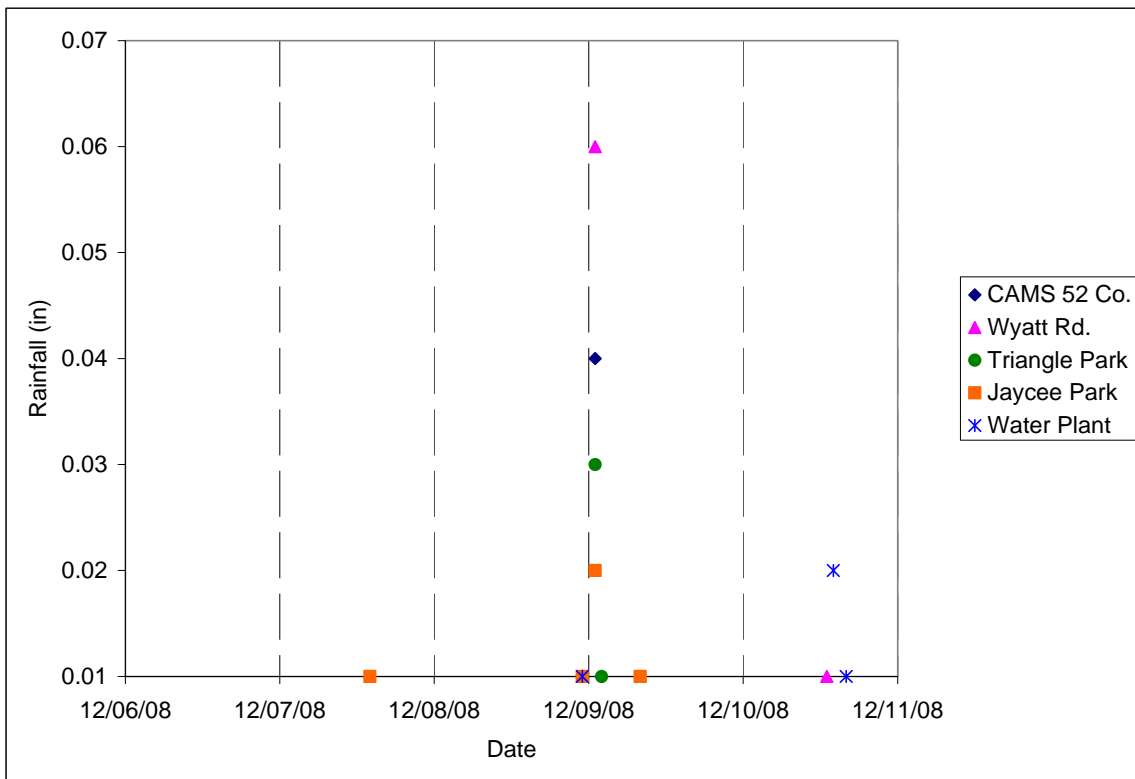
**Figure 4-3. Time Series of 1-Hour Temperature Averages**



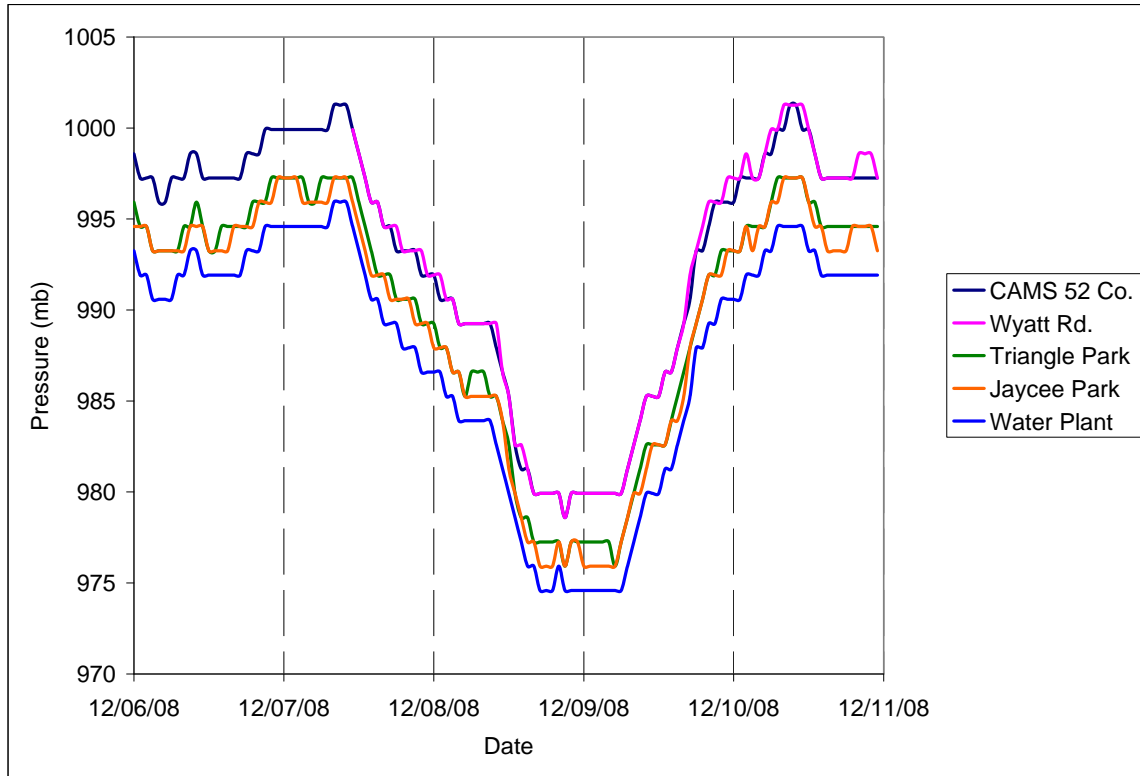
**Table 4-4. Daily Rainfall Totals**

	Total Rainfall				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	0.00	No Data	0.00	0.00	0.00
7-Dec-08	0.00	0.00	0.00	0.01	0.00
8-Dec-08	0.01	0.01	0.01	0.01	0.01
9-Dec-08	0.04	0.06	0.04	0.03	0.00
10-Dec-08	0.00	0.01	0.00	0.00	0.03

**Figure 4-4. Time Series of 1-Hour Rainfall Totals**



**Figure 4-5. Time Series of 1-Hour Barometric Pressure Averages**



## 5.0 Data Quality and Completeness

### 5.1 Air Quality Data

One hundred percent of the routine VOC, PM<sub>10</sub> and Cr<sup>6+</sup> samples that were planned for the 5-day sampling round were collected and analyzed (Tables 5-1 through 5-3). No significant problems were encountered; However, metal concentrations found in a PM<sub>10</sub> field blank, which in some cases exceeding five times the respective detection limit, should be taken into account when interpreting the ambient sampling data. At Triangle Park, a 1.2” Hg drop in canister vacuum between 12:00 midnight and 10:00 a.m. on 7-Dec in the VOC sample collected on 6-Dec suggests a small amount of ambient air leakage into the canister after the end of the 24-hour sampling period; however, the laboratory analysis of that sample reveals no significant differences with respect to samples collected at Triangle Park on other days or at other sites on the same day.

**Table 5-1. VOC Data Completeness<sup>a</sup>**

	Completeness (WS, WD, T, P, Rain)				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	100%	100%	100%	100%	100%
7-Dec-08	100%	100%	100%	100%	100%
8-Dec-08	100%	100%	100%	100%	100%
9-Dec-08	100%	100%	100%	100%	100%
10-Dec-08	100%	100%	100%	100%	100%
6-10 Dec 08	100%	100%	100%	100%	100%

<sup>a</sup> Calculated as the number of valid results for the 13 target VOCs, expressed as a percentage of the number planned, based on one sample per site per day.

**Table 5-2. Hexavalent Chromium Data Completeness<sup>a</sup>**

	Completeness (WS, WD, T, P, Rain)				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	100%	100%	100%	100%	100%
7-Dec-08	100%	100%	100%	100%	100%
8-Dec-08	100%	100%	100%	100%	100%
9-Dec-08	100%	100%	100%	100%	100%
10-Dec-08	100%	100%	100%	100%	100%
6-10 Dec 08	100%	100%	100%	100%	100%

<sup>a</sup> Calculated as the number of valid results for the 13 target VOCs, expressed as a percentage of the number planned, based on one sample per site per day

**Table 5-3. Metals Data Completeness<sup>a</sup>**

	Completeness (WS, WD, T, P, Rain)				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	100%	100%	100%	100%	100%
7-Dec-08	100%	100%	100%	100%	100%
8-Dec-08	100%	100%	100%	100%	100%
9-Dec-08	100%	100%	100%	100%	100%
10-Dec-08	100%	100%	100%	100%	100%
6-10 Dec 08	100%	100%	100%	100%	100%

<sup>a</sup> Calculated as the number of valid results for the 21 target metals, expressed as a percentage of the number planned, based on one sample per site per day.

Field blank results for VOCS are given in Table 5-4. The VOC field blank was collected at the Triangle Park sampling site on 12-Dec-08. The only core VOC detected in the field blank was benzene, which was measured in the blank sample at a level of 0.027 ppb-v. This value is slightly greater than 10% of the average ambient benzene concentration measured during the 5-day period. One VOC field duplicate sample was attempted during this sampling round; however, it was voided in the field because a flow controller failure allowed the duplicate canister to fill during just the first 30 minutes of the 24-hour sampling period. An extra field duplicate will be collected during the next round to compensate.

**Table 5-4. VOC Field Blank Results**

Analyte	Result (ppb-v)	Detection Limit (ppb-v)
Benzene	0.027	0.010
1,3-Butadiene	ND	0.005
Carbon Tetrachloride	ND	0.004
Chloroform	ND	0.007
1,2-Dibromoethane	ND	0.007
1,2-Dichloroethane	ND	0.009
Dichloromethane	ND	0.018
1,1,2,2-Tetrachloroethane	ND	0.009
1,1,2-Trichloroethane	ND	0.008
1,2,4-Trimethylbenzene	ND	0.016
1,3,5-Trimethylbenzene	ND	0.016
Vinyl chloride	ND	0.005
m/p-Xylene	ND	0.019

Field blank results for metals, including (Cr<sup>6+</sup>), are given in Table 5-5. Seven of the 22 metals, which are indicated in Table 5-5 by bold type, were detected in the field blank sample at levels greater than five times the respective detection limit. Three of the seven, including total chromium, also had average ambient air concentrations less than five times the blank. The field blank levels for these, and perhaps all the detected metals, should be considered when interpreting the ambient sampling data.

Conventional quartz fiber filters, as was used to collect PM<sub>10</sub>, typically contain variable amounts of aluminum and other metals that contribute to field blank concentrations. ERG will provide additional data collected during its detection limit assessment to evaluate whether the field blank results reported here are unusually high. Additionally, the number of field blanks collected during the next round of sampling will be increased so that a better assessment of the average field blank concentrations can be determined.

**Table 5-5. Metals Field Blank Results**

Analyte	Field Blank (ng/m <sup>3</sup> )	Detection Limit (ng/m <sup>3</sup> )	Average Ambient Concentration (ng/m <sup>3</sup> )
<b>Aluminum</b>	<b>13.9</b>	<b>1.59</b>	<b>132.28</b>
Antimony	0.015	0.007	0.5998
Arsenic	0.011	0.009	0.7772
<b>Barium</b>	<b>1.71</b>	<b>0.169</b>	<b>10.704</b>
Beryllium	ND	0.007	0.0076
Cadmium	ND	0.029	0.2468
<b>Chromium (total)</b>	<b>1.61</b>	<b>0.165</b>	<b>2.872</b>
Chromium (6+)	ND	0.0065	0.0538
Cobalt	ND	0.049	0.134
<b>Copper</b>	<b>0.88</b>	<b>0.142</b>	<b>16.34</b>
Lead	0.15	0.056	5.6
<b>Manganese</b>	<b>0.576</b>	<b>0.057</b>	<b>26.7</b>
Mercury	0.005	0.017	0.0458
<b>Molybdenum</b>	<b>0.127</b>	<b>0.012</b>	<b>0.5526</b>
Nickel	0.289	0.152	1.3794
Selenium	0.019	0.013	0.6298
<b>Silver</b>	<b>0.068</b>	<b>0.006</b>	<b>0.0094</b>
Thallium	ND	0.001	0.0094
Thorium	0.001	0.0006	0.022
Uranium	0.005	0.002	0.035
Vanadium	0.029	0.014	1.3454
Zinc	12.2	3.01	48.3

Field duplicate results (Table 5-6) met the 20% relative percent difference objective for about one-half the number of metals, most notably for aluminum and chromium (total and Cr<sup>6+</sup>); However, relatively poor precision for others, perhaps related to the field blank issue described above, indicates a need for corrective action and an increased number of field duplicate samples in future sampling rounds.

**Table 5-6. Metals Field Duplicate Results**

Analyte	Routine Sample Concentration (ng/m <sup>3</sup> )	Duplicate Sample Concentration (ng/m <sup>3</sup> )	Relative Percent Difference
Aluminum	303	291	4.0%
Antimony	0.663	1.05	45.2%
Arsenic	1.48	2.72	59.0%
Barium	12.4	13.2	6.2%
Beryllium	0.013	0.012	8.0%
Cadmium	0.751	1.2	46.0%
Chromium (total)	7.96	8.39	5.3%
Chromium (6+)	0.379	0.358	5.4%
Cobalt	0.22	0.3	30.8%
Copper	29.4	50.5	52.8%
Lead	24.6	46.2	61.0%
Manganese	120	135	11.8%
Mercury	0.276	0.326	16.6%
Molybdenum	1.45	2.59	56.4%
Nickel	2.91	4.18	35.8%
Selenium	1.24	1.46	16.3%
Silver	0.033	0.138	122.8%
Thallium	0.011	0.015	30.8%
Thorium	0.027	0.022	20.4%
Uranium	0.045	0.044	2.2%
Vanadium	3.61	3.95	9.0%
Zinc	277	457	49.0%

## 5.2 Meteorological Data

Data completeness for meteorological parameters was 100% at the CAMS 52 Collocated, Triangle Park, Jaycee Park, and Water Treatment Facility sites (Table 5-7). Meteorological data completeness was 71% at Wyatt Road, with 35 hours of data lost at the start of the sampling round due to a data logger error. No site recorded calm winds or rainfall for more than six hours on more than one day (Tables 5-8 and 5-9, respectively).

The gap in the meteorological data from Wyatt Road is from 6-Dec-08 12:00 a.m. through 7-Dec-08 10:00 a.m. From that period forward, until the end of the sampling round, wind direction, temperature, pressure, and rainfall measurements at Wyatt Road averaged within 4% of the CAMS 52 Collocated site readings, indicating that the CAMS 52 Collocated data are adequate substitutes for most of the missing data. CAMS 52 Collocated wind speed measurements, however, averaged 17% (3 mph) greater than at Wyatt Road and provide for only rough estimates of the Wyatt Road wind speeds during the period of lost data.

**Table 5-7. Meteorological Data Completeness**

	Completeness (WS, WD, T, P, Rain)				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	100%	0%	100%	100%	100%
7-Dec-08	100%	54%	100%	100%	100%
8-Dec-08	100%	100%	100%	100%	100%
9-Dec-08	100%	100%	100%	100%	100%
10-Dec-08	100%	100%	100%	100%	100%
6-10 Dec 08	100%	71%	100%	100%	100%

**Table 5-8. Number of Hours per Day with Calm Winds**

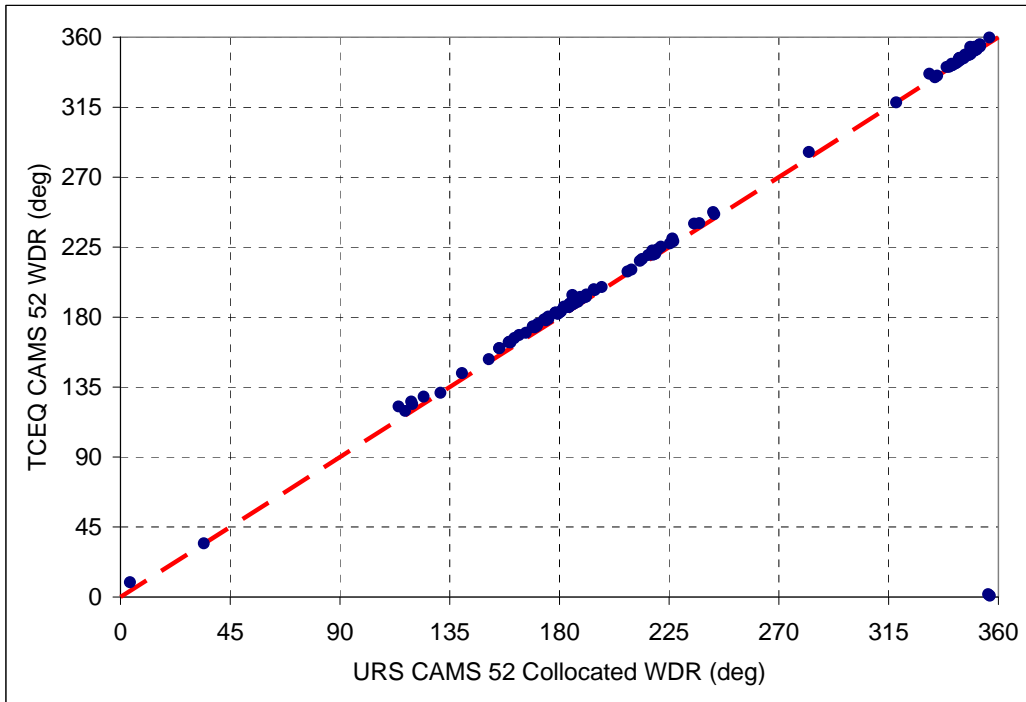
	Number of Calm Hours				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	5	0	9	7	4
7-Dec-08	3	0	3	1	0
8-Dec-08	0	0	0	0	0
9-Dec-08	0	0	0	0	0
10-Dec-08	0	0	0	0	0
# Days > 6	0	0	1	1	0

**Table 5-9. Number of Hours per Day with Measured Rainfall**

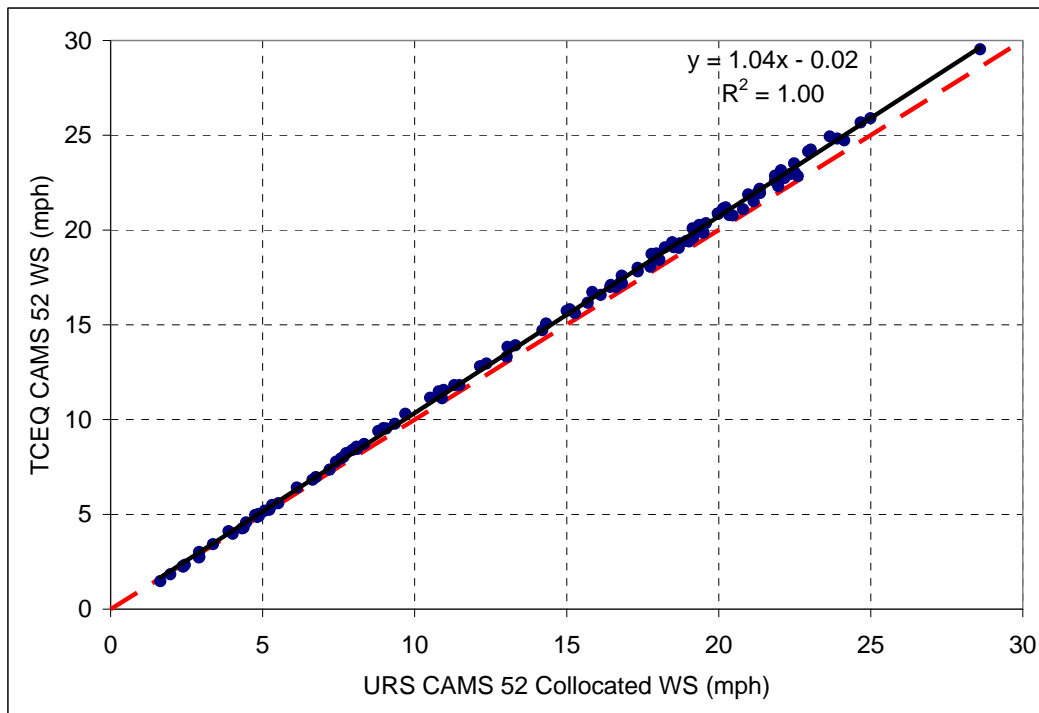
	Number of Hours with Measured Rainfall				
	CAMS 52 Collocated	Wyatt Road	Triangle Park	Jaycee Park	Water Plant
6-Dec-08	0	0	0	0	0
7-Dec-08	0	0	0	1	0
8-Dec-08	1	1	1	1	1
9-Dec-08	1	1	2	2	0
10-Dec-08	0	1	0	0	2
# Days > 6	0	0	0	0	0

Collocated measurements of wind direction at CAMS 52 by TCEQ and URS are shown in the scatter plot given in Figure 5-1. The readings from the two systems differed by less than 5° for 113 of the 120 hours and, on average, differed by less than 2°. The greatest difference was 8.9 degrees, which occurred during calm conditions (wind speed less than 3 mph) on 6-Dec-08. A similar scatter plot for wind speed is given in Figures 5-2. The linear regression r-square for the collocated wind speed measurements was 1.00; however, a slight relative bias was apparent as the TCEQ wind speed measurements averaged about 0.5 mph (3%) greater.

**Figure 5-1. Scatter Plot Showing the Agreement between Collocated 1-Hour Resultant Wind Direction Measurements Made by TCEQ and URS at CAMS 52. The Diagonal Line Represents 1:1.**

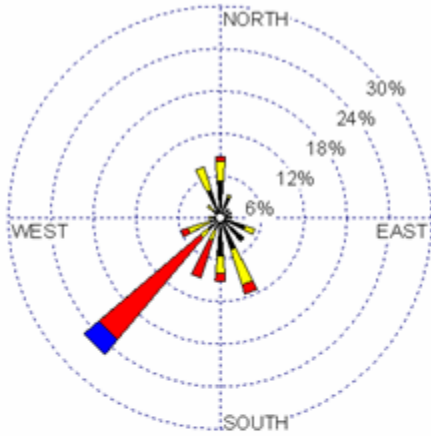


**Figure 5-1. Scatter Plot Showing the Agreement between Collocated 1-Hour Wind Speed Averages Measured by TCEQ and URS at CAMS 52. The Diagonal Line Represents 1:1.**

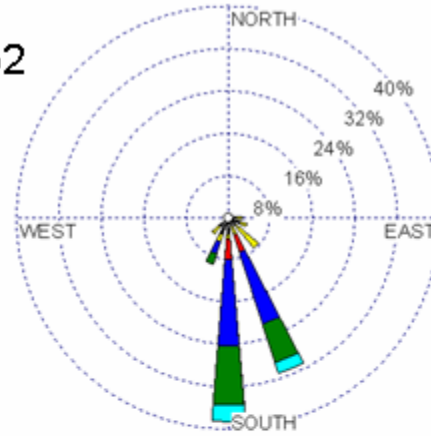


**APPENDIX A**  
**Daily Wind Roses**

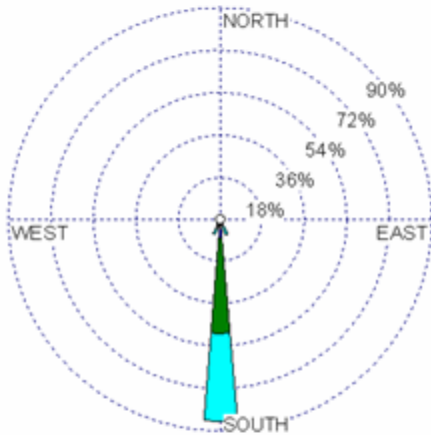
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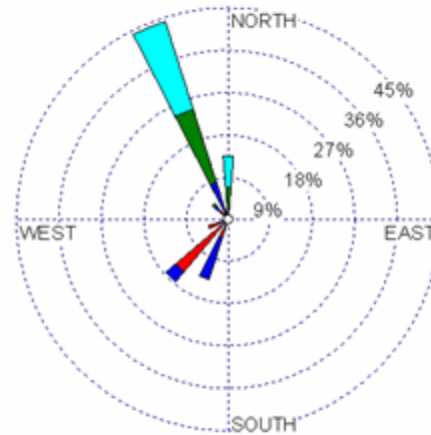
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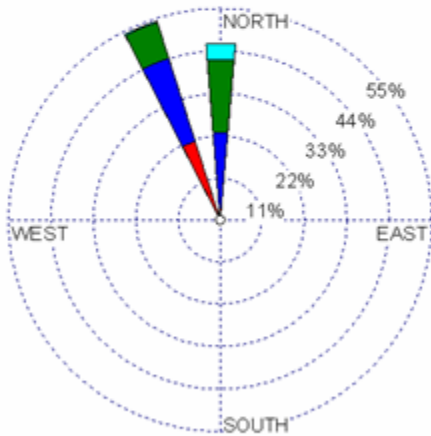
07-Dec-08



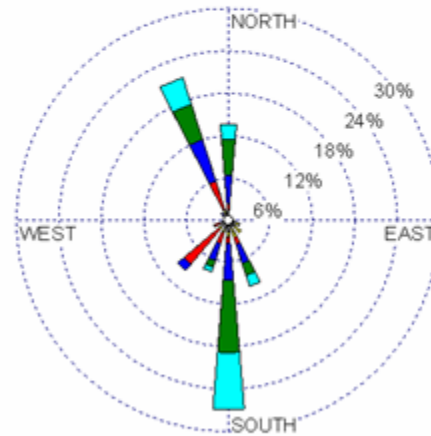
08-Dec-08



09-Dec-08



10-Dec-08



06-10 Dec 08

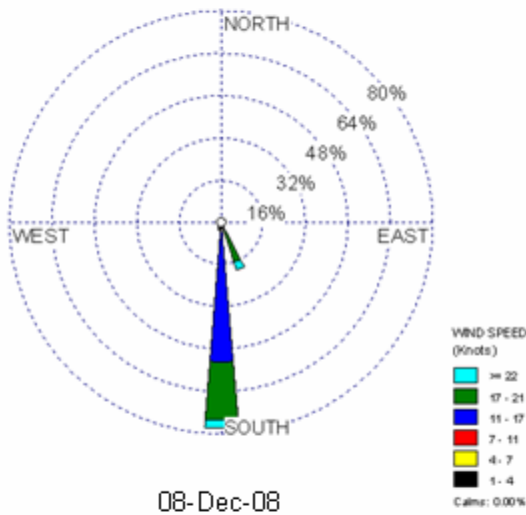


# Wyatt Rd.

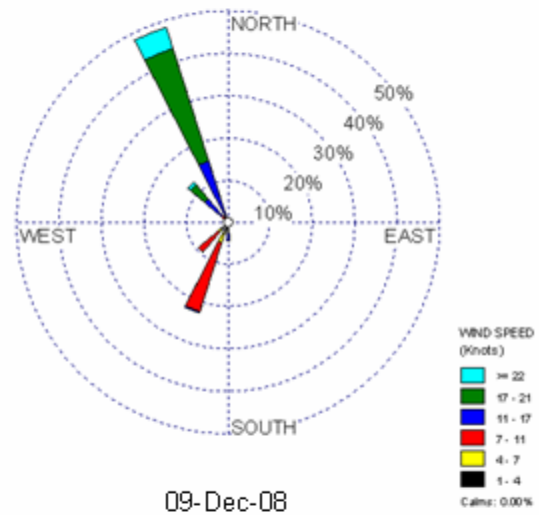
No meteorological data available for 06-Dec-08

Insufficient data capture for 07-Dec-08

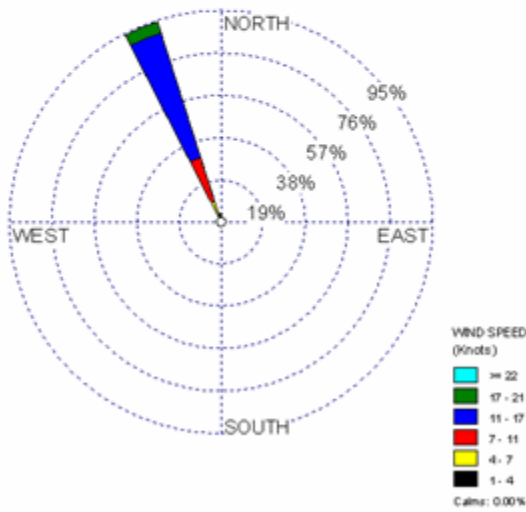
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07-Dec-08



08-Dec-08

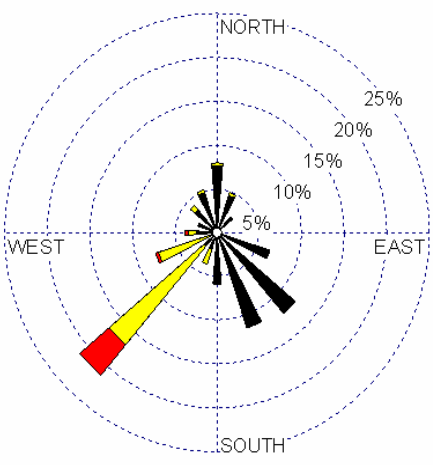


09-Dec-08

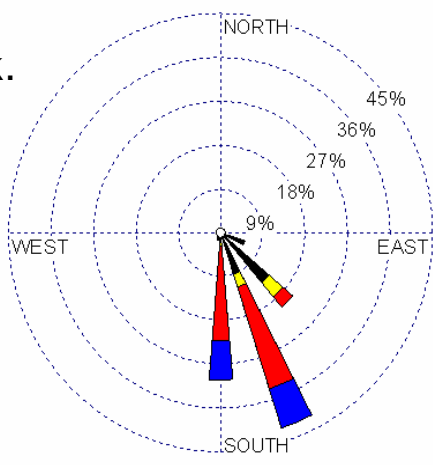
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06-10 Dec 08

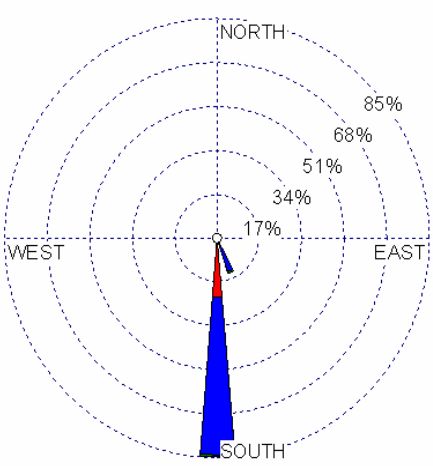
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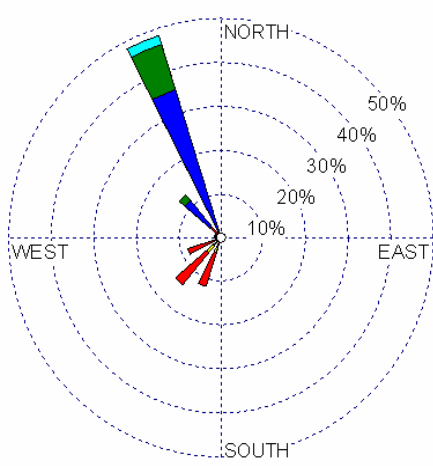
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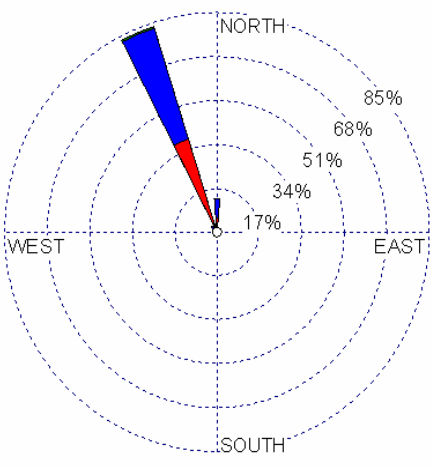
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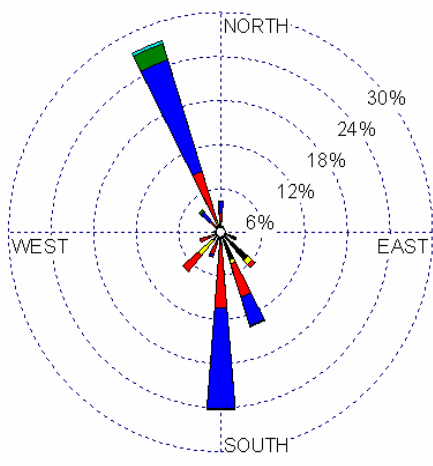
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09-Dec-08



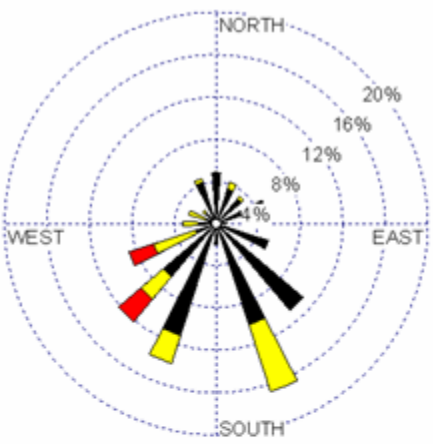
10-Dec-08



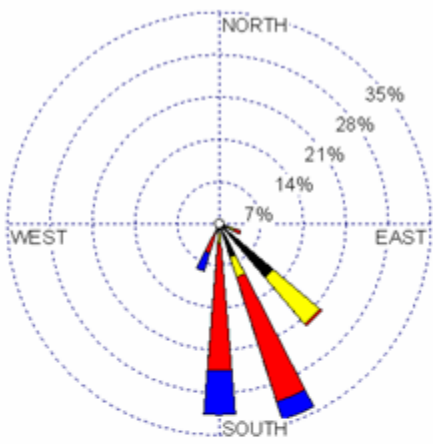
06-10 Dec 08



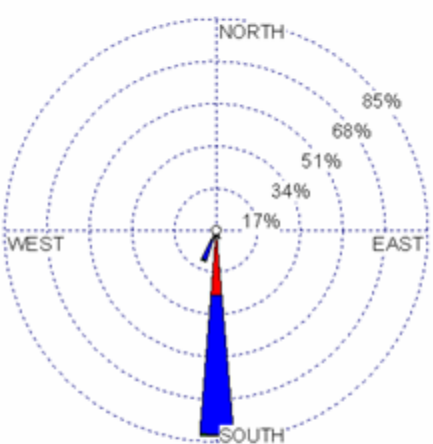
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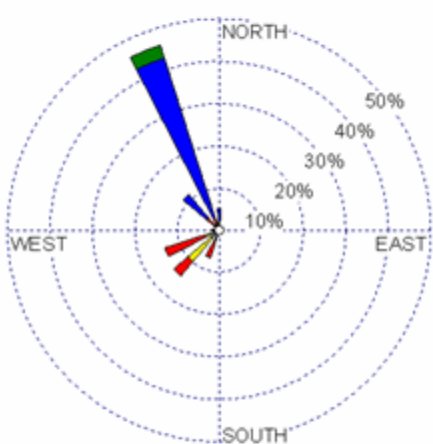
06-Dec-08



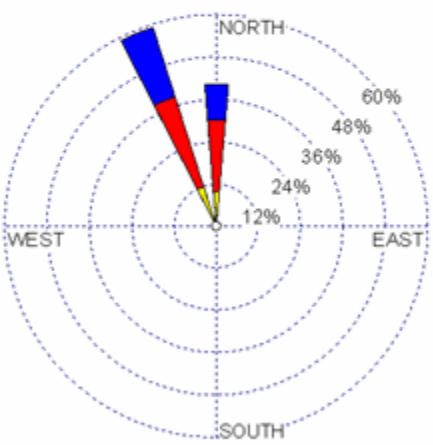
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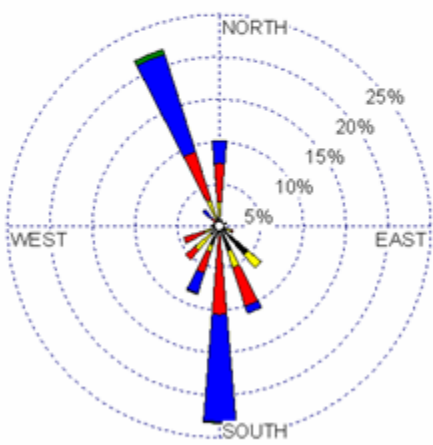
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09-Dec-08



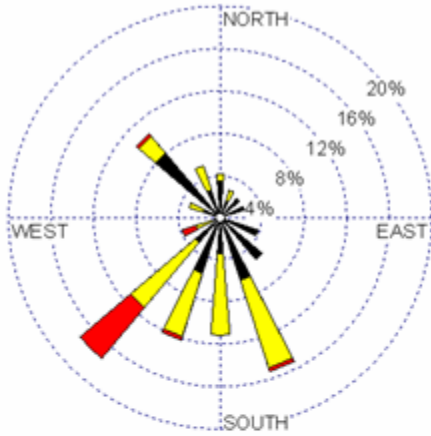
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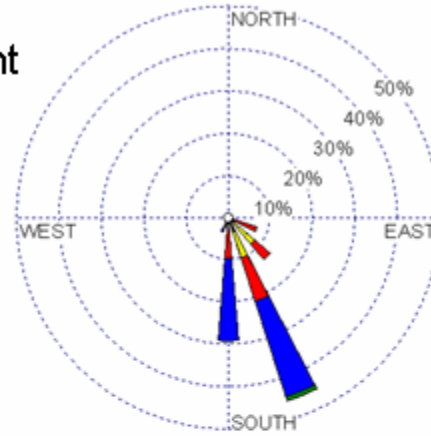
06-10 Dec 08



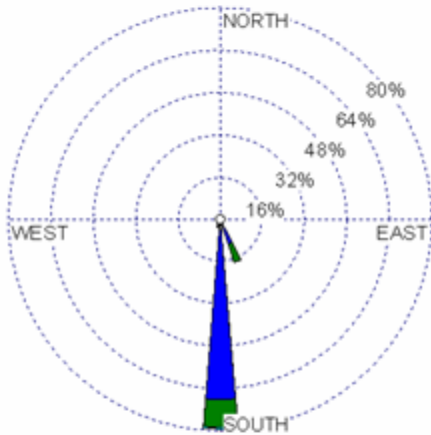
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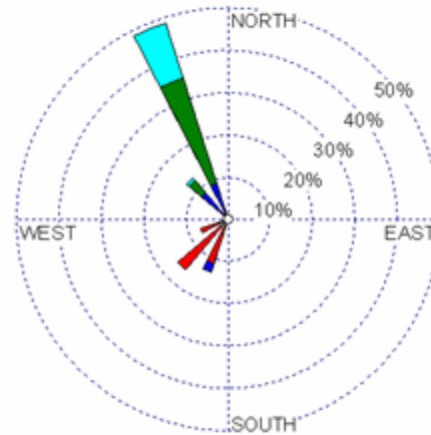
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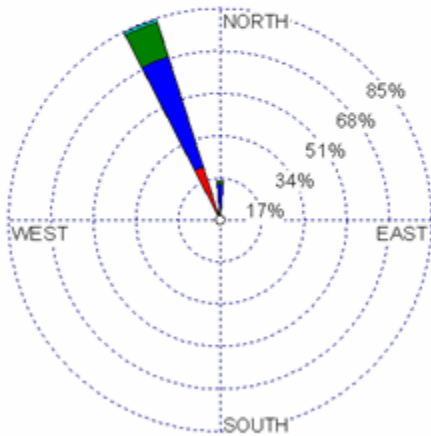
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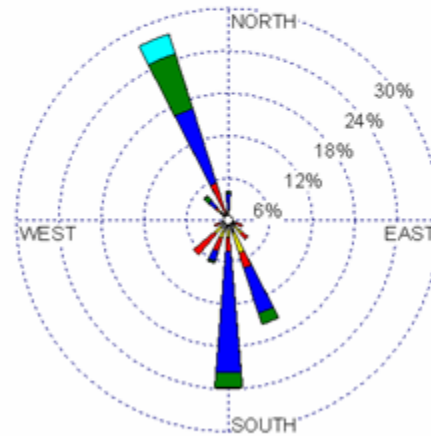
08-Dec-08



09-Dec-08



10-Dec-08



06-10 Dec 08

