



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

**FINAL REPORT**

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## 1.0 INTRODUCTION

This report presents the analytical results for 82 chemicals measured in ambient air samples collected in Midlothian, TX, during December 2008 – July 2009. The data were collected as part of a special study sponsored by the Texas Commission on Environmental Quality (TCEQ) to address citizens' questions about the air quality in Midlothian. The TCEQ and its predecessor organizations have monitored the air quality at multiple locations in Midlothian since 1981, according to a draft health consultation report by the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), which summarized the data collected through 2005 (ATSDR, 2007). The ATSDR found that the majority of risks associated with exposure to air pollution were low but this conclusion has not been reassuring to the entire Midlothian community.

In August 2008, TCEQ contracted with URS Corporation to conduct additional air quality and meteorological measurements at several Midlothian locations. The resulting data, which are reported here, are intended to help answer the following questions from concerned citizens:

- How are industries in Midlothian affecting air quality?
- Does the TCEQ every-6th-day monitoring site give an accurate representation of daily air concentrations?
- What is the air quality close to schools and parks in Midlothian?
- What percentage of total chromium in inhalable particulate matter is comprised of hexavalent chromium (Cr<sup>6+</sup>)?

This measurement study also helps fill data gaps that ATSDR noted in its draft health consultation report and cited as its reason for classifying the Midlothian air quality as an Indeterminate Public Health Hazard (ATSDR, 2007).

This is the fourth and final report by URS Corporation on this measurement study and includes data previously reported in the three interim reports in addition to the analytical results for the final set of samples. Internet links to the interim reports, laboratory data reports, a Quality Assurance Project Plan, quality assurance audit reports, and evaluations of the measurement results by the TCEQ Toxicology Division are available online at <http://www.tceq.state.tx.us/implementation/tox/research/midlothian.html>.

A brief overview of the study design and results follows. Subsequent chapters of this report describe the sampling sites (Chapter 2), the sampling and analytical methods (Chapter 3), the sampling results (Chapter 4), the weather condition during sampling events (Chapter 5), and the data quality (Chapter 6).

## 1.1 Overview of Study Design and Results

Four rounds of air sampling for volatile organic compounds (VOCs) and metal constituents of particulate matter in the PM<sub>10</sub> size fraction (including total unspeciated chromium and hexavalent chromium) were conducted. During each round, air samples were collected over five consecutive 24-hour periods at five sites. Four of the sampling sites were fixed throughout the field study (Figure 1-1). The fifth site was changed between sampling rounds to sample the air at four different locations in the sequence of five-day rounds (Figure 1-2). Sampling for VOCs and metals was conducted at each site except Wyatt Road, which was equipped just for sampling metals. The sampling rounds took place during four consecutive calendar quarters, starting with the fourth quarter of 2008. Table 1-1 gives the sampling dates at each site.

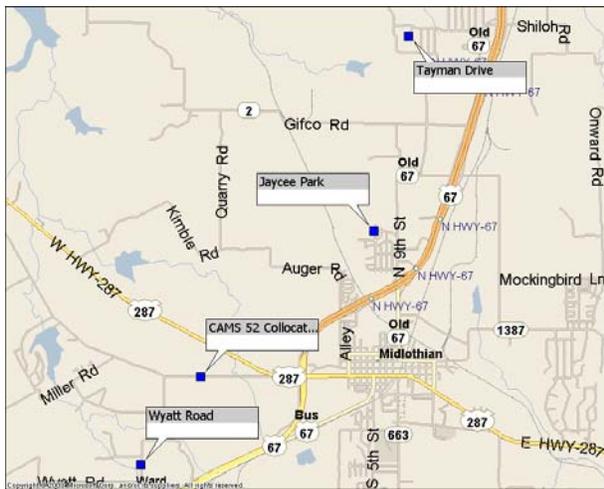


Figure 1-1. Fixed Sampling Sites

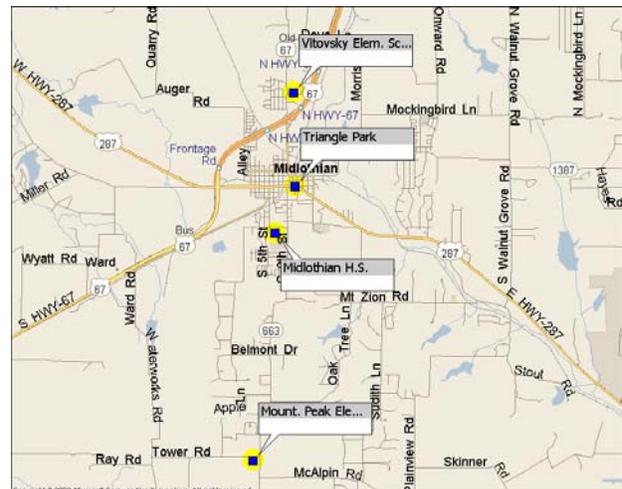


Figure 1-2. Sequential Sampling Sites

Table 1-1. Sampling Dates and Sites

Round No.	Quarter	Sampling Dates	Sampling Sites
1	4 <sup>th</sup> Quarter 2008	December 6-10, 2008	Four fixed sites and Triangle Park
2	1 <sup>st</sup> Quarter 2009	February 26 – March 2, 2009	Four fixed sites and Mountain Peak Elementary School
3	2 <sup>nd</sup> Quarter 2009	May 5-9, 2009	Four fixed sites and Vitovsky Elementary School
4	3 <sup>rd</sup> Quarter 2009	July 3-7, 2009	Four fixed sites and Midlothian High School

The air samples were collected and analyzed for 60 VOCs and 21 metals by EPA methods TO-15 and IO-3.5, respectively. Hexavalent chromium, which cannot be measured by the EPA method for metals, was collected on bicarbonate-impregnated filters and analyzed by ion chromatography, using a method similar to California Air Resources Board (CARB) Method 039 (ERG, 2006). The Eastern Research Group, Inc (ERG) Research Triangle Park Laboratory, a TCEQ accredited laboratory and prime laboratory contractor to EPA on national air toxics monitoring programs, provided all the sampling media and analyzed the samples.

Table 1-2 gives the average levels measured for 13 core VOCs measured in this study. These compounds, which were requested in the scope of work by TCEQ, were identified by ATSDR (2007) as potentially the greatest risk drivers among the 117 VOCs previously measured in Midlothian. The other 47 chemicals analyzed by TO-15, which make up the remainder of ERG's TO-15 standard target list for the national Urban Air Toxics Monitoring Program (ERG, 2008), are reported as supplemental data in a separate spreadsheet file. Note that five of the 13 VOCs listed in Table 1-2 were rarely detected. For these and all the other reported compounds, average concentrations were estimated using one-half the method detection limit (MDL) as a proxy for non-detects. The MDLs for TO-15 analytes are given in Table 3-1.

Table 1-3 gives the average levels of the 22 measured PM<sub>10</sub> metals including Cr<sup>6+</sup>. The metals data are reported in units of nanograms per cubic meter (ng/m<sup>3</sup>) at local temperature and pressure conditions. All the metals except beryllium, silver, thallium, and Cr<sup>6+</sup> were detected in 100% of the ambient air samples and field blanks. For several of the metal compounds, field blank levels were significant when compared with the concentrations reported for ambient air. The reported concentrations for ambient air have not been adjusted for the levels found in blanks. Chapter 6 presents the field blank results and their significance with respect to data quality. The MDLs for PM<sub>10</sub> metals are given in Table 3-2.

**Table 1-2. Mean VOC Concentrations in Parts-per-Billion-Volume (ppbv) and the Number of Times Detected**

VOC	Mean Concentration Over a Sampling Days (ppb-v)													
	CAMS 52 Collocated (Old Fort Worth Road)		Jaycee Park		Water Treatment Plant (Tayman Dr.)		Triangle Park		Mountain Peak Elementary School		Vitovsky Elementary School		Midlothian High School	
	Mean <sup>1</sup>	No. <sup>2</sup>	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.
Benzene	0.212	20	0.197	20	0.190	20	0.228	5	0.135	4	0.227	5	0.115	5
1,3-Butadiene	0.011	17	0.012	19	0.010	18	0.031	5	0.008	4	0.011	5	0.007	5
Carbon Tetrachloride	0.110	20	0.116	20	0.114	20	0.112	5	0.091	4	0.106	5	0.143	5
Chloroform	0.020	18	0.022	20	0.038	20	0.019	5	0.014	4	0.019	5	0.019	3
1,2-Dibromoethane	0.002	1	0.001	0	0.001	0	0.004	0	0.001	0	0.001	0	0.001	0
1,2-Dichloroethane	0.002	0	0.002	0	0.002	0	0.005	0	0.001	0	0.001	0	0.001	0
Dichloromethane	0.152	20	0.095	20	0.087	20	0.116	5	0.058	4	0.123	5	0.067	5
1,1,2,2-Tetrachloroethane	0.002	0	0.002	0	0.002	0	0.005	0	0.001	1	0.002	0	0.002	0
1,1,2-Trichloroethane	0.002	1	0.002	0	0.002	1	0.004	0	0.002	1	0.002	0	0.002	0
1,2,4-Trimethylbenzene	0.024	20	0.026	20	0.022	20	0.027	5	0.026	4	0.024	5	0.021	5
1,3,5-Trimethylbenzene	0.009	20	0.010	20	0.008	20	0.009	5	0.010	4	0.009	5	0.007	5
Vinyl chloride	0.003	5	0.003	5	0.003	5	0.003	0	0.001	0	0.006	5	0.001	0
m,p-Xylene	0.068	20	0.076	20	0.051	20	0.062	5	0.210	4	0.057	5	0.035	5

<sup>1</sup> Mean concentrations were calculated using one-half the method detection limit (MDL) as a proxy for sample concentrations that were not detected. Average detection limits for each compound are given in Table 3-1.

<sup>2</sup> No. stands for the number of samples in which the compound was detected, including samples in which the measured concentration was below the estimated MDL. The total number of samples collected was 20 at CAMS 52, Jaycee Park, and Tayman Dr. (i.e., the Water Treatment Plant). Five samples were collected at each of the other sites; however, one sample from Mountain Peak Elementary School was voided (only four samples were analyzed).

**Table 1-3. Mean Metal Concentrations in Nanograms-per-Cubic Meter**

Metal	Mean Concentration Over All Sampling Days (ng/m <sup>3</sup> Local Conditions)							
	CAMS 52 Collocated (Old Fort Worth Road)	Wyatt Road	Jaycee Park	Water Treatment Plant (Tayman Dr.)	Triangle Park	Mountain Peak Elementary School	Vitovsky Elementary School	Midlothian High School
Aluminum	127	269	88	117	57	84	93	80
Antimony	0.453	0.549	0.411	0.447	0.583	0.265	0.365	0.545
Arsenic	0.582	1.082	0.579	0.513	0.470	0.288	0.625	0.548
Barium	9.82	12.5	7.73	7.57	10.64	7.37	5.35	15.33
Beryllium	0.007	0.012	0.005	0.006	0.004	0.007	0.004	0.003
Cadmium	0.153	0.431	0.146	0.141	0.254	0.081	0.138	0.069
Chromium (total)	2.82	5.19	2.09	2.04	1.57	1.84	2.64	2.00
Chromium (6+)	0.0551	0.0602	0.0159	0.0178	0.0165	0.0143	0.0214	0.0059
Cobalt	0.123	0.238	0.094	0.104	0.065	0.089	0.076	0.079
Copper	8.48	22.1	6.29	41.12	7.85	3.93	5.46	8.84
Lead	3.80	14.5	2.57	3.63	2.67	1.89	1.81	2.78
Manganese	17.1	62.7	9.1	11.5	6.9	9.4	9.0	4.9
Mercury	0.086	0.095	0.057	0.026	0.065	0.262	0.011	0.008
Molybdenum	0.398	1.01	0.327	0.286	0.303	0.341	0.279	0.226
Nickel	1.032	2.131	1.005	1.548	0.764	0.837	1.145	0.615
Selenium	0.809	0.821	0.729	0.743	0.495	0.488	1.094	0.685
Silver	0.007	0.033	0.006	0.006	0.001	0.006	0.004	0.003
Thallium	0.009	0.011	0.013	0.009	0.007	0.010	0.016	0.000
Thorium	0.019	0.033	0.014	0.016	0.014	0.016	0.014	0.009
Uranium	0.024	0.054	0.018	0.028	0.016	0.025	0.010	0.010
Vanadium	1.320	2.349	1.015	1.083	0.697	0.792	1.794	0.356
Zinc	30.7	141.2	22.5	19.1	26.9	13.3	18.4	13.9

## 2.0 SAMPLING SITES

Table 2-1 gives the latitude/longitude coordinates and the nearest street address for each sampling site. Sampling was conducted at four “fixed” sites during all four sampling rounds. Sampling was conducted at four other sites in succession for one sampling round each. The latter group of sites is referred to in this report as the “sequential” sites. The fixed sampling sites were selected based on the following specifications given by TCEQ:

- One fixed site shall be collocated with the TCEQ Continuous Air Monitoring Station (CAMS 52) on Old Fort Worth Road;
- One fixed site shall be located in the predominantly downwind direction from the Gerdau Ameristeel steel mill near the intersection of Highway 67 and Wyatt Road;
- One fixed site shall be located near Jaycee Park; and
- One fixed site shall be located north (predominantly downwind) of the Ash Grove Texas, LP cement manufacturing facility.

The sequential sites were initially designated to be in or near four public parks. Sampling was conducted in Triangle Park during the first round, as planned. Before the second sampling round, TCEQ, responding to advice from the Citizen Focus Group that advised TCEQ on other aspects of the study design, requested that the next sequential sites be near the three public schools listed in Table 2-1.

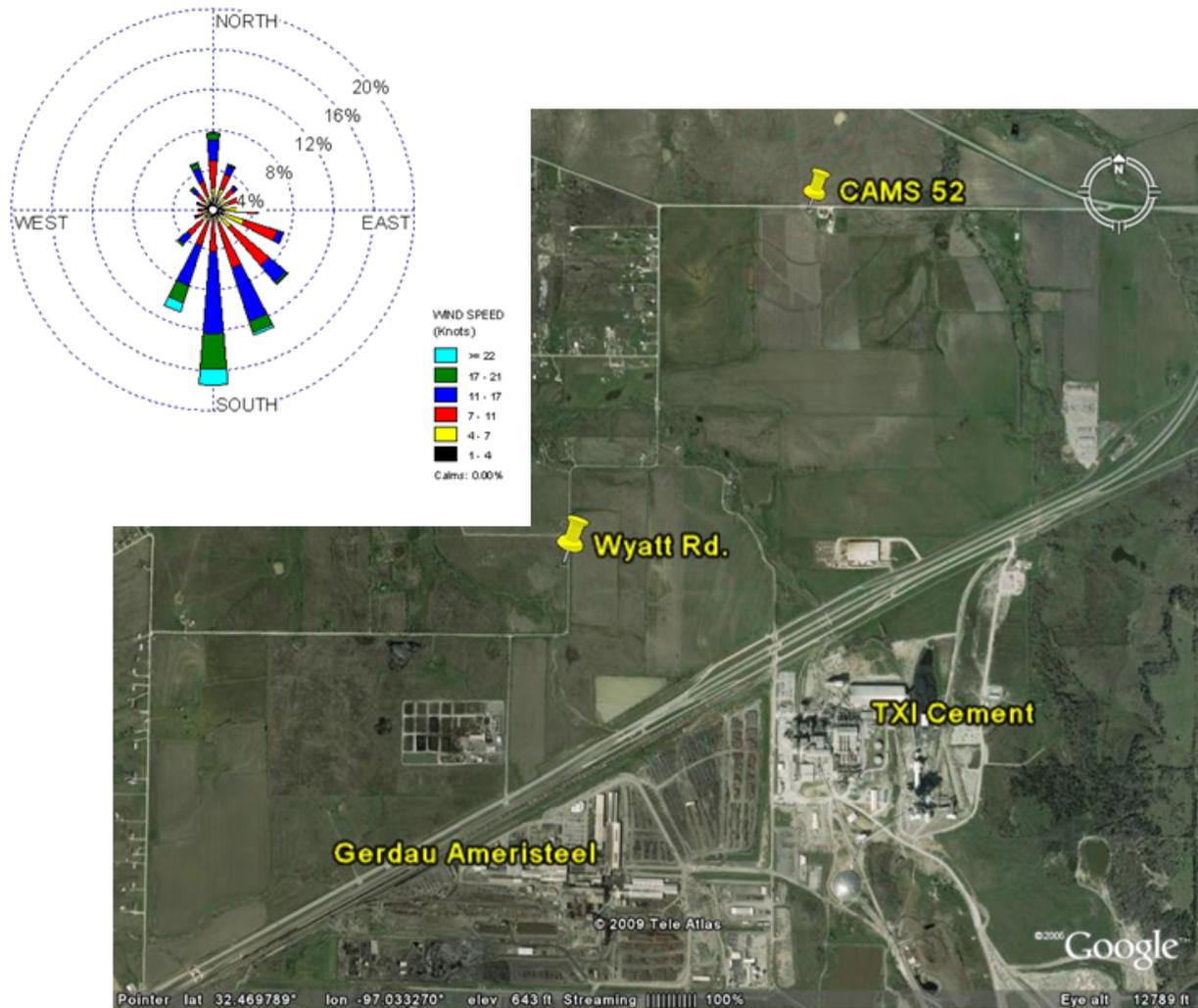
**Table 2-1. Fixed and Sequential Sampling Sites**

Site Name	Street Address	Latitude	Longitude
<b>Fixed Sites</b>			
CAMS 52 Collocated	2725 Old Fort Worth Rd.	32.4822	-97.0269
Wyatt Road	1291 E. Wyatt Rd.	32.4696	97.0372
Jaycee Park	1711 Meadow Ln.	32.5030	-96.9976
Midlothian Water Treatment Facility	440 Tayman Dr.	32.5301	-96.9918
<b>Sequential Sites</b>			
Triangle Park	200 E Ave. G	32.4823	-96.9917
Mountain Peak Elem. Sch.	5201 FM 663	32.4290	-97.0014
Vitovsky Elem. Sch.	333 Church St.	32.5007	-96.9922
Midlothian H.S.	923 South 9 <sup>th</sup> St.	32.4732	-96.9964

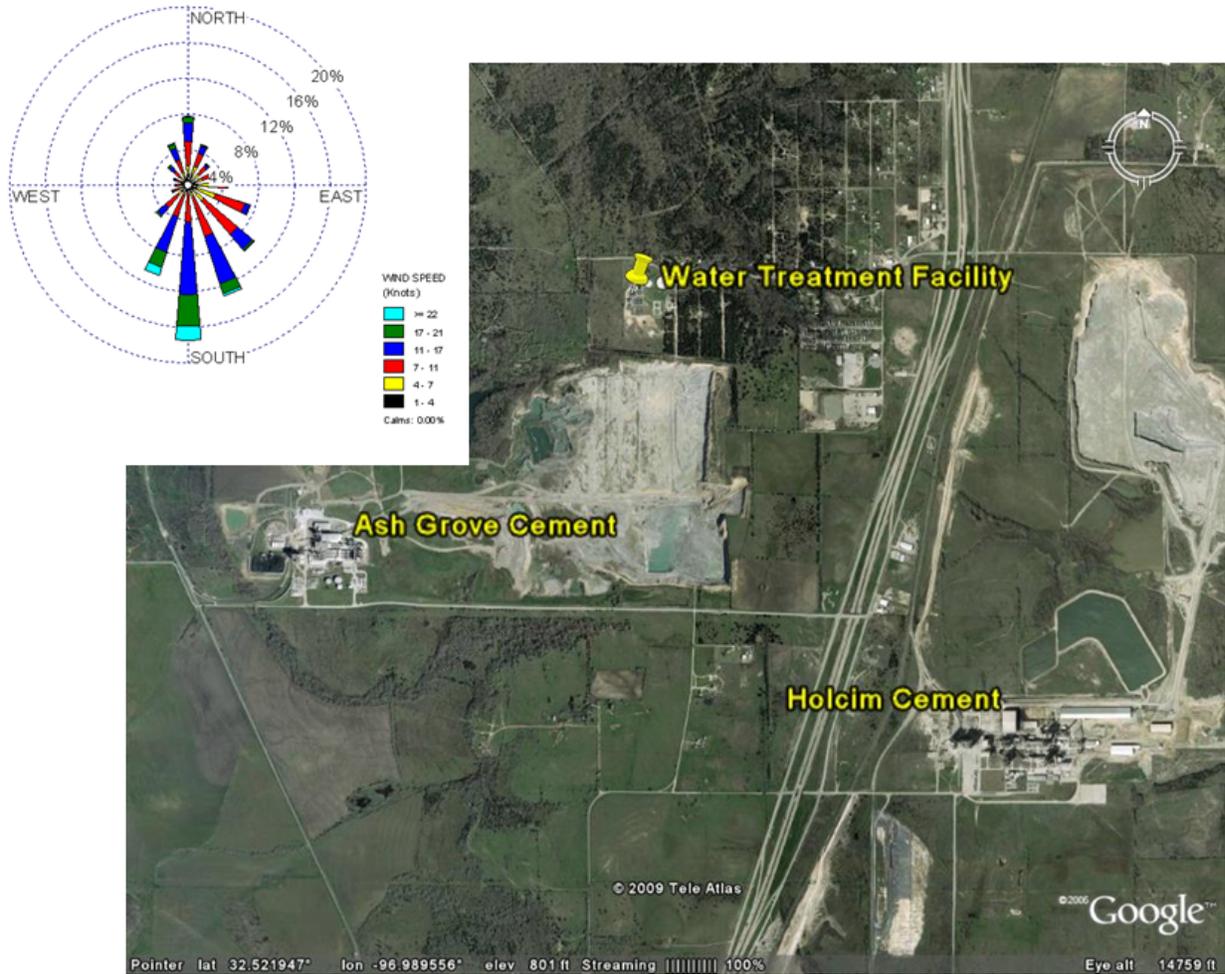
With six of the eight sites pre-determined, URS surveyed the general areas north of the Gerdau Ameristeel and Ash Grove facilities and recommended the Wyatt Road and Tayman Drive (Midlothian Water Treatment Facility) sites to complete the sampling network. In

selecting those sites, URS considered exposure to unobstructed airflow, accessibility in all weather conditions, access to electricity, and security. Southerly winds are predominant in Midlothian, based on measurements at CAMS 52 during 2004-2008. Winds from the south-southeast and south-southwest are also relatively common. The site at 1291 E. Wyatt Road is about 0.5 miles almost due north from the Gerdau Ameristeel facility (Figure 2-1) and met all the other site requirements. The Wyatt Road site is also about 0.4 miles southeast of CAMS 302, where TCEQ monitored the air quality during 2000-2006.

The Midlothian Water Treatment Facility on Tayman Drive is about 1.2 miles northeast of the Ash Grove Texas, LP facility. Though not directly in the most predominant downwind direction relative to Ash Grove, this site was the best option available in the approximate direction in terms of exposure, security, and access to electricity within 1-2 miles of the facility. This site is also about 2 miles northwest of the Holcim cement manufacturing facility (Figure 2-2). The Texas Natural Resources Conservation Commission operated an air sampling station at the Tayman Drive site during 1993-1997. Figures 2-3 through 2-10 give street level maps and close up aerial views of all the sampling sites.



**Figure 2-1. Aerial Photograph Showing the Locations of the Wyatt Road and CAMS 52 Sampling Sites Relative to the Gerdau Ameristeel and TXI Midlothian Facilities (the Wind Rose in the Upper Left is from CAMS 52, 2004-2008)**



**Figure 2-2. Aerial Photograph Showing the Locations of the Tayman Drive Water Treatment Facility Sampling Site Relative to the Ash Grove and Holcim Cement Manufacturing Facilities (the Wind Rose in the Upper Left is from CAMS 52, 2004-2008)**

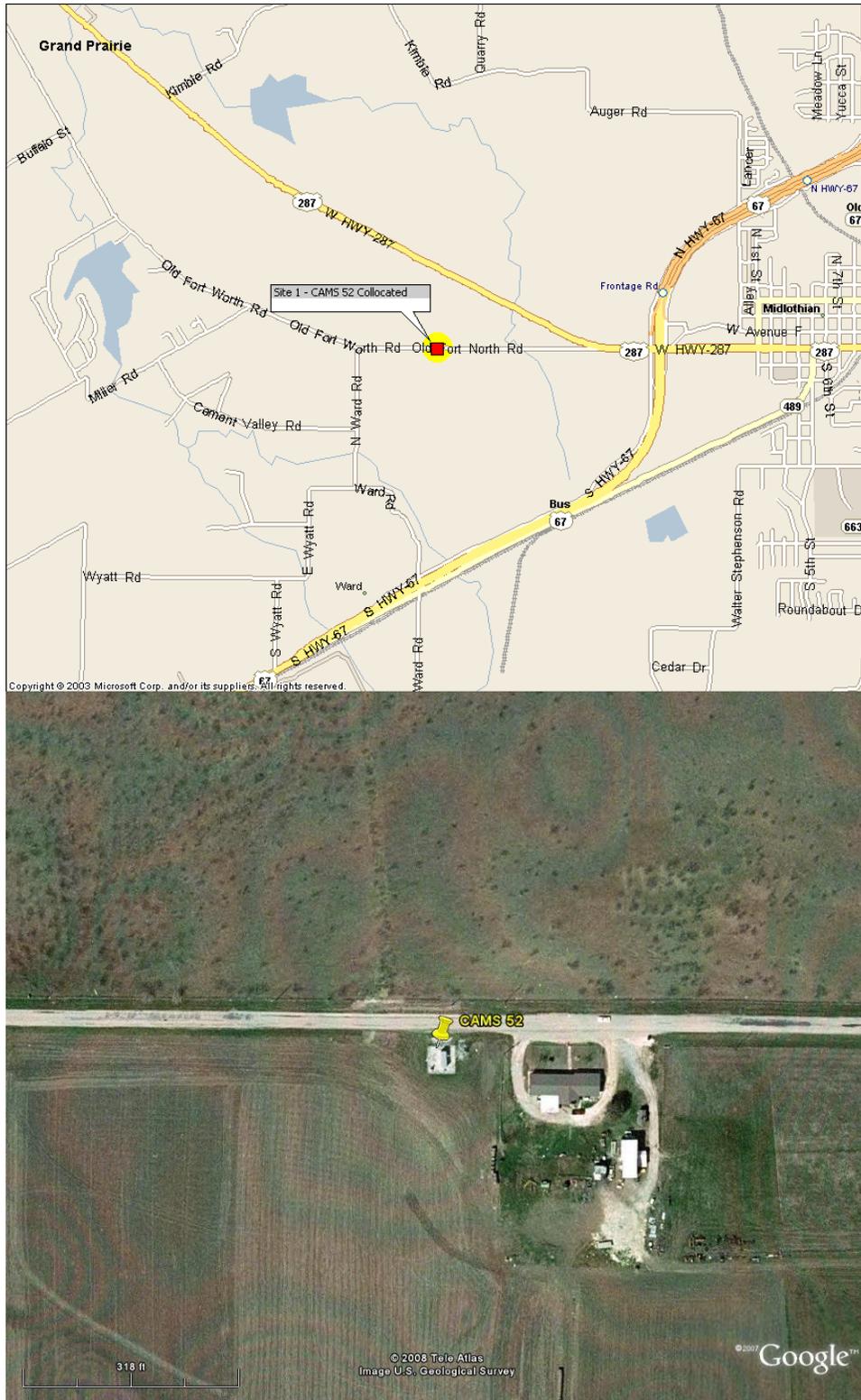
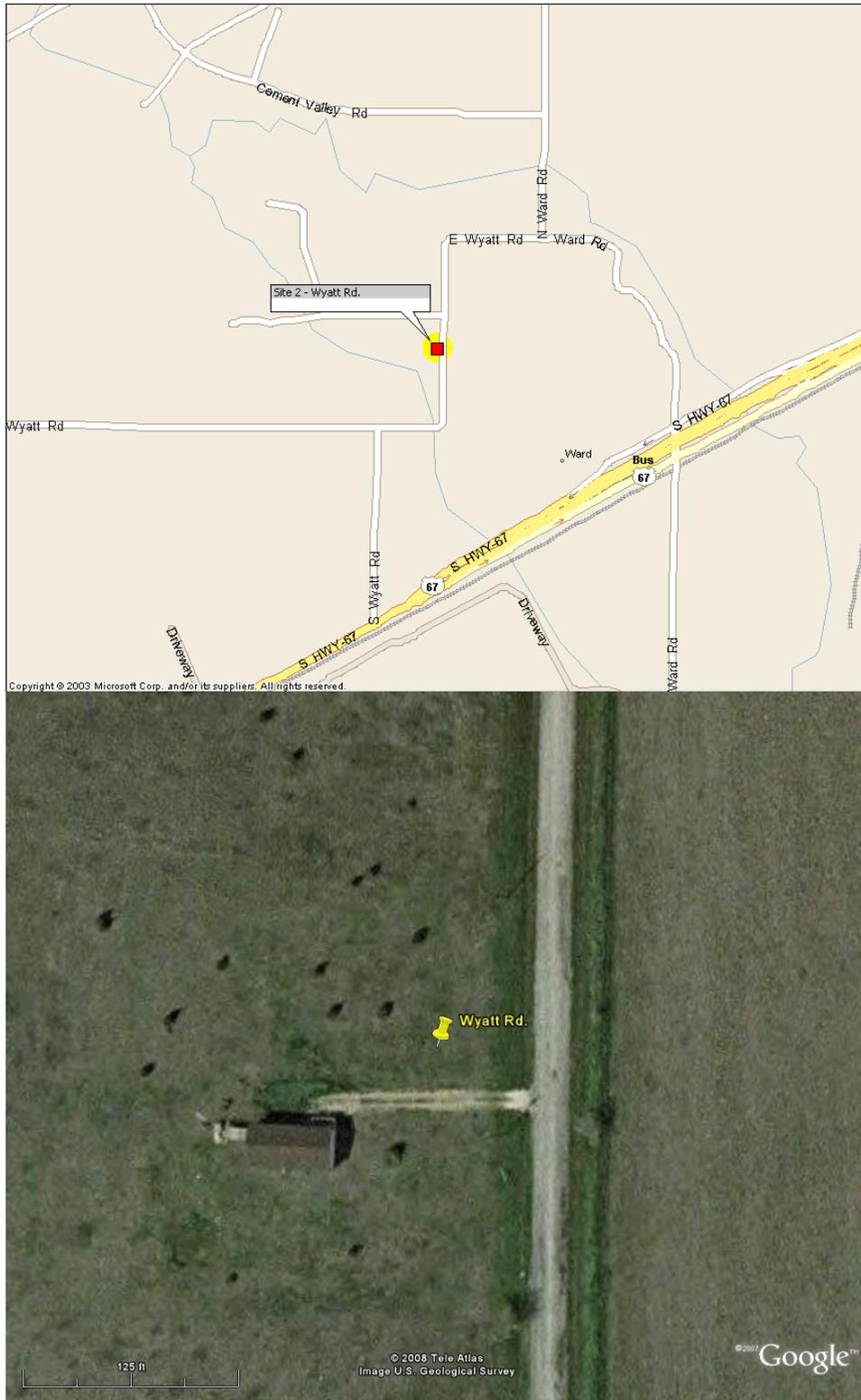


Figure 2-3. Street Level Map and Aerial Photo of CAMS 52 (Old Fort Worth Road)



**Figure 2-4. Street Level Map and Aerial Photo of Wyatt Road**

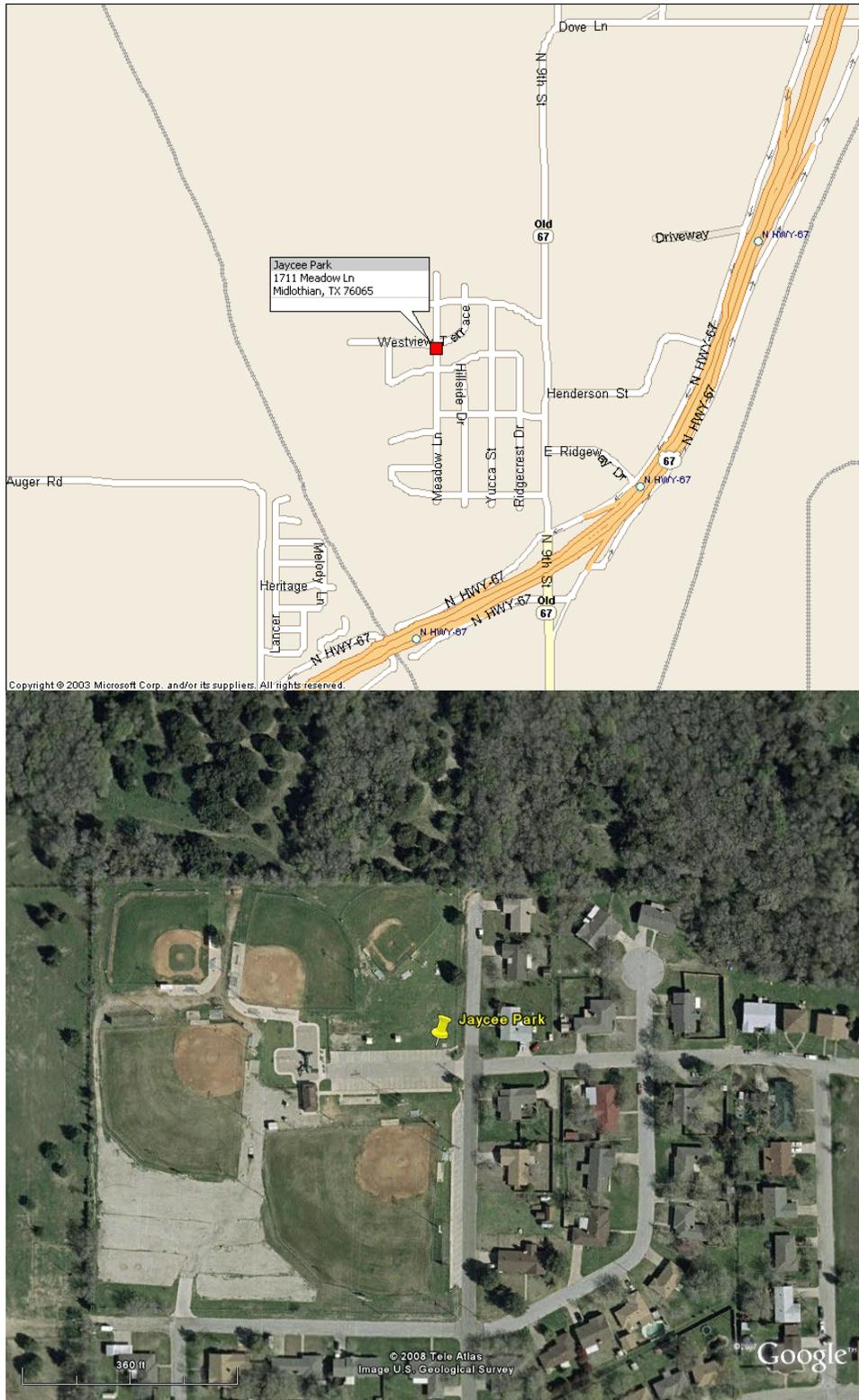
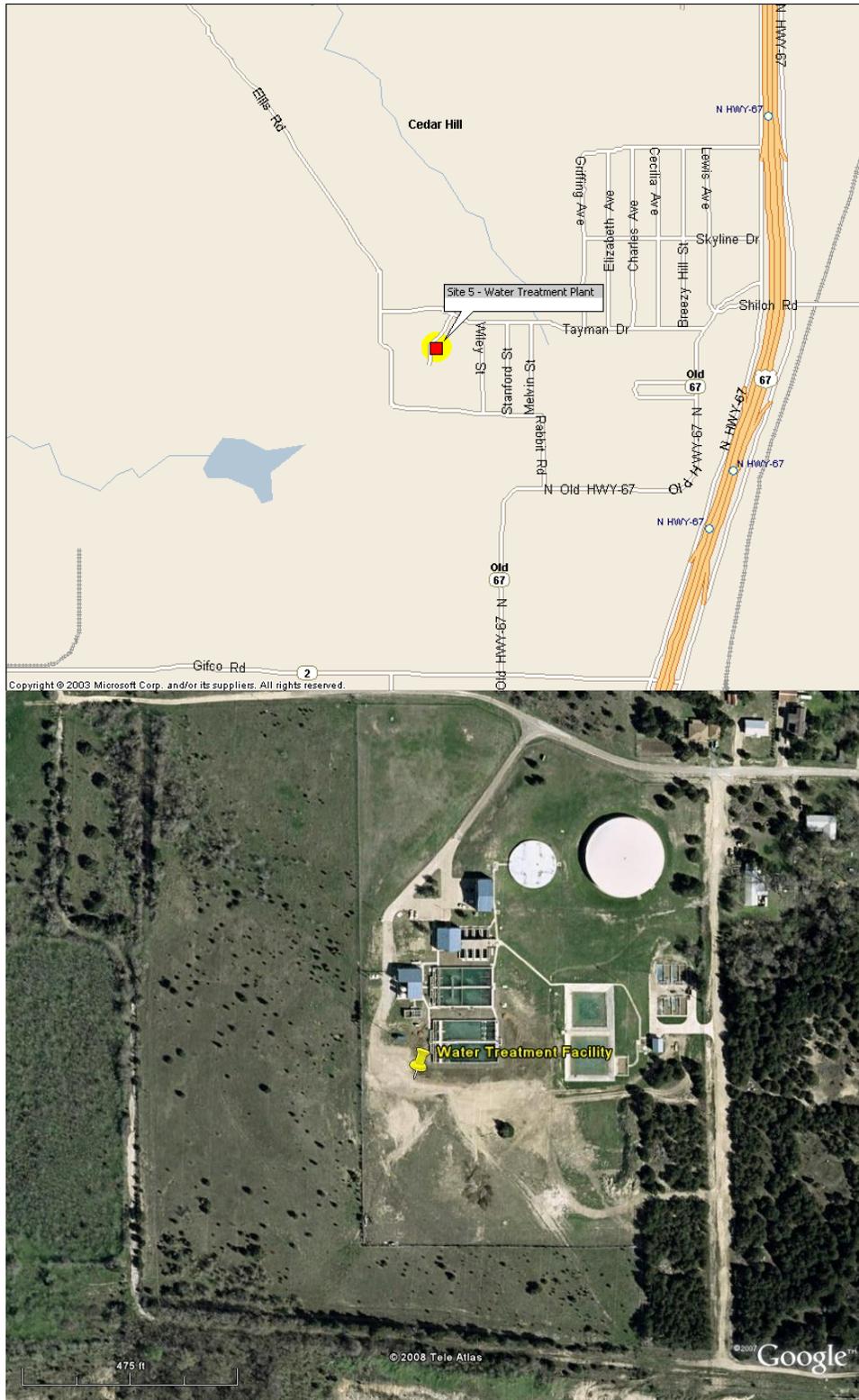


Figure 2-5. Street Level Map and Aerial Photo of Jaycee Park



**Figure 2-6. Street Level Map and Aerial Photo of the Tayman Dr. Water Treatment Facility**

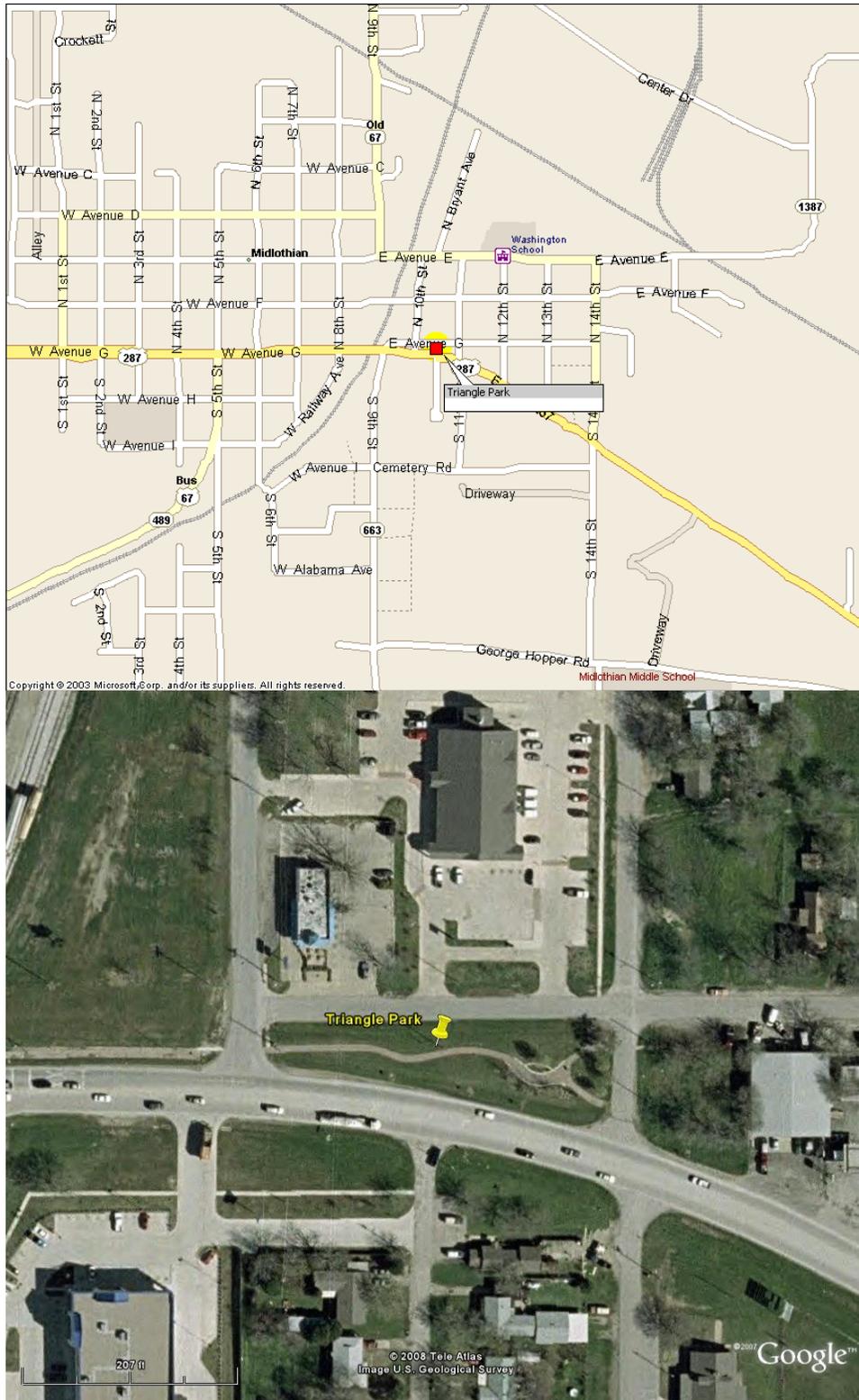
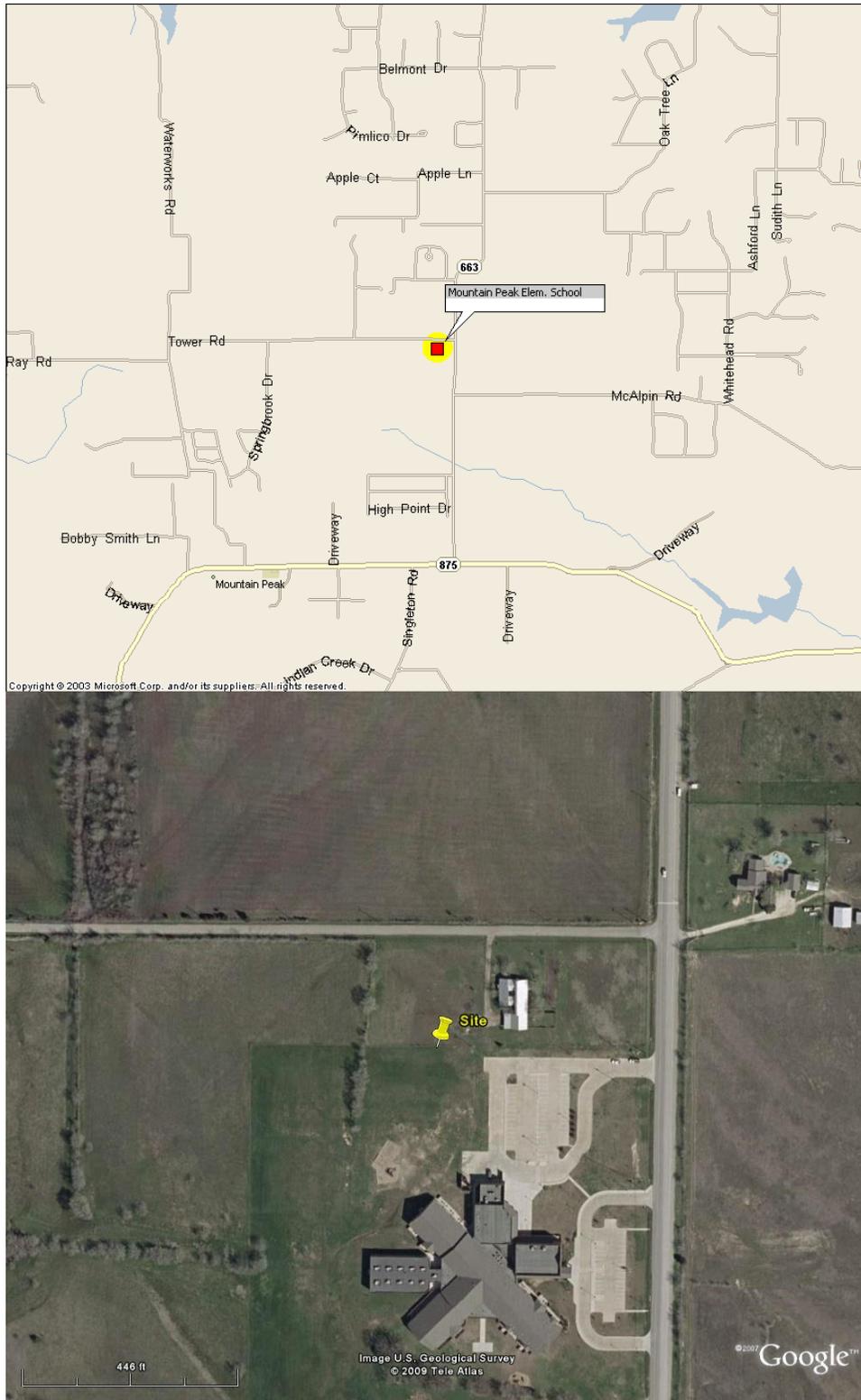


Figure 2-7. Street Level Map and Aerial Photo of Triangle Park



**Figure 2-8. Street Level Map and Aerial Photo of Mountain Peak Elementary School**

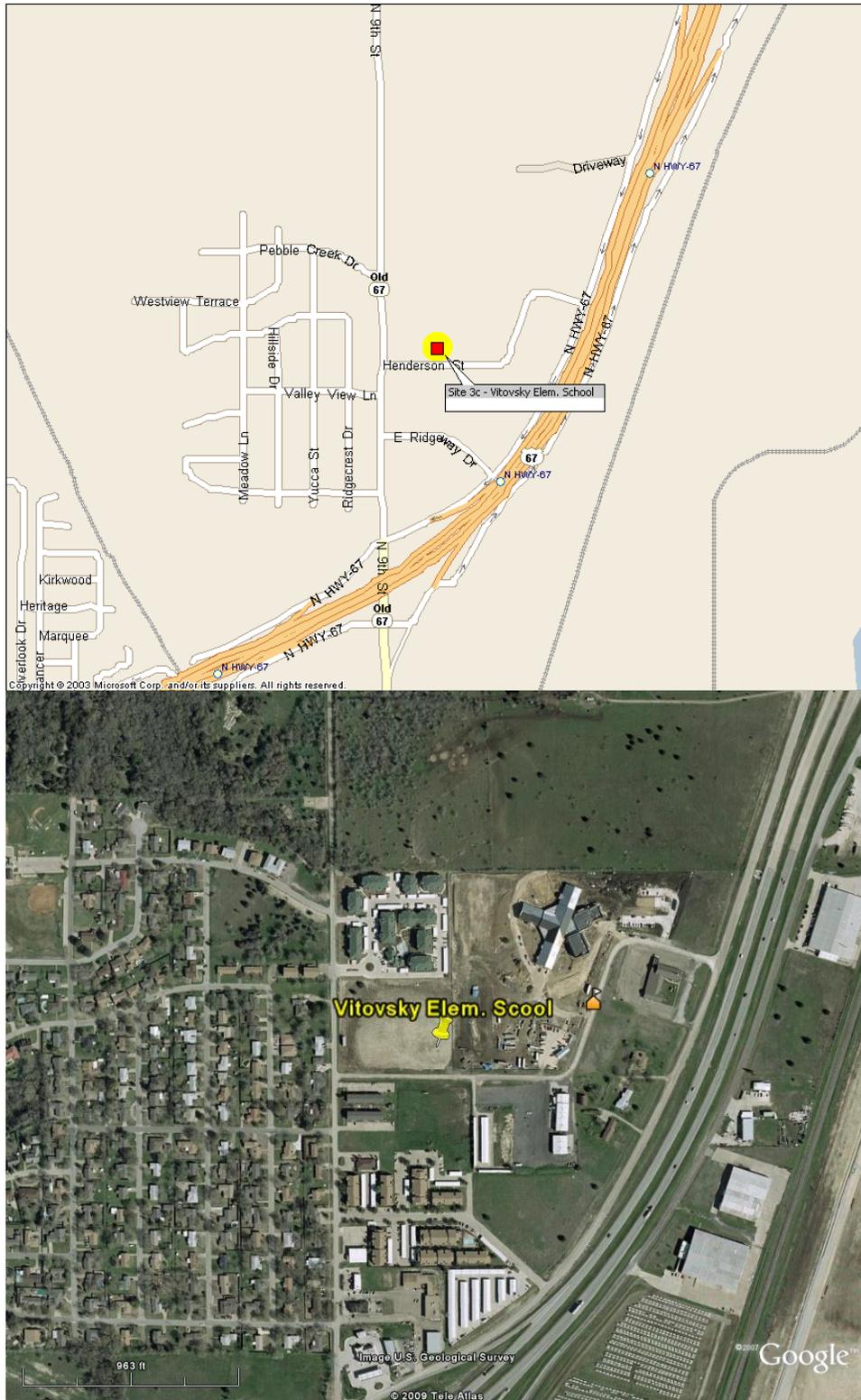


Figure 2-9. Street Level Map and Aerial Photo of Vitovsky Elementary School

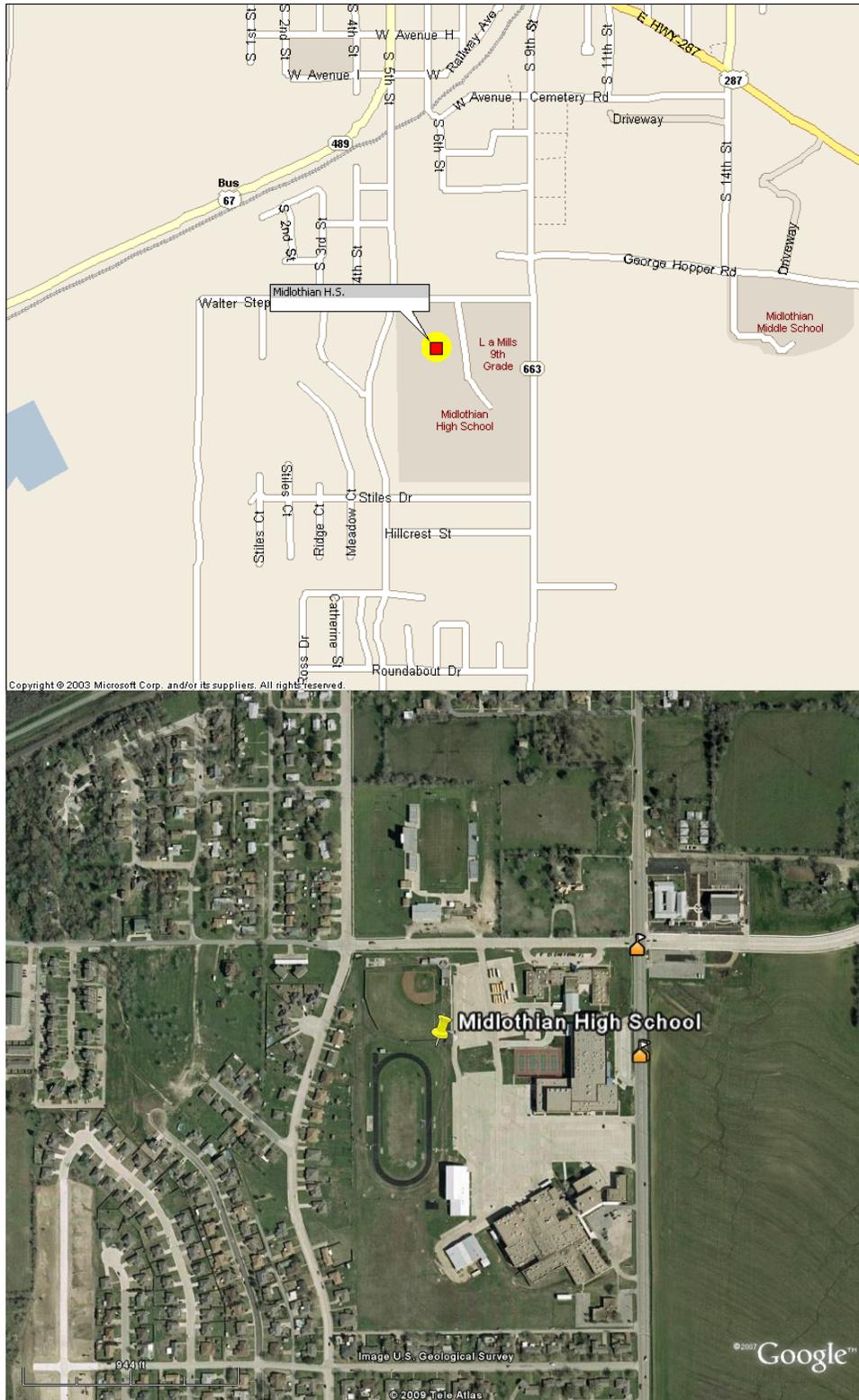


Figure 2-10. Street Level Map and Aerial Photo of Midlothian High School

### **3.0 SAMPLING AND ANALYTICAL METHODS**

The air samples were collected and analyzed for 60 VOCs and 21 metals by EPA methods TO-15 and IO-3.5, respectively. Hexavalent chromium, which cannot be measured by the EPA method for metals, was collected on bicarbonate-impregnated filters and analyzed by ion chromatography, using a method similar to California Air Resources Board (CARB) Method 039 (ERG, 2006). Table 3-1 summarizes the measurement methods and lists references.

#### **3.1 Volatile Organic Compounds**

Air Toxics Compendium Method TO-15 (EPA, 1999) involves the collection of air samples in specially prepared evacuated canisters and analysis by gas chromatography/mass spectrometry (GC/MS). Sampling systems used to regulate and monitor air flow into each canister during each 24-hour sampling period were custom designed and built for this project by URS. Key components of the canister sampling systems included chromatography grade stainless steel inlets and internal tubing, mass flow controllers, canister pressure monitors, valves, pumps, programmable timer/data loggers, and fan-ventilated enclosures. Three independently programmed sampling channels were built into each sampling system to allow sequential and duplicate sampling. All the sampling systems were tested and certified with humid zero air and gas standards according to TO-15 specifications less than two months before the first sampling round.

The canister samplers were programmed to run continuously during each 5-day series of 24-hour sampling periods, alternating between the first and second sampling trains so that canisters could be changed without downtime. The third channel was used for collecting duplicates. When activated, the canisters were filled with ambient air to subatmospheric pressures, using the pressure differential force created by the canister vacuum to draw air from the sampler inlet stream. Mass flow controllers were used to regulate the rate of airflow into the canister. Solenoid valves upstream of the canisters were switched open and closed at the beginning and end of the programmed sampling period by the datalogger. Mass flow rates and canister vacuums were monitored and recorded continuously throughout each sampling round to provide data for checking the start and stop times of each sampling period, that the canister filled at a continuous steady rate, and that no air leaked into the canister before or after the sampling period.

ERG provided cleaned and evacuated canisters within a few days of the start of each sampling round and analyzed the samples using the same laboratory equipment and procedures it uses to support the national Urban Air Toxics Monitoring Program (UATMP) and the National Air Toxics Trends Stations (NATTS) network (ERG, 2008). Each canister sample was analyzed for 13 VOCs requested by TCEQ plus 47 other chemicals that ERG routinely measures by TO-

15 for the UATMP and NATTS programs. Table 3-2 lists the reported TO-15 compounds and method detection limits.

**Table 3-1. Summary of Measurement Methods**

<b>Parameter Group</b>	<b>Sampling and Analysis Method</b>	<b>Sampling Equipment</b>	<b>References</b>
Volatile Organic Compounds	TO-15, "Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)"	URS-built VOC sampler compliant w/ TO-15 specifications	<i>Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA/625/R-96/010b)</i>
Metals as PM <sub>10</sub> (except Cr <sup>6+</sup> )	Sample collection by 40 CFR 50, App. J "Reference Method for the Determination of Particulate Matter as PM <sub>10</sub> in the Atmosphere"  Analysis by IO-3.5, "Determination of Metals in Ambient Particulate Matter by Inductively Coupled Plasma/Mass Spectroscopy"	Tisch Environmental, Inc. TE-6070V PM <sub>10</sub> High Volume Air Sampler	<i>Code of Federal Regulations, Title 40-- Protection of Environment, Chapter I-- Environmental Protection Agency, Subchapter C--Air Programs, Part 50-- "National Primary and Secondary Ambient Air Quality Standards"</i>  <i>Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air (EPA/625/R-96/010a)</i>
Hexavalent Chromium as PM <sub>10</sub>	Modified CARB Method 039, "Extraction and Analysis of Hexavalent Chromium by Ion Chromatography"	ERG-built PM sampler compliant with NATTS specifications and modified with Teflon-coated PM <sub>10</sub> cyclone heads	<i>Standard Operating Procedure for the Determination of Hexavalent Chromium In Ambient Air Analyzed By Ion Chromatography (IC) (ERG, 2006)</i>  <i>Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program (ERG, 2007)</i>

**Table 3-2. Chemicals Measured by TO-15 and Method Detection Limits**

Compound Name	Avg. MDL	Compound Name	Avg. MDL	Compound Name	Avg. MDL
1,1,1-Trichloroethane	0.002	Bromomethane	0.003	m-Dichlorobenzene	0.007
1,1,2,2-Tetrachloroethane	0.005	Carbon Disulfide	0.003	Methyl Ethyl Ketone	0.036
1,1,2-Trichloroethane	0.004	Carbon Tetrachloride	0.003	Methyl Isobutyl Ketone	0.008
1,1-Dichloroethane	0.003	Chlorobenzene	0.004	Methyl Methacrylate	0.024
1,1-Dichloroethene	0.004	Chloroethane	0.003	Methyl tert-Butyl Ether	0.012
1,2,4-Trichlorobenzene	0.013	Chloroform	0.003	n-Octane	0.004
1,2,4-Trimethylbenzene	0.008	Chloromethane	0.007	o-Dichlorobenzene	0.007
1,2-Dibromoethane	0.003	Chloromethylbenzene	0.004	o-Xylene	0.004
1,2-Dichloroethane	0.004	Chloroprene	0.004	p-Dichlorobenzene	0.006
1,2-Dichloropropane	0.005	cis-1,2-Dichloroethylene	0.015	Propylene	0.033
1,3,5-Trimethylbenzene	0.007	cis-1,3-Dichloropropene	0.004	Styrene	0.008
1,3-Butadiene	0.004	Dibromochloromethane	0.002	tert-Amyl Methyl Ether	0.009
Acetonitrile	0.049	Dichlorodifluoromethane	0.004	Tetrachloroethylene	0.004
Acetylene	0.011	Dichloromethane	0.011	Toluene	0.012
Acrolein	0.016	Dichlorotetrafluoroethane	0.002	trans-1,2-Dichloroethylene	0.004
Acrylonitrile	0.014	Ethyl Acrylate	0.010	trans-1,3-Dichloropropene	0.004
Benzene	0.007	Ethyl tert-Butyl Ether	0.007	Trichloroethylene	0.003
Bromochloromethane	0.005	Ethylbenzene	0.005	Trichlorofluoromethane	0.002
Bromodichloromethane	0.003	Hexachloro-1,3-butadiene	0.013	Trichlorotrifluoroethane	0.004
Bromoform	0.003	m,p-Xylene	0.010	Vinyl chloride	0.003

### 3.2 IO-3.5 Metals

Inorganic Compendium Method IO-3.5 involves collection of suspended particulate matter using high volume filters and analysis by inductively coupled plasma/mass spectrometry (ICP/MS). Particulate matter samples in the PM<sub>10</sub> size fraction were collected on 8" x 10" quartz fiber filters using conventional federal reference method PM<sub>10</sub> high-volume samplers with volumetric flow control, operated at their design flow rates. Two samplers were installed at each site and programmed to run sequentially for 24-hour periods on alternating days so that samples were collected consecutively without any interruption for changing filters. A third PM<sub>10</sub> high-volume sampler was installed at the Wyatt Road site for collecting field duplicates. The PM<sub>10</sub> samplers were calibrated and operated according to 40 CFR Part 50, Appendix J (Reference Method for the Determination of Particulate Matter as PM<sub>10</sub> in the Atmosphere). Table 3-3 gives the MDLs for the 21 PM<sub>10</sub> metals measured by IO-3.5.

**Table 3-3. TO-15 Metals and Method Detection Limits**

<b>Metal</b>	<b>First Round MDL (ng/m<sup>3</sup>)</b>	<b>Second through Fourth Round MDL (ng/m<sup>3</sup>)</b>
Aluminum	1.59	3.9
Antimony	0.007	0.007
Arsenic	0.009	0.009
Barium	0.169	0.148
Beryllium	0.007	0.002
Cadmium	0.029	0.029
Chromium	0.165	0.343
Cobalt	0.049	0.006
Copper	0.142	0.124
Lead	0.056	0.006
Manganese	0.057	0.571
Mercury	0.017	0.017
Molybdenum	0.012	0.012
Nickel	0.152	0.132
Selenium	0.013	0.013
Silver	0.006	0.008
Thallium	0.001	0.0009
Thorium	0.0006	0.0008
Uranium	0.002	0.001
Vanadium	0.014	0.006
Zinc	3.01	3.01

### **3.3 Hexavalent Chromium**

The sampling and analytical method for Cr<sup>6+</sup> involves collection of suspended particulate matter on sodium bicarbonate impregnated 47-millimeter cellulose fiber filters and analysis by ion chromatography. ERG adapted this method from CARB Method 039 to be used in the UATMP and NATTS programs. The method detection limit was estimated to be 0.0065 ng/m<sup>3</sup> for the first round and 0.0043 ng/m<sup>3</sup> during the next three rounds. The filter samples were collected using instrumentation based on NATTS specifications (ERG, 2007). The standard NATTS sampler uses an oil-free vacuum pump and calibrated rotameter to draw air through the filter at a nominal rate of 15 liters per minute with no intended particle size-selective restrictions. A programmable timer is used to activate and deactivate the sampler components at the beginning and end of each sampling period while dual sampling trains allow for simultaneous duplicate sample collection.

Each Cr<sup>6+</sup> sampler used in this study was retrofitted with Teflon-coated cyclones (URG-2000-ENB) placed upstream of the filter holders to restrict particle collection to approximately the PM<sub>10</sub> size fraction<sup>1</sup>. Additionally, the device controller was reprogrammed to allow sequential sampling using the dual channels so that the sampler could run continuously through successive 24-hour periods with no downtime for changing filters.

### **3.4 Weather Parameters**

Each sampling station was equipped for monitoring wind speed and wind direction at 10 meters above ground level in addition to temperature, pressure and rainfall near the surface. The weather measurements were recorded and stored as both 5-minute and hourly averages.

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<sup>1</sup> The cyclones were designed by the manufacturer to achieve a 10 micron size cut when sampling at 16.7 liters per minute (lpm). At the Cr<sup>6+</sup> sampler design flow rate of 15 lpm, the cyclone cut-point is estimated to be about 11 microns, which may have produced a small positive bias in the reported Cr<sup>6+</sup> results.

## 4.0 RESULTS

### 4.1 Volatile Organic Compounds

Tables 4-1 through 4-13 give the measurement results for the 13 core VOCs. One table for each chemical gives the 24-hour measurement results and averages for all the sites. Each table also gives the predominant wind direction observed at the CAMS 52 collocated site on Old Fort Worth Road. That site typically recorded the highest wind speeds of all the fixed sites and therefore it is assumed to provide as good, if not better, representation of the area's unobstructed wind flow as the others. Large shifts or fluctuations in the wind direction during a 24-hour sampling period were rare and the predominant wind directions can reasonably be characterized as either northerly, north-northwesterly, southerly, or south-southeasterly on most of the sampling days (wind roses for every sampling period are given in Appendix A). The VOC data tables are ordered alphabetically by chemical name, starting with benzene.

**Table 4-1. Benzene Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.225	0.237	0.194	0.370			
12/7/08	S	0.202	0.194	0.245	0.239			
12/8/08	S	0.231	0.220	0.211	0.209			
12/9/08	NNW	0.214	0.151	0.154	0.171			
12/10/08	NNW	0.151	0.145	0.148	0.150			
2/26/09	S	0.160	0.127	0.102		0.109		
2/27/09	N	0.183	0.158	0.136		-- <sup>2</sup>		
2/28/09	NNW	0.189	0.162	0.144		0.132		
3/1/09	N	0.177	0.151	0.129		0.134		
3/2/09	ESE	0.210	0.194	0.153		0.166		
5/5/09	SSE	0.232	0.322	0.206			0.248	
5/6/09	S	0.283	0.203	0.188			0.169	
5/7/09	SSE	0.246	0.460	0.360			0.273	
5/8/09	S	0.399	0.326	0.270			0.282	
5/9/09	N	0.275	0.200	0.271			0.165	
7/3/09	SSE	0.165	0.167	0.158				0.131
7/4/09	SSE	0.138	0.122	0.120				0.099
7/5/09	N	0.152	0.132	0.179				0.092
7/6/09	N	0.227	0.109	0.196				0.117
7/7/09	SE	0.171	0.162	0.237				0.138
Mean		0.212	0.197	0.190	0.228	0.135	0.227	0.115

<sup>1</sup> Predominant wind direction from the CAMS 52 collocated site on Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-2. 1,3-Butadiene Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.020	0.030	0.015	0.094			
12/7/08	S	0.015	0.011	0.023	0.030			
12/8/08	S	0.007	ND	ND	0.005			
12/9/08	NNW	0.012	0.007	ND	0.012			
12/10/08	NNW	ND	0.011	0.009	0.015			
2/26/09	S	0.015	0.006	0.006		0.003		
2/27/09	N	0.017	0.012	0.010		-- <sup>2</sup>		
2/28/09	NNW	0.006	0.013	0.006		0.005		
3/1/09	N	0.012	0.009	0.007		0.011		
3/2/09	ESE	0.022	0.023	0.015		0.014		
5/5/09	SSE	0.013	0.017	0.017			0.012	
5/6/09	S	0.008	0.013	0.011			0.012	
5/7/09	SSE	0.009	0.016	0.012			0.011	
5/8/09	S	ND	0.012	0.010			0.010	
5/9/09	N	0.018	0.013	0.012			0.010	
7/3/09	SSE	0.008	0.012	0.006				0.007
7/4/09	SSE	ND	0.005	0.006				0.004
7/5/09	N	0.016	0.006	0.006				0.005
7/6/09	N	0.009	0.007	0.008				0.009
7/7/09	SE	0.010	0.008	0.013				0.010
Mean		0.011	0.012	0.010	0.031	0.008	0.011	0.007

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-3. Carbon Tetrachloride Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.132	0.102	0.119	0.097			
12/7/08	S	0.129	0.116	0.110	0.093			
12/8/08	S	0.138	0.129	0.142	0.139			
12/9/08	NNW	0.129	0.130	0.131	0.138			
12/10/08	NNW	0.081	0.123	0.101	0.093			
2/26/09	S	0.095	0.102	0.092		0.096		
2/27/09	N	0.095	0.090	0.080		-- <sup>2</sup>		
2/28/09	NNW	0.093	0.079	0.080		0.084		
3/1/09	N	0.092	0.089	0.091		0.093		
3/2/09	ESE	0.042	0.067	0.011		0.090		
5/5/09	SSE	0.107	0.098	0.104			0.105	
5/6/09	S	0.104	0.106	0.120			0.117	
5/7/09	SSE	0.106	0.116	0.110			0.102	
5/8/09	S	0.105	0.132	0.124			0.105	
5/9/09	N	0.114	0.110	0.105			0.101	
7/3/09	SSE	0.118	0.126	0.112				0.156
7/4/09	SSE	0.123	0.142	0.158				0.153
7/5/09	N	0.162	0.165	0.149				0.125
7/6/09	N	0.126	0.145	0.161				0.146
7/7/09	SE	0.112	0.156	0.186				0.135
Mean		0.110	0.116	0.114	0.112	0.091	0.106	0.143

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-4. Chloroform Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.024	0.024	0.059	0.021			
12/7/08	S	0.017	0.018	0.037	0.021			
12/8/08	S	0.019	0.019	0.021	0.022			
12/9/08	NNW	0.019	0.018	0.017	0.016			
12/10/08	NNW	0.018	0.016	0.018	0.016			
2/26/09	S	0.014	0.016	0.015		0.013		
2/27/09	N	0.014	0.016	0.016		-- <sup>2</sup>		
2/28/09	NNW	0.016	0.014	0.015		0.013		
3/1/09	N	0.015	0.015	0.016		0.014		
3/2/09	ESE	0.016	0.018	0.038		0.016		
5/5/09	SSE	ND	0.026	0.066			0.024	
5/6/09	S	0.023	0.024	0.056			0.020	
5/7/09	SSE	0.026	0.029	0.040			0.002	
5/8/09	S	ND	0.025	0.031			0.025	
5/9/09	N	0.029	0.030	0.058			0.023	
7/3/09	SSE	0.034	0.020	0.035				ND
7/4/09	SSE	0.016	0.016	0.014				ND
7/5/09	N	0.034	0.021	0.043				0.016
7/6/09	N	0.028	0.028	0.052				0.030
7/7/09	SE	0.033	0.048	0.116				0.047
Mean		0.020	0.022	0.038	0.019	0.014	0.019	0.019

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-5. 1,2-Dibromoethane Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	ND	ND	ND	ND			
12/7/08	S	ND	ND	ND	ND			
12/8/08	S	ND	ND	ND	ND			
12/9/08	NNW	ND	ND	ND	ND			
12/10/08	NNW	ND	ND	ND	ND			
2/26/09	S	ND	ND	ND		ND		
2/27/09	N	ND	ND	ND		-- <sup>2</sup>		
2/28/09	NNW	ND	ND	ND		ND		
3/1/09	N	ND	ND	ND		ND		
3/2/09	ESE	ND	ND	ND		ND		
5/5/09	SSE	ND	ND	ND			ND	
5/6/09	S	ND	ND	ND			ND	
5/7/09	SSE	ND	ND	ND			ND	
5/8/09	S	ND	ND	ND			ND	
5/9/09	N	ND	ND	ND			ND	
7/3/09	SSE	ND	ND	ND				ND
7/4/09	SSE	ND	ND	ND				ND
7/5/09	N	0.007	ND	ND				ND
7/6/09	N	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND				ND
Mean		0.002	0.001	0.001	0.004	0.001	0.001	0.001

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-6. 1,2-Dichloroethane Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	ND	ND	ND	ND			
12/7/08	S	ND	ND	ND	ND			
12/8/08	S	ND	ND	ND	ND			
12/9/08	NNW	ND	ND	ND	ND			
12/10/08	NNW	ND	ND	ND	ND			
2/26/09	S	ND	ND	ND		ND		
2/27/09	N	ND	ND	ND		-- <sup>2</sup>		
2/28/09	NNW	ND	ND	ND		ND		
3/1/09	N	ND	ND	ND		ND		
3/2/09	ESE	ND	ND	ND		ND		
5/5/09	SSE	ND	ND	ND			ND	
5/6/09	S	ND	ND	ND			ND	
5/7/09	SSE	ND	ND	ND			ND	
5/8/09	S	ND	ND	ND			ND	
5/9/09	N	ND	ND	ND			ND	
7/3/09	SSE	ND	ND	ND				ND
7/4/09	SSE	ND	ND	ND				ND
7/5/09	N	ND	ND	ND				ND
7/6/09	N	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND				ND
Mean		0.002	0.002	0.002	0.005	0.001	0.001	0.001

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-7. Dichloromethane Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.084	0.083	0.072	0.072			
12/7/08	S	0.073	0.092	0.117	0.164			
12/8/08	S	0.072	0.071	0.159	0.217			
12/9/08	NNW	0.082	0.058	0.063	0.065			
12/10/08	NNW	0.066	0.072	0.090	0.063			
2/26/09	S	0.063	0.066	0.051		0.050		
2/27/09	N	0.916	0.065	0.091		-- <sup>2</sup>		
2/28/09	NNW	0.058	0.084	0.059		0.072		
3/1/09	N	0.065	0.058	0.053		0.057		
3/2/09	ESE	0.067	0.077	0.052		0.054		
5/5/09	SSE	0.156	0.189	0.154			0.194	
5/6/09	S	0.300	0.238	0.142			0.146	
5/7/09	SSE	0.123	0.175	0.074			0.070	
5/8/09	S	0.143	0.094	0.063			0.109	
5/9/09	N	0.134	0.095	0.082			0.098	
7/3/09	SSE	0.081	0.070	0.063				0.062
7/4/09	SSE	0.067	0.053	0.060				0.050
7/5/09	N	0.072	0.052	0.078				0.045
7/6/09	N	0.073	0.079	0.092				0.078
7/7/09	SE	0.338	0.133	0.134				0.099
Mean		0.152	0.095	0.087	0.116	0.058	0.123	0.067

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-8. 1,1,2,2-Tetrachloroethane Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	ND	ND	ND	ND			
12/7/08	S	ND	ND	ND	ND			
12/8/08	S	ND	ND	ND	ND			
12/9/08	NNW	ND	ND	ND	ND			
12/10/08	NNW	ND	ND	ND	ND			
2/26/09	S	ND	ND	ND		ND		
2/27/09	N	ND	ND	ND		-- <sup>2</sup>		
2/28/09	NNW	ND	ND	ND		ND		
3/1/09	N	ND	ND	ND		0.001		
3/2/09	ESE	ND	ND	ND		ND		
5/5/09	SSE	ND	ND	ND			ND	
5/6/09	S	ND	ND	ND			ND	
5/7/09	SSE	ND	ND	ND			ND	
5/8/09	S	ND	ND	ND			ND	
5/9/09	N	ND	ND	ND			ND	
7/3/09	SSE	ND	ND	ND				ND
7/4/09	SSE	ND	ND	ND				ND
7/5/09	N	ND	ND	ND				ND
7/6/09	N	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND				ND
Mean		0.002	0.002	0.002	0.005	0.001	0.002	0.002

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-9. 1,1,2-Trichloroethane Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	ND	ND	ND	ND			
12/7/08	S	ND	ND	ND	ND			
12/8/08	S	ND	ND	ND	ND			
12/9/08	NNW	ND	ND	ND	ND			
12/10/08	NNW	ND	ND	ND	ND			
2/26/09	S	ND	ND	ND		ND		
2/27/09	N	ND	ND	ND		-- <sup>2</sup>		
2/28/09	NNW	ND	ND	ND		ND		
3/1/09	N	ND	ND	ND		0.002		
3/2/09	ESE	ND	ND	ND		ND		
5/5/09	SSE	ND	ND	ND			ND	
5/6/09	S	ND	ND	ND			ND	
5/7/09	SSE	ND	ND	ND			ND	
5/8/09	S	ND	ND	ND			ND	
5/9/09	N	ND	ND	ND			ND	
7/3/09	SSE	ND	ND	ND				ND
7/4/09	SSE	ND	ND	ND				ND
7/5/09	N	ND	ND	0.003				ND
7/6/09	N	0.004	ND	ND				ND
7/7/09	SE	ND	ND	ND				ND
Mean		0.002	0.002	0.002	0.004	0.002	0.002	0.002

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-10. 1,2,4-Trimethylbenzene Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.021	0.030	0.021	0.050			
12/7/08	S	0.014	0.026	0.027	0.038			
12/8/08	S	0.008	0.016	0.013	0.018			
12/9/08	NNW	0.014	0.013	0.013	0.019			
12/10/08	NNW	0.009	0.010	0.015	0.012			
2/26/09	S	0.025	0.043	0.023		0.023		
2/27/09	N	0.073	0.035	0.100		-- <sup>2</sup>		
2/28/09	NNW	0.013	0.016	0.013		0.050		
3/1/09	N	0.014	0.015	0.014		0.012		
3/2/09	ESE	0.020	0.036	0.014		0.017		
5/5/09	SSE	0.025	0.044	0.029			0.027	
5/6/09	S	0.031	0.028	0.024			0.029	
5/7/09	SSE	0.032	0.032	0.019			0.022	
5/8/09	S	0.014	0.030	0.019			0.026	
5/9/09	N	0.027	0.024	0.020			0.017	
7/3/09	SSE	0.044	0.037	0.013				0.034
7/4/09	SSE	0.008	0.015	0.015				0.019
7/5/09	N	0.027	0.019	0.014				0.013
7/6/09	N	0.018	0.015	0.014				0.017
7/7/09	SE	0.037	0.033	0.023				0.024
Mean		0.024	0.026	0.022	0.027	0.026	0.024	0.021

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-11. 1,3,5-Trimethylbenzene Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.010	0.011	0.007	0.016			
12/7/08	S	0.005	0.008	0.010	0.011			
12/8/08	S	0.003	0.006	0.006	0.005			
12/9/08	NNW	0.006	0.006	0.005	0.007			
12/10/08	NNW	0.005	0.005	0.007	0.004			
2/26/09	S	0.010	0.015	0.008		0.007		
2/27/09	N	0.023	0.012	0.027		-- <sup>2</sup>		
2/28/09	NNW	0.006	0.007	0.006		0.019		
3/1/09	N	0.007	0.006	0.005		0.007		
3/2/09	ESE	0.008	0.014	0.006		0.006		
5/5/09	SSE	0.012	0.019	0.012			0.010	
5/6/09	S	0.011	0.012	0.012			0.010	
5/7/09	SSE	0.013	0.013	0.008			0.008	
5/8/09	S	0.006	0.012	0.010			0.011	
5/9/09	N	0.012	0.011	0.010			0.008	
7/3/09	SSE	0.013	0.012	0.005				0.011
7/4/09	SSE	0.003	0.004	0.006				0.006
7/5/09	N	0.012	0.007	0.002				0.004
7/6/09	N	0.008	0.005	0.005				0.006
7/7/09	SE	0.011	0.012	0.010				0.008
Mean		0.009	0.010	0.008	0.009	0.010	0.009	0.007

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>1</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-12. Vinyl Chloride Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	ND	ND	ND	ND			
12/7/08	S	ND	ND	ND	ND			
12/8/08	S	ND	ND	ND	ND			
12/9/08	NNW	ND	ND	ND	ND			
12/10/08	NNW	ND	ND	ND	ND			
2/26/09	S	ND	ND	ND		ND		
2/27/09	N	ND	ND	ND		-- <sup>2</sup>		
2/28/09	NNW	ND	ND	ND		ND		
3/1/09	N	ND	ND	ND		ND		
3/2/09	ESE	ND	ND	ND		ND		
5/5/09	SSE	0.006	0.006	0.007			0.006	
5/6/09	S	0.005	0.007	0.009			0.004	
5/7/09	SSE	0.007	0.008	0.007			0.007	
5/8/09	S	ND	0.011	0.009			0.008	
5/9/09	N	0.005	0.006	0.007			0.006	
7/3/09	SSE	ND	ND	ND				ND
7/4/09	SSE	ND	ND	ND				ND
7/5/09	N	0.012	ND	ND				ND
7/6/09	N	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND				ND
Mean		0.003	0.003	0.003	0.003	0.001	0.006	0.001

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

**Table 4-13. m,p-Xylene Measurement Results**

Date	Wind Direction <sup>1</sup>	Old Fort Worth Road	Jaycee Park	Tayman Drive <sup>3</sup>	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	0.056	0.083	0.015	0.137			
12/7/08	S	0.042	0.043	0.115	0.073			
12/8/08	S	0.014	0.028	0.008	0.028			
12/9/08	NNW	0.049	0.026	0.028	0.035			
12/10/08	NNW	0.026	0.028	0.030	0.035			
2/26/09	S	0.076	0.253	0.043		0.026		
2/27/09	N	0.332	0.062	0.213		-- <sup>2</sup>		
2/28/09	NNW	0.034	0.096	0.062		0.747		
3/1/09	N	0.032	0.047	0.027		0.025		
3/2/09	ESE	0.060	0.246	0.032		0.041		
5/5/09	SSE	0.104	0.088	0.094			0.051	
5/6/09	S	0.170	0.046	0.049			0.093	
5/7/09	SSE	0.056	0.065	0.037			0.043	
5/8/09	S	0.025	0.151	0.033			0.058	
5/9/09	N	0.065	0.055	0.046			0.042	
7/3/09	SSE	0.080	0.054	0.006				0.032
7/4/09	SSE	0.021	0.020	0.028				0.024
7/5/09	N	0.047	0.033	0.038				0.028
7/6/09	N	0.012	0.029	0.052				0.035
7/7/09	SE	0.067	0.068	0.060				0.057
Mean		0.068	0.076	0.051	0.062	0.210	0.057	0.035

<sup>1</sup> Predominant wind direction at Old Fort Worth Road

<sup>2</sup> Sample was voided after laboratory air leaked into the canister

<sup>3</sup> The Tayman Drive site was located at the Midlothian Water Treatment Facility

## 4.2 IO-3.5 Metals

Tables 4-14 through 4-34 give the measurement results for the 21 PM<sub>10</sub> metals measured by Method IO-3.5. One table for each chemical gives the 24-hour measurement results and averages for all the sites. Each table also gives the predominant wind direction observed at the CAMS 52 collocated site on Old Fort Worth Road. That site typically recorded the highest wind speeds of all the fixed sites and therefore it is assumed to provide as good, if not better, representation of the area's unobstructed wind flow as the others. Large shifts or fluctuations in the wind direction during a 24-hour sampling period were rare and the predominant wind directions can reasonably be characterized as either northerly, north-northwesterly, southerly, or south-southeasterly on most of the sampling days (wind roses for every sampling period are given in Appendix B). The PM<sub>10</sub> data tables are ordered alphabetically by chemical name, starting with benzene.

**Table 4-14. Aluminum Measurement Results**

Date	WD <sup>1</sup>	Old Fort Worth Road	Wyatt Road	Jaycee Park	Tayman Drive	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
12/6/08	SW	182	653	69.9	85.6	90.8			
12/7/08	S	187	390	58.4	148	42.3			
12/8/08	S	166	303	36.2	84.6	41.4			
12/9/08	NNW	131	166	66.5	47.9	60.1			
12/10/08	NNW	46	35.3	88.8	76.5	50.3			
2/26/09	S	148	386	70.2	139		70.8		
2/27/09	N	99.7	202	78.6	137		77.3		
2/28/09	NNW	135	120	199	161		155		
3/1/09	N	87.5	350	109	49.2		53.3		
3/2/09	ESE	66.1	267	78.4	103		62.3		
5/5/09	SSE	82.7	187	70.6	73.6			73	
5/6/09	S	101	173	51.5	64.1			62.9	
5/7/09	SSE	136	276	93.8	112			106	
5/8/09	S	238	704	116	121			87.8	
5/9/09	N	118	212	227	139			133	
7/3/09	SSE	157	306	68.6	155				145
7/4/09	SSE	192	306	94.2	238				140
7/5/09	N	141	148	114	155				35.8
7/6/09	N	62.5	61.9	35.7	56.6				35.7
7/7/09	SE	57.9	141	28.3	188				42.5
Mean		127	269	88	117	57	84	93	80

<sup>1</sup> Predominant wind direction from the CAMS 52 collocated site on Old Fort Worth Road

**Table 4-15. Antimony Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	1.2	0.989	0.858	0.857	1.44			
12/7/08	S	0.864	0.928	0.739	0.74	0.432			
12/8/08	S	0.396	0.663	0.3	0.307	0.421			
12/9/08	NNW	0.435	0.676	0.263	0.172	0.335			
12/10/08	NNW	0.232	0.248	0.912	0.302	0.289			
2/26/09	S	0.233	0.867	0.149	0.14		0.133		
2/27/09	N	0.44	0.662	0.405	0.41		0.39		
2/28/09	NNW	0.174	0.132	0.153	0.154		0.237		
3/1/09	N	0.379	0.206	0.174	0.131		0.215		
3/2/09	ESE	0.255	0.418	0.278	0.424		0.349		
5/5/09	SSE	0.358	0.429	0.434	0.672			0.467	
5/6/09	S	0.382	0.411	0.299	0.232			0.324	
5/7/09	SSE	0.291	0.699	0.293	1.2			0.342	
5/8/09	S	0.204	0.564	0.413	0.517			0.436	
5/9/09	N	0.426	0.427	0.714	0.216			0.257	
7/3/09	SSE	0.375	0.416	0.233	0.302				0.396
7/4/09	SSE	0.4	0.482	0.426	0.194				0.381
7/5/09	N	0.473	0.5	0.425	0.601				0.715
7/6/09	N	0.726	0.629	0.518	0.645				0.628
7/7/09	SE	0.811	0.637	0.24	0.724				0.607
Mean		0.453	0.549	0.411	0.447	0.583	0.265	0.365	0.545

**Table 4-16. Arsenic Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	1.31	1.73	0.493	0.502	0.767			
12/7/08	S	0.969	1.12	1.12	0.749	0.531			
12/8/08	S	0.767	1.48	0.547	0.607	0.557			
12/9/08	NNW	0.848	2.02	0.256	0.17	0.296			
12/10/08	NNW	0.164	0.184	1.54	0.503	0.2			
2/26/09	S	0.43	2.09	0.224	0.275		0.308		
2/27/09	N	0.358	1.19	0.339	0.362		0.343		
2/28/09	NNW	0.292	0.282	0.358	0.363		0.296		
3/1/09	N	0.328	0.569	0.268	0.158		0.178		
3/2/09	ESE	0.283	0.571	0.321	0.384		0.313		
5/5/09	SSE	0.784	0.929	0.81	0.821			0.805	
5/6/09	S	0.785	1.1	0.87	0.514			0.687	
5/7/09	SSE	0.793	2.06	0.69	0.682			0.652	
5/8/09	S	0.402	1.49	0.655	0.465			0.66	
5/9/09	N	0.572	0.597	1.03	0.376			0.323	
7/3/09	SSE	0.542	0.879	0.331	0.892				0.283
7/4/09	SSE	0.18	0.614	0.617	0.717				0.287
7/5/09	N	0.357	0.411	0.315	0.365				0.721
7/6/09	N	0.623	0.723	0.608	0.603				0.692
7/7/09	SE	0.851	1.6	0.192	0.75				0.756
Mean		0.582	1.082	0.579	0.513	0.470	0.288	0.625	0.548

**Table 4-17. Barium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	19	27.4	12.5	11.3	24.1			
12/7/08	S	11.7	17.2	9.17	11.4	6.99			
12/8/08	S	7.37	12.4	5.61	6.04	7.27			
12/9/08	NNW	10.5	11.1	5.65	4.85	8.33			
12/10/08	NNW	6.12	5.33	11.8	7.9	6.49			
2/26/09	S	7.31	17.6	5.87	5.97		5.36		
2/27/09	N	11.8	14.1	9.3	9.39		9.77		
2/28/09	NNW	10.5	10.1	9.85	8.6		10.1		
3/1/09	N	8.92	12.5	5.28	3.67		5.12		
3/2/09	ESE	7.86	10.6	5.89	6.13		6.51		
5/5/09	SSE	4.84	7.64	4.7	4.63			5.39	
5/6/09	S	5.51	5.99	3.56	2.9			4.29	
5/7/09	SSE	4.79	8.39	4.43	6.24			5.61	
5/8/09	S	6.36	14.7	6.14	6.53			6.41	
5/9/09	N	7.42	7.75	10.3	3.62			5.04	
7/3/09	SSE	9.37	14.2	7.38	8.36				23.4
7/4/09	SSE	17.5	18.1	10.6	7.15				23.3
7/5/09	N	14.6	14.6	15.5	17.4				10.5
7/6/09	N	11.2	9.22	7.63	8.35				9.24
7/7/09	SE	13.7	11.5	3.44	10.9				10.2
Mean		9.82	12.52	7.73	7.57	10.64	7.37	5.35	15.33

**Table 4-18. Beryllium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.01	0.039	0.005	0.005	0.007			
12/7/08	S	0.009	0.017	0.005	0.009	0.002			
12/8/08	S	0.009	0.013	0.003	0.004	0.004			
12/9/08	NNW	0.009	0.011	0.004	0.004	0.006			
12/10/08	NNW	0.003	0.002	0.005	0.006	0.003			
2/26/09	S	0.007	0.016	0.005	0.009		0.005		
2/27/09	N	0.008	0.013	0.007	0.009		0.007		
2/28/09	NNW	0.011	0.008	0.014	0.012		0.012		
3/1/09	N	0.005	0.025	0.007	0.003		0.004		
3/2/09	ESE	0.005	0.017	0.006	0.006		0.005		
5/5/09	SSE	0.004	0.009	0.003	0.003			0.003	
5/6/09	S	0.005	0.008	0.003	0.002			0.004	
5/7/09	SSE	0.007	0.014	0.004	0.005			0.005	
5/8/09	S	0.01	0.025	0.006	0.005			0.005	
5/9/09	N	0.007	0.012	0.011	0.006			0.005	
7/3/09	SSE	0.001	0.009	0.001	ND				0.005
7/4/09	SSE	0.002	0.007	0.003	0.001				0.005
7/5/09	N	ND	0.0007	0.003	ND				ND
7/6/09	N	ND	ND	ND	ND				ND
7/7/09	SE	ND	0.0004	ND	ND				0.0004
Mean		0.007	0.0123	0.005	0.006	0.004	0.007	0.004	0.003

**Table 4-19. Cadmium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.331	0.443	0.3	0.229	0.324			
12/7/08	S	0.192	0.341	0.177	0.16	0.092			
12/8/08	S	0.194	0.751	0.118	0.212	0.131			
12/9/08	NNW	0.201	0.372	0.233	0.054	0.136			
12/10/08	NNW	0.072	0.082	0.262	0.175	0.589			
2/26/09	S	0.243	1.89	0.075	0.116		0.05		
2/27/09	N	0.117	0.548	0.104	0.101		0.092		
2/28/09	NNW	0.083	0.087	0.109	0.117		0.075		
3/1/09	N	0.114	0.101	0.084	0.087		0.062		
3/2/09	ESE	0.092	0.207	0.127	0.163		0.128		
5/5/09	SSE	0.127	0.618	0.138	0.139			0.139	
5/6/09	S	0.178	0.539	0.097	0.137			0.13	
5/7/09	SSE	0.169	0.713	0.25	0.259			0.148	
5/8/09	S	0.269	1.03	0.181	0.21			0.092	
5/9/09	N	0.08	0.085	0.219	0.206			0.183	
7/3/09	SSE	0.196	0.331	0.094	0.093				0.06
7/4/09	SSE	0.049	0.161	0.139	0.065				0.034
7/5/09	N	0.051	0.061	0.052	0.066				0.077
7/6/09	N	0.076	0.064	0.106	0.081				0.074
7/7/09	SE	0.232	0.201	0.051	0.153				0.098
Mean		0.153	0.431	0.146	0.141	0.254	0.081	0.138	0.069

**Table 4-20. Chromium (Non-Speciater) Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	3.39	9.73	1.87	1.91	1.94			
12/7/08	S	3.49	6.65	1.41	2	1.28			
12/8/08	S	3.95	7.96	1.48	1.64	1.35			
12/9/08	NNW	2.23	3.62	1.87	1.59	1.61			
12/10/08	NNW	1.79	1.79	3.76	1.82	1.65			
2/26/09	S	3.64	10.1	1.56	1.65		1.56		
2/27/09	N	1.97	4.4	1.74	1.76		1.64		
2/28/09	NNW	2.46	2.55	2.13	2.09		2.08		
3/1/09	N	2.2	3.73	1.95	1.77		2.03		
3/2/09	ESE	1.98	4.26	2.26	1.93		1.89		
5/5/09	SSE	2.16	4.74	2.14	2.04			2.64	
5/6/09	S	2.59	3.91	2.14	2.16			2.33	
5/7/09	SSE	3.22	7.04	2.14	2.54			2.77	
5/8/09	S	4.89	11.9	2.26	2.43			2.3	
5/9/09	N	2.31	2.64	2.59	2.22			3.16	
7/3/09	SSE	4.05	6.6	2.18	2.38				2.04
7/4/09	SSE	3.08	4.71	2.5	2.2				2.07
7/5/09	N	2.36	2.45	1.97	2.21				2.08
7/6/09	N	2.13	2.14	1.88	2.28				1.89
7/7/09	SE	2.41	2.94	2	2.18				1.92
Mean		2.82	5.19	2.09	2.04	1.57	1.84	2.64	2.00

**Table 4-21. Cobalt Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.179	0.663	0.082	0.099	0.108			
12/7/08	S	0.139	0.271	0.065	0.146	0.039			
12/8/08	S	0.129	0.22	0.043	0.102	0.047			
12/9/08	NNW	0.141	0.251	0.069	0.057	0.071			
12/10/08	NNW	0.06	0.051	0.162	0.097	0.058			
2/26/09	S	0.115	0.301	0.075	0.133		0.068		
2/27/09	N	0.113	0.24	0.113	0.117		0.095		
2/28/09	NNW	0.156	0.13	0.264	0.18		0.152		
3/1/09	N	0.094	0.409	0.148	0.058		0.058		
3/2/09	ESE	0.08	0.267	0.08	0.108		0.071		
5/5/09	SSE	0.048	0.125	0.049	0.05			0.06	
5/6/09	S	0.09	0.143	0.047	0.068			0.07	
5/7/09	SSE	0.102	0.219	0.076	0.111			0.095	
5/8/09	S	0.149	0.363	0.072	0.068			0.063	
5/9/09	N	0.072	0.122	0.155	0.098			0.091	
7/3/09	SSE	0.237	0.285	0.067	0.144				0.128
7/4/09	SSE	0.322	0.228	0.126	0.144				0.136
7/5/09	N	0.127	0.139	0.118	0.127				0.037
7/6/09	N	0.048	0.052	0.042	0.042				0.042
7/7/09	SE	0.067	0.285	0.027	0.134				0.051
Mean		0.123	0.238	0.094	0.104	0.065	0.089	0.076	0.079

**Table 4-22. Copper Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	21.3	30.6	8.83	29.5	18.5			
12/7/08	S	8.17	24.5	4.7	13.3	4.48			
12/8/08	S	8.19	29.4	2.38	4.4	4.8			
12/9/08	NNW	12.4	28.9	5.51	88.6	5.41			
12/10/08	NNW	9.19	5.85	21.7	11	6.06			
2/26/09	S	6.52	41.4	4.02	13.3		2.85		
2/27/09	N	5.31	19.7	5.03	10.8		4.38		
2/28/09	NNW	3.74	4.89	2.44	53.9		3.2		
3/1/09	N	6.44	18.1	3.63	9.71		3.82		
3/2/09	ESE	4.26	9.6	4.17	36.1		5.39		
5/5/09	SSE	6.77	15.8	3.27	12.7			5.01	
5/6/09	S	6.02	15.4	16.7	4.66			4.75	
5/7/09	SSE	6.44	41.9	3.09	50.3			8.84	
5/8/09	S	3.22	35.2	5.19	33.6			5.43	
5/9/09	N	7	7.49	7.57	20.5			3.25	
7/3/09	SSE	9.01	19.4	3.93	45.9				10.3
7/4/09	SSE	8.72	23.6	6.18	73.1				10
7/5/09	N	10	19.9	8.42	115				8.33
7/6/09	N	7.9	30.9	5.82	7.99				7.59
7/7/09	SE	18.9	19.4	3.24	188				7.96
Mean		8.48	22.1	6.29	41.12	7.85	3.93	5.46	8.84

**Table 4-23. Lead Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	11.7	14.7	5.46	6.84	5.98			
12/7/08	S	4.49	9.7	3.12	4.42	1.62			
12/8/08	S	4.9	24.6	1.7	2.38	2.05			
12/9/08	NNW	5.3	10.3	1.94	1.3	2.46			
12/10/08	NNW	1.28	1.3	7.7	3.55	1.26			
2/26/09	S	8.46	74.1	1.31	1.88		1.21		
2/27/09	N	2.55	19.5	2.4	2.58		2.26		
2/28/09	NNW	2.3	3.42	2.56	1.92		1.97		
3/1/09	N	2.72	4.05	1.88	0.974		1.5		
3/2/09	ESE	1.69	4.43	2.21	3.38		2.49		
5/5/09	SSE	1.45	6.74	1.36	6.68			1.71	
5/6/09	S	3.75	15.1	1.37	2.23			2.31	
5/7/09	SSE	2.14	26	1.28	13.8			2.03	
5/8/09	S	3.97	32.8	1.64	1.76			1.67	
5/9/09	N	1.69	2.23	2.74	1.14			1.34	
7/3/09	SSE	6.3	19.1	2.7	3.69				2.99
7/4/09	SSE	3.33	11.7	3.01	3.38				3.04
7/5/09	N	2.28	2.99	2.1	2.28				2.1
7/6/09	N	2.3	2.84	3.87	2.88				2.34
7/7/09	SE	3.43	4.78	1.12	5.53				3.41
Mean		3.80	14.52	2.57	3.63	2.67	1.89	1.81	2.78

**Table 4-24. Manganese Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	34.4	161	10.7	14	15.1			
12/7/08	S	32.9	92.4	6.12	18.9	3.51			
12/8/08	S	36	120	4.02	11	4.32			
12/9/08	NNW	14.7	26.1	6.68	3.8	6.93			
12/10/08	NNW	4.78	3.98	21.3	9.86	4.86			
2/26/09	S	32.3	152	7.62	20.5		5.94		
2/27/09	N	12.7	60.8	10.2	12.4		8.39		
2/28/09	NNW	17.8	21.1	29.5	23.5		19.4		
3/1/09	N	11.1	70.7	14.7	4.59		5.98		
3/2/09	ESE	8.42	53	8.45	15.6		7.07		
5/5/09	SSE	4	36.9	3.32	4.39			8.73	
5/6/09	S	8.66	37.2	2.91	3.18			5.4	
5/7/09	SSE	14.9	88.2	3.6	5.33			10.6	
5/8/09	S	38.3	162	5.81	5.3			5.18	
5/9/09	N	5.82	17.2	13.9	8.43			15.1	
7/3/09	SSE	28.8	65.6	9.33	15.8				6.43
7/4/09	SSE	16.1	43.5	11.5	13.4				6.26
7/5/09	N	8.75	11.8	6.01	7.75				3.05
7/6/09	N	3.98	6.6	3.55	2.89				3.71
7/7/09	SE	6.9	23.3	2	28.4				4.87
Mean		17.07	62.67	9.06	11.45	6.94	9.36	9.00	4.86

**Table 4-25. Mercury Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.146	0.036	0.037	0.02	0.213			
12/7/08	S	0.033	0.016	0.019	0.013	0.04			
12/8/08	S	0.032	0.276	0.012	0.008	0.028			
12/9/08	NNW	0.012	0.021	0.01	0.003	0.023			
12/10/08	NNW	0.005	0.012	0.102	0.007	0.022			
2/26/09	S	0.369	0.655	0.069	0.121		0.266		
2/27/09	N	0.384	0.172	0.041	0.07		0.342		
2/28/09	NNW	0.163	0.023	0.058	0.062		0.246		
3/1/09	N	0.32	0.07	0.027	0.022		0.181		
3/2/09	ESE	0.059	0.07	0.604	0.059		0.276		
5/5/09	SSE	0.006	0.068	0.006	0.017			0.01	
5/6/09	S	0.016	0.039	0.004	0.012			0.008	
5/7/09	SSE	0.028	0.17	0.004	0.009			0.007	
5/8/09	S	0.028	0.124	0.021	0.024			0.015	
5/9/09	N	0.023	0.025	0.034	0.012			0.015	
7/3/09	SSE	0.046	0.044	0.039	0.014				0.006
7/4/09	SSE	0.015	0.024	0.018	0.01				0.006
7/5/09	N	0.01	0.011	0.006	0.008				0.006
7/6/09	N	0.014	0.014	0.015	0.01				0.006
7/7/09	SE	0.018	0.02	0.005	0.016				0.015
Mean		0.086	0.095	0.057	0.026	0.065	0.262	0.011	0.008

**Table 4-26. Molybdenum Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.646	1.44	0.378	0.417	0.571			
12/7/08	S	0.522	0.719	0.264	0.363	0.199			
12/8/08	S	0.577	1.45	0.249	0.246	0.252			
12/9/08	NNW	0.618	1.66	0.208	0.228	0.247			
12/10/08	NNW	0.248	0.222	1.49	0.357	0.248			
2/26/09	S	0.551	2.96	0.401	0.32		0.187		
2/27/09	N	0.33	1.48	0.29	0.288		0.266		
2/28/09	NNW	0.326	0.253	0.231	0.214		0.887		
3/1/09	N	0.315	0.341	0.184	0.154		0.194		
3/2/09	ESE	0.254	0.429	0.246	0.207		0.173		
5/5/09	SSE	0.332	0.562	0.272	0.3			0.364	
5/6/09	S	0.312	1.19	0.188	0.221			0.239	
5/7/09	SSE	0.327	1.83	0.185	0.194			0.244	
5/8/09	S	0.434	1.53	0.301	0.265			0.267	
5/9/09	N	0.322	0.317	0.371	0.252			0.283	
7/3/09	SSE	0.769	2.29	0.268	0.383				0.185
7/4/09	SSE	0.26	0.772	0.342	0.192				0.156
7/5/09	N	0.233	0.217	0.203	0.339				0.208
7/6/09	N	0.233	0.206	0.287	0.44				0.214
7/7/09	SE	0.358	0.376	0.173	0.341				0.367
Mean		0.398	1.012	0.327	0.286	0.303	0.341	0.279	0.226

**Table 4-27. Nickel Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	1.11	3.3	0.647	0.681	0.772			
12/7/08	S	1.09	3.29	0.68	0.999	0.5			
12/8/08	S	1.73	2.91	0.658	0.912	0.962			
12/9/08	NNW	1.66	4.05	2.22	0.501	0.666			
12/10/08	NNW	0.623	0.591	2.05	0.964	0.92			
2/26/09	S	1.35	3.82	0.961	1.24		1.21		
2/27/09	N	1.44	2.21	1.4	1.85		0.924		
2/28/09	NNW	1.01	0.739	1.34	1.3		0.773		
3/1/09	N	0.551	2.05	1.34	0.549		0.607		
3/2/09	ESE	0.655	1.5	0.656	0.722		0.673		
5/5/09	SSE	0.785	1.36	0.959	0.97			0.862	
5/6/09	S	1.09	1.53	0.899	1.2			1.45	
5/7/09	SSE	1.2	2.58	1.08	9.16			1.36	
5/8/09	S	1.59	4.22	0.86	0.962			0.775	
5/9/09	N	0.738	0.891	1.48	3.48			1.28	
7/3/09	SSE	1.48	3.28	0.63	0.915				0.764
7/4/09	SSE	0.9	2.08	0.831	2.88				0.603
7/5/09	N	0.619	0.667	0.543	0.541				0.782
7/6/09	N	0.51	0.52	0.368	0.465				0.517
7/7/09	SE	0.505	1.04	0.503	0.677				0.409
Mean		1.032	2.131	1.005	1.548	0.764	0.837	1.145	0.615

**Table 4-28. Selenium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.463	0.488	0.319	0.373	0.306			
12/7/08	S	1	0.98	0.82	0.809	0.499			
12/8/08	S	1.46	1.24	1.23	1.24	1.16			
12/9/08	NNW	0.603	0.721	0.359	0.138	0.361			
12/10/08	NNW	0.137	0.129	0.153	0.604	0.149			
2/26/09	S	0.807	0.734	0.557	0.557		0.5		
2/27/09	N	1.01	1.07	0.997	0.999		0.961		
2/28/09	NNW	0.295	0.259	0.503	0.288		0.443		
3/1/09	N	0.651	0.132	0.244	0.092		0.109		
3/2/09	ESE	0.138	0.721	0.447	0.399		0.429		
5/5/09	SSE	0.95	0.965	0.934	0.961			0.918	
5/6/09	S	1.08	1.21	0.976	1.04			1.04	
5/7/09	SSE	1.47	1.51	1.49	1.46			1.5	
5/8/09	S	1.31	1.37	0.755	0.79			0.753	
5/9/09	N	0.745	0.745	1.65	1.26			1.26	
7/3/09	SSE	0.898	0.829	0.676	0.882				0.557
7/4/09	SSE	0.681	0.676	0.905	0.746				0.559
7/5/09	N	0.6	0.591	0.565	0.65				0.785
7/6/09	N	0.895	0.934	0.703	0.853				0.834
7/7/09	SE	0.988	1.12	0.29	0.714				0.691
Mean		0.809	0.821	0.729	0.743	0.495	0.488	1.094	0.685

**Table 4-29. Silver Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.005	0.012	0.003	0.007	0.003			
12/7/08	S	0.001	0.009	0.0008	0.007	0.0002			
12/8/08	S	0.008	0.033	0.004	0.002	0.0005			
12/9/08	NNW	0.009	0.069	0.01	0.005	0.0005			
12/10/08	NNW	0.004	0.02	0.011	0.007	0.0008			
2/26/09	S	0.026	0.294	0.006	0.005		0.007		
2/27/09	N	0.009	0.113	0.012	0.01		0.009		
2/28/09	NNW	0.012	0.025	0.009	0.014		0.006		
3/1/09	N	0.009	0.024	0.012	0.013		0.006		
3/2/09	ESE	0.013	0.019	0.008	0.003		0.002		
5/5/09	SSE	ND	ND	ND	ND			ND	
5/6/09	S	ND	ND	ND	ND			ND	
5/7/09	SSE	ND	0.004	ND	ND			ND	
5/8/09	S	ND	ND	ND	ND			ND	
5/9/09	N	ND	ND	ND	ND			ND	
7/3/09	SSE	ND	ND	ND	ND				ND
7/4/09	SSE	0.007	ND	ND	0.002				ND
7/5/09	N	ND	0.001	ND	0.019				0.0001
7/6/09	N	0.007	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND	ND				ND
Mean		0.007	0.033	0.006	0.006	0.001	0.006	0.004	0.003

**Table 4-30. Thallium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.013	0.024	0.011	0.011	0.011			
12/7/08	S	0.012	0.012	0.008	0.013	0.003			
12/8/08	S	0.012	0.011	0.006	0.009	0.005			
12/9/08	NNW	0.008	0.009	0.01	0.004	0.006			
12/10/08	NNW	0.004	0.004	0.012	0.01	0.008			
2/26/09	S	0.012	0.018	0.01	0.012		0.005		
2/27/09	N	0.007	0.012	0.011	0.007		0.007		
2/28/09	NNW	0.007	0.007	0.048	0.007		0.025		
3/1/09	N	0.013	0.012	0.024	0.004		0.006		
3/2/09	ESE	0.006	0.016	0.01	0.009		0.007		
5/5/09	SSE	0.012	0.015	0.011	0.011			0.012	
5/6/09	S	0.011	0.014	0.01	0.011			0.01	
5/7/09	SSE	0.023	0.026	0.022	0.022			0.023	
5/8/09	S	0.03	0.037	0.011	0.008			0.008	
5/9/09	N	0.008	0.009	0.04	0.028			0.028	
7/3/09	SSE	ND	ND	0.004	ND				ND
7/4/09	SSE	ND	ND	0.0007	0.004				ND
7/5/09	N	ND	ND	ND	ND				ND
7/6/09	N	ND	ND	ND	ND				ND
7/7/09	SE	ND	ND	ND	ND				ND
Mean		0.009	0.011	0.013	0.009	0.007	0.010	0.016	0.000

**Table 4-31. Thorium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.034	0.084	0.019	0.024	0.022			
12/7/08	S	0.028	0.045	0.017	0.038	0.012			
12/8/08	S	0.019	0.027	0.009	0.019	0.009			
12/9/08	NNW	0.017	0.018	0.015	0.011	0.015			
12/10/08	NNW	0.012	0.009	0.018	0.013	0.011			
2/26/09	S	0.024	0.041	0.007	0.013		0.016		
2/27/09	N	0.02	0.029	0.015	0.016		0.015		
2/28/09	NNW	0.025	0.022	0.026	0.017		0.015		
3/1/09	N	0.021	0.048	0.026	0.014		0.013		
3/2/09	ESE	0.02	0.044	0.015	0.018		0.019		
5/5/09	SSE	0.011	0.026	0.009	0.012			0.012	
5/6/09	S	0.015	0.025	0.008	0.009			0.01	
5/7/09	SSE	0.021	0.039	0.012	0.015			0.016	
5/8/09	S	0.031	0.073	0.016	0.015			0.015	
5/9/09	N	0.018	0.028	0.025	0.018			0.017	
7/3/09	SSE	0.022	0.035	0.011	0.016				0.017
7/4/09	SSE	0.021	0.03	0.012	0.019				0.016
7/5/09	N	0.016	0.015	0.013	0.013				0.003
7/6/09	N	0.005	0.004	0.002	0.002				0.003
7/7/09	SE	0.008	0.016	0.006	0.009				0.006
Mean		0.019	0.033	0.014	0.016	0.014	0.016	0.014	0.009

**Table 4-32. Uranium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	0.056	0.207	0.021	0.026	0.027			
12/7/08	S	0.041	0.101	0.018	0.042	0.012			
12/8/08	S	0.033	0.045	0.011	0.029	0.011			
12/9/08	NNW	0.027	0.03	0.015	0.016	0.016			
12/10/08	NNW	0.023	0.013	0.027	0.018	0.016			
2/26/09	S	0.028	0.059	0.017	0.047		0.016		
2/27/09	N	0.031	0.063	0.027	0.035		0.026		
2/28/09	NNW	0.047	0.036	0.053	0.072		0.044		
3/1/09	N	0.022	0.142	0.03	0.017		0.018		
3/2/09	ESE	0.023	0.084	0.02	0.049		0.019		
5/5/09	SSE	0.01	0.022	0.008	0.012			0.009	
5/6/09	S	0.012	0.021	0.007	0.009			0.009	
5/7/09	SSE	0.014	0.029	0.009	0.013			0.01	
5/8/09	S	0.026	0.061	0.012	0.014			0.011	
5/9/09	N	0.015	0.028	0.023	0.018			0.012	
7/3/09	SSE	0.022	0.04	0.013	0.033				0.013
7/4/09	SSE	0.02	0.039	0.014	0.029				0.012
7/5/09	N	0.015	0.017	0.012	0.018				0.007
7/6/09	N	0.01	0.012	0.009	0.009				0.008
7/7/09	SE	0.013	0.037	0.007	0.044				0.01
Mean		0.024	0.054	0.018	0.028	0.016	0.025	0.010	0.010

**Table 4-33. Vanadium Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	1.35	5.2	0.547	0.669	0.609			
12/7/08	S	2.03	3.3	0.734	0.759	0.554			
12/8/08	S	2.63	3.61	1.54	1.77	1.41			
12/9/08	NNW	1.08	1.37	0.472	0.393	0.47			
12/10/08	NNW	0.516	0.499	0.687	0.996	0.442			
2/26/09	S	1.99	4.57	1.39	1.58		1.34		
2/27/09	N	1.46	2.56	1.59	1.64		1.39		
2/28/09	NNW	0.669	0.733	1.25	0.717		0.696		
3/1/09	N	0.371	2.27	0.677	0.232		0.268		
3/2/09	ESE	0.33	1.66	0.291	0.401		0.265		
5/5/09	SSE	1.52	2.21	1.44	1.37			1.51	
5/6/09	S	1.66	2.03	1.35	1.45			1.47	
5/7/09	SSE	2.48	3.5	2.21	2.26			2.32	
5/8/09	S	3.17	5.43	1.13	1.08			1.11	
5/9/09	N	1.14	1.48	2.8	2.44			2.56	
7/3/09	SSE	1.55	2.74	0.532	1.3				0.684
7/4/09	SSE	1.47	2.15	0.951	1.47				0.677
7/5/09	N	0.615	0.683	0.542	0.601				0.17
7/6/09	N	0.154	0.193	0.106	0.134				0.113
7/7/09	SE	0.206	0.797	0.066	0.398				0.134
Mean		1.320	2.349	1.015	1.083	0.697	0.792	1.794	0.356

**Table 4-34. Zinc Measurement Results**

<b>Date</b>	<b>WD</b>	<b>Old Fort Worth Road</b>	<b>Wyatt Road</b>	<b>Jaycee Park</b>	<b>Tayman Drive</b>	<b>Triangle Park</b>	<b>Mountain Peak Elem. School</b>	<b>Vitovsky Elem. School</b>	<b>Midlothian High School</b>
12/6/08	SW	66.9	88.7	35.7	41.4	45.7			
12/7/08	S	33.9	84.5	19.3	27.3	14.8			
12/8/08	S	47.2	277	14.7	17.5	31.1			
12/9/08	NNW	41.4	62.4	24.1	10.4	26.9			
12/10/08	NNW	21.7	27.1	100	32.1	16.2			
2/26/09	S	65.1	602	12.4	14.9		12.2		
2/27/09	N	17.9	169	17.2	19.2		13.6		
2/28/09	NNW	16.1	18.4	29.2	14.5		13.3		
3/1/09	N	10.8	24.4	18.6	10.8		13.6		
3/2/09	ESE	11.2	26.8	15.4	13.9		13.6		
5/5/09	SSE	14.3	89.4	15.4	18.1			18.3	
5/6/09	S	35.3	179	13.4	16.9			15.4	
5/7/09	SSE	28	417	14.7	21.7			25.7	
5/8/09	S	51.5	488	12.2	12			11.5	
5/9/09	N	12.3	15.5	25.1	15.6			21.3	
7/3/09	SSE	69.6	137	28.3	22.3				11.5
7/4/09	SSE	22.1	53.3	25.6	38				8.31
7/5/09	N	14	16	9.93	9.36				19.5
7/6/09	N	15	18.9	10.3	12				12.7
7/7/09	SE	19.9	29.5	8.04	13.1				17.3
Mean		30.7	141.2	22.5	19.1	26.9	13.3	18.4	13.9

### 4.3 Hexavalent Chromium

Table 4-35 gives the measurement results for Cr<sup>6+</sup>. A procedural mistake in sample documentation prevented the laboratory from positively matching the third-round Cr<sup>6+</sup> measurement results with the specific dates on which the samples were collected. The mistake occurred when the Chain-of-Custody Form (COC) that documents the sampling date and site was removed from each solitary sample container by laboratory receiving personnel without any of the sampling dates ever being copied from the COCs. Since the sample containers were all labeled with site identification codes, the location at which each sample was collected is known and five valid daily Cr<sup>6+</sup> measurement results were obtained for each site despite the error (though the order in which the samples were collected at each site is indeterminate).

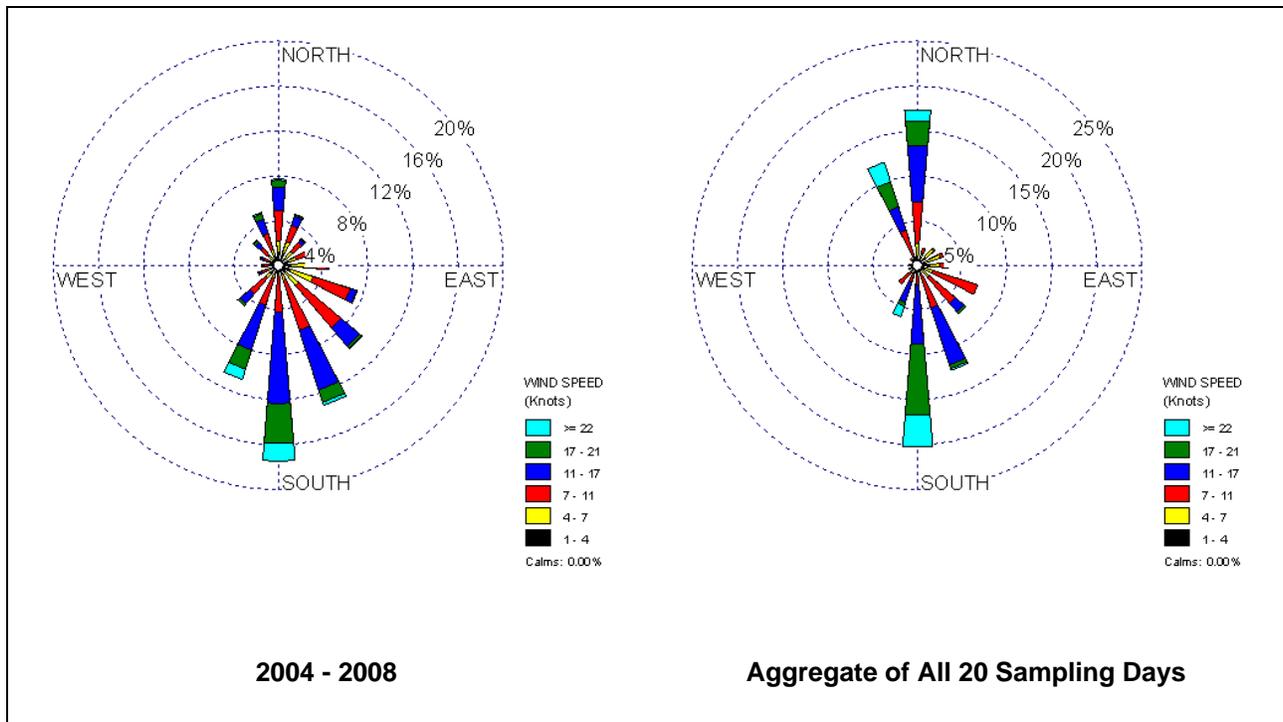
**Table 4-35 Hexavalent Chromium Measurement Results**

Date	WD <sup>1</sup>	Old Fort Worth Road	Wyatt Road	Jaycee Park	Tayman Drive	Triangle Park	Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School
<b>First, Second, and Fourth Round Results Sorted by Date</b>									
12/6/08	SW	0.0677	0.3790	0.0179	0.0472	0.0305			
12/7/08	S	0.2570	0.1600	0.0024	0.0281	ND			
12/8/08	S	0.1520	0.0192	0.0024	0.0038	0.0081			
12/9/08	NNW	0.0043	0.0003	0.0226	0.0210	0.0206			
12/10/08	NNW	0.0015	ND	0.0638	ND	0.0209			
2/26/09	S	0.1060	0.0609	ND	ND		ND		
2/27/09	N	0.0449	0.0736	ND	ND		ND		
2/28/09	NNW	ND	ND	0.0226	ND		0.0392		
3/1/09	N	0.0511	ND	ND	ND		ND		
3/2/09	ESE	ND	0.1380	0.0246	ND		0.0257		
7/3/2009	SSE	0.0294	0.1030	0.0342	0.0128				0.0184
7/4/2009	SSE	0.1210	0.0473	0.0454	0.1200				0.0389
7/5/2009	N	0.0569	ND	ND	0.0204				0.0144
7/6/2009	N	ND	ND	ND	0.0296				0.0203
7/7/2009	SE	0.0141	0.0361	0.0115	0.0119				0.0148
<b>Third Round Results Sorted From Highest to Lowest</b>									
05/09		0.0941	0.0525	0.0204	0.0201			0.0211	
05/09		0.0626	0.0395	0.0177	0.0197			ND	
05/09		0.0292	0.0340	0.0169	ND			ND	
05/09		ND	0.0292	ND	ND			ND	
05/09		ND	0.0199	ND	ND			ND	
		0.0551	0.0602	0.0159	0.0178	0.0165	0.0143	0.0059	0.0214

<sup>1</sup> Predominant wind direction from the CAMS 52 collocated site on Old Fort Worth Road

## 5.0 WEATHER SUMMARY

Most of the air samples were collected under predominantly southerly, south-southeasterly, northerly, and north-northwesterly wind flow. Figure 5-1, for example, gives the aggregate wind rose based on the hourly wind speed and wind direction measurements at the CAMS 52 collocated site on Old Fort Worth Road during all 20 sampling periods. The bimodal distribution of wind direction frequencies is convenient for assessing the differences in air quality between days when monitors were generally upwind versus downwind of the city center and local industrial facilities; however, the frequencies of southerly and northerly winds were more evenly balanced during the 20 sampling periods than is typical for an entire year. Wind roses for individual 24-hour sampling periods are given in Appendix B.



**Figure 5-1. CAMS 52 Wind Roses for 2004-2008 and Aggregate for All 20 Sampling Days**

Calm winds (i.e., wind speeds less than three miles per hour) were infrequent and never exceeded six hours on more than one day per sampling round at any of the sampling sites (Table 5-1). Only one precipitation event lasting more than six hours occurred on a sampling day (Table 5-2). That was on July 6, 2009, when rainfall varied between sites from 0.18 inches to 0.47 inches over periods lasting 4-7 hours. Rainfall was not measured for more than two hours or above 0.06 inches depth at any sampling site on any other sampling day during the entire study. Daily maximum temperatures on sampling days ranged from the low 40s to over 100 degrees.

**Table 5-1. Number of Hours per Day with Calm Winds**

Date	First Round Number of Calm Hours				
	Old Fort Worth Road	Wyatt Road	Triangle Park	Jaycee Park	Tayman Drive
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
	Second Round Number of Calm Hours				
	Old Fort Worth Road	Wyatt Road	Mt. Peak Elem. School	Jaycee Park	Tayman Drive
26-Feb-09	0	0	0	0	0
27-Feb-09	0	0	0	0	0
28-Feb-09	0	0	0	0	0
1-Mar-09	3	3	0	2	0
1-Mar-09	1	1	0	0	0
# Days > 6	0	0	0	0	0
	Third Round Number of Calm Hours				
	Old Fort Worth Road	Wyatt Road	Vitovsky Elementary School	Jaycee Park	Tayman Drive
5-May-09	0	0	0	0	0
6-May-09	0	0	0	0	0
7-May-09	0	0	0	0	0
8-May-09	0	0	0	0	0
9-May-09	0	0	0	0	0
# Days > 6	0	0	0	0	0
	Fourth Round Number of Hours with Calm Winds				
	Old Fort Worth Road	Wyatt Road	Midlothian High School	Jaycee Park	Tayman Drive
3-Jul-09	0	0	0	0	0
4-Jul-09	0	0	0	0	0
5-Jul-09	0	1	1	0	0
6-Jul-09	3	5	4	7	5
7-Jul-09	7	9	6	6	2
# Days > 6	1	1	0	1	0

**Table 5-2. Number of Hours per Day with Measured Rainfall**

Date	First Round Number of Hours with Measured Rainfall				
	Old Fort Worth Road	Wyatt Road	Triangle Park	Jaycee Park	Tayman Drive
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
	Second Round Number of Hours with Measured Rainfall				
	Old Fort Worth Road	Wyatt Road	Mt. Peak Elem. School	Jaycee Park	Tayman Drive
26-Feb-09	0	0	0	0	0
27-Feb-09	0	0	0	0	0
28-Feb-09	0	0	0	0	0
1-Mar-09	0	0	0	0	0
1-Mar-09	0	0	0	0	0
# Days > 6	0	0	0	0	0
	Third Round Number of Hours with Measured Rainfall				
	Old Fort Worth Road	Wyatt Road	Vitovsky Elementary School	Jaycee Park	Tayman Drive
5-May-09	0	0	0	0	0
6-May-09	0	0	0	0	1
7-May-09	0	0	0	0	0
8-May-09	0	0	0	0	0
9-May-09	0	0	0	0	0
# Days > 6	0	0	0	0	1
	Fourth Round Number of Hours with Measured Rainfall				
	Old Fort Worth Road	Wyatt Road	Midlothian High School	Jaycee Park	Tayman Drive
3-Jul-09	0	0	0	0	0
4-Jul-09	0	0	1	0	0
5-Jul-09	0	0	0	0	0
6-Jul-09	5	5	4	7	5
7-Jul-09	0	0	2	0	0
# Days > 6	0	0	0	1	0

## 5.1 First Round

The first sampling round, which took place from December 6-10, 2008, started with three consecutive days of mostly southwesterly, southerly, and south-southeasterly winds until a cold front on Day 4 (December 9) brought northerly and north-northwesterly winds for most of the last two days. Daily average wind speeds ranged from 4-5 miles per hour (mph) on Day 1 (December 6) and increased to as high as 21 mph on December 8, ahead of the front. Daily average wind speeds remained between 10 and 16 mph behind the front for the last two days of the sampling round. Maximum daily temperatures ranged from about 42 degrees following the cold front to about 71 degrees ahead of the frontal passage. Rainfall totals ranged from 0.04-0.08 inches, with most of the precipitation during 1-2 hours early on December 9. The pressure ranged from lows of 975-980 milibars (mb) to highs of 995-1000 mb. Figure 5-2 gives a set of time series plots of the hourly wind direction, wind speed, temperature, and rainfall measurements.

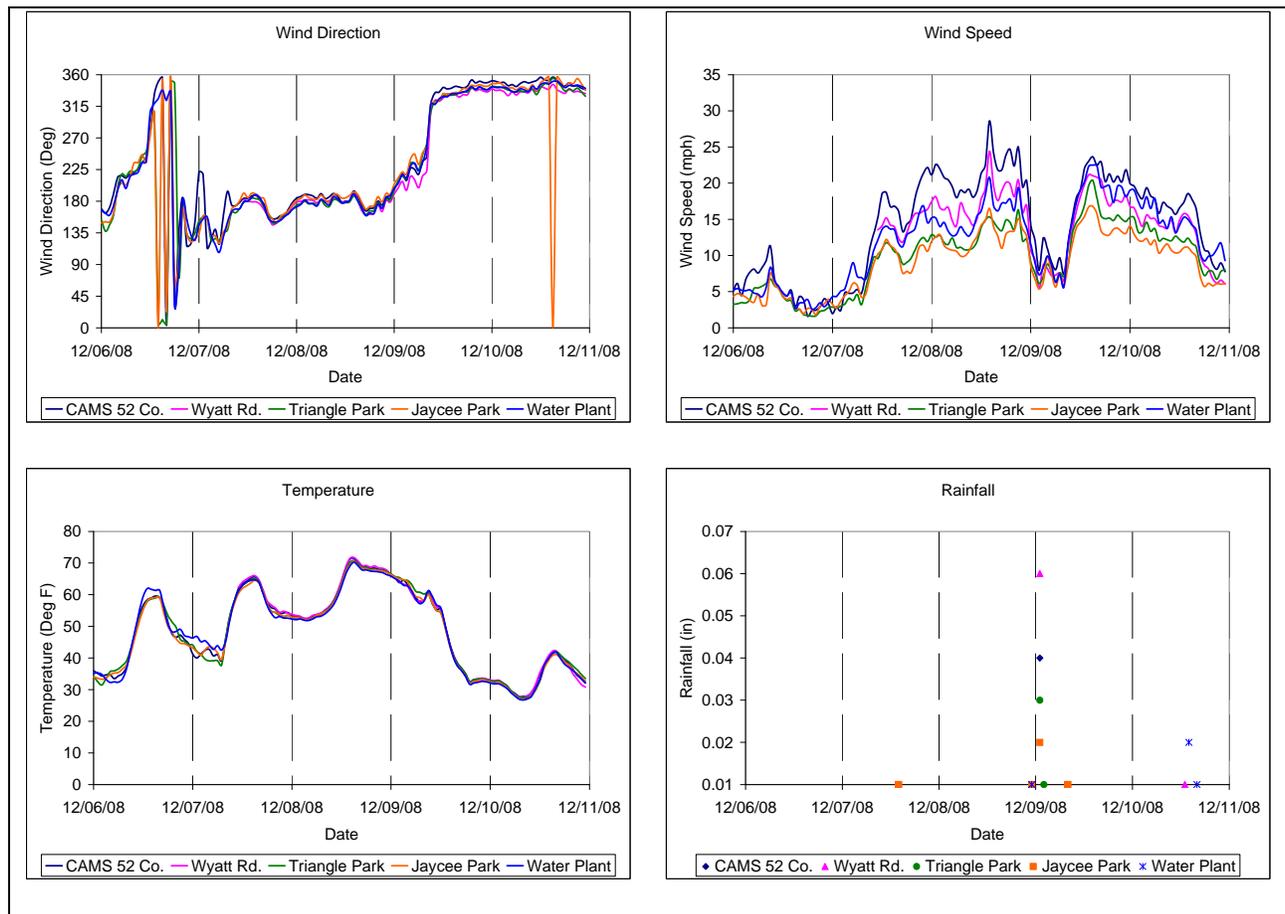


Figure 5-2. Time Series Charts of First Round Hourly Weather Measurements

## 5.2 Second Round

The second sampling round, which took place from February 26 – March 2, 2009, started with southerly winds averaging 11 mph to 18 mph on Day 1. The winds shifted to northerly and decreased in speed when a cold front passed early on Day 2 (February 27). The winds remained northerly for most of the next two days, averaging up to 20 mph on Day 3 (February 28) and up to 11 mph on Day 4 (March 1). The winds were mostly easterly and southeasterly at average speeds of 7-8 mph on the last day of the round (March 2). Daily maximum temperatures were in the low 80s on Day 1 and dropped to highs ranging from about 50 degrees to 70 degrees the remainder of the sampling round. No rainfall was measured on any of the five days. Barometric pressures ranged from lows of about 975 – 980 mb to lows of about 1005 – 1010 mb near the time of the frontal passage. Figure 5-3 gives a set of time series plots of the hourly wind direction, wind speed, temperature, and rainfall measurements.

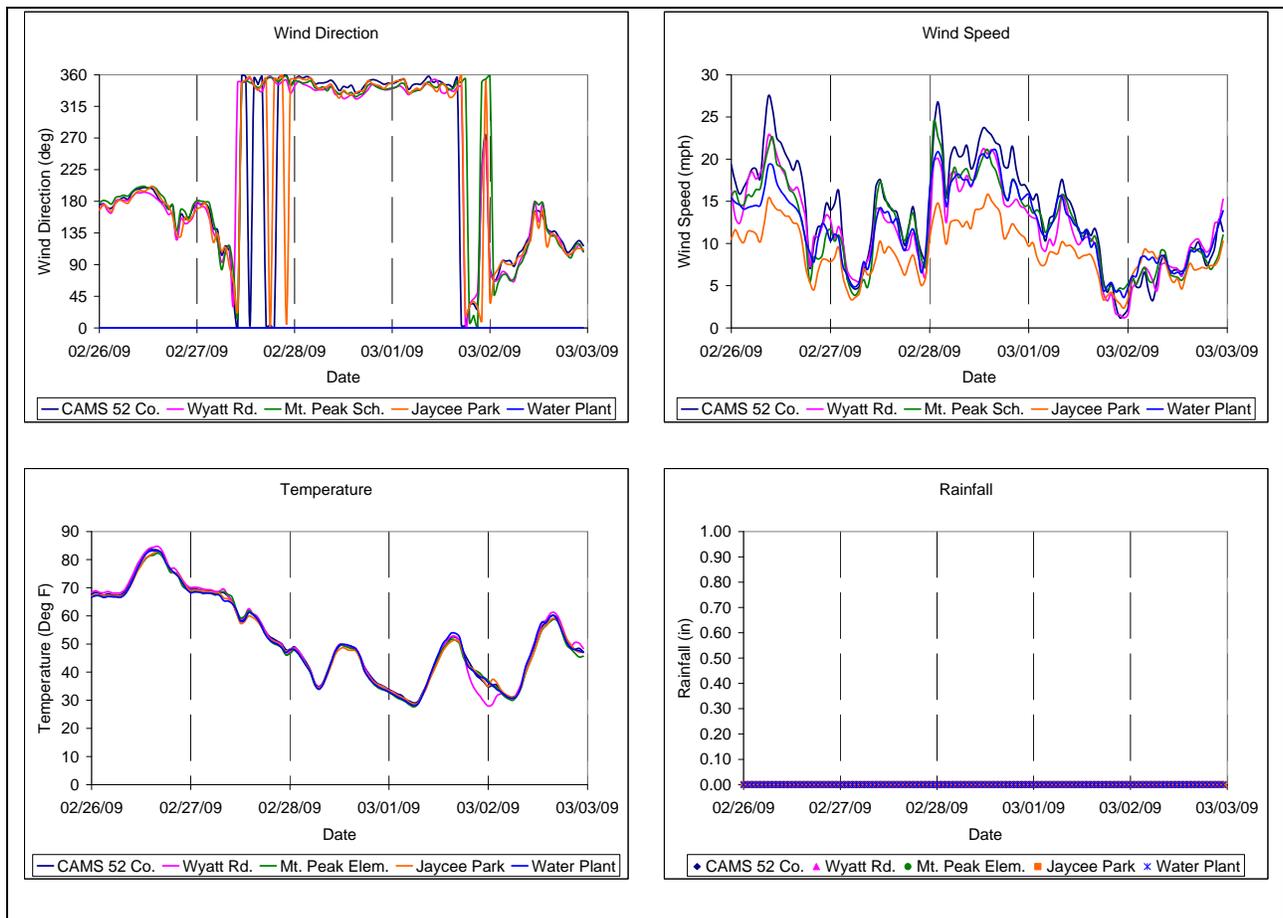


Figure 5-3. Time Series Charts of Second Round Hourly Weather Measurements

### 5.3 Third Round

The third sampling round, which took place from May 5-9, 2009, started with four days of mostly southerly and southeasterly winds with wind speeds averaging about 7 - 11 mph during May 5-7 and 11 - 18 mph on May 8. The winds were northerly most of May 9, at average speeds ranging between sites from 6 -10 mph. Daily maximum temperatures ranged from the high 70s to about 90 degrees. No rainfall was measured except for a trace at the Tayman Drive Water Treatment Facility on May 6. Barometric pressures ranged from lows of about 975 - 980 milibars (mb) to highs of about 987 - 993 mb. Figure 5-4 gives a set of time series plots of the hourly wind direction, wind speed, temperature, and rainfall measurements.

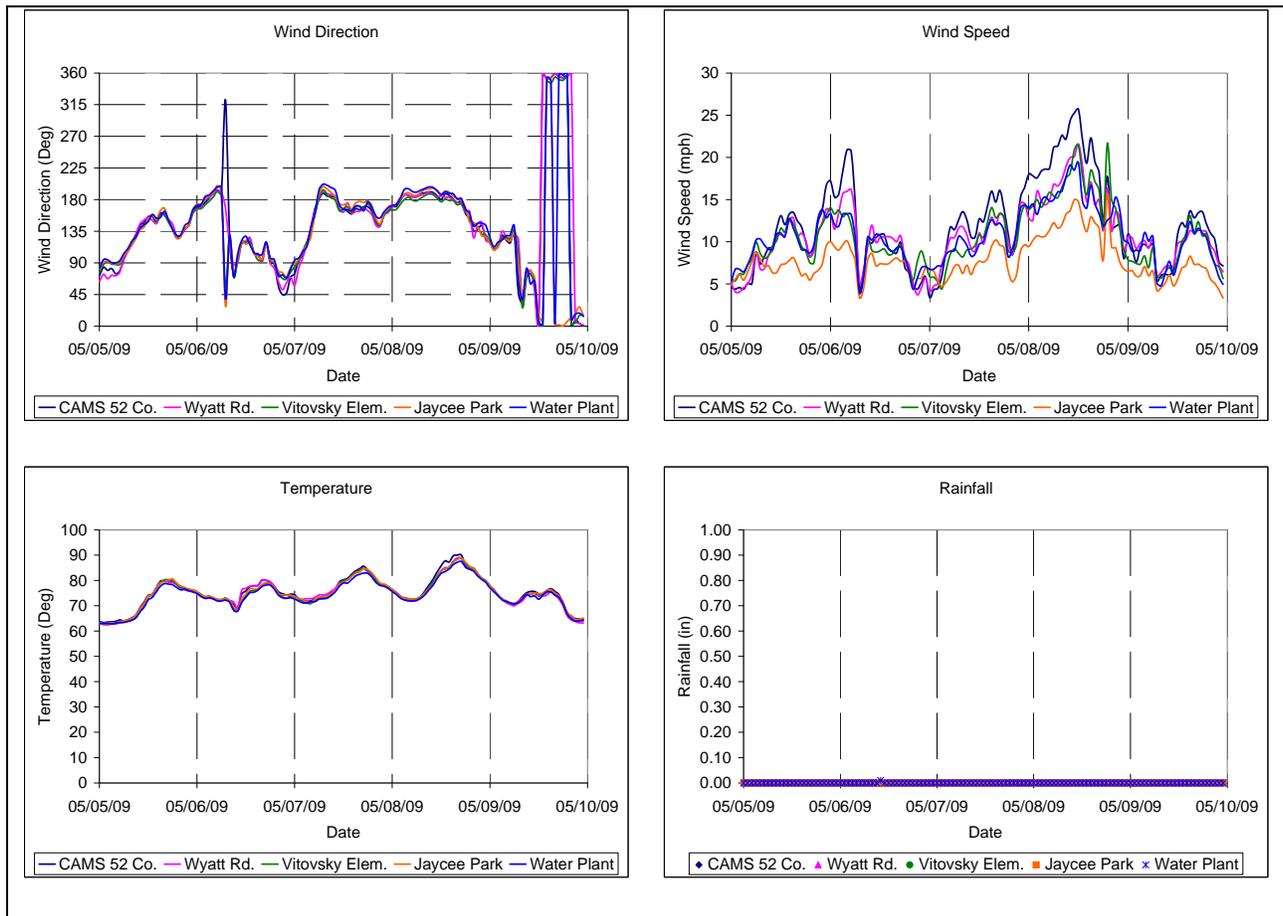


Figure 5-4. Time Series Charts of Third Round Hourly Weather Measurements

## 5.4 Fourth Round

The fourth sampling round, which took place from July 3-7, 2009, started with two days of mostly southwesterly, southerly, and southeasterly winds with wind speeds averaging about 6 – 10 mph on July 3 and 9 - 13 on July 4. The winds became northerly midday on July 5 and decreased, and remained northerly and comparatively calm until midday on July 7. The wind speeds on the last three sampling days averaged about 4 - 10 mph. Daily maximum temperatures ranged from the high 80s to about 102 degrees. Rainfall amounts on the morning of July 6 varied between sites from 0.18 inches to 0.47 inches over periods lasting 4-7 hours. Barometric pressures ranged from lows of about 980 – 985 mb to highs of about 990 – 995 mb. Figure 5-5 gives a set of time series plots of the hourly wind direction, wind speed, temperature, and rainfall measurements.

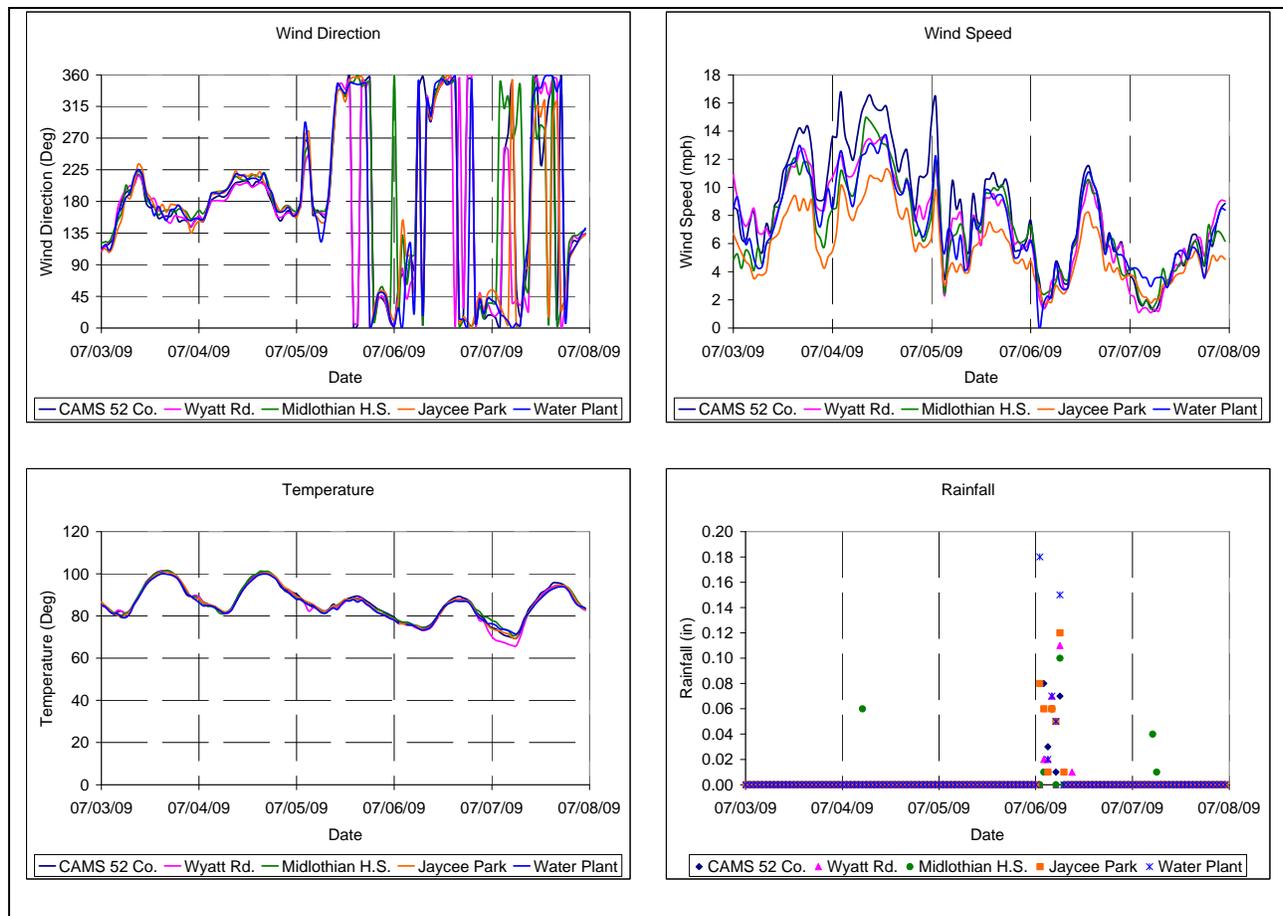


Figure 5-5. Time Series Charts of Fourth Round Hourly Weather Measurements

## 6.0 DATA QUALITY AND COMPLETENESS

### 6.1 Volatile Organic Compounds

One hundred percent of the routine VOC canister samples that were planned for this study were collected; however, the sample collected at Mt. Peak Elementary School on February 27, 2009, was voided by the laboratory when a leak occurred during a routine canister leak check. The VOC data completeness (Table 6-1) reflects the loss of that one sample.

**Table 6-1. VOC Data Completeness**

Sampling Round	Old Fort Worth Road		Jaycee Park		Tayman Drive		Triangle Park		Mt. Peak Elem. School <sup>b</sup>		Vitovsky Elem. School		Midlothian High School	
	No. <sup>1</sup>	% <sup>2</sup>	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Round 1	20	100	20	100	20	100	5	100						
Round 2	20	100	20	100	20	100			4	80				
Round 3	20	100	20	100	20	100					5	100		
Round 4	20	100	20	100	20	100							5	100
All Rounds	80	100	80	100	80	100	5	100	4	80	5	100	5	100

<sup>1</sup> Number of samples collected and analyzed

<sup>2</sup> Number of samples collected and analyzed divided by the number of samples planned (times 100%)

The VOC measurement precision was estimated by comparing the analysis results from pairs of samples collected during the same 24-hour period at the same site (duplicates). For each pair, the relative percent difference (RPD) was calculated for each of the detected compounds as:

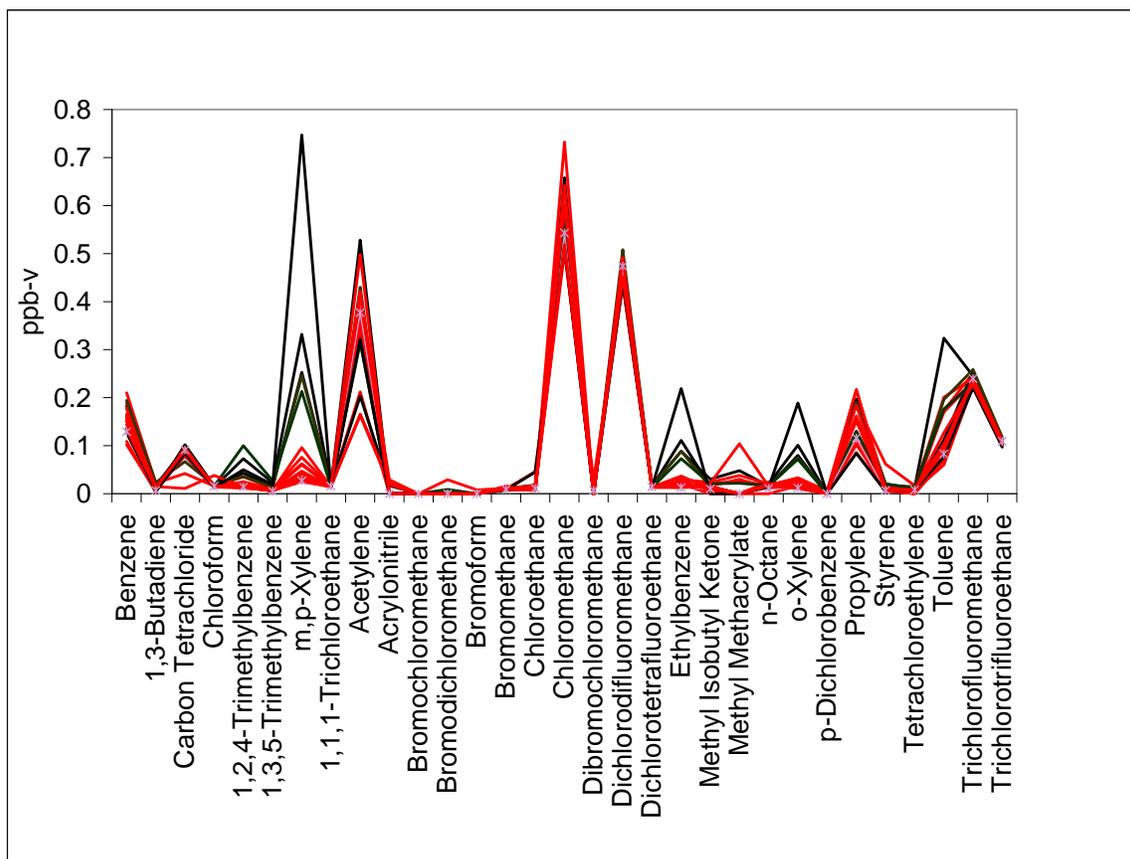
$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100\%$$

where  $X_1$  and  $X_2$  are the measurement results from the primary and secondary samples, respectively. The measurement precision for each VOC species was estimated by the average of all the RPDs calculated for that compound. One set of duplicate samples per round was planned for this study however the first round secondary sample was voided after it was observed from the recorded data that the canister filled to atmospheric pressure in just 30 minutes. The problem was traced to a flow controller error and an extra set of duplicates was collected in the second round to compensate for the loss.

The measurement results and average RPD for the four pairs of canister duplicates collected in this study are given in Table 6-2. Four of the 13 core VOCs are omitted from the table, as are all the target VOCs that were not detected in both samples of at least one pair. The

average RPDs were less than 30% for five of the other nine core VOCs: benzene; 1,3-butadiene; carbon tetrachloride; chloroform; and vinyl chloride. The average RPD was 35% for dichloromethane but the actual precision appears to be much better than that as the average RPD for the three duplicate pairs, excluding round 3, was a comparatively good 11 percent.

The high average RPDs for 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; and m,p-xylene also do not appear to reflect large systemic random errors. Instead, the poor precision estimated for those compounds are symptoms of a bias that randomly affected five ambient samples plus the two duplicate samples collected during the second sampling round. Evidence of this is given in the Figure 6-1. Nineteen lines in the graph shown in Figure 6-1 depict the levels of 31 chemical species detected in each of the 19 second-round canister samples. Fourteen of the canister samples are coded with red lines while the other five are colored black. The two sets of lines overlap for most compounds but are prominently separated for m,p-xylene, the trimethylbenzene isomers, ethylbenzene, and o-xylene.



**Figure 6-1. VOC "Fingerprint Plot" Illustrating Anomalies for m,p-Xylene and Other Compounds in Five Second Round Samples**

**Table 6-2. VOC Duplicate Sample Results in PPB-V  
and Average Relative Percent Differences**

Chemical Name	Tayman Drive 2/26/09		Mountain Peak Elementary School 3/1/09		Jaycee Park 5/9/09		Tayman Drive 7/7/09		Average RPD (%)
	Sample 1 <sup>1</sup>	Sample 2 <sup>2</sup>	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2	
Benzene	0.102	0.116	0.134	0.146	0.200	0.294	0.237	0.177	22
1,3-Butadiene	0.006	0.004	0.011	0.011	0.013	0.017	0.013	0.011	21
Carbon Tetrachloride	0.092	0.099	0.093	0.085	0.110	0.110	0.186	0.160	8
Chloroform	0.015	0.014	0.014	0.015	0.030	0.029	0.116	0.098	9
Dichloromethane	0.051	0.060	0.057	0.060	0.095	0.321	0.134	0.121	35
1,2,4-Trimethylbenzene	0.023	0.053	0.012	0.028	0.024	0.042	0.023	0.025	55
1,3,5-Trimethylbenzene	0.008	0.015	0.007	0.012	0.011	0.014	0.010	0.008	40
Vinyl chloride	ND	ND	ND	ND	0.006	0.007	ND	ND	15
m,p-Xylene	0.043	0.281	0.025	0.264	0.055	0.060	0.060	0.054	83
1,1,1-Trichloroethane	0.016	0.016	0.016	0.016	0.022	0.022	0.020	0.018	3
Chloroethane	0.011	0.011	0.011	0.011	0.018	0.016	0.020	0.020	3
p-Dichlorobenzene	ND	ND	ND	ND	0.015	0.014	0.008	0.008	3
Dichlorotetrafluoroethane	0.015	0.015	0.015	0.014	0.024	0.024	0.026	0.024	4
Chloromethane	0.554	0.603	0.603	0.591	0.643	0.662	0.983	0.879	6
Trichlorofluoromethane	0.225	0.246	0.240	0.225	0.289	0.282	0.400	0.367	7
Trichlorotrifluoroethane	0.106	0.111	0.112	0.101	0.137	0.140	0.142	0.124	8
Dichlorodifluoromethane	0.438	0.481	0.492	0.452	0.581	0.565	0.865	0.775	8
Toluene	0.060	0.065	0.088	0.092	0.142	0.149	0.215	0.178	9
Tetrachloroethylene	0.007	0.007	0.009	0.008	0.025	0.022	0.023	0.017	14
Acetylene	0.163	0.183	0.413	0.381	0.334	0.471	0.594	0.516	17
Dibromochloromethane	ND	ND	ND	ND	ND	ND	0.078	0.065	18
Styrene	0.014	0.014	0.005	0.004	0.014	0.025	0.011	0.011	20
Bromoform	ND	ND	ND	ND	ND	ND	0.024	0.019	23
Methyl Isobutyl Ketone	0.016	0.022	0.015	0.011	0.026	0.024	0.027	0.034	23
Bromomethane	0.016	0.010	0.013	0.010	0.019	0.018	0.017	0.014	24
Methyl Ethyl Ketone	0.293	0.507	0.221	0.234	0.404	0.406	0.546	0.802	24
Propylene	0.102	0.136	0.184	0.123	0.126	0.161	0.296	0.322	25
n-Octane	0.011	0.015	0.016	0.015	0.015	0.020	0.008	0.015	32
Trichloroethylene	ND	ND	ND	ND	ND	ND	0.013	0.018	32
Acetonitrile	0.134	0.138	0.060	0.064	0.256	0.005	0.207	0.210	51
Acrylonitrile	0.019	0.032	0.029	ND	ND	ND	ND	ND	51
Acrolein	0.215	0.336	0.616	0.189	0.295	0.427	0.394	0.626	58
Methyl Methacrylate	0.030	0.054	ND	ND	0.017	0.062	0.054	0.077	69
o-Xylene	0.018	0.085	0.011	0.074	0.025	0.028	0.024	0.022	75
Ethylbenzene	0.018	0.092	0.013	0.091	0.025	0.028	0.027	0.023	78
Carbon Disulfide	0.898	0.561	0.006	0.045	0.028	2.770	3.550	2.680	106

<sup>1</sup> Primary sample

<sup>2</sup> Secondary (duplicate) sample

Comparatively high levels of these chemicals are not explained by any known source, although they are components of common solvents. The anomalies seemed to occur at random, at least once at each site but no more than twice at any individual site, and at least at one site on four different days but no more than at two sites on any single day (Table 6-3). This apparent bias was only detected in samples collected during the second round when the two duplicate secondary samples each had the same unexplained enrichment of the same five compounds. Duplicate samples collected during the third and fourth rounds (Table 6-2) indicated comparably good precision, with average RPDs of 10% for m,p-xylene and o-xylene; and from 14% to 31% for ethylbenzene and the trimethylbenzene isomers.

**Table 6-3. Sampling Dates and Sites of Second Round VOC Anomalies**

Date	Site	p,m-Xylene Concentration (ppb-v) in Sample	Average p,m-Xylene Concentration (ppb-v) at Site Excluding Outlier(s)
2/26/09	Jaycee Park	0.253	0.057
2/27/09	Old Fort Worth Road	0.332	0.055
2/27/09	Tayman Drive	0.213	0.042
2/28/09	Mountain Peak Elem. School	0.747	0.031
3/2/09	Jaycee Park	0.246	0.057

Table 6-4 gives the canister field blank results for VOCs detected in at least one of four field blanks collected in this study. The field blanks consisted of humid ultrapure cylinder air, drawn through a sampling system inlet and internal plumbing where a slipstream was pulled into an evacuated canister for three hours at a regulated rate. Five of the 60 target VOCs were detected in the first round blank, all at levels less than 0.1 ppb-v. Seven target VOCs were detected in the second round blank, also at levels below 0.1 ppb. Benzene, the only core VOC found in either of the first two VOC field blanks, had levels below 0.03 ppb-v in both cases.

The third-round field blank did not resemble the first two. Twenty-four target species were detected, including seven of the core 13. A fingerprint plot similar to the one in Figure 6-2 resembled diluted ambient air, suggesting a breach in the blanking apparatus or a canister leak. At the end of the fourth round, two more blanks were collected. One was drawn through the sampling system just as the first three had been. The other fourth-round blank was collected by bypassing the sampling system and drawing humid ultrapure air directly into a cleaned evacuated canister. Similar levels of impurities were measured in both samples, indicating that a component of the blanking apparatus (perhaps the regulator or the water-filled canister used to humidify the air) was a source of the contamination. The fourth-round blanks were repeated at Tayman Dr. using a new zero-air supply and regulator prior to dismantling the site. This time, the results were similar to the field blank results from the first two sampling rounds.

**Table 6-4. VOC Field Blank Results in PPB-V**

Analyte	Triangle Park 12/12/08	Mountain Peak Elementary School 3/2/09	Jaycee Park 5/10/09	Tayman Drive 7/8/09	Apparatus Blank 7/8/09	Tayman Drive 8/8/09	Apparatus Blank 8/8/09	MDL
Benzene	0.027	0.022	0.156	0.112	0.129	0.026	0.042	0.006
Carbon Tetrachloride	ND	ND	0.006	0.036	0.016	ND	ND	0.002
Chloroform	ND	ND	0.007	ND	0.179	ND	ND	0.002
Dichloromethane	ND	ND	0.066	0.025	0.071	ND	ND	0.008
1,2,4-Trimethylbenzene	ND	ND	0.008	0.01	0.01	ND	0.004	0.005
1,3,5-Trimethylbenzene	ND	ND	0.006	0.004	0.005	ND	0.002	0.004
m,p-Xylene	ND	ND	0.014	0.012	0.016	ND	0.006	0.007
1,1,1-Trichloroethane	ND	ND	0.008	ND	ND	ND	ND	0.001
Acetonitrile	ND	ND	0.068	0.081	0.197	ND	ND	0.058
Acetylene	0.064	0.033	0.243	0.084	0.084	0.01	0.064	0.012
Acrolein	ND	ND	0.248	8.67	0.829	ND	ND	0.015
Acrylonitrile	ND	ND	ND	3.55	3.72	ND	ND	0.015
Bromomethane	ND	ND	ND	0.045	0.03	ND	ND	0.002
Carbon Disulfide	ND	ND	0.092	0.665	0.195	0.024	0.032	0.002
Chloroethane	ND	ND	ND	0.018	0.119	ND	ND	0.002
Chloromethane	ND	0.011	0.079	0.329	0.687	0.013	0.023	0.006
Dichlorodifluoromethane	ND	ND	0.011	0.147	0.022	ND	ND	0.004
Ethylbenzene	0.006	ND	0.008	0.008	0.01	ND	0.004	0.004
Methyl Ethyl Ketone	ND	0.084	0.356	0.544	0.547	0.081	0.225	0.039
Methyl Isobutyl Ketone	ND	ND	0.015	0.038	0.035	0.007	0.021	0.005
Methyl Methacrylate	ND	ND	ND	0.066	ND	ND	ND	0.028
n-Octane	ND	ND	ND	0.006	0.01	ND	ND	0.004
o-Xylene	ND	ND	0.007	0.008	0.01	ND	ND	0.003
p-Dichlorobenzene	ND	ND	0.006	ND	0.002	ND	ND	0.004
Propylene	0.072	0.056	0.112	0.326	0.261	0.11	0.181	0.037
Styrene	ND	ND	0.008	0.012	0.011	ND	ND	0.003
Toluene	0.018	0.025	0.031	0.038	0.05	0.002	0.012	0.008
Trichlorofluoromethane	ND	ND	0.008	0.068	0.05	ND	0.004	0.002
Trichlorotrifluoroethane	ND	0.036	0.046	0.029	0.006	ND	0.004	0.003

## 6.2 PM<sub>10</sub> Metals by EPA Method IO-3.5

One hundred percent of the PM<sub>10</sub> high volume samples that were planned for this study were collected and analyzed for metals by EPA Method IO-3.5 (Table 6-5).

**Table 6-5. PM<sub>10</sub> Metals Data Completeness**

Sampling Round	Old Fort Worth Road		Wyatt Road		Jaycee Park		Tayman Drive		Triangle Park		Mt. Peak Elem. School <sup>b</sup>		Vitovsky Elem. School		Midlothian High School	
	No. <sup>1</sup>	% <sup>2</sup>	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Round 1	20	100	20	100	20	100	20	100	5	100						
Round 2	20	100	20	100	20	100	20	100			5	100				
Round 3	20	100	20	100	20	100	20	100					5	100		
Round 4	20	100	20	100	20	100	20	100							5	100
All	80	100	80	100	80	100	80	100	5	100	5	100	5	100	5	100

<sup>1</sup> Number of samples collected and analyzed

<sup>2</sup> Number of samples collected and analyze divided by the number of samples planned (times 100%)

The PM<sub>10</sub> sampling systems were audited for flow rate accuracy before each sampling round using a certified volumetric flow control orifice. Each time, the measured flow rates were all found to be within  $\pm 7\%$  of the audit flow rate and within  $\pm 10\%$  of the sampler design flow rate (i.e., the optimum flow rate for capturing particulate matter in the PM<sub>10</sub> size range).

Table 6-6 gives the field duplicate results for PM<sub>10</sub> metals analyzed by Method IO-3.5. The measurement precision, expressed as the average RPD from five duplicate sample sets, was within 30% for 16 of the 21 metals. The exceptions were copper, zinc, mercury, cadmium, and silver. Only silver had an average RPD greater than 40%. All the PM<sub>10</sub> metals duplicates were collected at the Wyatt Road site.

Table 6-7 gives the field blank results for PM<sub>10</sub> metals analyzed by Method IO-3.5. The type of quartz fiber filters used in the high volume samplers typically has detectable background levels of metals (EPA, 2005) and in this study all the target species were detected in at least two of the four field blanks. Field blank concentrations exceeded five times the MDL for eight of the target species: barium, chromium, copper, lead, manganese, molybdenum, silver, and vanadium. The average ambient concentrations for three of those metals (chromium, molybdenum, and silver) were less than five times the average blank, suggesting that a significant fraction of the reported concentrations for some samples may be attributed to the filter background.

**Table 6-6. PM<sub>10</sub> Metals Duplicate Sample Results in Nanograms per Cubic Meter**

Analyte	8-Dec-09		26-Feb		28-Feb		5-May-09		4-Jul-09		Avg. RPD %
	Sample 1 <sup>1</sup>	Sample 2 <sup>2</sup>	Sample 1	Sample 2							
Thorium	0.027	0.022	0.041	0.039	0.022	0.021	0.026	0.029	0.03	0.03	8%
Barium	12.4	13.2	17.6	18	10.1	11.7	7.64	8.54	18.1	20.2	9%
Uranium	0.045	0.044	0.059	0.06	0.036	0.046	0.022	0.025	0.039	0.037	9%
Selenium	1.24	1.46	0.734	0.677	0.259	0.301	0.965	1.02	0.676	0.687	9%
Aluminum	303	291	386	402	120	169	187	200	306	313	10%
Vanadium	3.61	3.95	4.57	4.46	0.733	1	2.21	2.39	2.15	2.2	10%
Chromium	7.96	8.39	10.1	10.6	2.55	3.54	4.74	5.13	4.71	4.8	10%
Thallium	0.011	0.015	0.018	0.015	0.007	0.007	0.015	0.015	ND	ND	12%
Manganese	120	135	152	151	21.1	33.7	36.9	36.5	43.5	45.6	13%
Beryllium	0.013	0.012	0.016	0.017	0.008	0.012	0.009	0.01	0.007	0.008	16%
Cobalt	0.22	0.3	0.301	0.298	0.13	0.177	0.125	0.14	0.228	0.253	17%
Antimony	0.663	1.05	0.867	0.778	0.132	0.174	0.429	0.469	0.482	0.532	20%
Arsenic	1.48	2.72	2.09	1.79	0.282	0.354	0.929	0.99	0.614	0.618	21%
Molybdenum	1.45	2.59	2.96	2.54	0.253	0.314	0.562	0.544	0.772	0.869	22%
Nickel	2.91	4.18	3.82	3.77	0.739	1.12	1.36	1.3	2.08	2.96	24%
Lead	24.6	46.2	74.1	68.2	3.42	4.34	6.74	4.93	11.7	12.3	26%
Copper	29.4	50.5	41.4	36.2	4.89	5.87	15.8	10.2	23.6	16.9	32%
Zinc	277	457	602	557	18.4	34.6	89.4	56.3	53.3	54.8	33%
Mercury	0.276	0.326	0.655	0.424	0.023	0.027	0.068	0.033	0.024	0.031	34%
Cadmium	0.751	1.2	1.89	1.76	0.087	0.14	0.618	0.266	0.161	0.187	39%
Silver	0.033	0.138	0.294	0.251	0.025	0.016	ND	ND	ND	0.0003	61%

<sup>1</sup> Primary sample

<sup>2</sup> Secondary (duplicate) sample

**Table 6-7. PM<sub>10</sub> Metals Field Blank Results in Nanograms per Cubic Meter**

Analyte	12/10/08	3/2/09	5/5/09	7/4/09	Average Field Blank	MDL	Average Ambient Level (All Sites)
Aluminum	13.9	16.2	22	15.4	16.875	3.9	113
Antimony	0.015	0.011	0.093	0.011	0.033	0.007	0.451
Arsenic	0.011	0.009	0.015	ND	0.012	0.009	0.580
Barium	1.71	0.802	1.11	0.759	1.095	0.148	9.45
Beryllium	ND	0.001	0.0006	ND	0.001	0.002	0.006
Cadmium	0.01	0.007	0.082	0.022	0.030	0.029	0.174
Chromium	1.61	1.74	1.98	1.74	1.768	0.343	2.48
Cobalt	0.015	0.01	0.011	0.008	0.011	0.006	0.106
Copper	0.88	0.685	0.903	0.831	0.825	0.124	14.99
Lead	0.15	0.196	0.256	0.176	0.195	0.006	4.06
Manganese	0.576	0.385	0.778	0.34	0.520	0.057	15.80
Mercury	0.005	0.023	0.005	0.003	0.009	0.017	0.076
Molybdenum	0.127	0.107	0.121	0.103	0.115	0.012	0.383
Nickel	0.289	0.253	0.309	0.272	0.281	0.132	1.12
Selenium	0.019	0.011	0.003	0.031	0.016	0.013	0.731
Silver	0.068	0.042	ND	ND	0.055	0.008	0.008
Thallium	0.0001	0.0001	0.0005	ND	0.000	0.0009	0.010
Thorium	0.001	0.004	0.003	0.002	0.003	0.0008	0.017
Uranium	0.005	0.005	0.004	0.004	0.005	0.001	0.023
Vanadium	0.029	0.018	0.044	ND	0.030	0.006	1.16
Zinc	12.2	2.24	7.79	2.35	6.145	3.01	113

### 6.3 Hexavalent Chromium

One hundred percent of the Cr<sup>6+</sup> samples that were planned for this study were collected and analyzed (Table 6-8); however, a procedural mistake in sample documentation prevented the laboratory from positively matching the third-round Cr<sup>6+</sup> measurement results with the specific dates on which the samples were collected. The mistake occurred when the Chain-of-Custody Form (COC) that documents the sampling date and site was removed from each solitary sample container by laboratory receiving personnel without any of the sampling dates ever being copied from the COCs. Since the sample containers were all labeled with site identification codes, the location at which each sample was collected is known and five valid daily Cr<sup>6+</sup> measurement results were obtained for each site despite the error (though the order in which the samples were collected at each site is indeterminate).

**Table 6-8. Hexavalent Chromium Data Completeness**

Sampling Round	Old Fort Worth Road		Wyatt Road		Jaycee Park		Tayman Drive		Triangle Park		Mt. Peak Elem. School <sup>b</sup>		Vitovsky Elem. School		Midlothian High School	
	No. <sup>1</sup>	% <sup>2</sup>	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Round 1	20	100	20	100	20	100	20	100	5	100						
Round 2	20	100	20	100	20	100	20	100			5	100				
Round 3	20	100	20	100	20	100	20	100					5	100		
Round 4	20	100	20	100	20	100	20	100							5	100
All	80	100	80	100	80	100	80	100	5	100	5	100	5	100	5	100

<sup>1</sup> Number of samples collected and analyzed

<sup>2</sup> Number of samples collected and analyze divided by the number of samples planned (times 100%)

The precision estimate for Cr<sup>6+</sup> measurements is 12%, base on the average RPD from three sets of duplicate samples (Table 6-9). An additional duplicate sample set was collected during the third sampling round but the primary and secondary samples cannot be matched because of the sample identification problem described above. Four Cr<sup>6+</sup> field blanks were collected and analyzed and the results were all non-detects.

**Table 6-9. Hexavalent Chromium Duplicate Sample Results**

Date	Primary Sample Result (ng/m <sup>3</sup> )	Secondary Sample Result (ng/m <sup>3</sup> )	RPD
12/8/09	0.379	0.359	5%
2/26/09	0.0609	0.0686	12%
7/4/09	0.0389	0.0473	19%
Average			12%

The Cr<sup>6+</sup> sampling systems were audited for flow rate accuracy before each sampling round using an NIST-traceable volumetric flow meter. Each time, the flow rates were all found to be within  $\pm 10\%$  of the sampler design flow rate.

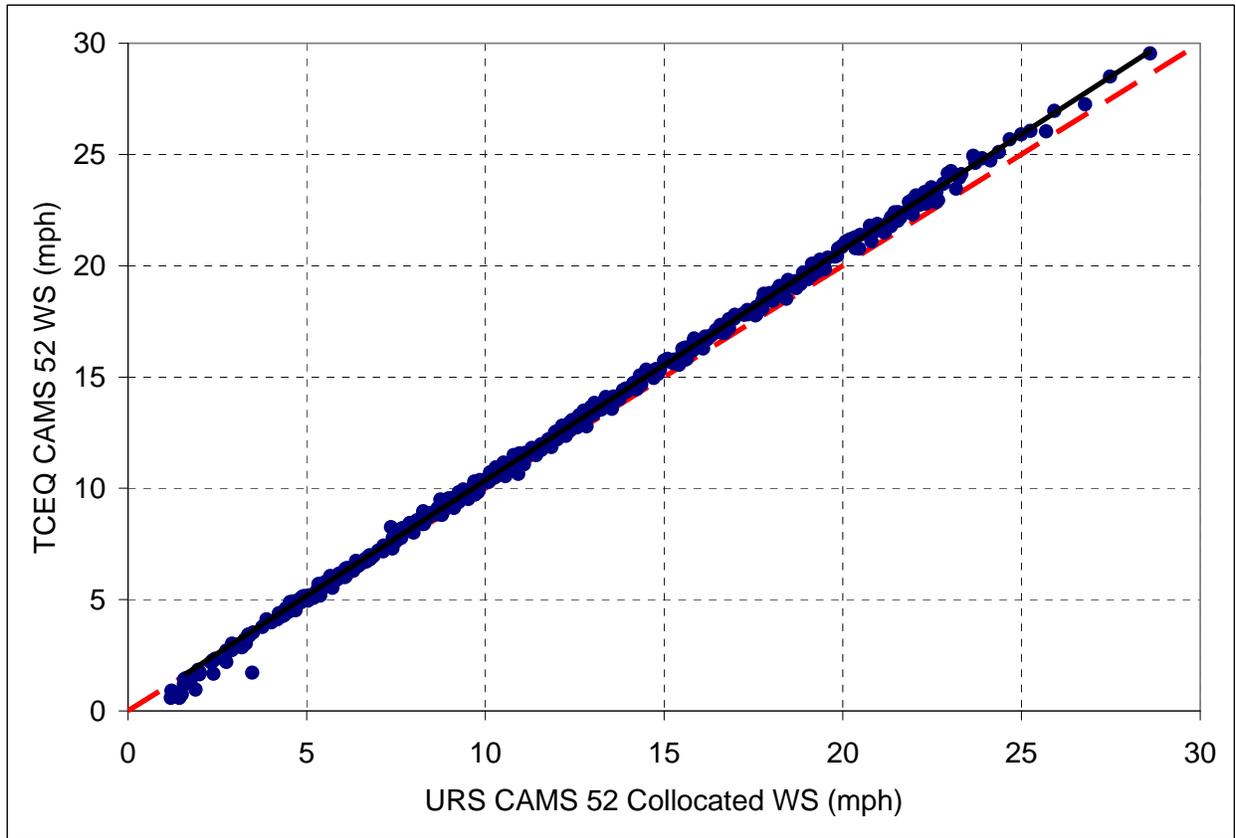
#### **6.4 Weather Parameters**

Table 6-1 gives the data completeness for meteorological parameters. The only significant period of downtime was on December 6 and 7, 2008, at Wyatt Road when 35 hours of data were lost at the start of the first sampling round due to a data logger error. 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.

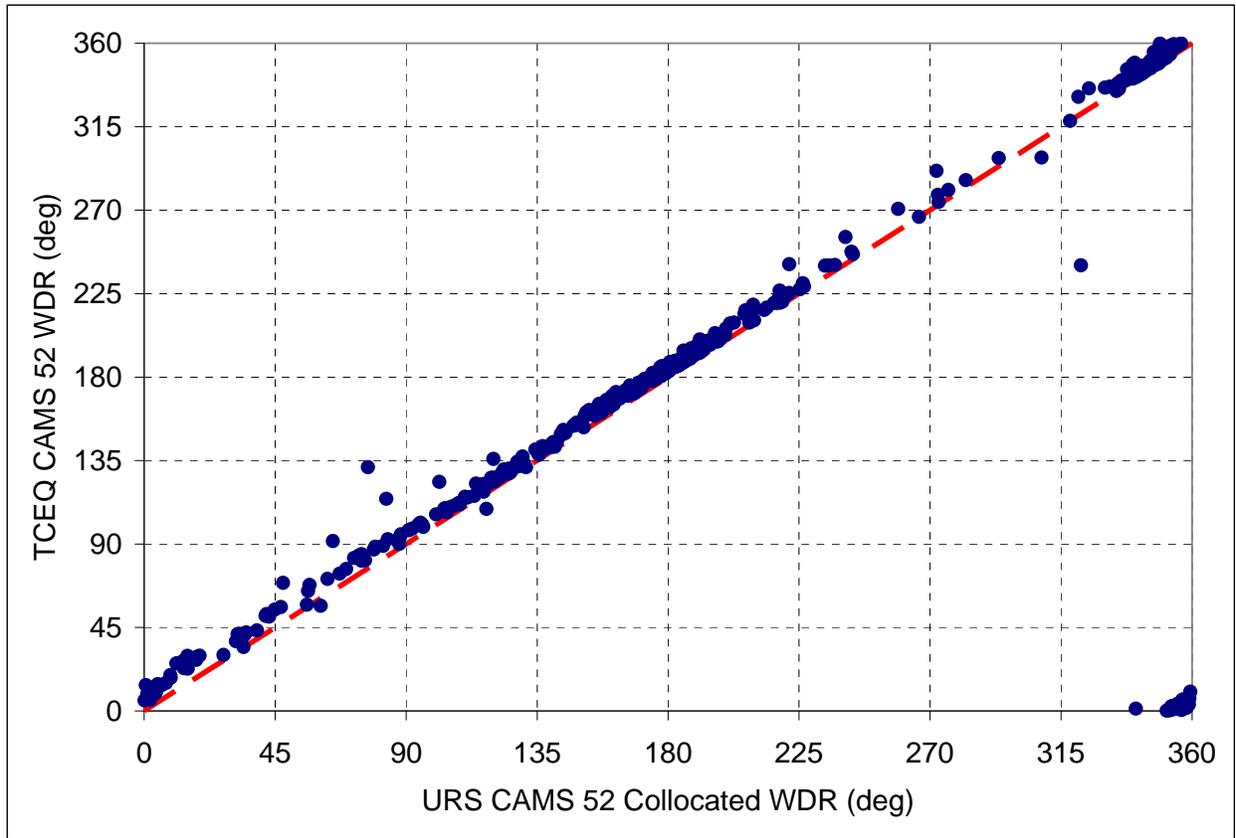
Performance audits of the weather systems were conducted before the start of each sampling round to test measurement accuracy. The audits were conducted by comparing field measurements to audit reference equipment measurements. No significant problems were identified. Additionally, wind speed and wind direction measurements at CAMS 52 agreed very well with measurements recorded by TCEQ at the same site (Figures 6-2 and 6-3).

**Table 6-10. Weather Parameter Data Capture**

Date	First Round Completeness (WS, WD, T, P, Rain)				
	Old Fort Worth Road	Wyatt Road	Triangle Park	Jaycee Park	Tayman Drive
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%
Round 1	100%	71%	100%	100%	100%
	Second Round Completeness (WS, WD, T, P, Rain)				
	Old Fort Worth Road	Wyatt Road	Mt. Peak Elem. School	Jaycee Park	Tayman Drive
26-Feb-09	100%	100%	100%	100%	100%
27-Feb-09	100%	100%	100%	100%	100%
28-Feb-09	100%	100%	100%	100%	100%
1-Mar-09	100%	100%	100%	100%	100%
1-Mar-09	100%	100%	100%	100%	100%
Round 2	100%	100%	100%	100%	100%
	Third Round Completeness (WS, WD, T, P, Rain)				
	Old Fort Worth Road	Wyatt Road	Vitovsky Elementary School	Jaycee Park	Tayman Drive
5-May-09	100%	100%	100%	100%	100%
6-May-09	100%	100%	100%	100%	100%
7-May-09	100%	100%	100%	100%	100%
8-May-09	100%	100%	100%	100%	100%
9-May-09	100%	100%	100%	100%	100%
Round 3	100%	100%	100%	100%	100%
	Fourth Round Completeness (WS, WD, T, P, Rain)				
	Old Fort Worth Road	Wyatt Road	Midlothian High School	Jaycee Park	Tayman Drive
3-Jul-09	100%	100%	100%	100%	100%
4-Jul-09	100%	100%	100%	100%	100%
5-Jul-09	100%	100%	100%	100%	100%
6-Jul-09	100%	100%	100%	100%	96%
7-Jul-09	100%	100%	100%	100%	100%
Round 4	100%	100%	100%	100%	99%



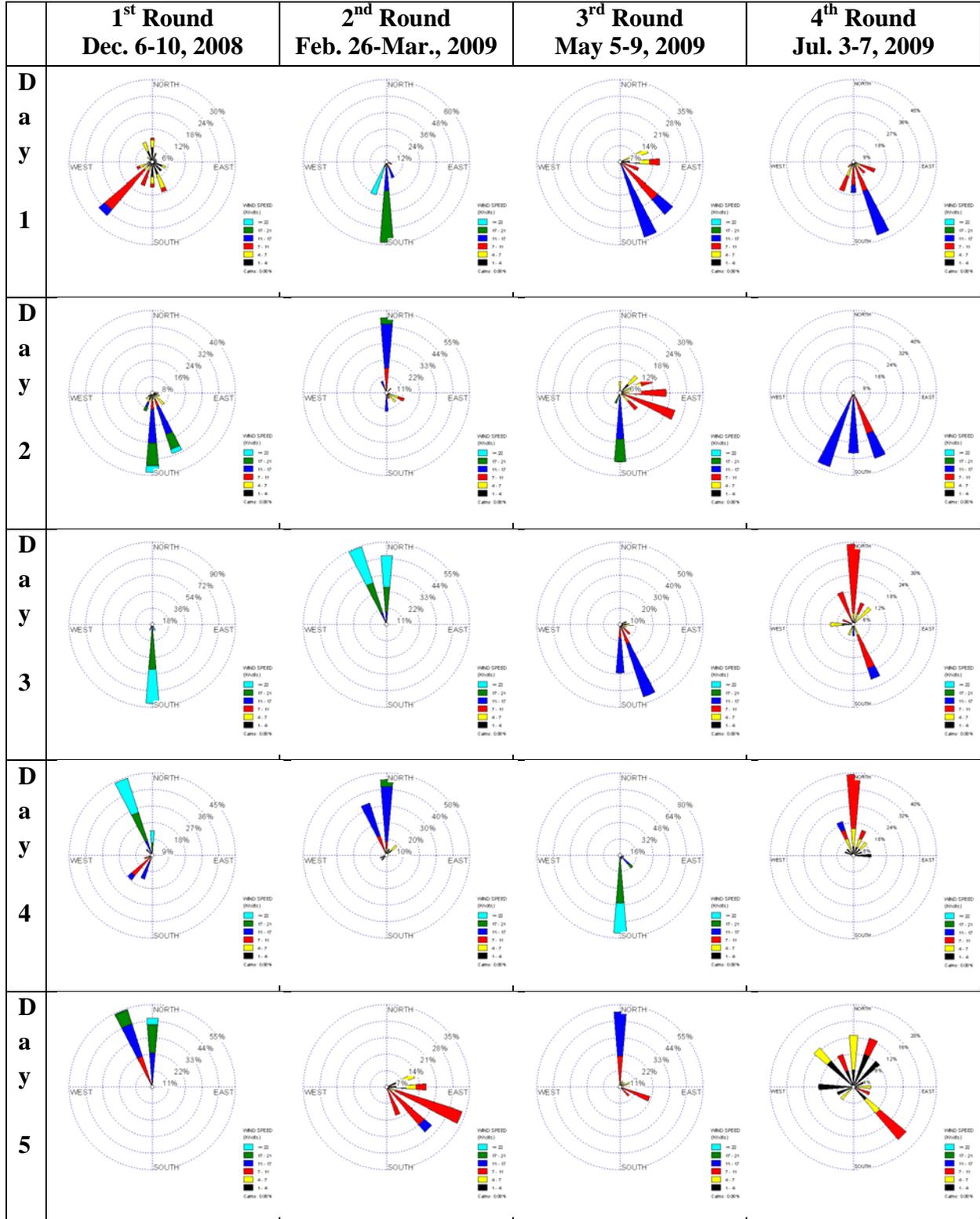
**Figure 6-2. Comparison of URS and TCEQ Wind Speed Measurements at CAMS 52**



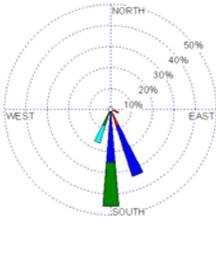
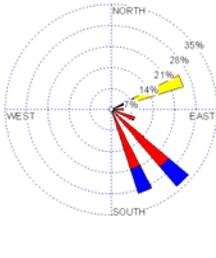
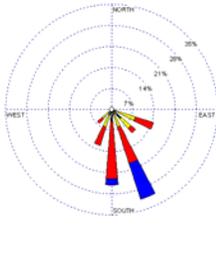
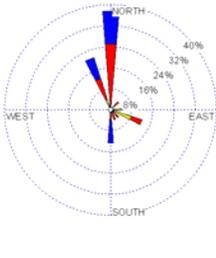
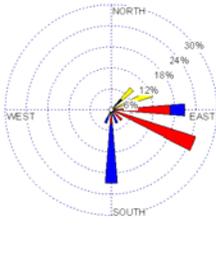
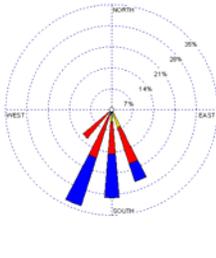
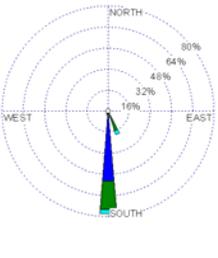
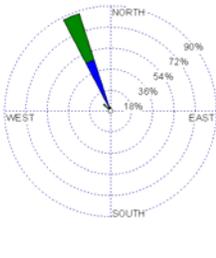
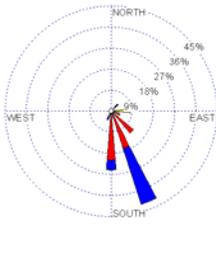
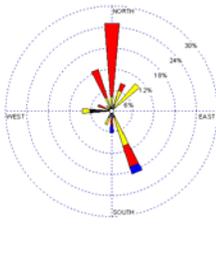
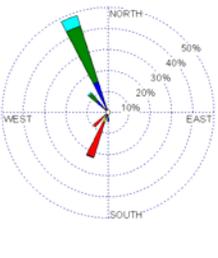
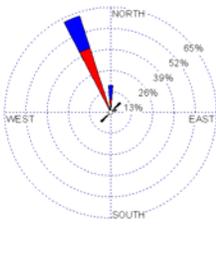
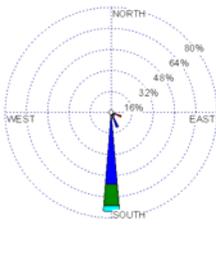
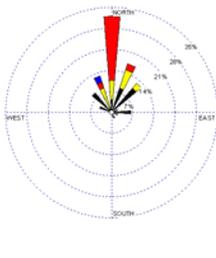
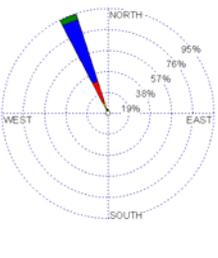
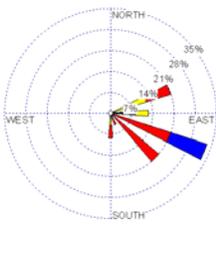
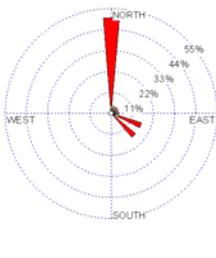
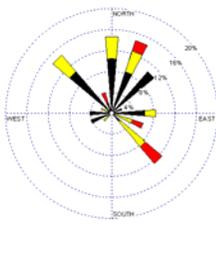
**Figure 6-3. Comparison of URS and TCEQ Wind Direction Measurements at CAMS 52**

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

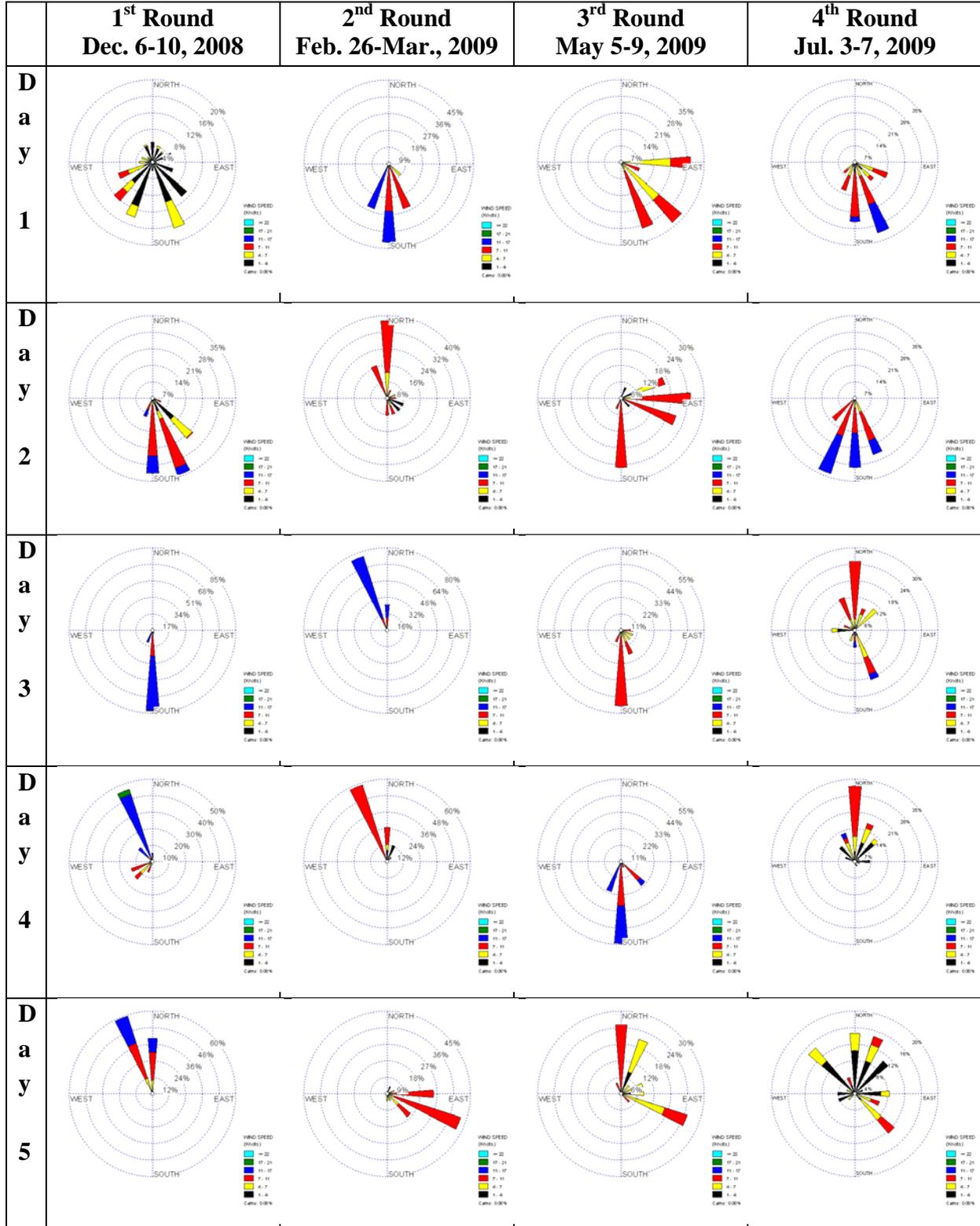
### CAMS 52 Collocated (Old Fort Worth Road)



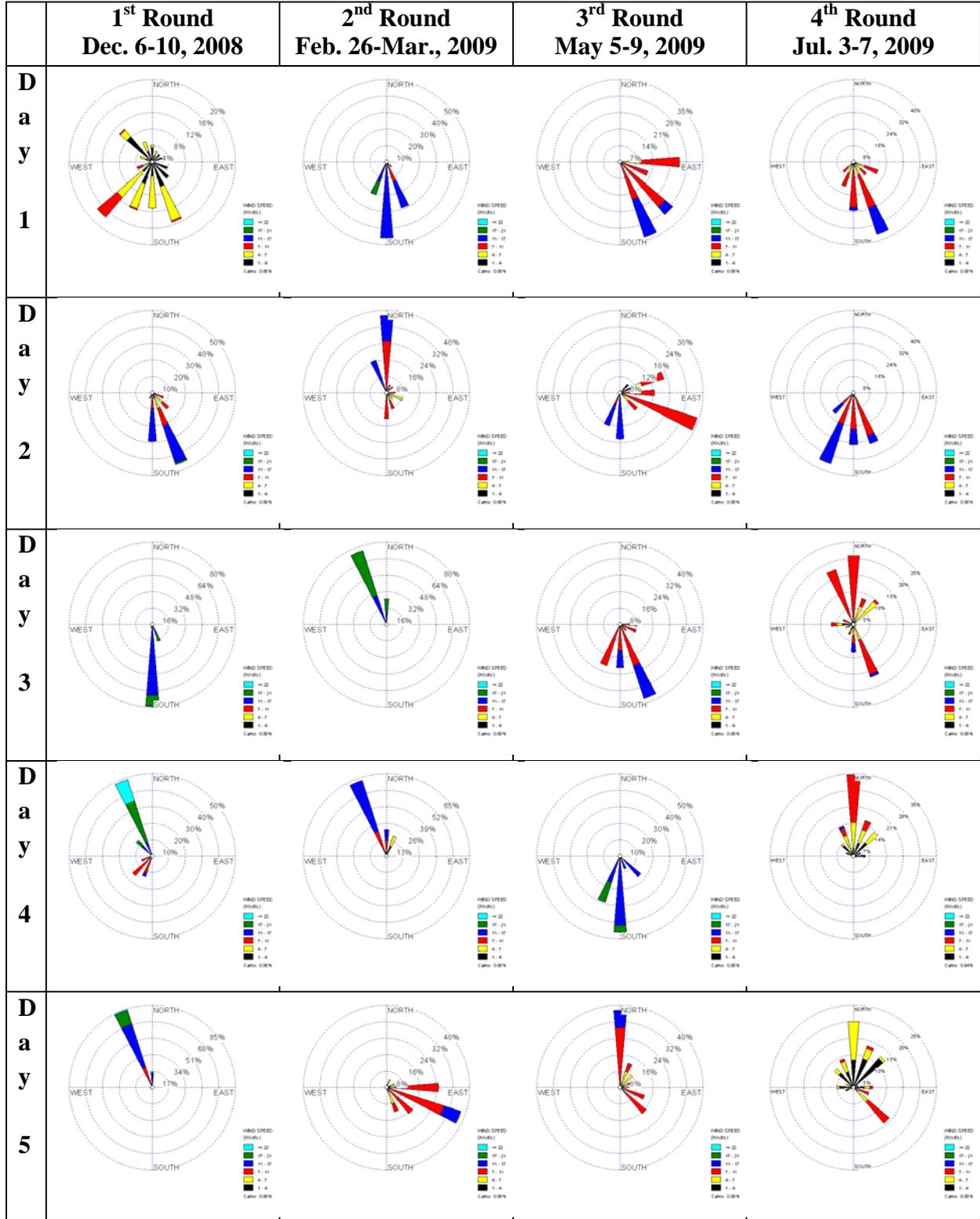
# Wyatt Road

	<b>1<sup>st</sup> Round Dec. 6-10, 2008</b>	<b>2<sup>nd</sup> Round Feb. 26-Mar., 2009</b>	<b>3<sup>rd</sup> Round May 5-9, 2009</b>	<b>4<sup>th</sup> Round Jul. 3-7, 2009</b>
<b>D a y 1</b>	No meteorological data available for 06-Dec-08			
<b>D a y 2</b>	Insufficient data capture for 07-Dec-08			
<b>D a y 3</b>				
<b>D a y 4</b>				
<b>D a y 5</b>				

# Jaycee Park



# Tayman Drive



## Sequential Sites

