APPENDIX
ARB REPORT

State of California
California Environmental Protection Agency
Air Resources Board

Report to the Office of Environmental Health Hazard Assessment

Kettleman City Air Quality Assessment

December 2010

Table of Contents

		Page
Preface		2
1.0	Background	3
2.0	Sampling Locations	3
3.0	Target Analytes, Sample Duration and Frequency	3
4.0	Additional Assessment	5
5.0	Sampling and Analysis Methods	6
6.0	Quality Control	8
7.0	Findings	8
7.1	Summary of Monitoring Results	8
7.2	Air Sample Results Near Drinking Water Well Treatment Units	17
7.3	Interpretation of Results with Meteorological Data	18
7.4	Diesel Exhaust Exposure Assessment	19
7.5	Historical Monitoring Results at Chemical Waste Management Kettleman Hills Facility	19
7.6	Comparison of ARB and Chemical Waste Management Monitoring Results	21
8.0	Further Action	22
Appendix A	- Locations and Photographs of Monitoring Sites	23
Appendix B	- Evaluation of Monitoring Data Quality	28
Appendix C	- Monitoring Results	37
Appendix D	- Regional Diesel Exhaust Exposure Assessment	69
Appendix E	- Local Diesel Exhaust Exposure Assessment	72
Appendix F	- Historical Monitoring Results at Chemical Waste Management Kettleman Hills Facility	85
Appendix G	- Comparison of ARB and Chemical Waste Management Monitoring Results	90

Preface

The results of ambient air measurements in Kettleman City, and upwind and downwind of the Chemical Waste Management Kettleman Hills hazardous waste management facility are presented in this report. Air concentrations are presented in units of mass of a chemical per cubic meter of sampled air, referred to as mass per volume. Due to substantial differences in the air concentrations of different groups of chemicals, different units are used to report the air concentrations of these different groups of chemicals as follows:

- Volatile organic compounds (VOCs) are reported in units of micrograms of a VOC per cubic meter of sampled air ($\mu g/m^3$). One microgram is 1×10^{-6} grams.
- Metals are reported in units of nanograms of a metal per cubic meter of sampled air (ng/m^3). One nanogram is 1×10^{-9} grams.
- Polychlorinated biphenyl (PCB), dioxin and furan congeners are reported in units of femtograms of a chemical per cubic meter of sampled air (fg/m^3). One femtogram is 1×10^{-15} grams.

1.0 Background

In the spring of 2010, the California Environmental Protection Agency (Cal/EPA) initiated an environmental assessment of the Kings County town of Kettleman City, to investigate potential causes of the increased numbers of birth defects that have been documented in the town since 2007. Cal/EPA's community exposure assessment plan included air, soil and water sampling for several environmental contaminants that have the potential to cause birth defects. As a part of this assessment, the Air Resources Board (ARB) was requested to conduct air sampling and related air quality assessment in Kettleman City.

2.0 Sampling Locations

The ARB Monitoring and Laboratory Division (MLD) conducted ambient air monitoring at three monitoring sites (see Appendix A for locations and photographs of the monitoring sites):

1. Kettleman City Elementary School (the "School") is located at 701 General Petroleum Avenue, Kettleman City. ARB installed an ambient air monitoring trailer on the tennis courts located on the school grounds near the corner of General Petroleum Avenue and 6th Street. The trailer was outfitted with ambient air monitoring instruments. (Note: trailers are commonly used as air monitoring instrument shelters for temperature-sensitive instruments.)

2. Chemical Waste Management Kettleman Hills hazardous waste management facility (the "Facility") is located 3.5 miles to the southwest of Kettleman City. ARB conducted ambient air monitoring at two locations:

    a) Downwind Monitoring Station: This site was located southeast of the Facility, collocated (situated side-by-side) with the Facility's existing downwind monitoring site #2.
    b) Upwind Monitoring Station: This site was located northwest of the Facility, collocated with the Facility's existing upwind monitoring site.

    .

3.0 Target Analytes, Sample Duration and Frequency

Specific metals, volatile organic compounds (VOCs), sulfur dioxide, and polychlorinated biphenyl (PCB), dioxin and furan congeners were selected for investigation by the Office of Environmental Health Hazard Assessment (OEHHA) and are analytes for which ARB has sampling and/or analytical capability. This list was identified in the Cal/EPA Kettleman City Community Exposure Assessment Work Plan (the "Work Plan"), dated June 17, 2010. A list of these target analytes is provided in Table 1. ARB also collected data for

several non-target analytes (compounds not associated with birth defects), including two criteria air pollutants: nitrogen dioxide and fine particulate matter (particles with a diameter of 2.5 microns and smaller, referred to as PM2.5). Criteria air pollutants have established ambient air quality standards and include carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, respirable particulate matter (PM10), and PM2.5. (Note: no monitoring was requested for the criteria air pollutants ozone and carbon monoxide.)

Table 1. Target Analytes

Metals	VOCs	PCB Congeners [Congener # in ( )]	Dioxin/ Furan Congeners
Arsenic	Benzene	3,3',4,4'-TeCB (77)	**Dioxins**
Cadmium	Toluene	3,4,4',5-TeCB (81)	2,3,7,8-TCDD
Lead	Ethyl Benzene	2,3,3',4,4'-PeCB (105)	1,2,3,7,8-PeCDD
Nickel	Carbon Disulfide	2,3,4,4',5-PeCB (114)	1,2,3,4,7,8-HxCDD
Hexavalent Chromium		2,3',4,4',5-PeCB (118)	1,2,3,6,7,8-HxCDD
	Other	2',3,4,4',5-PeCB (123)	1,2,3,7,8,9-HxCDD
	Sulfur Dioxide	3,3',4,4',5-PeCB (126)	1,2,3,4,6,7,8-HpCDD
		2,3,3',4,4',5-HxCB (156)	OCDD
		2,3,3',4,4',5'-HxCB (157)	**Furans**
		2,3',4,4',5,5'-HxCB (167)	2,3,7,8-TCDF
		3,3',4,4',5,5'-HxCB (169)	1,2,3,7,8-PeCDF
		2,3,3',4,4',5,5'-HpCB (189)	2,3,4,7,8-PeCDF
			1,2,3,4,7,8-HxCDF
			1,2,3,6,7,8-HxCDF
			1,2,3,7,8,9-HxCDF
			2,3,4,6,7,8-HxCDF
			1,2,3,4,6,7,8-HpCDF
			1,2,3,4,7,8,9-HpCDF
			OCDF

Ambient air monitoring was conducted from mid-June through late August or early September 2010, depending on the compound. For metals and VOCs, 24-hour samples were collected twice weekly from mid-June through August 25. The sampling duration for PCB, dioxin and furan congeners was 28 days in length, for a total of three sampling periods between mid-June and September 6.

(The extended sampling duration for PCB, dioxin and furan congeners allowed for more sensitive detections.) For sulfur dioxide, PM2.5 and nitrogen dioxide, continuous analyzers were operated that measured hourly air concentrations from mid-June through September 6.

Laboratory analyses for metals and VOCs were performed by the ARB-MLD. The United States Environmental Protection Agency's (U.S. EPA) Environmental Chemistry Laboratory in Mississippi conducted the analyses for PCB, dioxin and furan congeners.

All data are being provided to OEHHA for interpretation with regard to potential health implications. Data on metals and VOCs from other locations in the San Joaquin Valley are included for comparison. Data have also been evaluated regarding seasonal differences at other monitoring sites in the San Joaquin Valley to assess whether there may be seasonal differences in Kettleman City.

Data on non-target metals and VOCs were collected concurrently as part of ARB's sampling and analysis methods. A list of these non-target metals and VOCs was provided in Appendix 3.1 of the Work Plan. These other metals and VOCs have not been associated with birth defects. For informational purposes, ARB is providing these additional data to OEHHA.

4.0 Additional Assessment

Due to community concerns, ARB conducted two additional types of air assessment:

1) ARB assessed the public's exposure to benzene in the air near two drinking water wells in Kettleman City. Treatment units are connected to the well heads of these two drinking water wells to remove benzene from the drinking water prior to distribution. Air samples were collected downwind of these units for subsequent analysis, to assess potential public exposure from benzene emitted into the air by the treatment units. One air sample was collected near each treatment unit in mid-July, early August, and late August 2010.

2) ARB assessed the public's exposure to diesel exhaust in Kettleman City. Diesel exhaust contributes to airborne PM2.5 and consists of a mixture of many chemical compounds. Due to this complex mixture, there is no method to directly analyze ambient air samples for diesel exhaust. Therefore, ARB used two approaches previously used by ARB in other parts of the state. To estimate the regional exposure to diesel particulate matter (DPM), the population-weighted average concentration of DPM was estimated using the population-weighted average air concentration of nitrogen oxides (NO_x) in Kings County over a three-year period (2006-2008), scaled based on the average ratio of DPM emissions to NO_x emissions. To estimate exposure to DPM from local sources in Kettleman City, ARB used modeling of emissions from trucks and other diesel

sources. ARB has used this method to estimate local exposure to diesel exhaust at ports, rail yards, freeways, and warehouse distribution centers.

5.0 Sampling and Analysis Methods

Air samples for the target and non-target analytes were collected using the following monitoring equipment:

- VOCs at the School - Xonteck Model 910PC toxic gaseous sampler.
- VOCs at the upwind and downwind Facility monitoring sites - Tisch 323 samplers, due to a lack of spare Xonteck samplers (a Tisch 323 sampler was also located at the School for comparison with the Xonteck results).
- Metals - BGI PQ100 portable programmable mass flow controlled samplers.
- PCB, dioxin and furan congeners – Themo Andersen and Tisch polyurethane foam (PUF) samplers.

All sample inlet heights were approximately six feet above each respective sampling platform.

The Xonteck 910PC and Tisch 323 samplers were used to collect air samples in stainless steel canisters. The airflow to the canister was uniformly maintained in order to fill the canister to a sufficient pressure (10 to 16 pounds per square inch) for laboratory analysis of VOCs as well as to obtain a representative sample over a 24-hour period. Air samples were analyzed by direct injection, Gas Chromatography/Mass Spectrometry (GC/MS).

The BGI PQ100 mass flow controlled sampler was used to collect ambient air samples of total suspended particulates (TSP), which were then analyzed for metals. Teflon filters [37 millimeters (mm) in diameter] were used for collecting samples with an air flow rate of approximately 12 standard liters per minute (slpm). Air samples were acid extracted and analyzed by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS).

A second BGI PQ100 was used to collect TSP for hexavalent chromium analysis. Bicarbonate impregnated 37 mm cellulose filters were used for collecting the samples, with an air flow rate of approximately 12 slpm. To achieve limits of detection (LOD) similar to ARB's standard methodology, seven to nine filters were composited for water extraction and subsequent analysis by Ion Chromatography.

For sampling of PCB, dioxin and furan congeners, two types of PUF samplers were used: the Thermo Andersen PUF Sampler and the Tisch PUF Sampler. (Note: ARB did not have enough PUF samplers of the same type, so two types of samplers were used.) Both consist of a sampling head which is designed to

hold a circular 4-inch-diameter quartz-fiber filter (QFF) and a 2.5-inch-diameter by 5-inch-long cylindrical glass sample cartridge containing a 3-inch polyurethane foam (PUF) sorbent trap that fits snugly into the cartridge. Particulates in the sample stream were collected on the filter, while any vapors that passed through the filter were collected by the PUF sorbent. The flow rate was set at approximately 240 slpm. Samples were collected for five to six days, 24 hours per day. Samplers were then turned off to remove and replace the QFF with a new one. The PUF remained in place. Sampling resumed for another five to six days followed by a filter change. There were a total of four QFFs collected along with one PUF over the 28-day sampling period that makes up a single sample. The four QFFs and one PUF were composited for a single analysis. Air samples were extracted and analyzed by High Resolution GC/MS.

Air sampling for sulfur dioxide, PM2.5 and nitrogen dioxide was conducted only at the School (these analyzers are temperature-sensitive and needed to be housed inside of the air monitoring trailer). These analyzers are described in the following paragraphs.

Sulfur dioxide (SO_2) was measured using a continuous SO_2 analyzer (Thermo 43C). The principle measurement method is based on ultraviolet (UV) fluorescence. SO_2 molecules become excited when exposed to photons of the appropriate UV wavelength (approximately 214 nanometers, nm). As the excited SO_2 molecules release energy, the wavelength of fluoresced light (approximately 330 nm) is monitored. The SO_2 concentration is directly related to the fluoresced light emitted within the sample chamber.

PM2.5 was measured using a continuous PM2.5 sampler (Met One Beta-Attenuation Monitor, BAM-1020). The BAM-1020 automatically measures and records airborne fine particulate concentrations using beta ray attenuation. A small carbon 14 source emits a constant flow of high-energy electrons known as beta particles inside the sampler. These beta particles are detected and counted by a sensitive scintillation counter (photomultiplier tube). An external pump pulls a measured amount of ambient air through a filter tape. The measured differential particulate loading on the filter tape is calculated into mass.

Nitrogen dioxide (NO_2) was measured using a continuous NO_x analyzer (Teledyne – Advanced Pollution Instrumentation model 200A). This analyzer directly measures nitrogen oxide (NO) and NO_x by chemiluninescence, a physical process similar to UV fluorescence described above. NO_2 is automatically calculated as the difference between NO and NO_x.

In addition to air sampling, wind speed, wind direction and temperature were measured continuously at the monitoring sites in Kettleman City and near the Facility. Wind speed was monitored using a cup anemometer (Met One 010 wind speed sensor). Wind direction was monitored using a vane (Met One 020 wind direction sensor). Outside temperature was monitored using a thermistor

(Met One 060 temperature sensor). All three meteorological parameters were averaged for each hour and digitally stored. Wind speed/direction data were collected at the School from sensors set at approximately 25 feet above the ground. Wind speed/direction sensors at the downwind and upwind Facility sites were set at approximately nine feet above the sampling platform.

6.0 Quality Control

Lab and trip blanks were utilized for the filters/sorbents used to collect air samples for PCB, dioxin and furan congeners. Lab blanks were also collected for the canisters used to collect air samples for carbon disulfide, benzene, toluene, and ethyl benzene, and for the filters used to collect air samples for metals. Air monitoring results were not corrected to account for concentrations found in the blank samples. Zero air checks were performed as part of calibrations for the continuous analyzers of sulfur dioxide and nitrogen dioxide. All ARB monitoring data were validated.

ARB's Quality Assurance Section conducted performance audits on the ambient air samplers and meteorological sensors located at the three monitoring sites. Audits were conducted at the beginning and end of the monitoring. The audit gases and devices used to conduct the audits are traceable to the National Institute of Standards and Technology.

In addition, the Quality Assurance Section conducted an in-depth site evaluation to determine compliance with the U.S. EPA ambient air monitoring siting criteria (Code of Federal Regulations, title 40, part 58). Photographs and latitude/longitude coordinates were also taken.

The audits and site evaluation were conducted using the procedures described in the ARB Air Monitoring Quality Assurance Manual, Volume V. After each audit, a copy of the audit report, including the site survey, was provided to MLD staff. A summary of the findings of the audits is included in Appendix B.

7.0 Findings

The following sections describe the results of ARB's air monitoring and diesel exhaust exposure assessment.

7.1 Summary of Monitoring Results

This summary includes air monitoring results from June 16 to August 26, 2010, for VOCs and metals, and from June 16 to September 6, 2010, for criteria pollutants and PCB, dioxin and furan congeners. No unusual weather conditions or ambient air conditions (e.g., grass fires) were observed that could have affected the monitoring results. These data are being provided to OEHHA for interpretation with regard to potential health implications. In Tables 2-9, the

average, minimum and maximum air concentrations are presented. Average air concentrations were calculated using one-half of the LOD for data below the LOD. The complete monitoring results are presented in Appendix C, including an overview regarding air quality in the San Joaquin Valley and monitoring data on non-target analytes.

The current ARB statewide toxics monitoring network consists of 17 sites measuring ambient concentrations of about 42 substances. Collection of 24-hour samples at the routine sites is conducted once every 12 days and is adequate to determine long-term exposure on a regional basis. During the monitoring study at Kettleman City, sampling for toxic compounds was conducted twice per week (about once every third day) at the Kettleman City Elementary School, and at the northwest (upwind) and southeast (downwind) boundaries of the Chemical Waste Management Kettleman Hills hazardous waste facility (referred to as "Facility" or "Waste Mgt"). Data from the routine toxics monitoring sites at Bakersfield and Fresno were used to compare to data collected at the three Kettleman monitoring sites.

ARB's routine toxics monitoring sites use Xonteck samplers for VOC measurements. Due to a lack of spare Xonteck samplers, ARB used Tisch samplers at the two monitoring sites at the Facility. Both models of samplers were deployed at the School for comparison. Thus, the Xonteck sampler provided a means to relate measurements at the School to the routine monitoring network and the Tisch sampler provided a means to relate measurements at the School to the monitoring sites at the Facility. Differences were seen in the measurements of samples collected at the School by the two types of VOC samplers. An evaluation of these differences is described in Appendix B. ARB suggests that OEHHA use the higher of the two measurements in cases in which ARB reports side-by-side monitoring results at the School.

Criteria air pollutants were measured at the School site only. Data from the routine monitoring network sites of Corcoran, Bakersfield, Fresno, Hanford, and Visalia were used for comparison to Kettleman City.

Target Analytes

Toxics - VOCs

Out of 22 sampled days at Kettleman City, five days coincided with routine sampling in the statewide monitoring network. For each target analyte, the minimum, maximum and average 24-hour air concentrations are presented based on all valid samples from June 16 to August 26, 2010.

Toluene: Concentrations are shown in Table 2 in units of micrograms of toluene per cubic meter of sampled air ($\mu g/m^3$). The LOD was 0.75 $\mu g/m^3$.

Concentrations at the School collected by the Xonteck sampler were generally similar to those routinely measured at Bakersfield and Fresno. Concentrations at the School collected by the Tisch sampler were higher than those measured by the Xonteck (see Appendix B for further explanation) and were similar to those measured at the downwind Facility monitoring site. Slightly higher concentrations were measured at the upwind Facility monitoring site.

Table 2. Toluene Concentrations (µg/m^3)

Site Name	Average	Minimum	Maximum
Bakersfield	3.0	1.2	5.3
Fresno	1.1	0.94	1.3
Kettleman City School (Xonteck sampler)	0.75	0.38	2.0
Kettleman City School (Tisch sampler)	3.9	2.6	6.8
Waste Mgt NW Upwind (Tisch sampler)	6.5	2.5	18
Waste Mgt SE Downwind (Tisch sampler)	3.8	2.0	9.0

Carbon Disulfide: Concentrations are shown in Table 3. Concentrations at the School collected using the Xonteck sampler were less than the LOD of 0.31 µg/m^3. In contrast, concentrations at the School taken by the Tisch sampler were above the LOD (see Appendix B for further explanation), but lower than those measured at the upwind and downwind Facility monitoring sites. Higher concentrations were measured at the downwind Facility monitoring site.

Table 3. Carbon Disulfide Concentrations (µg/m^3)

Site Name	Average	Minimum	Maximum
Bakersfield	2.4	1.9	2.9
Fresno	0.78	0.68	0.87
Kettleman City School (Xonteck sampler)	<LOD	<LOD	<LOD
Kettleman City School (Tisch sampler)	2.3	0.93	5.3
Waste Mgt NW Upwind (Tisch sampler)	6.0	3.1	11
Waste Mgt SE Downwind (Tisch sampler)	9.1	2.9	22

Benzene: Concentrations are shown in Table 4. The LOD was 0.16 µg/m^3. Concentrations at the School collected with the Xonteck sampler were generally similar to those routinely measured at Bakersfield and Fresno. Concentrations at

the School using the Tisch sampler were also similar to those measured at both the upwind and downwind Facility monitoring sites.

Table 4. Benzene Concentrations (µg/m^3)

Site Name	Average	Minimum	Maximum
Bakersfield	0.58	0.36	1.2
Fresno	0.34	0.28	0.45
Kettleman City School (Xonteck sampler)	0.30	0.21	0.49
Kettleman City School (Tisch sampler)	0.57	0.36	0.94
Waste Mgt NW Upwind (Tisch sampler)	0.64	0.32	2.1
Waste Mgt SE Downwind (Tisch sampler)	0.45	0.21	0.58

Ethyl Benzene: Concentrations at all sites were below the LOD of 0.87 µg/m^3, which is typical for summer months at surrounding sites in the San Joaquin Valley.

Toxics – PCB, Dioxin and Furan Congeners

Monitoring results from the three Kettleman monitoring sites (the School, and upwind and downwind of the Facility) are compared with historical data from ARB's California Ambient Dioxin Air Monitoring Program (CADAMP) monitoring network, collected in 2005 from two Fresno County monitoring sites (First Street and Five Points). Results are summarized in the following subsections:

PCBs

- PCB congener patterns were alike at all three Kettleman monitoring sites and similar to the Fresno First Street site.
- PCB congeners 118 and 105 were the predominant PCBs at all three Kettleman monitoring sites.
- At all sites, PCB 118 was two to three times higher than PCB 105, which is a typical pattern for ambient air.
- At the School site, PCB 118 and PCB 105 were approximately two times higher than at the upwind and downwind Facility sites.
- All three Kettleman monitoring sites were lower than the Fresno First Street site (urban) and higher than the Fresno Five Points (rural) site for both PCB 118 and 105.

Dioxins

- Dioxin congener patterns were similar at all three Kettleman monitoring sites.
- All dioxin congeners, with the exception of OCDD and 1,2,3,4,6,7,8-HpCDD, had average concentrations less than 20 femtograms per cubic meter of sampled air (fg/m^3).
- OCDD and 1,2,3,4,6,7,8-HpCDD were the predominant dioxins at all three Kettleman monitoring sites and were higher than at the Fresno sites.
- OCDD was approximately four times higher than 1,2,3,4,6,7,8-HpCDD at all three Kettleman monitoring sites.

Furans

- Furan congener patterns were similar at all three Kettleman monitoring sites.
- All furan congeners, with the exception of OCDF and 1,2,3,4,6,7,8-HpCDF had average concentrations less than 20 fg/m^3.
- OCDF and 1,2,3,4,6,7,8-HpCDF were the predominant furans at all three Kettleman monitoring sites.
- Concentrations for all PCDFs at the three Kettleman monitoring sites were higher than at the Fresno sites.

Toxic Equivalents (TEQ)

- Toxic equivalents (TEQs) are calculated values that allow PCB, dioxin and furan congeners with different toxicities to be compared.
- All three Kettleman monitoring sites had PCB/dioxin/furan toxic equivalents less than 10 fg TEQ/m^3.
- Annual average PCB/dioxin/furan toxic equivalents at other California monitoring sites was 31 fg TEQ/m^3 (CADAMP, 2005).
- Average PCB/dioxin/furan toxic equivalents at other California monitoring sites for the same time of year (June – August) as the sampling period was 19 fg TEQ/m^3 (CADAMP, 2005).
- Dioxins/furans contributed the most TEQ at all three Kettleman monitoring sites.
- The TEQ value from dioxins and furans at the School was slightly higher than the upwind and downwind Facility sites, and slightly higher than previous monitoring in Fresno (CADAMP, 2005).

Toxics – Metals

Out of 22 sampled days, six days coincided with routine monitoring in the statewide monitoring network. For each target analyte, the minimum, maximum and average 24-hour air concentrations are presented based on all valid samples from June 16 to August 26, 2010.

Lead: Concentrations in the 24-hour samples at all sites were below the federal ambient air quality standard of 150 nanograms of lead per cubic meter of sampled air (ng/m^3, three-month rolling average) as shown in Table 5. The LOD was 1.5 ng/m^3. Concentrations at the School were generally similar to those measured at the upwind and downwind Facility monitoring sites as well as to the routinely measured values at Bakersfield and Fresno.

Table 5. Lead 24-Hr Concentrations (ng/m^3) – Federal Standard: 150 ng/m^3

Site Name	Average	Minimum	Maximum
Bakersfield	3.8	1.6	8.2
Fresno	3.5	0.75	6.4
Kettleman City School	3.3	1.5	7.1
Waste Mgt NW Upwind	2.2	1.6	6.4
Waste Mgt SE Downwind	2.6	1.7	5.4

Nickel: Concentrations at all sites were below the detection limit of 9 ng/m^3. Concentrations below the detection limit are typical for summer months at surrounding sites in the San Joaquin Valley.

Arsenic: Concentrations at all sites were below the detection limit of 1.5 ng/m^3, which is typical for summer months at surrounding sites in the San Joaquin Valley.

Cadmium: Concentrations at all sites were below the detection limit of 1.5 ng/m^3, which is typical for summer months at surrounding sites in the San Joaquin Valley.

Hexavalent Chromium: To achieve the LOD, seven 24-hour samples were composited for analysis. Hence, over the course of the monitoring, three composite samples were analyzed for each of the three monitoring sites. Hexavalent chromium composite samples at the School, and upwind and downwind Facility monitoring sites were all below the LOD (0.06 ng/m^3), with the exception of the second composite sample at the School, which was slightly above the LOD with a value of 0.09 ng/m^3. The average of the three composite samples at the School was less than the LOD. Since 2008, hexavalent chromium quarterly composite measurements have been below the detection limit at surrounding sites in San Joaquin Valley.

Criteria Pollutants – Sulfur Dioxide

For SO_2, the minimum, maximum and average 1-hour air concentrations are presented based on all valid samples from June 16 to September 6, 2010. All SO_2 data are below the State and federal ambient air quality standards as shown

in Figure 1. The LOD was 1 µg/m^3. As shown in Table 6, 1-hour SO_2 levels at the Kettleman City Elementary School were similar to those measured at Fresno, currently the only SO_2 monitoring site in the San Joaquin Valley.

Figure 1. SO_2 Daily 1-Hr Maximum – Federal 1-Hr Standard: 196 µg/m^3, State 1-Hr Standard: 655 µg/m^3

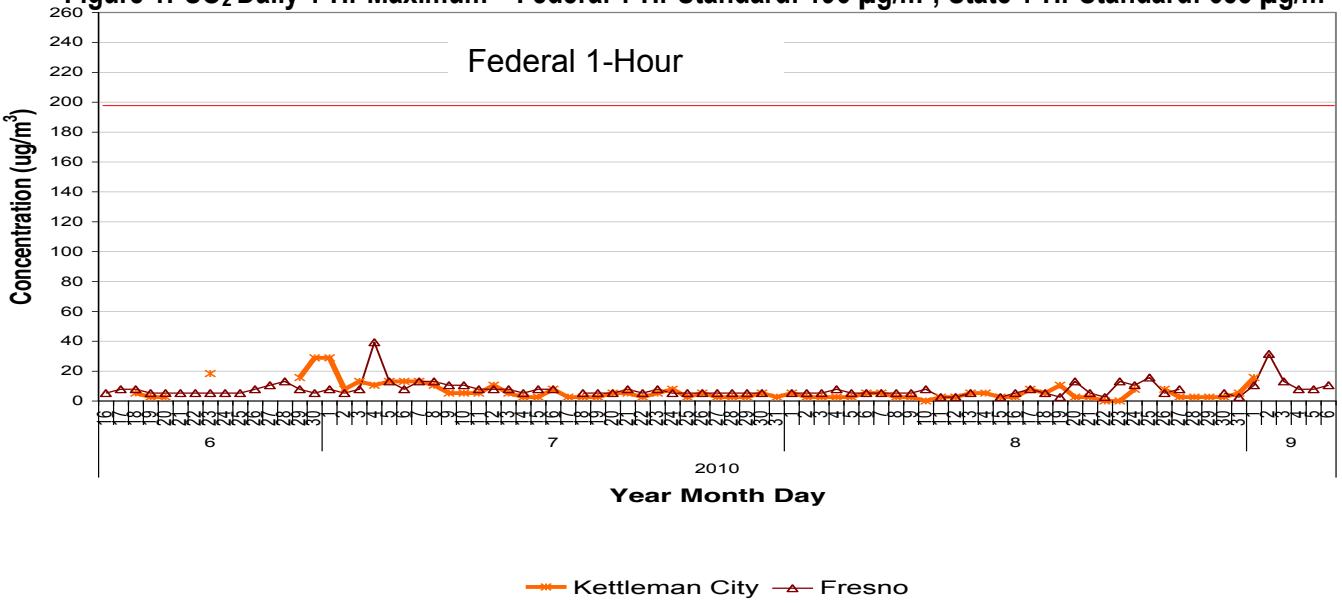


Table 6. Sulfur Dioxide 1-Hr Concentrations (µg/m^3)

Site Name	Average	Minimum	Maximum
Fresno	4	<LOD	39
Kettleman City School	3	<LOD	29

Seasonality of Target Analytes

Sampling was conducted from June 16 to September 6, 2010, capturing the summer season. Ambient air quality measurements typically exhibit a seasonal pattern, though this is not always the case. In order to assess the potential seasonal differences in the Kettleman City measurements, the seasonality of measurements at other routine monitoring sites in the San Joaquin Valley was evaluated. As described below, seasonal differences in toluene, benzene and ethyl benzene can lead to higher concentrations than were measured in the summer months at Kettleman City.

Toxics – VOCs

Toluene, benzene and ethyl benzene measurements at Bakersfield and Fresno are typically higher in the winter months and lower in the summer months. Ethyl benzene is typically below detection in the summer months. Carbon disulfide levels have no discernable seasonal pattern.

Toxics – Metals
Arsenic, cadmium, nickel, and lead measurements do not have a discernable seasonal pattern in Bakersfield and Fresno, but levels have decreased from 2007 to 2009. Many measurements for all target analytes, except lead, were below detection levels in 2009.

Similar to the other metal target analytes, hexavalent chromium measurements have gradually decreased throughout the years and have been below detection at Fresno and Bakersfield since 2008.

Criteria Pollutants – Sulfur Dioxide
When considering the seasonality of historical measurements at other routine monitoring sites in the San Joaquin Valley, higher levels of sulfur dioxide concentrations are observed in the summer months.

Non-target Analytes

Criteria Pollutants – PM2.5 and Nitrogen Dioxide

For the criteria pollutant non-target analytes PM2.5 and NO_2, the minimum, maximum and average concentrations are presented based on all valid samples from June 16 to September 6, 2010. All PM2.5 and NO_2 data were below the California and federal ambient air quality standards as shown in Figures 2 and 3. The LOD for PM2.5 and NO_2 were 1 and 0.75 µg/m^3, respectively. As shown in Tables 7 and 8, PM2.5 and NO_2 levels at the School were similar to those measured at other monitoring sites in the San Joaquin Valley.

Figure 2. PM2.5 Daily Average – Federal 24-Hr Standard: 35 µg/m^3

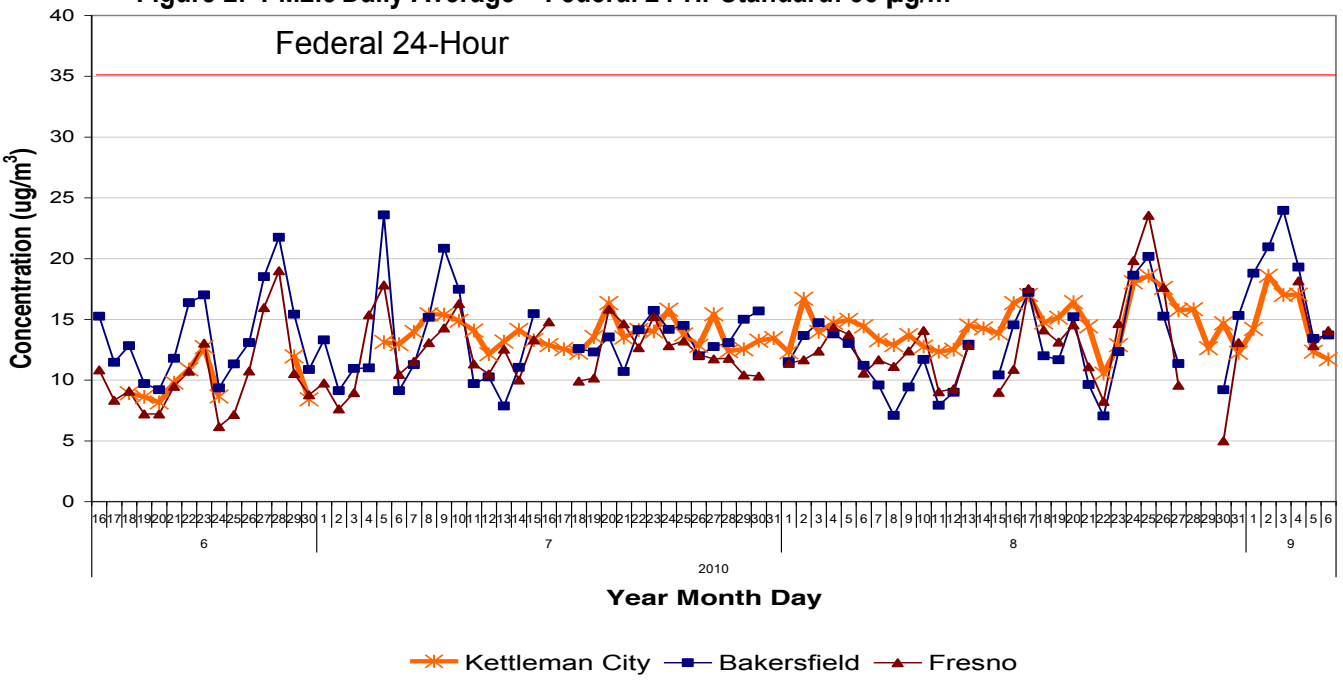


Figure 3. NO_2 Daily 1-Hr Maximum – Federal 1-Hr Std. 188 µg/m³, State 1-Hr Std. 339 µg/m³

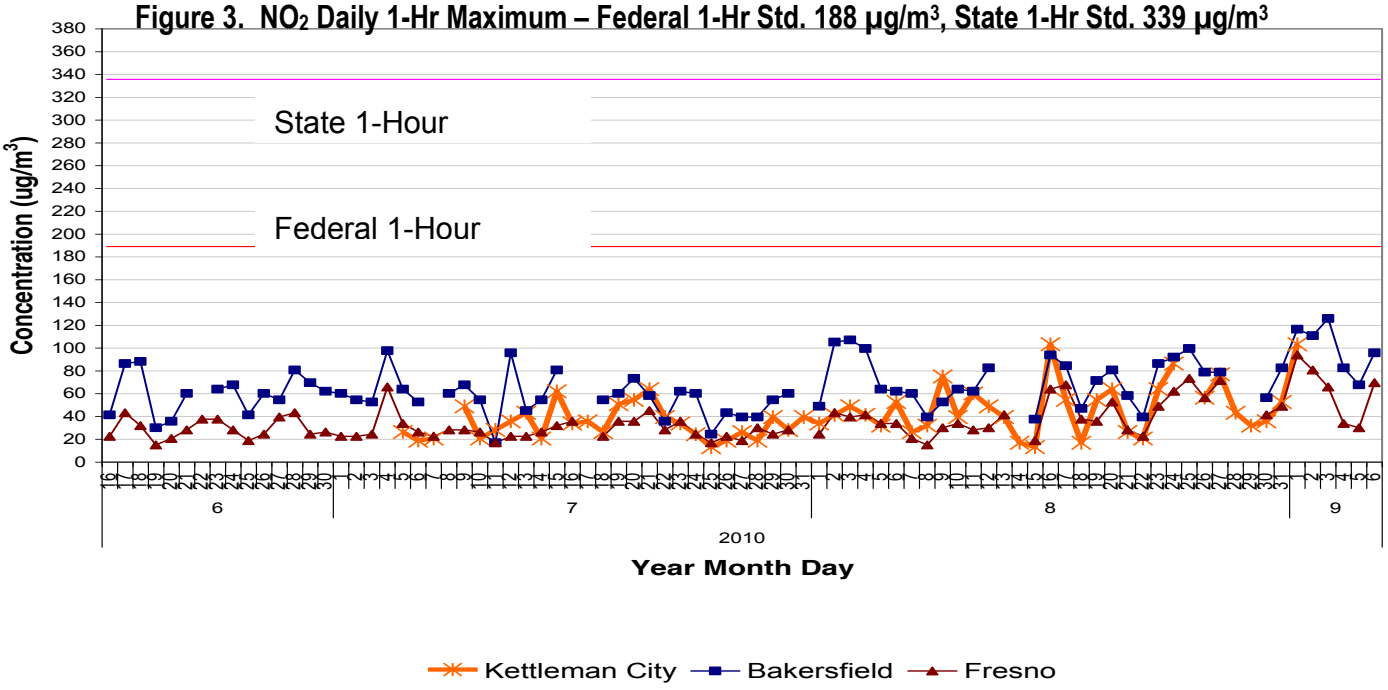


Table 7. PM2.5 24-Hr Concentrations (µg/m³) – Federal Standard: 35 µg/m³

Site Name	Average	Minimum	Maximum
Bakersfield	13	7	24
Corcoran	19	10	30
Fresno	12	5	24
Hanford	14	7	29
Kettleman City School	14	8	19
Visalia	11	3	22

Table 8. Nitrogen Dioxide 1-Hr Concentrations (µg/m³) – Federal Standard: 188 µg/m³

Site Name	Average	Minimum	Maximum
Bakersfield	28	2	130
Fresno	17	4	94
Hanford	13	<LOD	56
Kettleman City School	14	2	100
Visalia	21	8	110

Toxics - Manganese

For manganese, the minimum, maximum and average 24-hour concentrations are presented based on all valid samples from June 16 to August 26, 2010. Concentrations are shown in Table 9. The LOD was 1.5 ng/m^3. Average concentrations at the School were slightly higher than those measured at Fresno and Bakersfield. Average concentrations at the upwind and downwind Facility monitoring sites were lower than the average concentrations at the School and lower than the average concentrationss at Bakersfield and Fresno.

Table 9. Manganese 24-Hr Concentrations (ng/m^3)

Site Name	Average	Minimum	Maximum
Bakersfield	31	16	70
Fresno	26	16	60
Kettleman City School	36	21	55
Waste Mgt NW Upwind	19	12	36
Waste Mgt SE Downwind	19	10	34

7.2 Air Sample Results Near Drinking Water Well Treatment Units

Treatment units are connected to the well heads of two drinking water wells located in the southeast and southwest corners of Kettleman City. These treatment units, also referred to as air stripping units, were installed in 1998 to remove benzene from the drinking water prior to public distribution. To assess potential public exposure from benzene near the air stripping units, air samples were collected immediately downwind of these units. These air sampling periods were brief in duration (several seconds) and are referred to as grab samples. Three samples were collected near each of the units during the monitoring period. The measurements from the grab samples are all above the LOD. Since the collection of these grab samples was infrequent, the methodology and instrumentation used to capture these grab samples was different than that used for collection of 24-hour samples at the Kettleman City School. This difference in sampling methodology results in a slightly different LOD than for the samples at the School. The results of the grab samples are shown in Table 10, compared with the range of the 24-hour measurements at the School. However, these results are not directly comparable due to the difference in the length of the samples. The grab sample results near the southeast unit were similar to the average concentrations measured at the School. The grab sample results near the southwest unit were higher on two of the three days. Benzene emissions from the air stripping units do not appear to be affecting average air concentrations in Kettleman City, as average concentrations of benzene at the School were similar to Fresno and Bakersfield (see Table 4).

Table 10. Ambient Benzene Grab Sample Results Near Air Stripping Units

Site Name	Sampling Date	Concentration ($\mu g/m^3$)	LOD ($\mu g/m^3$)
Southeast Treatment Unit (grab)	7/14/2010	0.39	0.23
Southeast Treatment Unit (grab)	8/11/2010	0.48	0.23
Southeast Treatment Unit (grab)	8/25/2010	0.35	0.23
Southwest Treatment Unit (grab)	7/14/2010	4.9	0.23
Southwest Treatment Unit (grab)	8/11/2010	0.11	0.23
Southwest Treatment Unit (grab)	8/25/2010	26	0.23
School (Tisch Sampler) (24 Hr)	(June – August)	0.36 – 0.94	0.16
School (Xonteck Sampler) (24 Hr)	(June – August)	0.21 – 0.49	0.16

To further evaluate the potential public exposure to benzene in the air near the southwest air stripping unit, ARB used air dispersion computer modeling to estimate air concentrations of benzene downwind of the unit. The 2010 average benzene concentration in the water entering the air stripping unit (93 micrograms per liter) and the average flow of water through the unit (130 gallons per minute) were used as inputs to the U.S. EPA SCREEN3 screening air dispersion model. The annual average air concentration of benzene was modeled at distances of 20, 50 and 100 meters downwind of the southwest air stripping unit. The annual average air concentrations at those distances were estimated to be: 1.1 $\mu g/m^3$, 0.70 $\mu g/m^3$ and 0.47 $\mu g/m^3$, respectively. (Refined air dispersion modeling may estimate lower air concentrations than these screening estimates.) Exposure of potential concern appears to be limited to an area within close proximity (within about 50 meters) of the southwest air stripping unit. Beyond that distance, estimated air concentrations are similar to those measured at the School or in Fresno. Concentrations of benzene in the water at the southeast treatment unit were much lower. Estimated air concentrations downwind of the southeast unit are less than those measured at the School.

7.3 Interpretation of Results with Meteorological Data

No clear difference was seen when comparing data collected upwind and downwind of the Facility. Concentrations of the target analytes measured upwind and downwind of the Facility were similar to those measured in Kettleman City.

Prevailing winds during the monitoring period were from the northwest, which is typical for the entire year for this region of California. Winds that blow from the southwest have the potential to transport Facility emissions in the direction of Kettleman City. The frequency of winds from the southwest was evaluated. Historical wind data was compared with data collected in Kettleman City during the June – August 2010 monitoring period. Meteorological data collected historically in Lemoore, approximately 22 miles north of Kettleman City, was found to be representative of the frequency of wind directions in Kettleman City. The wind patterns at Lemoore for the past three years and during 2010 indicate

that winds blow from the southwest about four percent of the year. Similarly, winds in Kettleman City were measured to blow from the southwest about five percent of the time during the monitoring period.

7.4 Diesel Exhaust Exposure Assessment

ARB estimated regional and local contributions to diesel particulate matter (DPM) concentrations using approaches previously utilized by ARB in other communities. Two different methodologies were used: a population-weighted method for a regional scale assessment and air dispersion modeling for a local scale assessment.

The estimated population-weighted average concentration of DPM for Kings County was 0.9 $\mu g/m^3$. This concentration can be compared to the population-weighted average DPM concentration for another county in the San Joaquin Valley, Kern County, which was estimated to be 1.3 $\mu g/m^3$ using the same methodology. More details on the regional assessment are included in Appendix D.

At the local scale, an air dispersion model was used to estimate the DPM concentration in Kettleman City from local emission sources. The estimated annual average DPM concentration from local sources in the immediate vicinity of Kettleman City, including vehicles on Interstate 5 and Highway 41, was approximately 0.09 $\mu g/m^3$. The local sources are a subset of county DPM emission sources and a contributor to the county-wide DPM concentration. More details on the local assessment are included in Appendix E.

7.5 Historical Monitoring Results at Chemical Waste Management Kettleman Hills Facility

For many years, the Department of Toxic Substances Control (DTSC) has required that the Chemical Waste Management Kettleman Hills Facility conduct perimeter air monitoring as a condition of their hazardous waste facility permit. The Facility contracts with an environmental consulting firm for collection and analysis of air samples. Air monitoring is conducted at one location upwind based on the prevailing wind direction (northwest of the Facility) and at two downwind locations (south and southeast of the Facility). Air samples of 24 hours in duration are collected every 12 days on the same schedule used by ARB for collecting air samples from a network of toxic air contaminant monitoring sites in urban areas of California. The Facility analyzes air samples for several organic compounds and analyzes samples of airborne particulate matter for several metals. Stainless steel canisters are used to collect the air samples of organic compounds; quartz fiber filters are used to collect the air samples of particulate matter. Two of the organic compounds (benzene and toluene) and three of the metals (arsenic, lead, and nickel) collected by the Facility are target analytes for the Kettleman City Community Exposure Assessment. Hexavalent

chromium is listed in Table 1 as a target analyte. The Facility monitors for total chromium. We included the Facility's monitoring information for total chromium in this historical comparison, recognizing that this does not reflect air concentrations of hexavalent chromium.

The Facility provides air monitoring results to DTSC on a quarterly basis. The Facility's quarterly monitoring results are summarized in Appendix F for 2007 (the first year of increased numbers of birth defects in Kettleman City), 2008, 2009, and 2010. At the time this report was being finalized, 2010 data were only available through August. For each quarter, data were summarized with the same reporting format used by the Facility. Quarterly summaries include the maximum measured 24-hour air concentration, the mean of the samples above the reporting LOD, and the number of samples measured above the LOD compared to the total number of samples collected during the quarter (e.g., three samples above the LOD out of eight samples collected during the quarter was noted as 3/8). If no data were presented for a particular compound, no valid results were above the LOD. All air concentrations were presented in $\mu g/m^3$. Results were summarized for the upwind monitoring site and the highest of the two downwind monitoring sites. For comparison with the Facility's data, the annual maximum and mean 24-hour concentrations measured in ARB's statewide monitoring network and from the routine monitoring site in Fresno were included in Appendix F. (Due to some missing statewide data in 2008 and 2010, statewide data from 2007 were used for comparison with the Facility's data from 2008 and statewide data from 2009 were used for comparison with the Facility's data from 2010. Data from Fresno from 2009 were included for comparison with the Facility's 2010 data because the ARB data for 2010 were incomplete.)

When evaluating the Facility's monitoring results, it is important to note that a substantial portion of the reported concentrations of metals was due to background concentrations of these metals in the filters used to collect those air samples. The Facility's environmental consulting firm determined this by analyzing filters which were not used for air sampling (blanks). Similarly, organic compounds were also detected in some of the blank air samples, likely due to laboratory contamination of the stainless steel canisters used to collect those air samples. In particular, several of the canister samples appeared to have toluene contamination unrelated to actual air concentrations.

It is also important to recognize that concentrations measured downwind of the Facility do not typically reach Kettleman City, due the prevailing winds usually being from the north or northwest. When the wind does come from the southwest, which has the potential to carry Facility emissions toward Kettleman City, the worst-case dispersion (i.e., the least dispersion, as would occur at night with light wind) between the Facility and Kettleman City has been estimated by air dispersion computer models to dilute (reduce) Facility air concentrations by a factor of at least 10 due to atmospheric dispersion. During a tracer gas study conducted by an environmental consultant under contract to ARB in 1988, known

amounts of an inert gas, sulfur hexafluoride, were released from the Facility and measured at different locations and distances beyond the Facility perimeter. During nighttime conditions with light winds from the southwest, air concentrations of the tracer gas were measured in Kettleman City. The dilution factor between the Facility and the town was determined to be 24 (Reference: Gaseous Tracer Study at the Chemical Waste Management Kettleman Hills Facility, November 7-15, 1988, Tracer Technologies, ARB Contract # A742-099).

Some differences can be noted when comparing upwind and downwind monitoring results, with downwind results being somewhat higher in some cases. There were also some differences comparing data from quarter to quarter and from year to year. These differences do not appear to translate to a considerable difference in exposure when upwind data are compared with downwind data. Overall, upwind and downwind data are similar to concentrations measured statewide. Similarly, there does not appear to be a substantial difference in data from 2007, when the Facility was operating much as it has for many years, and 2010, when the Facility substantially reduced the volume of hazardous waste being treated and disposed.

7.6 Comparison of ARB and Chemical Waste Management Monitoring Results

During ARB's air monitoring, air samples were collected at two of the Facility air monitoring stations: the upwind station and the downwind station located southeast of the Facility (designated by the Facility as downwind monitoring station #2). ARB's monitoring was conducted by ARB-MLD personnel, using ARB sampling media (e.g., air sampling filters and stainless steel air sampling canisters). ARB's samples were analyzed by ARB's laboratory in Sacramento, with the exception of the air samples collected for PCB, dioxin and furan congeners, which were analyzed by a U.S. EPA laboratory. During ARB's monitoring from mid-June through late August 2010, six 24-hour sampling periods coincided with the Facility's 24-hour air sampling periods, which occur every 12 days. Appendix G contains a comparison of the ARB and Facility air monitoring results for these six sampling periods, for the same target analytes referred to in section 7.5. If no data were presented for a particular compound, no valid results were above the LOD.

There was no general trend when the ARB and Facility data were compared from the same sampling locations and sampling periods. In a few cases, the ARB and Facility data collected from the same sampling locations compared well. In some cases, ARB found measurable air concentrations of a target analyte and the Facility did not. In other cases, the Facility found higher air concentrations than ARB. Due to the fact that two laboratories were involved in analyzing samples with relatively low air concentrations of many of these chemicals, it may not be surprising that some differences were found. These differences do not put into

question the validity of the monitoring data collected by the Facility in recent years, because there was no consistent bias in the Facility's data.

8.0 Further Action

As noted in section 7.2, relatively high concentrations of benzene were found in two of the air samples collected near one of the drinking water well treatment units. Screening air dispersion modeling was used to estimate the air concentration of benzene near the southwest treatment unit. The estimated air concentration of benzene within close proximity (within about 50 meters) of the unit may be of potential concern. ARB has contacted the San Joaquin Valley Air Pollution Control District (the "District"), and will follow up regarding the need to further evaluate potential benzene emissions from the treatment units and whether the operator of the units needs to apply to the District for a permit to operate the units. The District will also evaluate whether emission control equipment is needed to reduce benzene emissions.

Appendix A

Locations and Photographs of Monitoring Sites

Figure 1. Air Monitoring Sites in Kettleman City and Upwind/Downwind of the Chemical Waste Management Kettleman Hills Facility

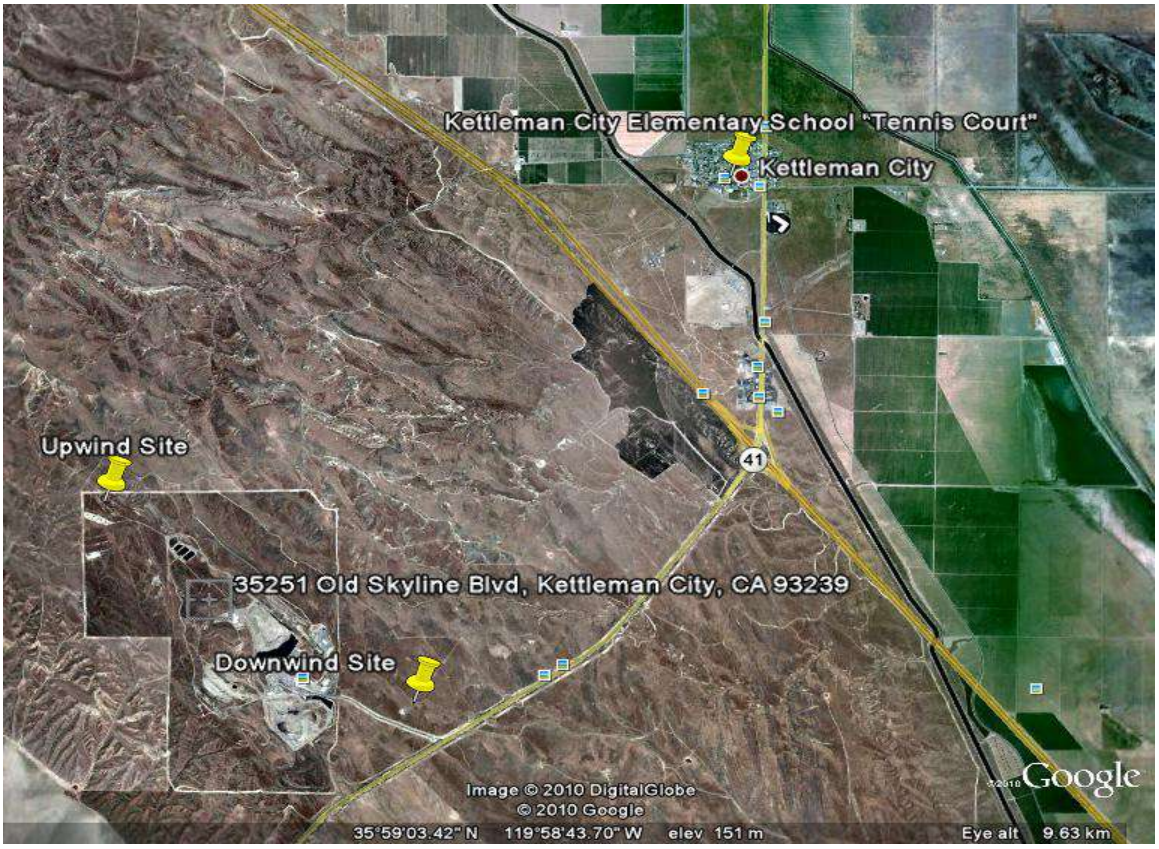


Figure 2. Kettleman City Elementary School - Air Monitoring Site

Figure 3. Kettleman Hills Facility – Upwind Air Monitoring Site

Figure 4. Kettleman Hills Facility – Downwind Air Monitoring Site

Appendix B

Evaluation of Monitoring Data Quality

Audits of Air Samplers

ARB's Quality Assurance Section (QAS) conducted performance audits on the ambient air samplers and meteorological sensors located at the three monitoring stations established for the Kettleman City Community Exposure Assessment.

Overall, the audits found that the instruments were operating within the established monitoring data quality objectives (DQO) identified in Appendix 3.2 of the Kettleman City Community Exposure Assessment Work Plan with the exception of the wind speed sensor located at the monitoring site upwind of the Chemical Waste Management Facility for the beginning audit conducted on July 6, 2010. The wind speed sensor displayed the correct wind speed values except when the sensor was manually stopped in the idle position (not moving). The wind speed sensor read 11 miles per hour at idle, causing the sensor to fail the established DQO. (Following the audit, the data logger was reconfigured to report wind speed data in units of knots.)

On July 20, 2010, field calibration staff verified the issue noted previously by QAS in that the wind speed sensor displayed correct wind speed values except when manually stopped in the idle position. The wind speed sensor manufacturer (Met One Instruments) was contacted to troubleshoot this issue and identified the problem as a grounding issue with the circuit board chassis. The circuit board chassis was grounded on July 20, 2010, and the wind speed sensor was successfully verified fully operational via on-site calibration on the same date.

The grounding problem affecting the idle reading was considered negligible due to the constant movement of the wind vane (sensor always observed moving) and the general one hour average wind speed data comparisons between the upwind and downwind Facility monitoring sites. No data corrections/invalidations were performed.

In addition, QAS conducted a siting evaluation to verify compliance with the U.S. EPA ambient air monitoring siting criteria (Code of Federal Regulations, title 40, part 58). All parameters were found to meet appropriate siting criteria. The comprehensive site survey and audit results are available upon request.

Evaluation of VOC Data

Issue: Reported results for carbon disulfide (CS_2) and some other VOCs differed among parallel sampling methods/samplers.

Issue Discussion: The initial exposure assessment plan for Kettleman City included one air monitoring site located at the Kettleman City Elementary School. This plan called for the deployment of a Xonteck 910 PC canister sampler for VOC sampling. The Xonteck 910 PC is the only canister sampler used in ARB's statewide air toxics sampling network.

As a result of public comments, the air monitoring scope expanded to include two additional monitoring sites near the upwind and downwind perimeter of the Kettleman Hills Facility. Tisch 323 samplers were deployed at these two sites. (Additional Xonteck samplers could not be procured in the time allowed.)

In addition to the Xonteck sampler located inside the School monitoring trailer, one Tisch sampler was located at the School outside of the trailer.

Canister Sampler Description: Both the Xonteck 910 PC and the Tisch 323 are marketed as U.S. EPA compliant samplers for the TO15 air monitoring method. Carbon disulfide (CS_2) is not routinely monitored in the ARB toxic network, but is a TO15 analyte.

Both the Xonteck and Tisch canister samplers work similarly, allowing for an air sample to be collected into an evacuated canister and pressurized to approximately one atmosphere. The Xonteck was configured and operated as per ARB's ambient toxics monitoring network procedures, which require the Xonteck to be operated in a temperature controlled environment. The Xonteck air sampler pumps outside air to the canister through tubing (approximately 12 feet long, ¼ inch diameter Teflon tubing), with the inlet mounted approximately six feet above the trailer roofline.

Because no temperature controlled enclosures were available for use at the upwind and downwind monitoring sites at the Facility, the Tisch canister samplers were installed in non-temperature controlled enclosures at all three sites and therefore directly exposed to outside ambient temperatures. The Tisch samplers were configured with the factory stainless steel inlets and Teflon filters (Xonteck samplers have no in-line filters). The Tisch ¼" stainless steel inlet tube is less than 20 inches long.

The Tisch canister sampler located at the School was configured/installed similarly to the Tisch samplers at the upwind and downwind Facility sites. The purpose of the Tisch at the School was to compare the results with the upwind and downwind locations. The Xonteck results collected at the School were intended to be compared to results from Xonteck 910 PC samplers permanently deployed in Fresno and Bakersfield.

Ambient Results: The following graphs highlight differences observed regarding Xonteck and Tisch canister sampling results.

Figure 1 displays CS_2 results for Kettleman City (KC School), and the upwind (KC Upwind) and downwind (KC Downwind) Facility sites. Included in the graph are CS_2 results collected at other ARB monitoring stations located nearest to Kettleman City (sampled using Xontecks). Audit results from August 19, 2010, are also included.

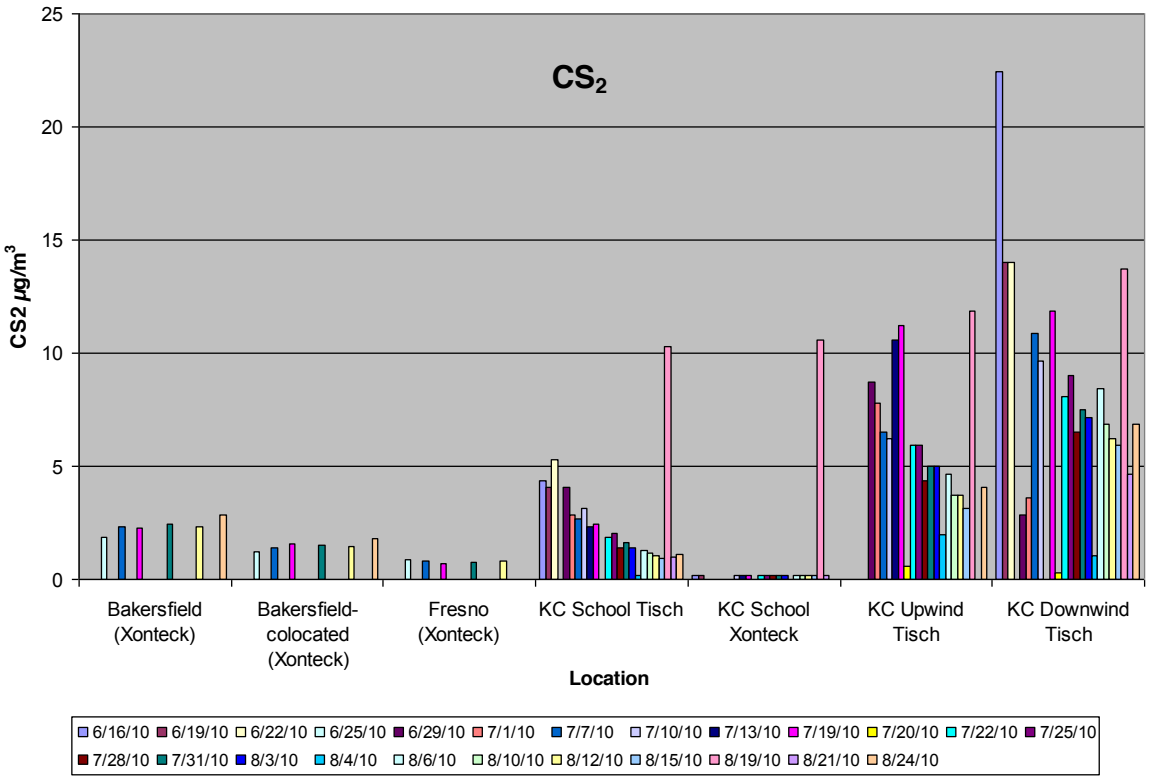


Figure 1. CS_2 results from Kettleman monitoring sites and nearby locations.

Figures 2-6 display results for the parallel Xonteck/Tisch canister samplers located at the School. Compounds that display the most significant differences in the canister analysis results are CS_2 and toluene (Figures 2 and 3). Results displayed for benzene show some differences (Figure 4); carbon tetrachloride and chloroform (Figures 5-6) show little to no difference between samplers.

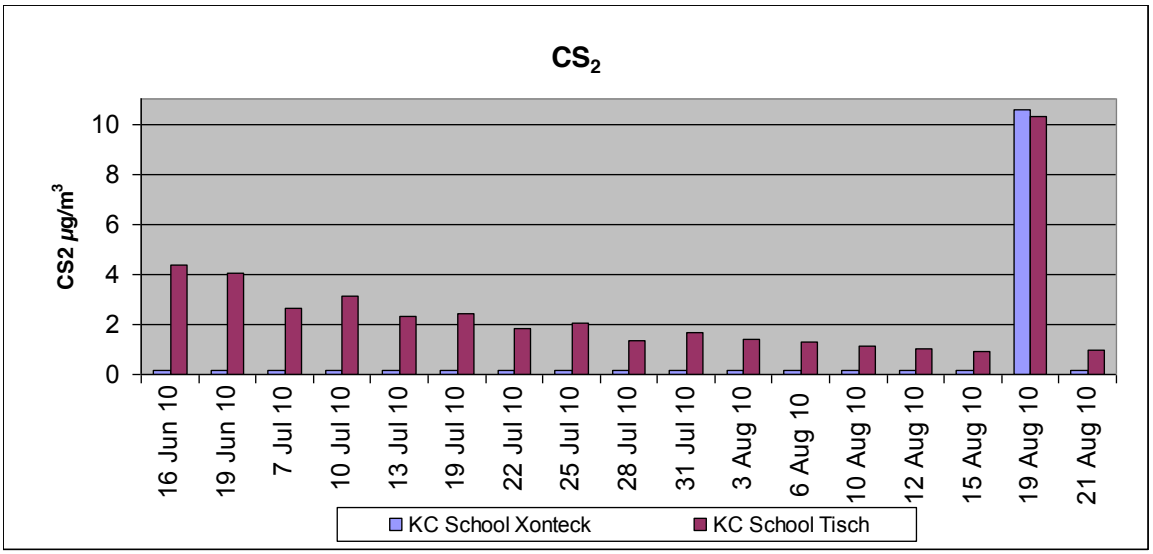


Figure 2. CS_2 results for parallel Xonteck and Tisch canister samplers. Note: in the graph above, all Xonteck CS_2 canister results were non-detect except on August 19th (which was an audit value, explained later).

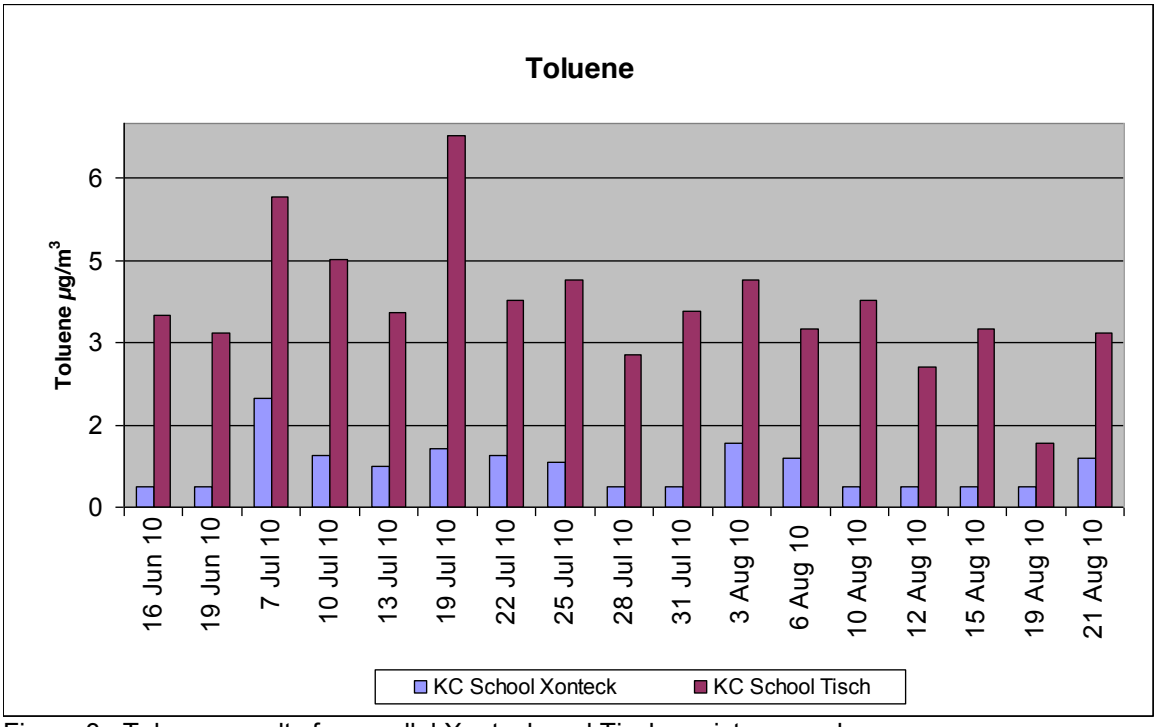


Figure 3. Toluene results for parallel Xonteck and Tisch canister samplers.

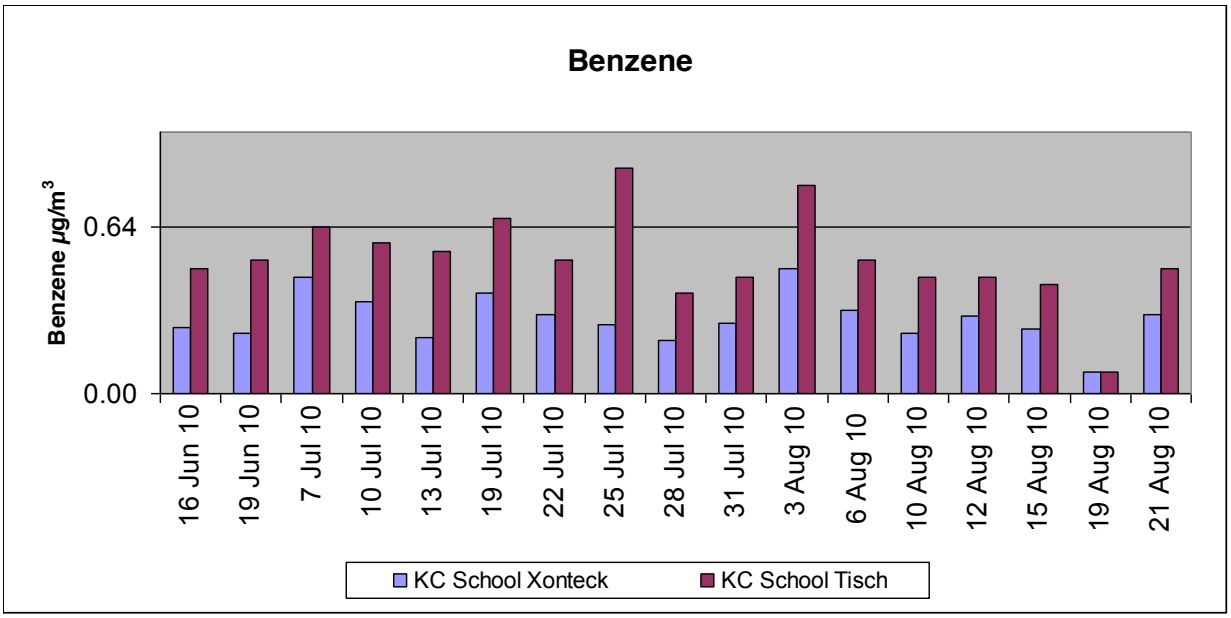


Figure 4. Benzene results for parallel Xonteck and Tisch canister samplers.

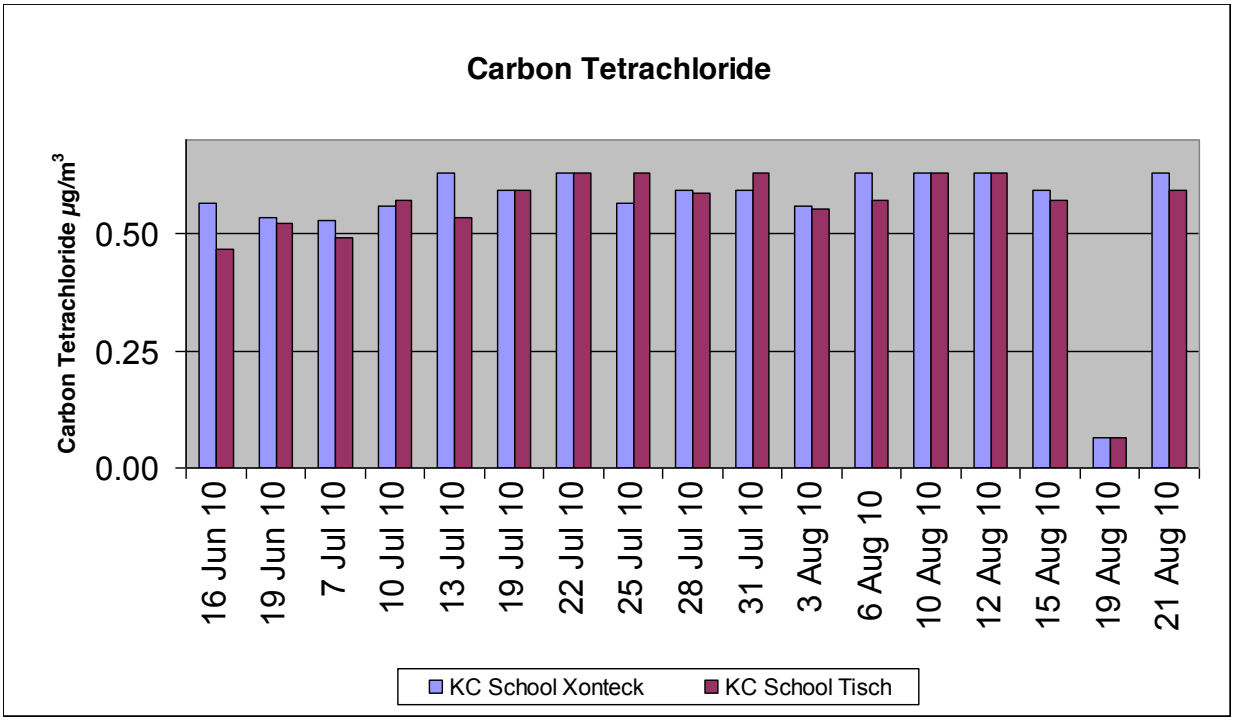


Figure 5. Carbon tetrachloride results for parallel Xonteck and Tisch canister samplers.

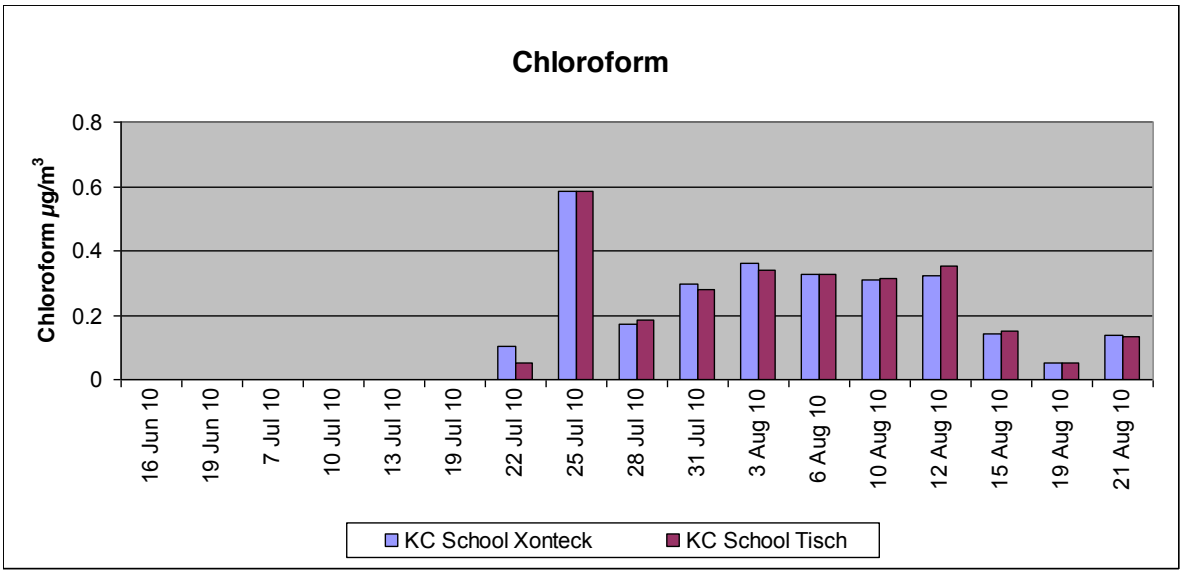


Figure 6. Chloroform results for parallel Xonteck and Tisch canister samplers.

Blanks: To determine if CS_2 contamination was an issue with the Tisch canister samplers, several 'blank' tests were performed. The tests were performed by sampling clean (zero) air through the samplers and then analyzing the sampled canisters for CS_2. The pre-deployment and the first field blanks were performed at room temperature (nominally, 25 ^{o}C). The second field blank was performed on August 4, 2010, at ambient daytime temperature (up to 37 ^{o}C). Blank results are presented in Figure 7. Note that the second field blank for the School Tisch sampler shows that the sampler was free of contamination.

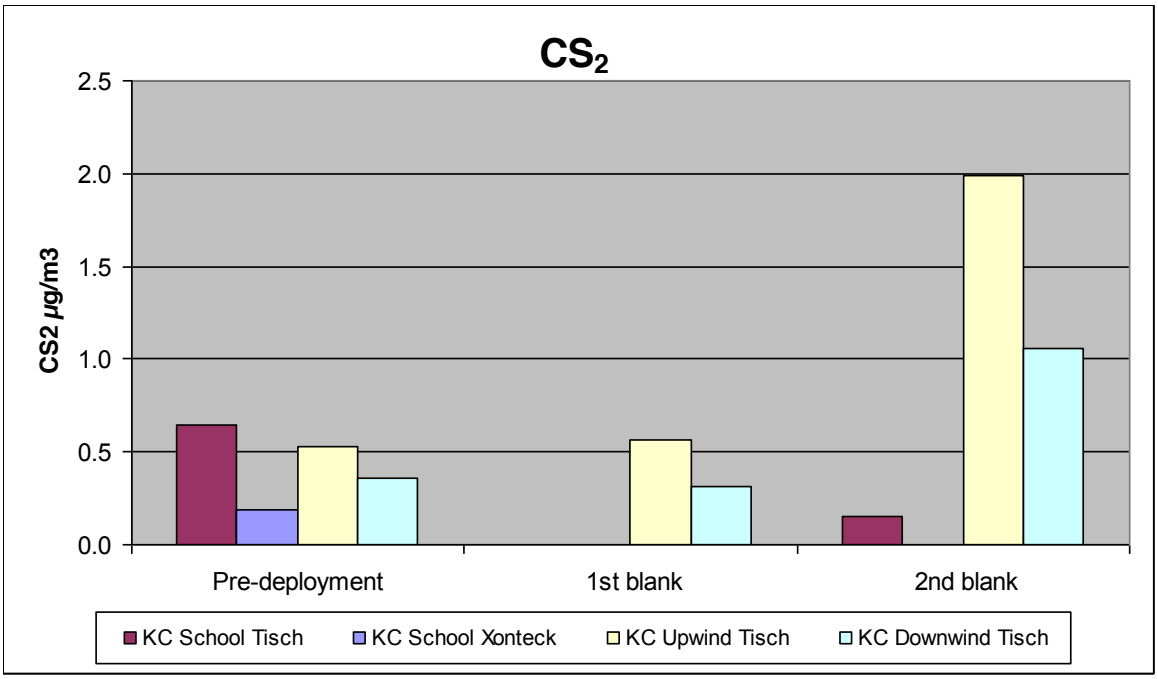


Figure 7. Blank samples for the Tisch. Note: for the Kettleman City School Tisch, no sample was measured for the first blank while the second blank sample was below the LOD. A blank was not measured on the Xonteck.

Sampler Audits: To determine whether the samplers had either a negative or positive artifact for CS_2, a field audit was performed. Each sampler was configured to collect a known CS_2 gas concentration (9.3 µg/m^3) from a common glass manifold simultaneously. The audit results are displayed in Figure 8.

The difference in CS_2 between the Tisch and Xonteck located at the School was 0.3 µg/m^3 and therefore are essentially equivalent. The results for the two school site samplers suggest a slight positive artifact and rule out a negative artifact with the Xonteck sampler. The higher audit results for the upwind/downwind canister samplers may suggest possible sampler contamination issues for these two samplers.

Grab Samples: In addition to the blank and audit samples, three sets of grab samples were collected during the study at two other locations in Kettleman City within three blocks of the School (these samples are described under section 3.3.0, Additional Assessment, in the Cal/EPA Work Plan).

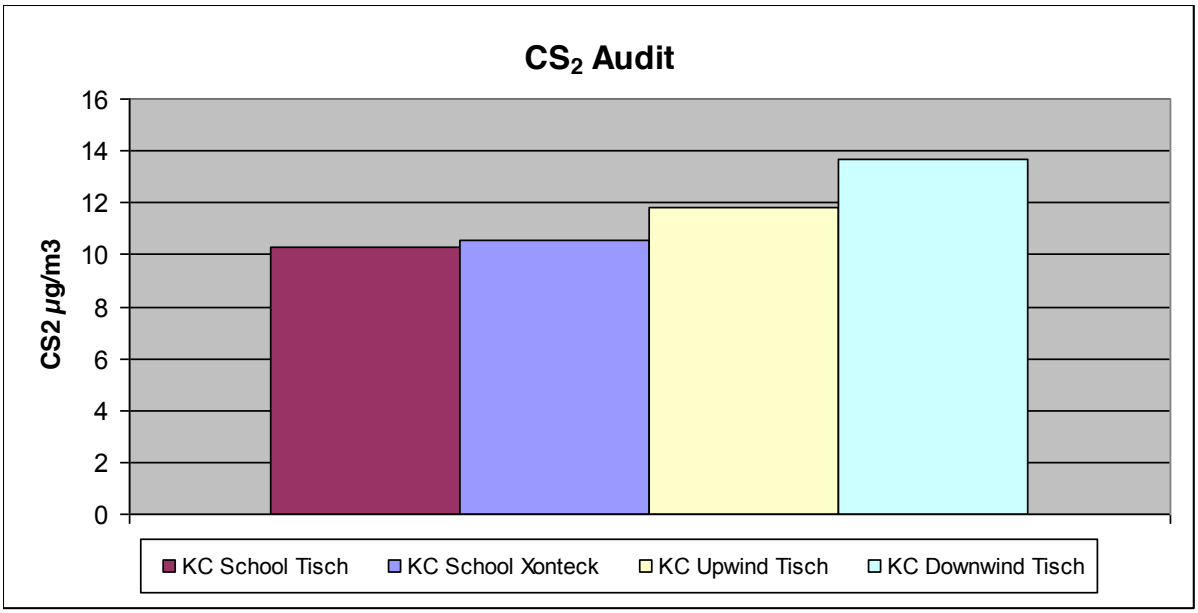


Figure 8. CS_2 audit results.

Also, two additional sets of grab samples were collected at the downwind Facility site on two separate days to confirm the presence of CS_2. The first grab sample was a single (one) canister, the second set of grab samples, performed after the study was concluded, included two canisters and three Tedlar bag samples (Tedlar bag samples utilized a lung sampler). The canister grab samples were performed without the use of a canister sampler, by opening the canister valve for each clean/evacuated canister until their internal pressure/vacuum reached ambient conditions. The results of all canister and Tedlar bag grab samples were reported below the detection limit for CS_2 except for one canister grab sample (16.5 µg/m^3 CS_2 collected during the second set of canister/Tedlar grab samples). This sample appears to either be a sampling anomaly or have contamination issues since the other canister grab sample, performed at the same time and location, was below the detection limit for CS_2.

Discussion and Recommendation: In general, the Tisch sampler at the School consistently measured CS_2 above the LOD while the Xonteck sampler at the School consistently measured CS_2 below the LOD. A pre-deployment blank test of both School site samplers and a field blank of the School site Tisch sampler showed no significant contamination. Audits of these two samplers demonstrated accuracy within 15 percent of the "true" concentration. Grab samples taken near the School did not confirm the presence or absence of CS_2 in the ambient air. However, the grab samples were short in duration (several seconds).

As no conclusive evidence currently exists to invalidate either the Xonteck or Tisch canister samples, ARB recommends using the higher reported concentrations (collected by the Tisch samplers) for the health risk assessment.

Appendix C

Monitoring Results

San Joaquin Valley Air Quality Overview

Although the air quality in the San Joaquin Valley (referred to as "SJV" or "Valley") has been getting better in recent years, the area still exceeds the federal 8-hour ozone, and 24-hour and annual PM2.5 standards by a significant amount. Human-related (anthropogenic) activities coupled with geographical and meteorological conditions unique to the area, result in the formation of some of the United States' worst air pollution in the SJV. The SJV air basin is bordered by mountains to the east, west and south. The mountains act as air flow barriers which prevents the dispersion of pollutants and results in the accumulation of air pollution in the Valley. In general, the highest ozone concentrations are found in the central and southern Valley. The general weather conditions that lead to high ozone levels in the Valley include large-scale high pressure systems that develop over the Western United States, and low wind speeds and high temperatures, which occur frequently in the Valley between May and September, and may persist for several days.

Similar to ozone, the SJV air basin has one of the most severe PM2.5 problems in California. PM2.5 concentrations are generally highest in the southern and central portions of the Valley during the winter. Ammonium nitrate and organic carbon are the major chemical components of PM2.5 in the Valley. Cold and humid conditions during the winter favor the formation of ammonium nitrate in the atmosphere from chemical reactions of nitrogen oxides emitted from mobile and stationary combustion sources. Burning activities, such as stationary combustion, residential wood combustion, cooking, and direct tailpipe emissions from mobile sources, are major sources of organic carbon.

Kettleman City is located in Kings County in the western part of the Valley. Kings County continues to experience violations of the ozone and PM2.5 national ambient air quality standards, although the overall air quality with respect to these two pollutants has improved by 15 to 20 percent over the past decade[1].

In summary, much more needs to be done in order to bring all parts of the Valley into attainment. Under the federal Clean Air Act, California developed a statewide emissions reduction strategy[2] that will provide a significant portion of the emissions reductions needed to attain the national standards. In addition, the San Joaquin Valley Air Pollution Control District (District) has adopted ozone[3] and PM2.5[4] plans that provide the remaining reductions needed for attainment. Together, these comprise the State Implementation Plan (SIP) for the entire San Joaquin Valley.

---

[1] California Air Resources Board, iADAM, http://www.arb.ca.gov/adam/

[2] California Air Resources Board, "Proposed State Strategy for California's State Implementation Plan (SIP) for the New Federal PM2.5 and 8-hour Ozone Standards," adopted September 27, 2007; Available on-line at: http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm

[3] San Joaquin Valley Air Pollution Control District, "2007 Ozone Plan," adopted June 14, 2007, available on-line at: http://www.arb.ca.gov/planning/sip/2007sip/sjv8hr/sjvozone.htm

[4] San JoaquinValley Air Pollution Control District. "2008 PM2.5 Plan," adopted April 30, 2008, available on-line at: http://www.arb.ca.gov/planning/sip/sjvpm25/sjvpm25.htm

The SIP relies heavily on reductions in emissions of nitrogen oxides (NO_x) as the most efficient and effective strategy for attaining both the national ozone and PM2.5 standards. Overall, the SIP calls for a 75 percent reduction in NO_x emissions and a 25 percent reduction in emissions of reactive organic gases in the SJV from 2006 levels. Photochemical modeling analyses show these reductions will provide for attaining the national annual PM2.5 standard by 2015 and the national ozone standard by 2024, as required by the federal Clean Air Act.

In addition to statewide control measures, the District has a longstanding local control program aimed at reducing emissions from stationary sources. District regulations are among the most stringent in the State. In addition, the District has Best Available Control Technology (BACT) requirements in place for both new and modified major sources as part of its New Source Review program. Finally, in an effort to accelerate attainment, the District has implemented a "Fast Track" action plan focused on expediting the adoption of regulations at the State and federal levels, pursuing increased funding for local incentive-based programs, and encouraging the development and implementation of innovative emissions control measures[5].

Monitoring Results

The following sections present the complete monitoring results:

1. Target analyte VOCs
2. Target analyte metals
3. Non-target analyte VOCs
4. Non-target analyte metals
5. Target analyte PCB, dioxin and furan congeners

Concentrations are presented in units as described in the Preface.

[5] San Joaquin Valley Air Pollution Control District , http://www.valleyair.org/Programs/FastTrack/FastTrackIdx.htm

1. Target Analytes – Volatile Organic Compounds (VOCs)

Table 1. VOCs – Detection Limits

Parameter	LOD ($\mu g/m^3$)
Toluene	0.75
Carbon Disulfide	0.31
Benzene	0.16
Ethyl Benzene	0.87

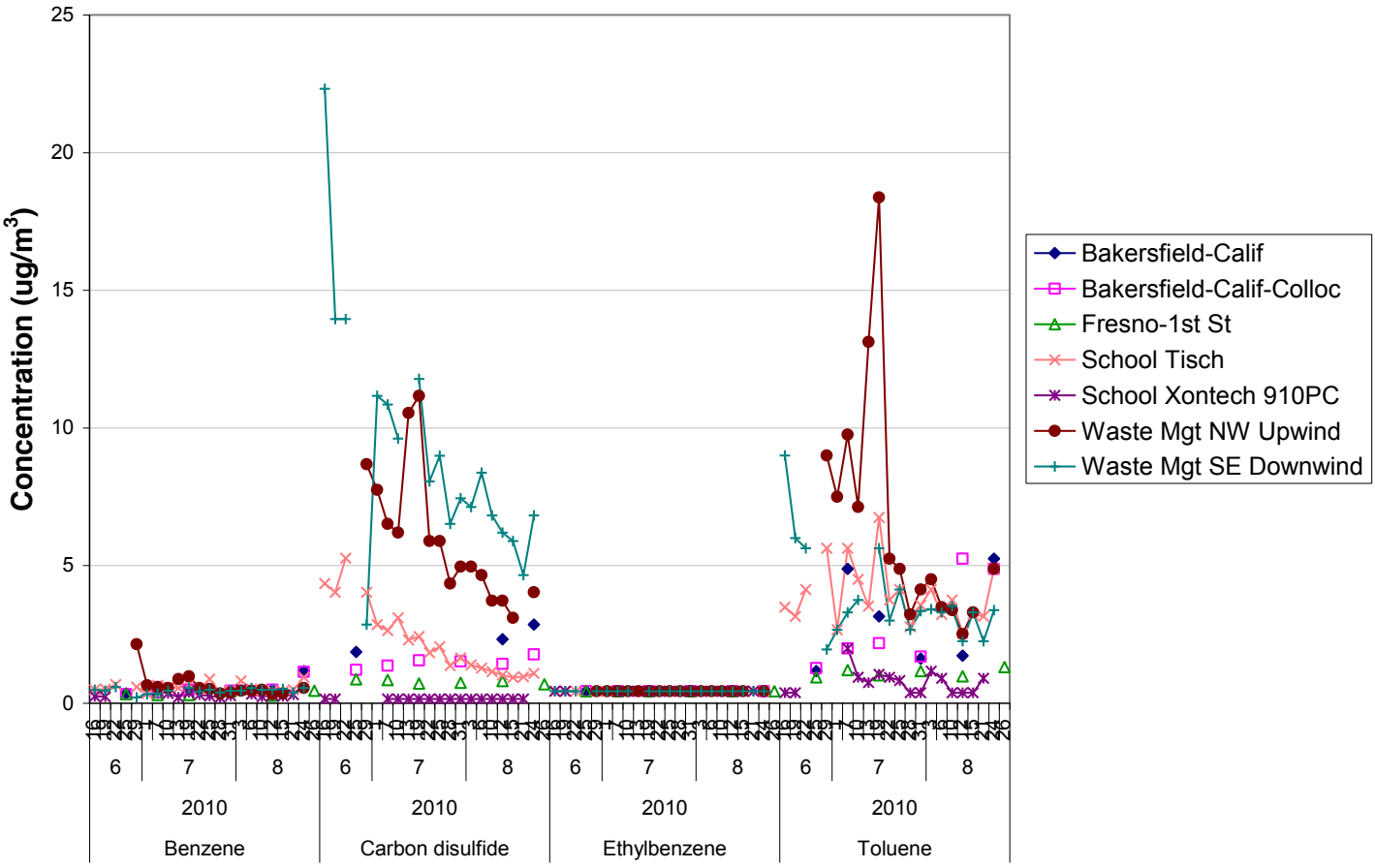


Figure 1. VOCs – 24-Hour Concentrations

Table 2. VOCs 24-Hour Average Data (µg/m^3)

(Site Name Abbreviations: Bak = Bakersfield, Bak-C = Bakersfield collocated, Fres = Fresno 1st Street, Sch-T = School Tisch, Sch-X = School Xonteck, Up = Waste Mgt Upwind, Down = Waste Mgt Downwind)

Compound	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010	8/26/2010
Tolu	Bak				1.2			4.9			3.2				1.6				1.7			5.3	
	Bak-C				1.3			2.0			2.2				1.7				5.3			4.9	
	Fres				0.94			1.2			1.0				1.2				0.98				1.3
	Sch-T	3.5	3.2	4.1		5.6	2.7	5.6	4.5	3.5	6.8	3.8	4.1	2.8	3.6	4.1	3.2	3.8	2.6	3.2	3.2	4.9	
	Sch-X	<LOD	<LOD					2.0	0.94	<LOD	1.1	0.94	0.83	<LOD	<LOD	1.2	0.90	<LOD	<LOD	<LOD	<LOD	0.90	
	Up					9.0	7.5	9.8	7.1	13	18	5.3	4.9	3.2	4.1	4.5	3.5	3.4	2.5	3.3		4.9	
	Down	9.0	6.0	5.6		2.0	2.6	3.3	3.8		5.6	3.0	4.1	2.7	3.3	3.4	3.3	3.5	2.3	3.3	2.3	3.4	
CS_2	Bak				1.9														2.3			2.9	
	Bak-C				1.2			1.4			1.6				1.5				1.4			1.8	
	Fres				0.87			0.84			0.71				0.74				0.81				0.68
	Sch-T	4.3	4.0	5.3		4.0	2.9	2.6	3.1	2.3	2.4	1.8	2.1	1.4	1.6	1.4	1.3	1.2	1.0	0.93	0.96	1.1	
	Sch-X	<LOD	<LOD					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					8.7	7.8	6.5	6.2	11	11	5.9	5.9	4.3	5.0	5.0	4.7	3.7	3.7	3.1		4.0	
	Down	22	14	14		2.9	11	11	9.6		12	8.1	9.0	6.5	7.4	7.1	8.4	6.8	6.2	5.9	4.7	6.8	
Benz	Bak				0.36			0.52			0.52				0.45				0.49			1.2	
	Bak-C				0.32			0.39			0.49				0.45				0.49			1.1	
	Fres				0.32			0.29			0.29				0.42				0.28				0.45
	Sch-T	0.49	0.52	0.68		0.58	0.36	0.65	0.58	0.55	0.68	0.52	0.87	0.39	0.45	0.81	0.52	0.45	0.45	0.42	0.49	0.94	
	Sch-X	0.26	0.23					0.45	0.36	0.22	0.39	0.30	0.27	0.21	0.27	0.49	0.32	0.24	0.30	0.25	0.30		
	Up					2.1	0.65	0.58	0.55	0.87	0.97	0.55	0.52	0.36	0.39	0.45	0.45	0.49	0.32	0.36		0.55	
	Down	0.49	0.45	0.58		0.21	0.32	0.36	0.45		0.55	0.42	0.49	0.39	0.45	0.45	0.55	0.49	0.49	0.52	0.39	0.55	
EBenz	Bak				<LOD			<LOD			<LOD				<LOD				<LOD			<LOD	
	Bak-C				<LOD			<LOD			<LOD				<LOD				<LOD			<LOD	
	Fres				<LOD			<LOD			<LOD				<LOD				<LOD				<LOD
	Sch-T	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
	Sch-X	<LOD	<LOD					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	
	Down	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	

2. Target Analytes – Metals

Table 3. Metals – Detection Limits

Parameter	LOD (ng/m^3)
Arsenic	1.5
Cadmium	1.5
Lead	1.5
Nickel	9

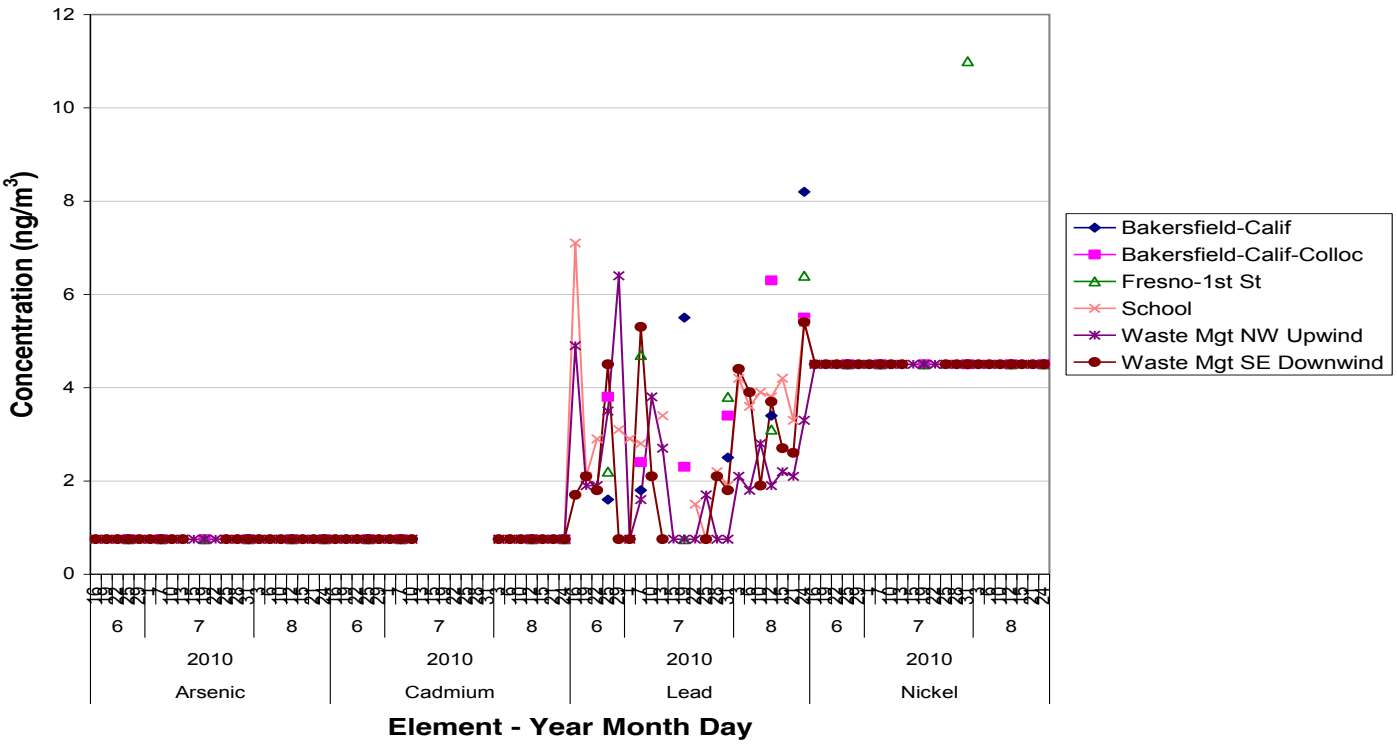


Figure 2. Metals – 24-Hour Concentrations

Table 4. Metals 24-Hour Average Data (ng/m^3)

(Site Name Abbreviations: Bak = Bakersfield, Bak-C = Bakersfield collocated, Fres = Fresno 1st Street, School = Kettleman City School, Up = Waste Mgt Upwind, Down = Waste Mgt Downwind)

Element	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/15/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010
Arsenic	Bak				<LOD			<LOD				<LOD				<LOD				<LOD			<LOD
	Bak-C				<LOD			<LOD				<LOD				<LOD				<LOD			<LOD
	Fres				<LOD			<LOD				<LOD				<LOD				<LOD			<LOD
	School	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD		<LOD			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Up	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Down	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium	Bak				<LOD			<LOD												<LOD			<LOD
	Bak-C				<LOD			<LOD												<LOD			<LOD
	Fres				<LOD			<LOD												<LOD			<LOD
	School	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD									<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Up	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Down	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	Bak				**1.6**			**1.8**				**5.5**				**2.5**				**3.4**			**8.2**
	Bak-C				**3.8**			**2.4**				**2.3**				**3.4**				**6.3**			**5.5**
	Fres				**2.2**			**4.7**				<LOD				**3.8**				**3.1**			**6.4**
	School	**7.1**	**2.1**	**2.9**		**3.1**	**2.9**	**2.8**		**3.4**			**<LOD**	<LOD	**2.2**	**1.9**	**4.2**	**3.6**	**3.9**	**3.8**	**4.2**	**3.3**	**5.4**
	Up	**4.9**	**1.9**	**1.9**	**3.5**	**6.4**	<LOD	**1.6**	**3.8**	**2.7**	<LOD	<LOD	<LOD	**1.7**	<LOD	<LOD	**2.1**	**1.8**	**2.8**	**1.9**	**2.2**	**2.1**	**3.3**
	Down	**1.7**	**2.1**	**1.8**	**4.5**	<LOD	<LOD	**5.3**	**2.1**	<LOD				<LOD	**2.1**	**1.8**	**4.4**	**3.9**	**1.9**	**3.7**	**2.7**	**2.6**	**5.4**
Nickel	Bak				<LOD			<LOD				<LOD				<LOD				<LOD			<LOD
	Bak-C				<LOD			<LOD				<LOD				<LOD				<LOD			<LOD
	Fres				<LOD			<LOD				<LOD				**11**				<LOD			<LOD
	School	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD		<LOD			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Up	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Down	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

3. Non-Target Analytes - VOCs

Table 5. VOCs – Detection Limits

Compound	LOD (ug/m^3)
1,1,1-Trichloroethane	0.05
1,3-Butadiene	0.09
Bromomethane	0.13
Carbon tetrachloride	0.13
Chloroform	0.10
cis-1,3-Dichloropropene	0.45
Dichloromethane	0.35
m/p-Xylene	0.87
o-Xylene	0.43
Perchloroethylene	0.07
Styrene	0.42
trans-1,3-Dichloropropene	0.45
Trichloroethylene	0.09

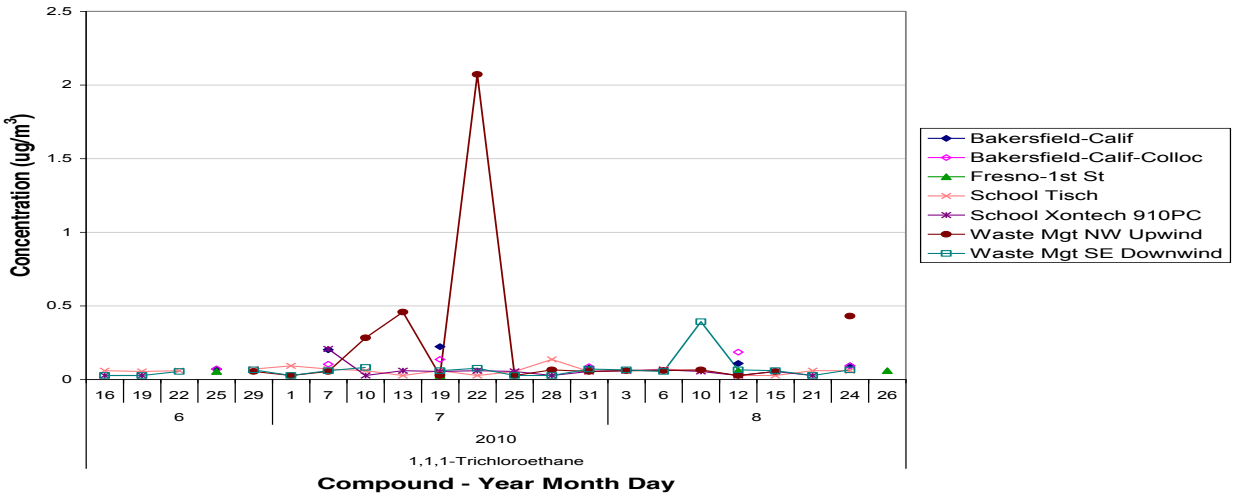


Figure 3. VOCs – 1,1,1 - Trichloroethane

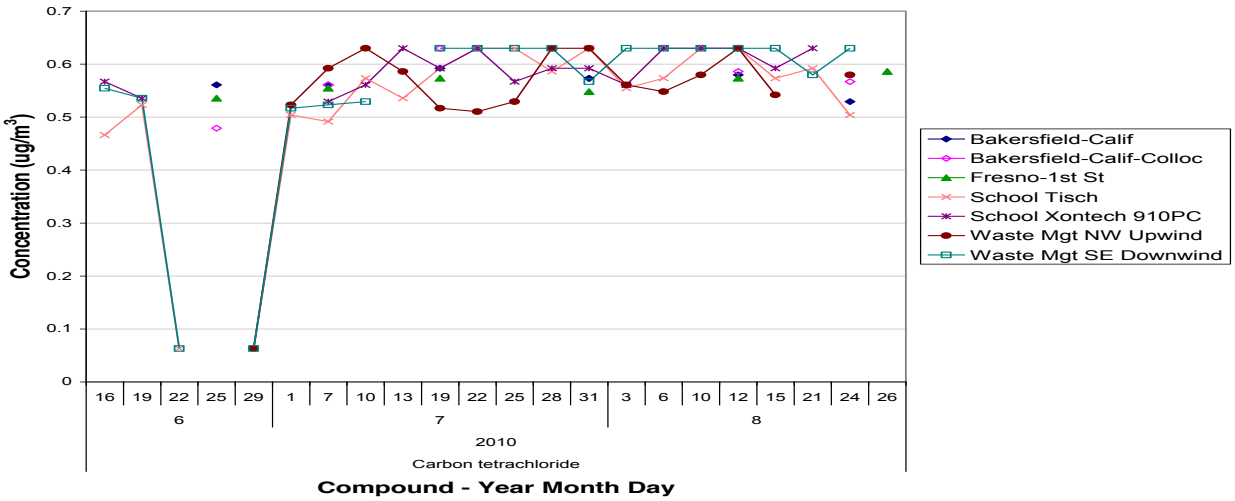


Figure 4. VOCs – Carbon Tetrachloride

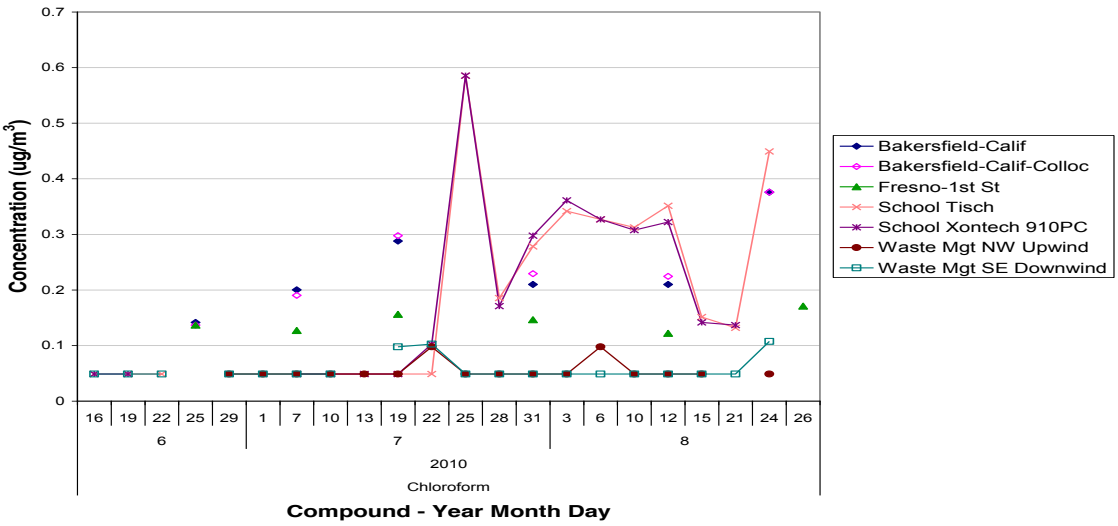


Figure 5. VOCs – Chloroform

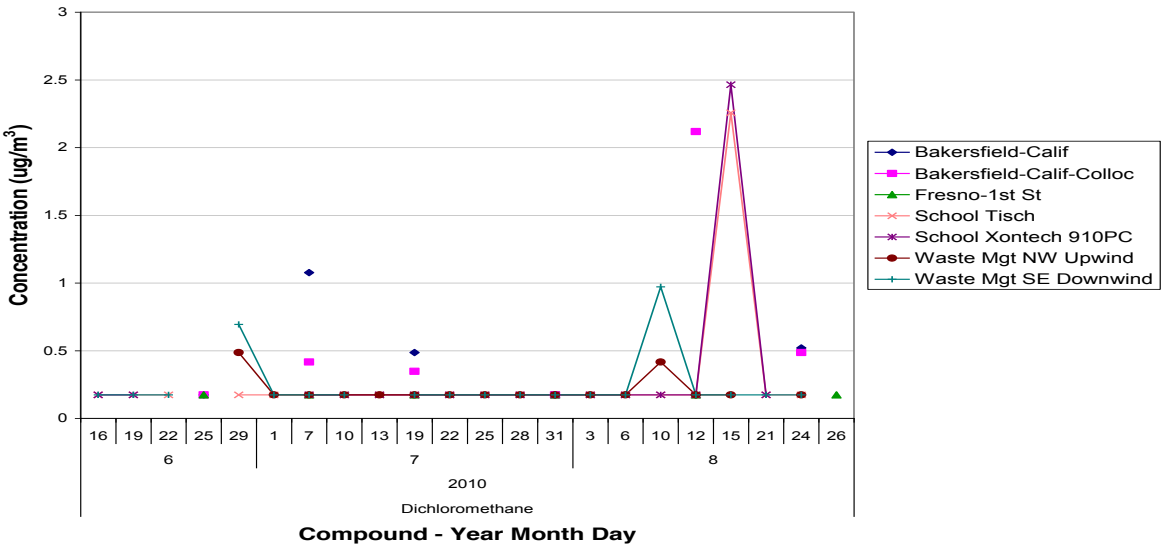


Figure 6. VOCs – Dichloromethane

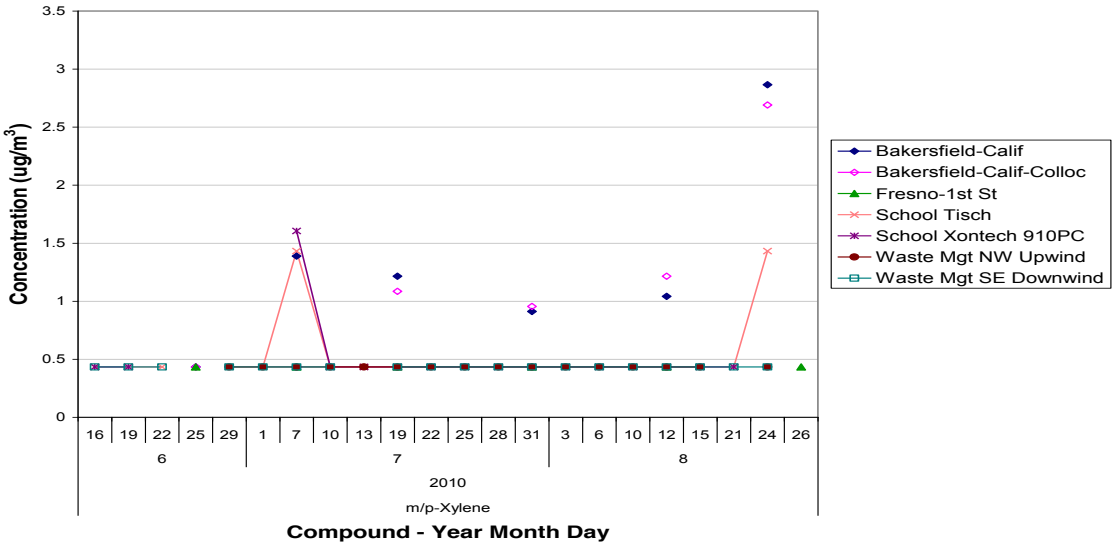


Figure 7. VOCs – m/p-Xylene

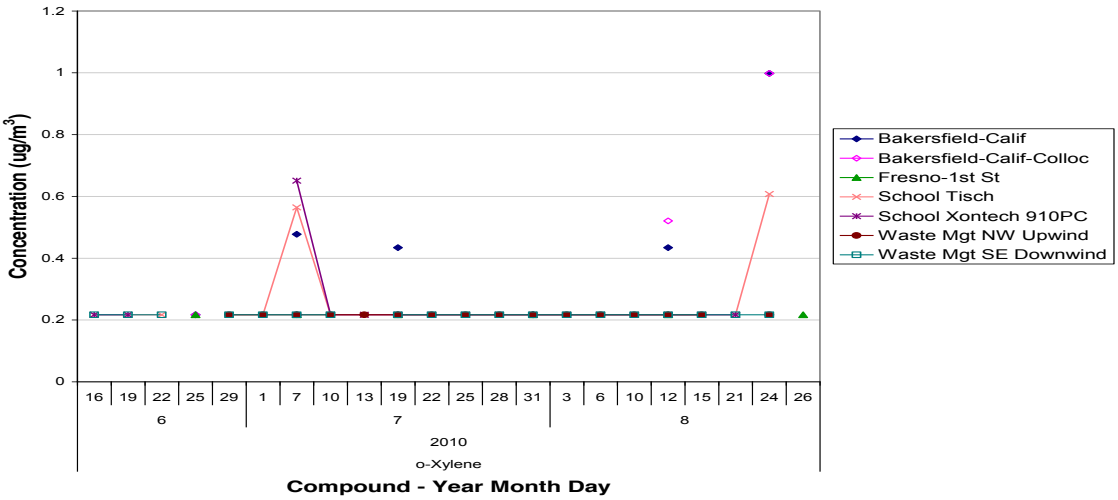


Figure 8. VOCs – o-Xylene

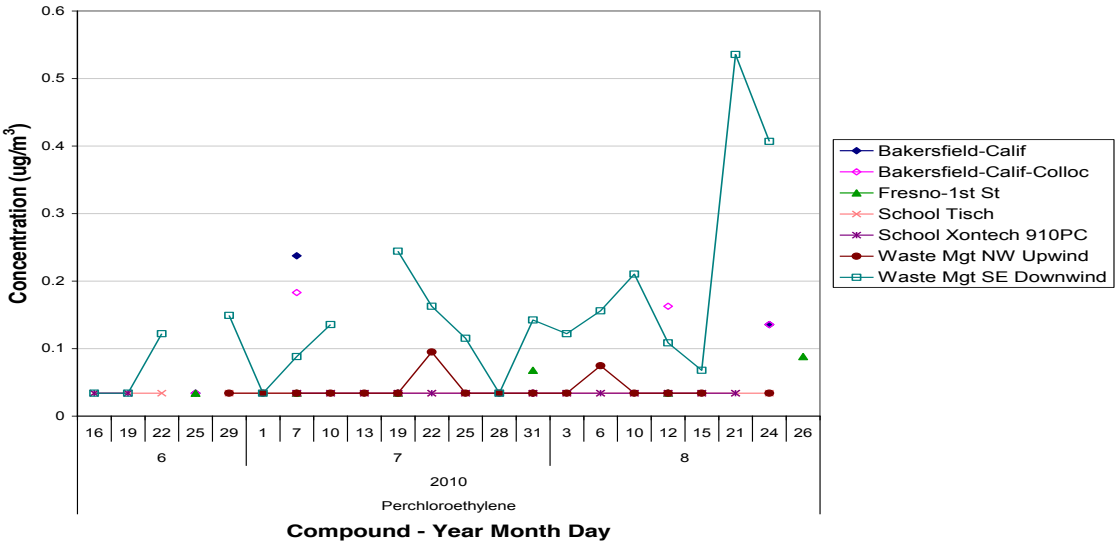


Figure 9. VOCs – Perchloroethlyene

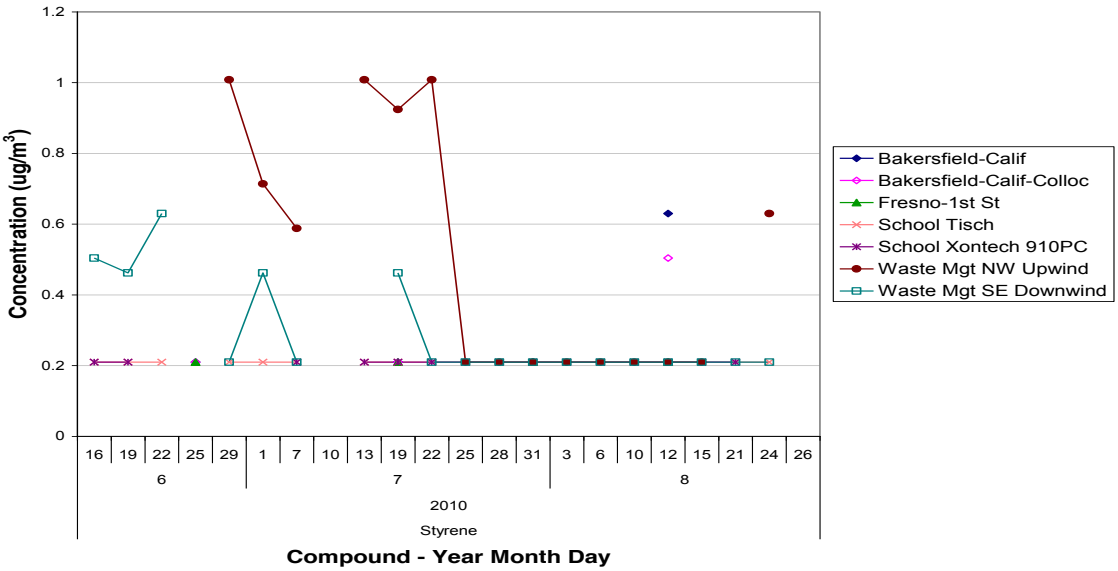


Figure 10. VOCs – Styrene

Table 6. Non-Target Analytes - VOCs 24-Hour Average Data (µg/m³)

(Site Name Abbreviations: Bak = Bakersfield, Bak-C = Bakersfield collocated, Fres = Fresno 1st Street, Sch-T = School Tisch, Sch-X = School Xonteck, Up = Waste Mgt Upwind, Down = Waste Mgt Downwind)

Compound	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010	8/26/2010
1,1,1-Trichloroethane	Bak				**0.07**			**0.20**			**0.22**				**0.08**				**0.11**			**0.09**	
	Bak-C				**0.07**			**0.10**			**0.14**				**0.09**				**0.19**			**0.09**	
	Fres				*<LOD*			**0.06**			*<LOD*				**0.07**				**0.06**				**0.06**
	Sch-T	**0.06**	*<LOD*	**0.06**		**0.07**	**0.09**	**0.07**	**0.06**	***<LOD***	**0.06**	***<LOD***	*<LOD*	**0.14**	*<LOD*	**0.06**	**0.07**	**0.06**	*<LOD*	*<LOD*	**0.06**	**0.06**	
	Sch-X	***<LOD***	*<LOD*					**0.21**	***<LOD***	**0.06**	*<LOD*	**0.06**	*<LOD*	***<LOD***	*<LOD*	**0.06**	**0.07**	*<LOD*	*<LOD*	*<LOD*	*<LOD*		
	Up	*<LOD*	*<LOD*			*<LOD*	*<LOD*	*<LOD*	**0.28**	**0.46**	*<LOD*	**2.07**	*<LOD*	**0.07**	*<LOD*	**0.06**	**0.06**	**0.07**	***<LOD***	*<LOD*		**0.43**	
	Down	*<LOD*	*<LOD*	*0.05*		**0.07**	*<LOD*	**0.06**	**0.08**		**0.06**	**0.08**	*<LOD*	*<LOD*	**0.07**	**0.07**	*<LOD*	**0.39**	**0.07**	**0.06**	*<LOD*	**0.07**	
1,3-Butadiene	Bak				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			**0.11**	
	Bak-C				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			**0.12**	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
Bromomethane	Bak				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Bak-C				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				**0.17**
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.14**	*<LOD*	**0.16**	*<LOD*	*<LOD*	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.13**	*<LOD*	*<LOD*	**0.16**	*<LOD*		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.15**		*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.23**	*<LOD*	**0.15**	*<LOD*	*<LOD*	

Table 6 (continued)

Compound	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010	8/26/2010
Carbon tetrachloride	Bak				**0.56**			**0.56**			**0.59**				**0.57**				**0.58**			**0.53**	
	Bak-C				**0.48**			**0.56**			**0.63**				**0.63**				**0.59**			**0.57**	
	Fres				**0.54**			**0.55**			**0.57**				**0.55**				**0.57**				**0.59**
	Sch-T	**0.47**	**0.52**	*<LOD*		*<LOD*	**0.50**	**0.49**	**0.57**	**0.54**	**0.59**	**0.63**	**0.63**	**0.59**	**0.63**	**0.55**	**0.57**	**0.63**	**0.63**	**0.57**	**0.59**	**0.50**	
	Sch-X	**0.57**	**0.54**					**0.53**	**0.56**	**0.63**	**0.59**	**0.63**	**0.57**	**0.59**	**0.59**	**0.56**	**0.63**	**0.63**	**0.63**	**0.59**	**0.63**		
	Up					*<LOD*	**0.52**	**0.59**	**0.63**	**0.59**	**0.52**	**0.51**	**0.53**	**0.63**	**0.63**	**0.56**	**0.55**	**0.58**	**0.63**	**0.54**		**0.58**	
	Down	**0.55**	**0.54**	*<LOD*		*<LOD*	**0.52**	**0.52**	**0.53**		**0.63**	**0.63**	**0.63**	**0.63**	**0.57**	**0.63**	**0.63**	**0.63**	**0.63**	**0.63**	**0.58**	**0.63**	
Chloroform	Bak				**0.14**			**0.20**			**0.29**				**0.21**				**0.21**			**0.38**	
	Bak-C				**0.14**			**0.19**			**0.30**				**0.23**				**0.22**			**0.38**	
	Fres				**0.14**			**0.13**			**0.16**				**0.15**				**0.12**				**0.17**
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.59**	**0.19**	**0.28**	**0.34**	**0.33**	**0.31**	**0.35**	**0.15**	**0.13**	**0.45**	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.10**	**0.59**	**0.17**	**0.30**	**0.36**	**0.33**	**0.31**	**0.32**	**0.14**	**0.14**		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.10**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.10**	*<LOD*	*<LOD*	*<LOD*		*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		**0.10**	**0.10**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.11**	
cis-1,3-Dichloropropene	Bak				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Bak-C				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
Dichloromethane	Bak				*<LOD*			**1.1**			**0.49**				*<LOD*				*<LOD*			**0.52**	
	Bak-C				*<LOD*			**0.42**			**0.35**				*<LOD*				**2.1**			**0.49**	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**2.3**	*<LOD*	*<LOD*	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**2.5**	*<LOD*		
	Up					**0.49**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.42**	*<LOD*	*<LOD*		*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		**0.69**	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.97**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	

Table 6 (continued)

Compound	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010	8/26/2010
m/p-Xylene	Bak				<LOD			**1.4**			**1.2**				**0.91**				**1.0**			**2.9**	
	Bak-C				<LOD			<LOD			**1.1**				**0.95**				**1.2**			**2.7**	
	Fres				<LOD			<LOD			<LOD				<LOD				<LOD				<LOD
	Sch-T	<LOD	<LOD	<LOD		<LOD	<LOD	**1.4**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	**1.4**	
	Sch-X	<LOD	<LOD					**1.6**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	
	Down	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
o-Xylene	Bak				<LOD			**0.48**			**0.43**				<LOD				**0.43**			**1.0**	
	Bak-C				<LOD			<LOD			<LOD				<LOD				**0.52**			**1.0**	
	Fres				<LOD			<LOD			<LOD				<LOD				<LOD				<LOD
	Sch-T	<LOD	<LOD	<LOD		<LOD	<LOD	**0.56**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	**0.61**	
	Sch-X	<LOD	<LOD					**0.65**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	
	Down	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Perchloro-ethylene	Bak				<LOD			**0.24**			<LOD				<LOD				<LOD			**0.14**	
	Bak-C				<LOD			**0.18**			<LOD				<LOD				**0.16**			**0.14**	
	Fres				<LOD			<LOD			<LOD				**0.07**				<LOD				**0.09**
	Sch-T	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
	Sch-X	<LOD	<LOD					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	**0.09**	<LOD	<LOD	<LOD	<LOD	**0.07**	<LOD	<LOD	<LOD		<LOD	
	Down	<LOD	<LOD	**0.12**		**0.15**	<LOD	**0.09**	**0.14**		**0.24**	**0.16**	**0.12**	<LOD	**0.14**	**0.12**	**0.16**	**0.21**	**0.11**	**0.07**	**0.54**	**0.41**	
Styrene	Bak				<LOD						<LOD				<LOD				**0.63**				
	Bak-C				<LOD						<LOD				<LOD				**0.50**				
	Fres				<LOD						<LOD				<LOD				<LOD				
	Sch-T	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
	Sch-X	<LOD	<LOD					<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
	Up					**1.0**	**0.71**	**0.59**		**1.0**	**0.92**	**1.0**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		**0.63**	
	Down	**0.50**	**0.46**	**0.63**		<LOD	**0.46**	<LOD			**0.46**	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	

Table 6 (continued)

Compound	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010	8/26/2010
trans-1,3-Dichloropropene	Bak				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Bak-C				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
Trichloro-ethylene	Bak				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*			*<LOD*	
	Bak-C				*<LOD*			*<LOD*			*<LOD*				*<LOD*				**1.2**			*<LOD*	
	Fres				*<LOD*			*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*
	Sch-T	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Sch-X	*<LOD*	*<LOD*					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*		
	Up					*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	
	Down	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	

4. Non-Target Analytes – Metals

Table 7. Metals – Detection Limits

Element	LOD (ng/m^3)
Antimony (Sb)	3
Chromium (Cr)	3
Cobalt (Co)	1.5
Copper (Cu)	1.5
Iron (Fe)	30
Manganese (Mn)	1.5
Molybdenum (Mo)	1.5
Platinum (Pt)	0.3
Selenium (Se)	1.5
Strontium (Sr)	1.5
Sulfur (S)	60
Tin (Sn)	3
Titanium (Ti)	9
Vanadium (V)	1.5
Zinc (Zn)	9
Zirconium (Zr)	1.5

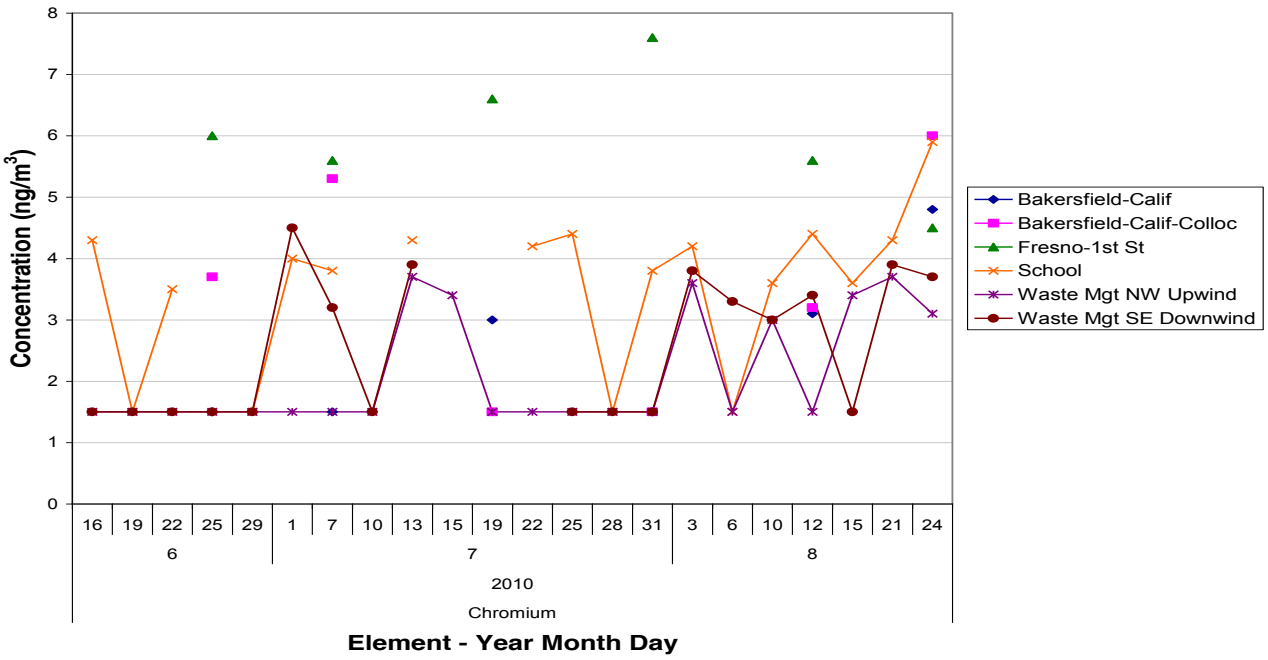


Figure 11. Metals – Chromium

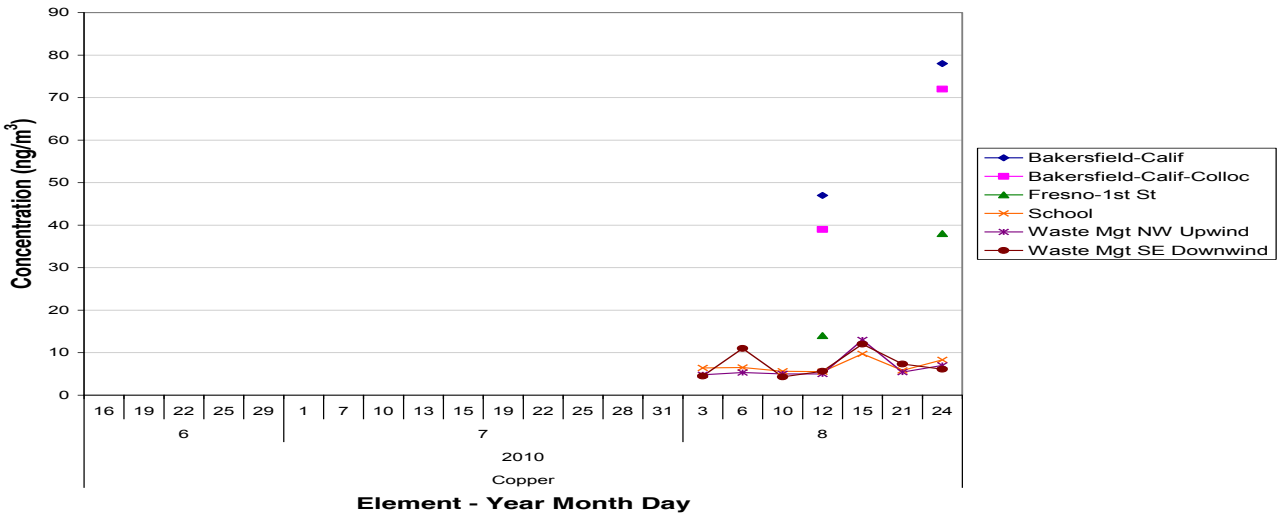


Figure 12. Metals - Copper

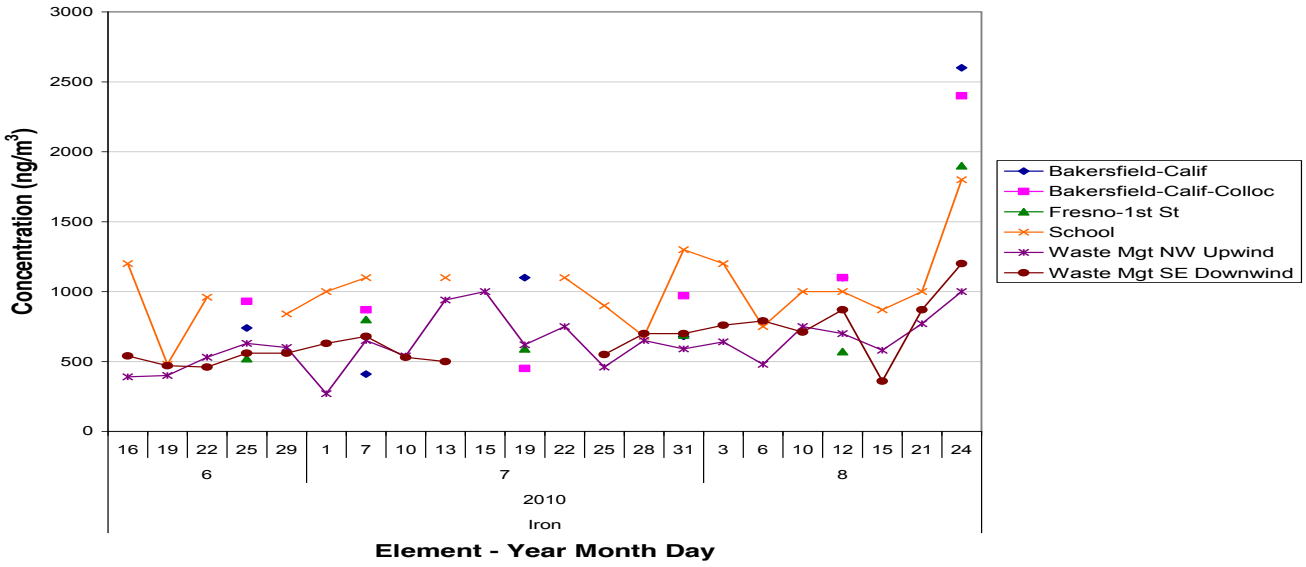


Figure 13. Metals - Iron

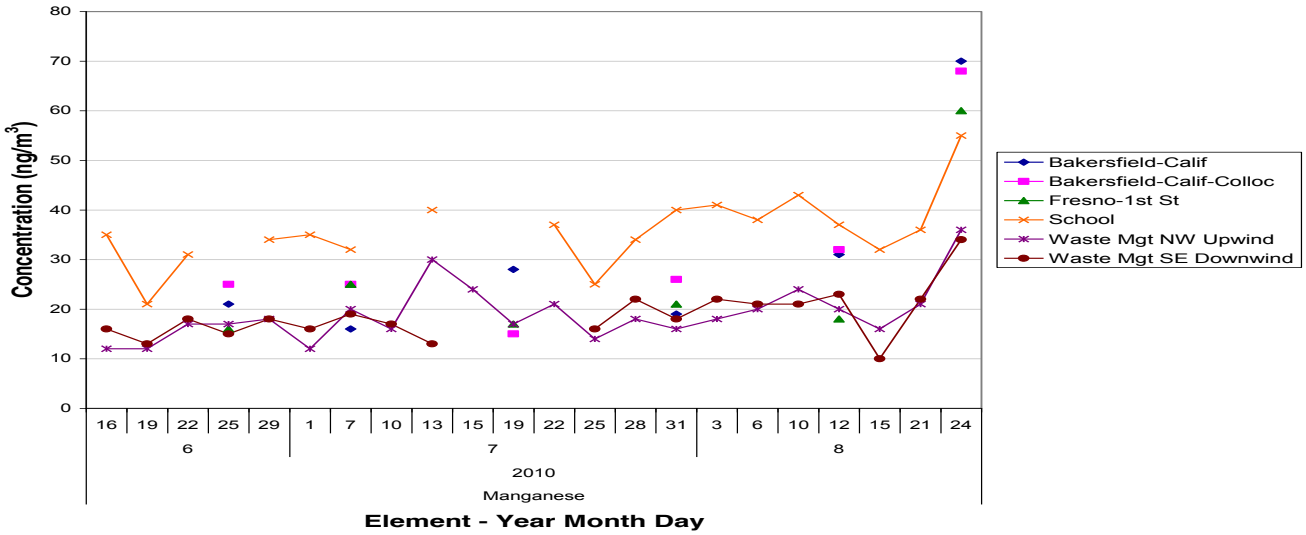


Figure 14. Metals - Manganese

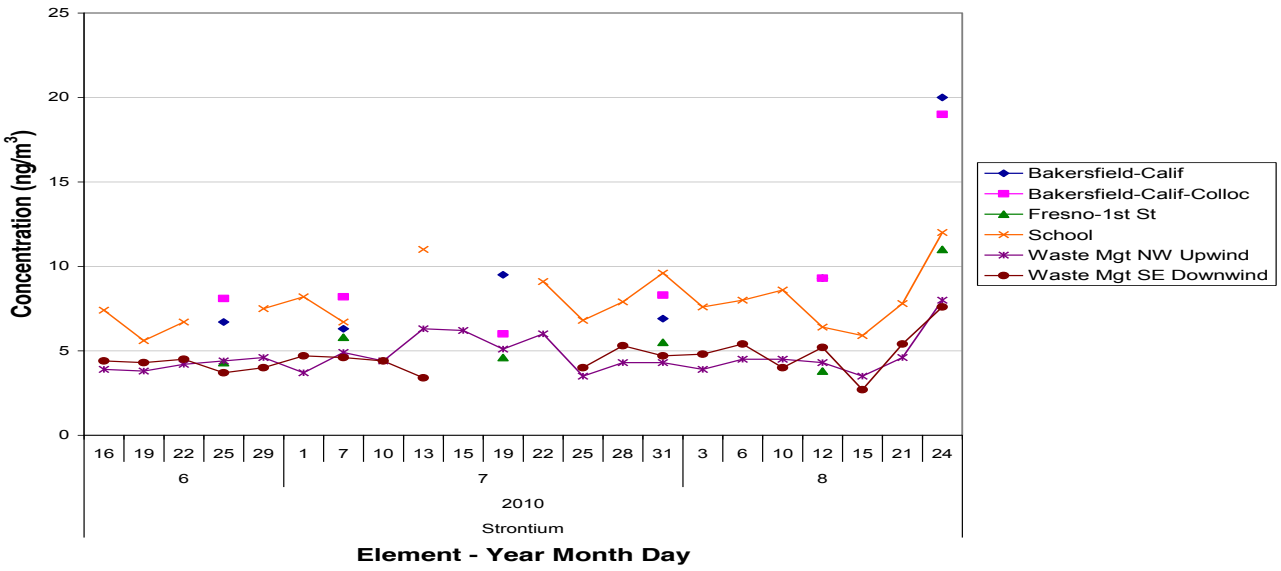


Figure 15. Metals – Strontium

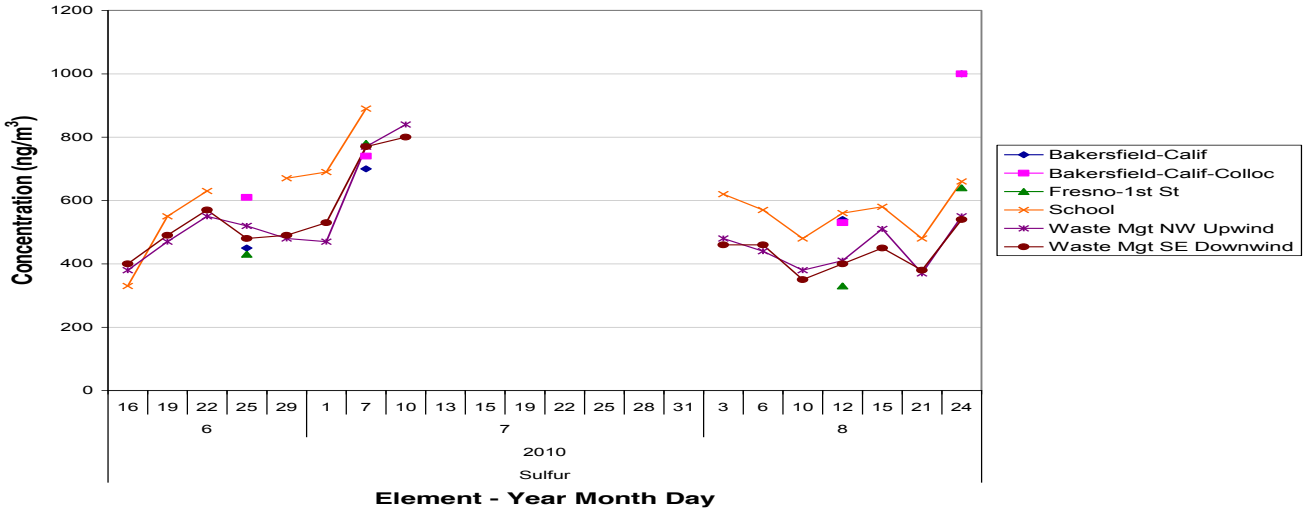


Figure 16. Metals - Sulfur

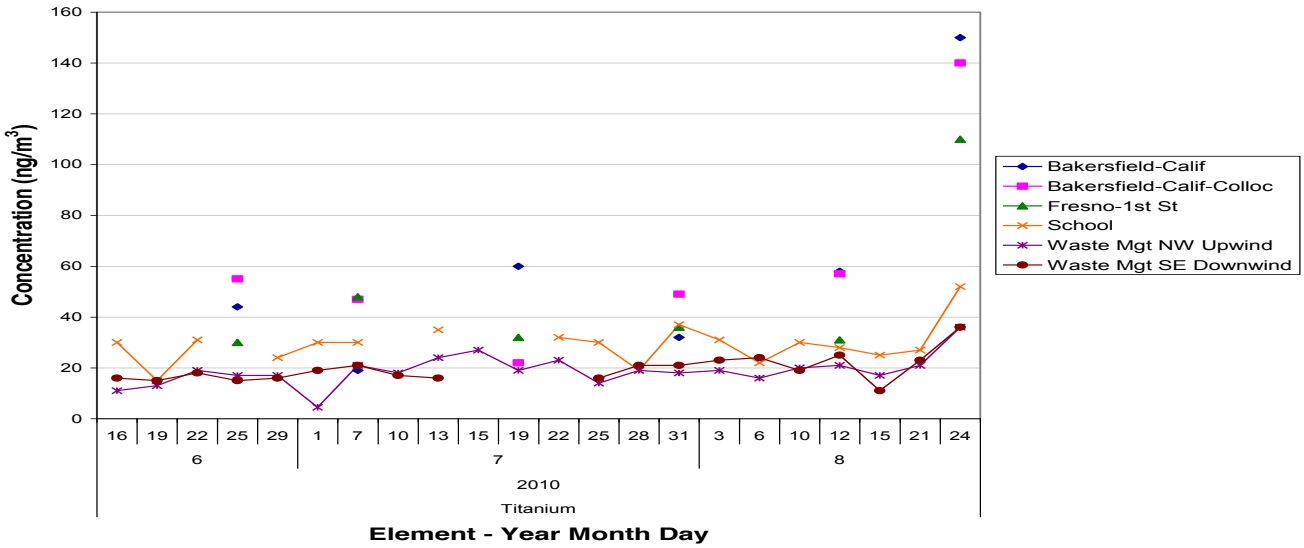


Figure 17. Metals - Titanium

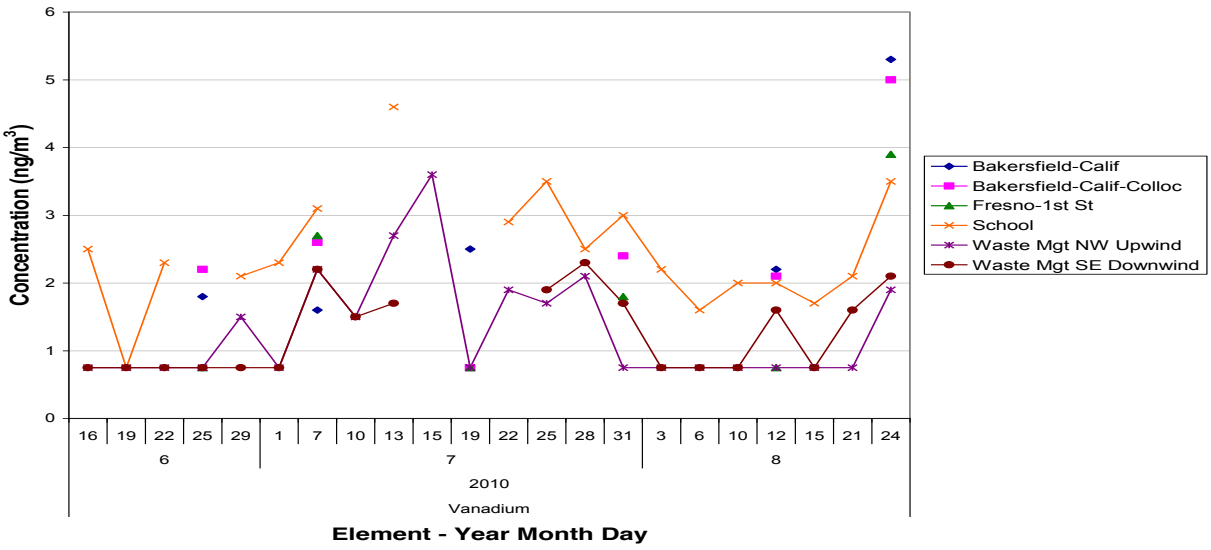


Figure 18. Metals - Vanadium

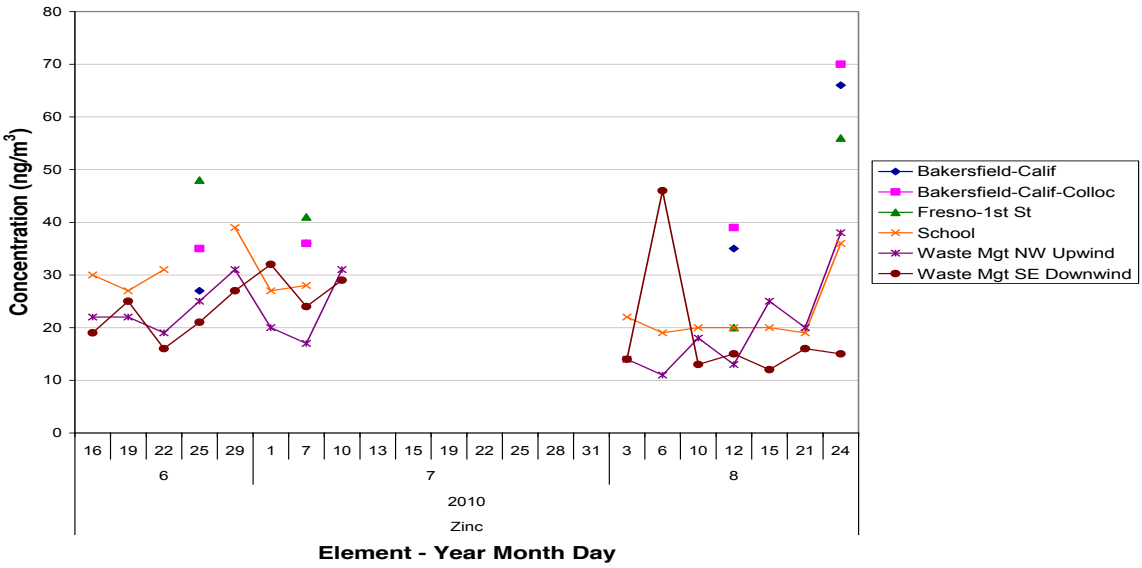


Figure 19. Metals - Zinc

Table 8. Non-Target Analytes – Metals 24-Hour Average Data (ng/m^3)

(Site Name Abbreviations: Bak = Bakersfield, Bak-C = Bakersfield collocated, Fres = Fresno 1st Street, School = Kettleman City School, Up = Waste Mgt Upwind, Down = Waste Mgt Downwind)

Element	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/15/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010
Sb	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
Cr	Bak				*<LOD*			*<LOD*				**3.0**				*<LOD*				**3.1**			**4.8**
	Bak-C				**3.7**			**5.3**				*<LOD*				*<LOD*				**3.2**			**6.0**
	Fres				**6.0**			**5.6**				**6.6**				**7.6**				**5.6**			**4.5**
	School	**4.3**	*<LOD*	**3.5**		*<LOD*	**4.0**	**3.8**		**4.3**			**4.2**	**4.4**	*<LOD*	**3.8**	**4.2**	*<LOD*	**3.6**	**4.4**	**3.6**	**4.3**	**5.9**
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**3.7**	**3.4**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**3.6**	*<LOD*	**3.0**	*<LOD*	**3.4**	**3.7**	**3.1**
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**4.5**	**3.2**	*<LOD*	**3.9**				*<LOD*	*<LOD*	*<LOD*	**3.8**	**3.3**	**3.0**	**3.4**	*<LOD*	**3.9**	**3.7**
Co	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
Cu	Bak																			**47**			**78**
	Bak-C																			**39**			**72**
	Fres																			**14**			**38**
	School																**6.4**	**6.5**	**5.6**	**5.5**	**9.7**	**5.8**	**8.3**
	Up																**4.8**	**5.3**	**5.0**	**5.0**	**13**	**5.4**	**7.0**
	Down																**4.5**	**11**	**4.3**	**5.6**	**12**	**7.3**	**6.1**

Table 8 (continued)

Element	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/15/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010
Fe	Bak				**740**			**410**				**1100**				**680**				**1100**			**2600**
	Bak-C				**930**			**870**				**450**				**970**				**1100**			**2400**
	Fres				**520**			**800**				**590**				**690**				**570**			**1900**
	School	**1200**	**480**	**960**		**840**	**1000**	**1100**		**1100**			**1100**	**900**	**680**	**1300**	**1200**	**750**	**1000**	**1000**	**870**	**1000**	**1800**
	Up	**390**	**400**	**530**	**630**	**600**	**270**	**650**	**540**	**940**	**1000**	**620**	**750**	**460**	**650**	**590**	**640**	**480**	**750**	**700**	**580**	**770**	**1000**
	Down	**540**	**470**	**460**	**560**	**560**	**630**	**680**	**530**	**500**				**550**	**700**	**700**	**760**	**790**	**710**	**870**	**360**	**870**	**1200**
Mn	Bak				**21**			**16**				**28**				**19**				**31**			**70**
	Bak-C				**25**			**25**				**15**				**26**				**32**			**68**
	Fres				**16**			**25**				**17**				**21**				**18**			**60**
	School	**35**	**21**	**31**		**34**	**35**	**32**		**40**			**37**	**25**	**34**	**40**	**41**	**38**	**43**	**37**	**32**	**36**	**55**
	Up	**12**	**12**	**17**	**17**	**18**	**12**	**20**	**16**	**30**	**24**	**17**	**21**	**14**	**18**	**16**	**18**	**20**	**24**	**20**	**16**	**21**	**36**
	Down	**16**	**13**	**18**	**15**	**18**	**16**	**19**	**17**	**13**				**16**	**22**	**18**	**22**	**21**	**21**	**23**	**10**	**22**	**34**
Mo	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
Pt	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			**0.50**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**0.30**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*

Table 8 (continued)

Element	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/15/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010
Se	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
Sr	Bak				**6.7**			**6.3**				**9.5**				**6.9**				**9.3**			**20**
	Bak-C				**8.1**			**8.2**				**6.0**				**8.3**				**9.3**			**19**
	Fres				**4.3**			**5.8**				**4.6**				**5.5**				**3.8**			**11**
	School	**7.4**	**5.6**	**6.7**		**7.5**	**8.2**	**6.7**		**11**			**9.1**	**6.8**	**7.9**	**9.6**	**7.6**	**8.0**	**8.6**	**6.4**	**5.9**	**7.8**	**12**
	Up	**3.9**	**3.8**	**4.2**	**4.4**	**4.6**	**3.7**	**4.9**	**4.4**	**6.3**	**6.2**	**5.1**	**6.0**	**3.5**	**4.3**	**4.3**	**3.9**	**4.5**	**4.5**	**4.3**	**3.5**	**4.6**	**8.0**
	Down	**4.4**	**4.3**	**4.5**	**3.7**	**4.0**	**4.7**	**4.6**	**4.4**	**3.4**				**4.0**	**5.3**	**4.7**	**4.8**	**5.4**	**4.0**	**5.2**	**2.7**	**5.4**	**7.6**
S	Bak				**450**			**700**												**540**			**1000**
	Bak-C				**610**			**740**												**530**			**1000**
	Fres				**430**			**780**												**330**			**640**
	School	**330**	**550**	**630**		**670**	**690**	**890**									**620**	**570**	**480**	**560**	**580**	**480**	**660**
	Up	**380**	**470**	**550**	**520**	**480**	**470**	**770**	**840**								**480**	**440**	**380**	**410**	**510**	**370**	**550**
	Down	**400**	**490**	**570**	**480**	**490**	**530**	**770**	**800**								**460**	**460**	**350**	**400**	**450**	**380**	**540**
Sn	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*

Table 8 (continued)

Element	Site Name	6/16/2010	6/19/2010	6/22/2010	6/25/2010	6/29/2010	7/1/2010	7/7/2010	7/10/2010	7/13/2010	7/15/2010	7/19/2010	7/22/2010	7/25/2010	7/28/2010	7/31/2010	8/3/2010	8/6/2010	8/10/2010	8/12/2010	8/15/2010	8/21/2010	8/24/2010
Ti	Bak				**44**			**19**				**60**				**32**				**58**			**150**
	Bak-C				**55**			**47**				**22**				**49**				**57**			**140**
	Fres				**30**			**48**				**32**				**36**				**31**			**110**
	School	**30**	**15**	**31**		**24**	**30**	**30**		**35**			**32**	**30**	**19**	**37**	**31**	**22**	**30**	**28**	**25**	**27**	**52**
	Up	**11**	**13**	**19**	**17**	**17**	*<LOD*	**21**	**18**	**24**	**27**	**19**	**23**	**14**	**19**	**18**	**19**	**16**	**20**	**21**	**17**	**21**	**36**
	Down	**16**	**15**	**18**	**15**	**16**	**19**	**21**	**17**	**16**				**16**	**21**	**21**	**23**	**24**	**19**	**25**	**11**	**23**	**36**
V	Bak				**1.8**			**1.6**				**2.5**				**1.7**				**2.2**			**5.3**
	Bak-C				**2.2**			**2.6**				*<LOD*				**2.4**				**2.1**			**5.0**
	Fres				*<LOD*			**2.7**				*<LOD*				**1.8**				*<LOD*			**3.9**
	School	**2.5**	*<LOD*	**2.3**		**2.1**	**2.3**	**3.1**		**4.6**			**2.9**	**3.5**	**2.5**	**3.0**	**2.2**	**1.6**	**2.0**	**2.0**	**1.7**	**2.1**	**3.5**
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**1.5**	*<LOD*	**2.2**	**1.5**	**2.7**	**3.6**	*<LOD*	**1.9**	**1.7**	**2.1**	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**1.9**
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	**2.2**	**1.5**	**1.7**				**1.9**	**2.3**	**1.7**	*<LOD*	*<LOD*	*<LOD*	**1.6**	*<LOD*	**1.6**	**2.1**
Zn	Bak				**27**			**36**												**35**			**66**
	Bak-C				**35**			**36**												**39**			**70**
	Fres				**48**			**41**												**20**			**56**
	School	**30**	**27**	**31**		**39**	**27**	**28**									**22**	**19**	**20**	**20**	**20**	**19**	**36**
	Up	**22**	**22**	**19**	**25**	**31**	**20**	**17**	**31**								**14**	**11**	**18**	**13**	**25**	**20**	**38**
	Down	**19**	**25**	**16**	**21**	**27**	**32**	**24**	**29**								**14**	**46**	**13**	**15**	**12**	**16**	**15**
Zr	Bak				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Bak-C				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	Fres				*<LOD*			*<LOD*				*<LOD*				*<LOD*				*<LOD*			*<LOD*
	School	*<LOD*	*<LOD*	*<LOD*		*<LOD*	*<LOD*	*<LOD*		*<LOD*			*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Up	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*
	Down	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*				*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*	*<LOD*

5. Target Analytes – PCB, Dioxin and Furan Congeners

Field Observations

PUF samplers were used for PCB/dioxin/furan monitoring at the School, and upwind and downwind of the Facility. A fourth PUF sampler was collocated with the downwind Facility sampler for quality assurance purposes. The PUF samplers were installed, leak tested and calibrated prior to the initial sampling start date. Following the weekly removal and installation of the quartz fiber filters, the sampler flow rates were recorded and adjusted as needed. After each monthly PUF cartridge change, the sampler flow rate was verified and leak tested. Two quality assurance audits were performed during the months of July and September. All four PUF samplers passed the quality assurance audit criteria.

Laboratory Observations

Sampling cartridges were spiked with an inert (surrogate) compound prior to use in collecting air samples as a means of checking for sampling and analytical recoveries. The field sampling surrogates displayed low recoveries. The low recoveries may be due to the extended sampling duration or high ambient temperatures during the sample collection period. The recoveries may indicate a possible low bias in reported results. However, the observed sample concentrations are consistent with those reported for typical rural ambient air samples. The established method control limits were designed for a 24-hour sample. It is not known how the modification to a 20-day sample affects the field surrogates. Therefore, it may not be appropriate to apply the same recovery criteria to these samples. In conversations with U.S. EPA laboratory staff that analyzed the samples, based on their experience, low recoveries of field surrogates do not necessarily represent losses in the sample and there is no indication that the low recoveries influenced the data.

Results

Figures 20-25 and Table 9 present the data for PCB, dioxin and furan congeners collected from mid-June through early September 2010. Data are summarized for two sites located downwind of the Facility (one site is identified as collocated), one site upwind of the Facility, and at the Kettleman City School. Data from two sites in Fresno County (First Street and Five Points), collected during June – August 2005, are presented for comparison.

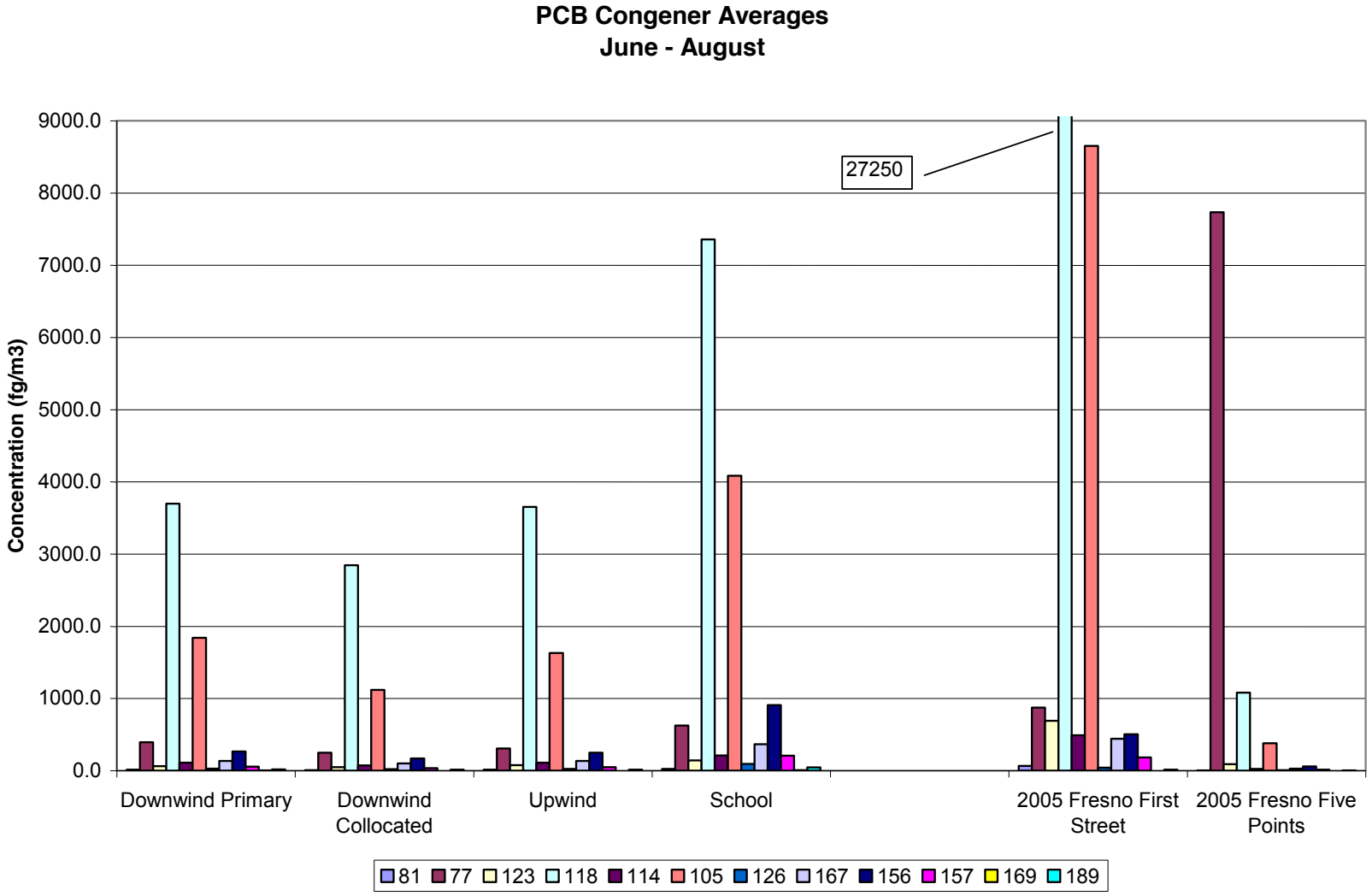

PCB Congener Averages
June - August
Concentration (fg/m3)
9000.0
8000.0
7000.0
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
27250
Downwind Primary
Downwind Collocated
Upwind
School
2005 Fresno First Street
2005 Fresno Five Points
81
77
123
118
114
105
126
167
156
157
169
189

Figure 20.

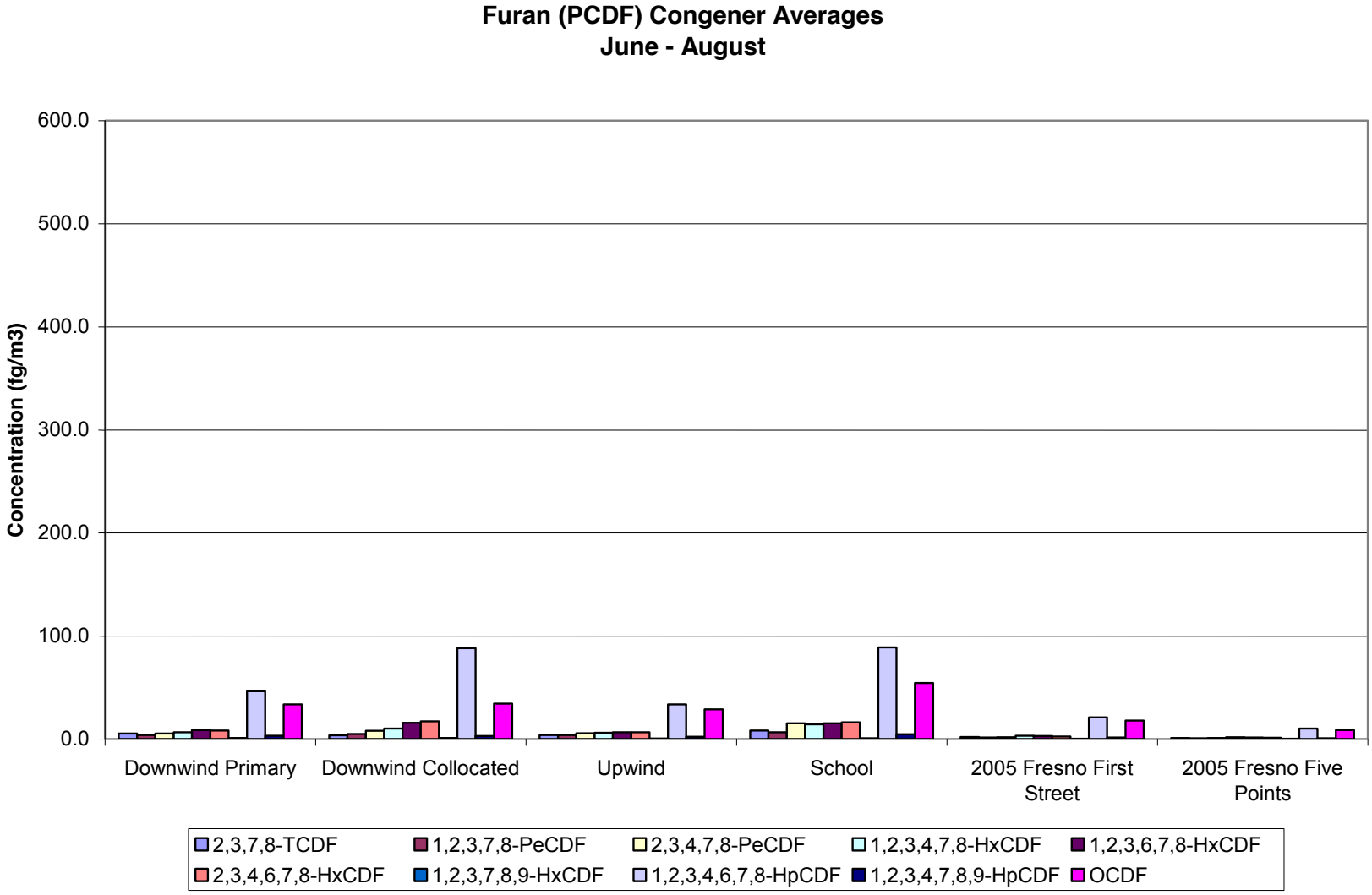

Furan (PCDF) Congener Averages
June - August
Concentration (fg/m3)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
Downwind Primary
Downwind Collocated
Upwind
School
2005 Fresno First Street
2005 Fresno Five Points
2,3,7,8-TCDF
1,2,3,7,8-PeCDF
2,3,4,7,8-PeCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
OCDF

Figure 21.

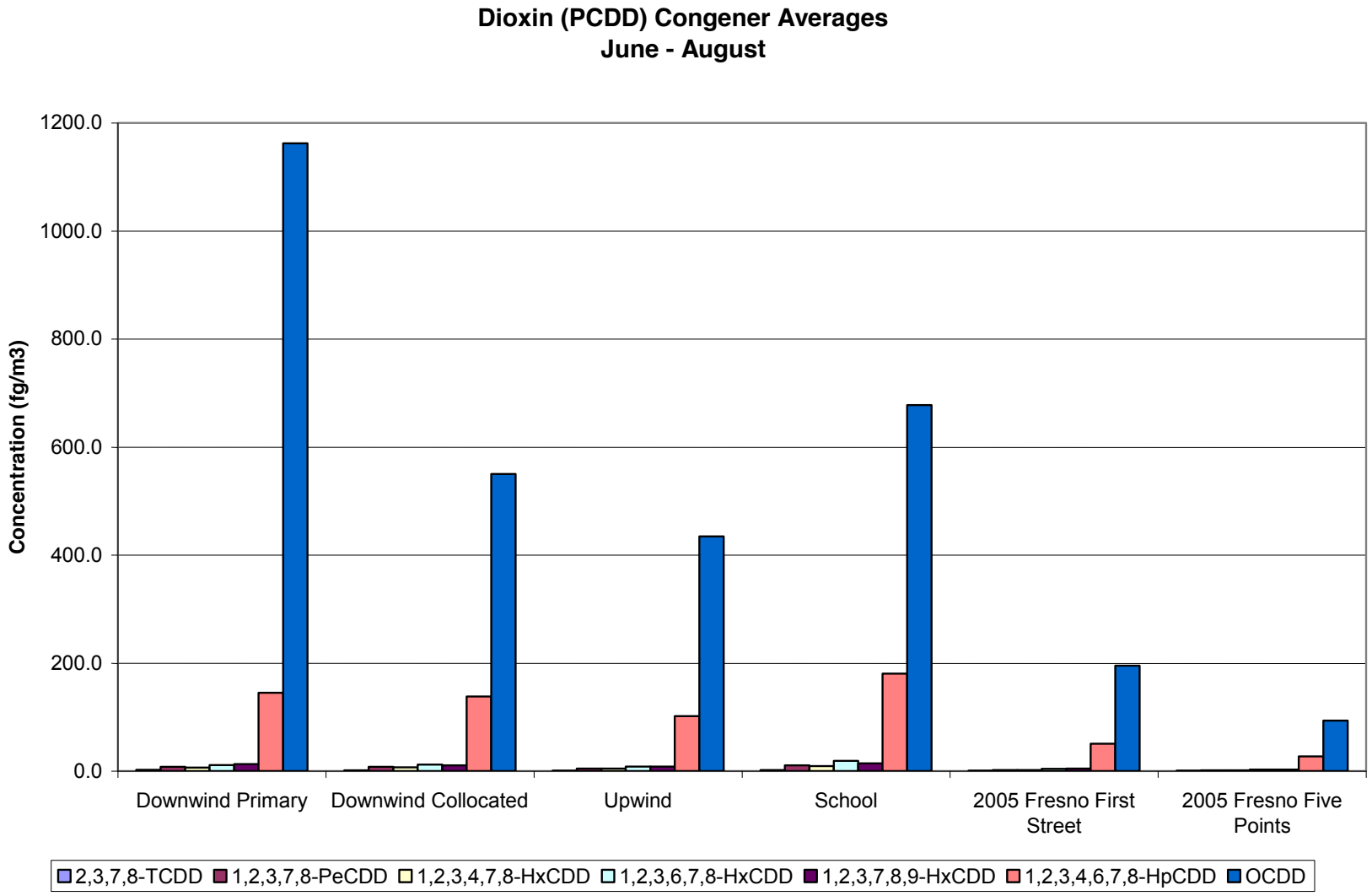

Dioxin (PCDD) Congener Averages
June - August
Concentration (fg/m3)
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Downwind Primary
Downwind Collocated
Upwind
School
2005 Fresno First Street
2005 Fresno Five Points
2,3,7,8-TCDD
1,2,3,7,8-PeCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
1,2,3,4,6,7,8-HpCDD
OCDD

Figure 22.

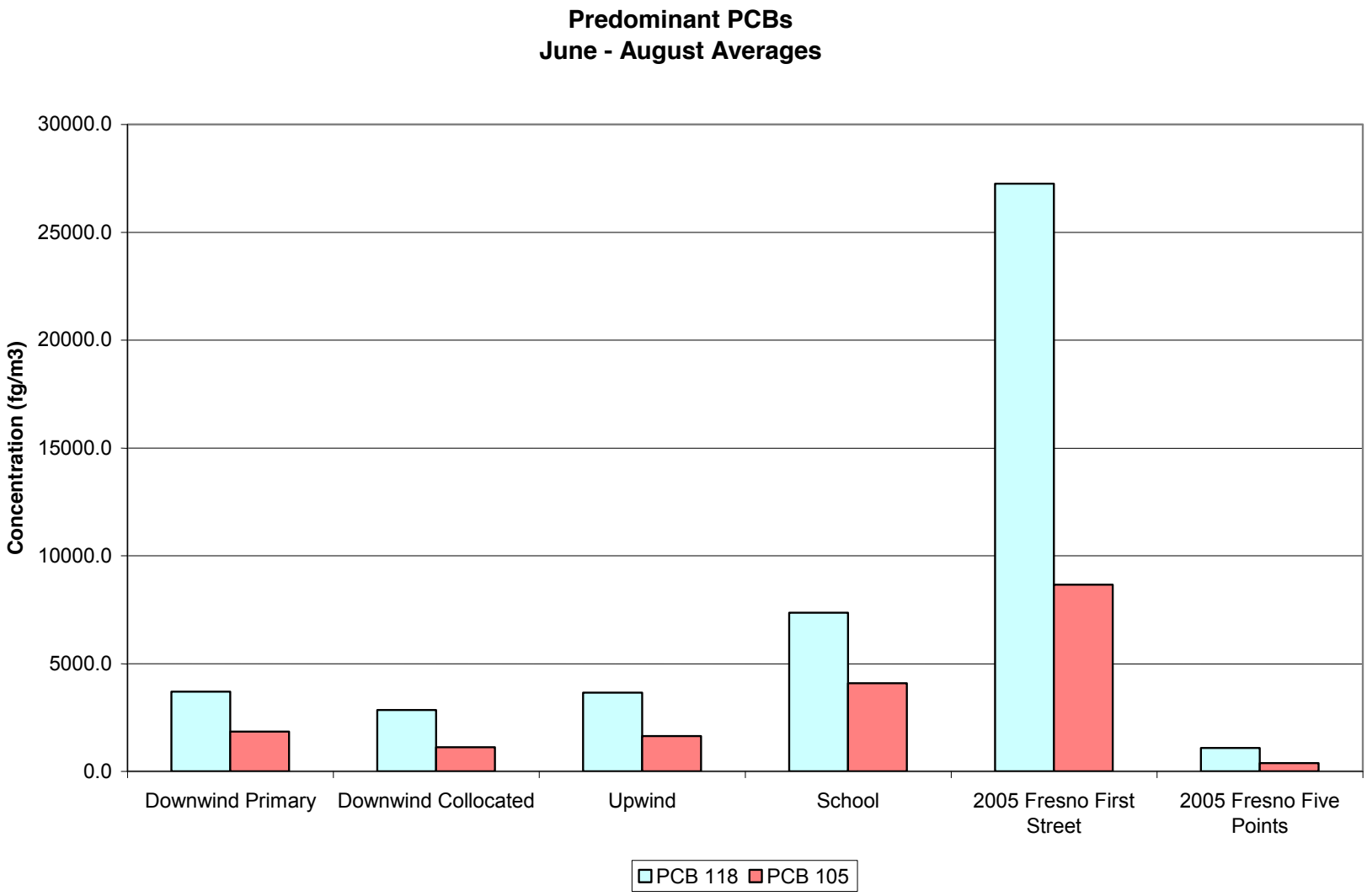

Predominant PCBs
June - August Averages
Concentration (fg/m3)
30000.0
25000.0
20000.0
15000.0
10000.0
5000.0
0.0
Downwind Primary
Downwind Collocated
Upwind
School
2005 Fresno First Street
2005 Fresno Five Points
PCB 118
PCB 105

Figure 23.

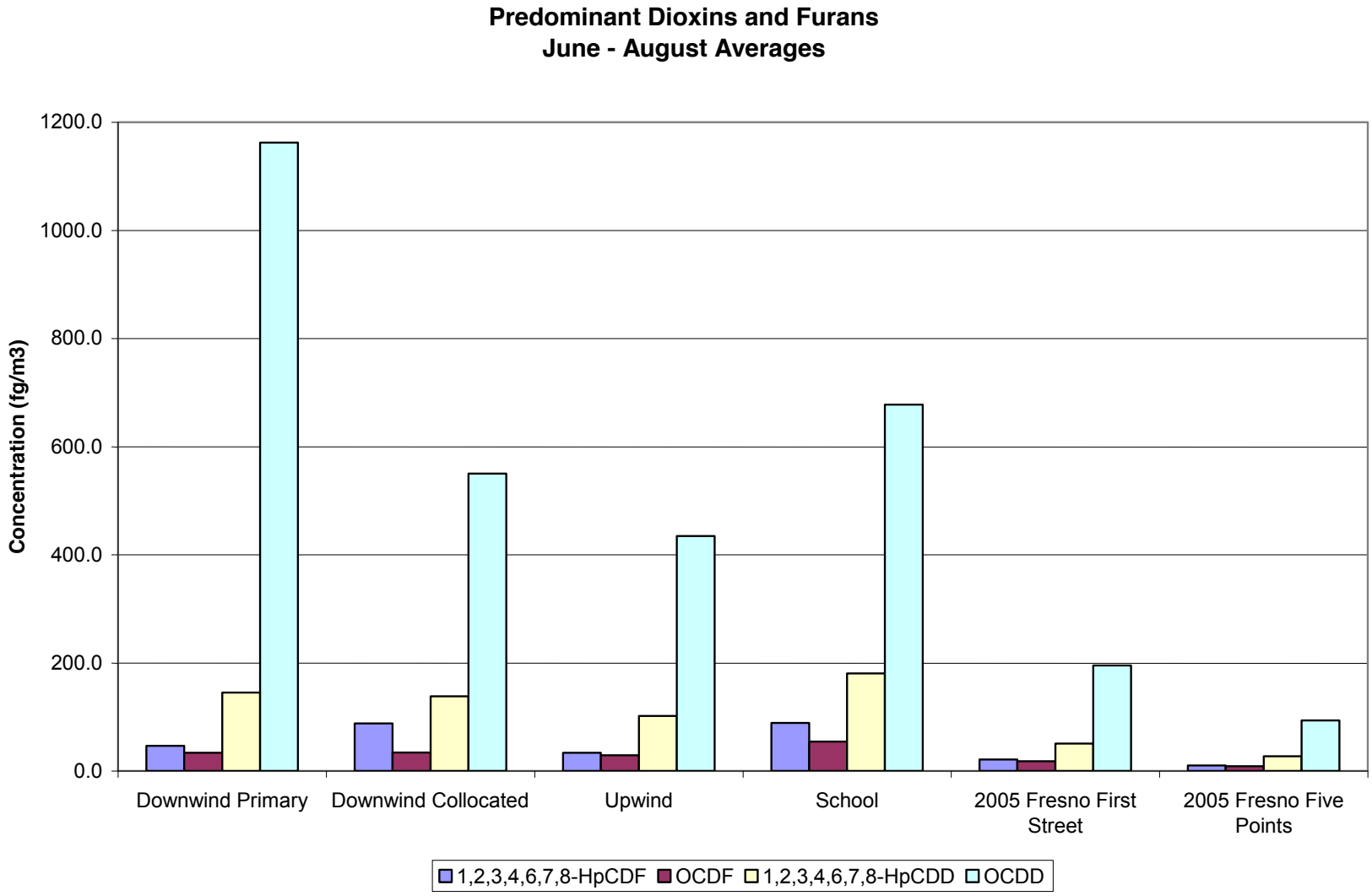

Predominant Dioxins and Furans
June - August Averages
Concentration (fg/m3)
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Downwind Primary
Downwind Collocated
Upwind
School
2005 Fresno First Street
2005 Fresno Five Points
1,2,3,4,6,7,8-HpCDF
OCDF
1,2,3,4,6,7,8-HpCDD
OCDD

Figure 24.

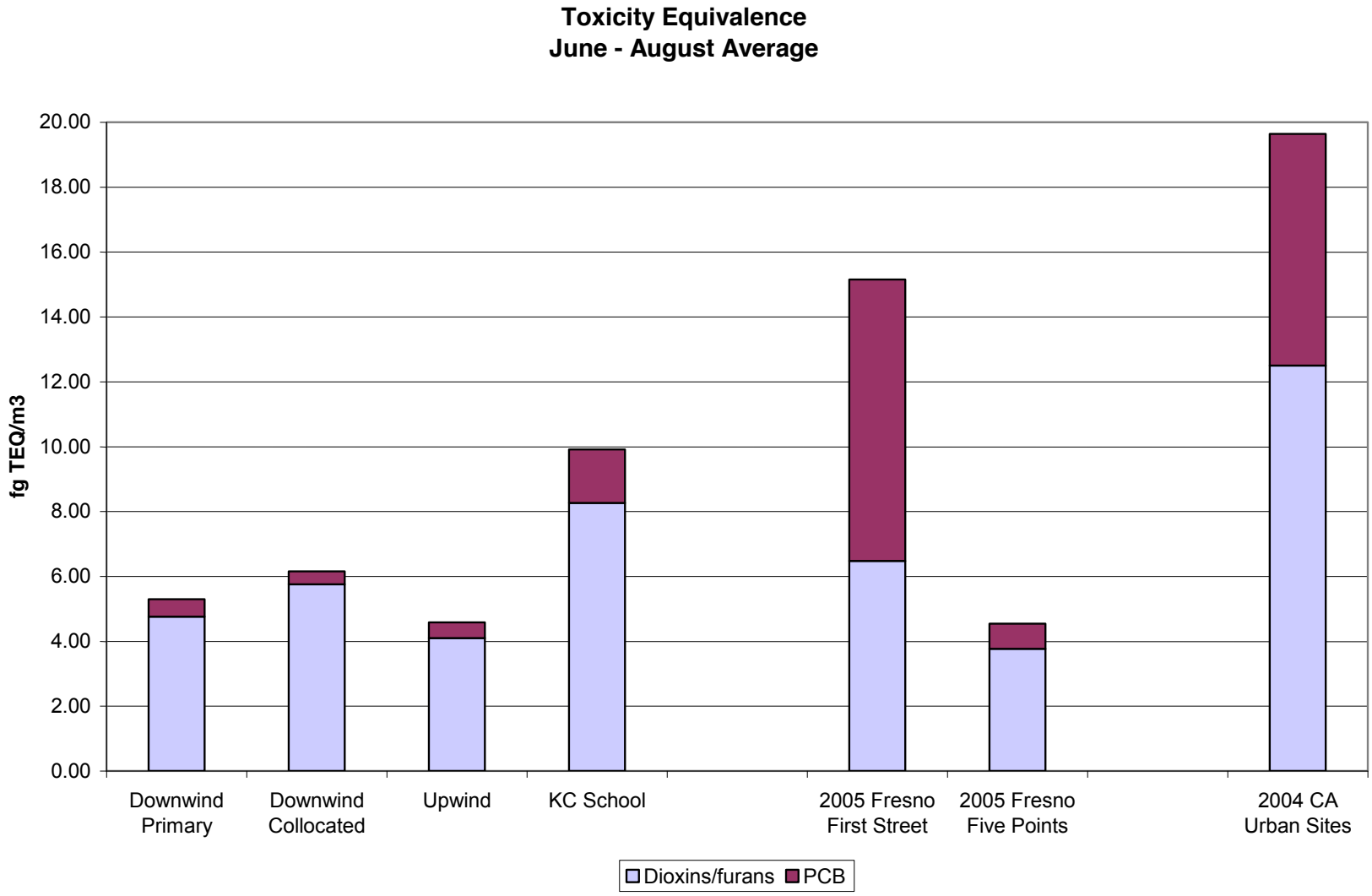

Toxicity Equivalence
June - August Average
fg TEQ/m3
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Downwind Primary
Downwind Collocated
Upwind
KC School
2005 Fresno First Street
2005 Fresno Five Points
2004 CA Urban Sites
Dioxins/furans
PCB

Figure 25.

Table 9. Congener averages (fg/m^3) of 3 samples per site collected from 6/17/2010 through 9/6/2010

PCBs	Congeners	Downwind Primary	Downwind Collocated	Upwind	School	2005 Fresno First Street	2005 Fresno Five Points
PCB 81	3,4,4',5 - TeCB	13.3	8.19	12.4	23.0	65	4.9
PCB 77	3,3',4,4' - TeCB	393	249	306	624	875	7730
PCB 123	2',3,4,4',5 - PeCB	63.4	47.1	76.5	143	690	91.3
PCB 118	2,3',4,4',5 - PeCB	3700	2840	3650	7360	27300	1080
PCB 114	2,3,4,4',5 - PeCB	109	73.1	110	211	490	24
PCB 105	2,3,3',4,4' - PeCB	1840	1120	1630	4080	8650	380
PCB 126	3,3',4,4',5 - PeCB	28.5	20.3	24.5	91.6	41.5	5.2
PCB 167	2,3',4,4',5,5' - HxCB	134	99.2	134	367	443	27.3
PCB 156	2,3,3',4,4',5 - HxCB	267	168	249	908	503	58.7
PCB 157	2,3,3',4,4',5' - HxCB	56.5	35.0	49.6	206	183	13.5
PCB 169	3,3',4,4',5,5' - HxCB	2.1	1.72	1.64	5.2	1.25	1.33
PCB 189	2,3,3',4,4',5,5' - HpCB	18.7	14.8	14.7	44.7	15.5	3.87

Table 9 (continued)

PCDFs/PCDDs	Downwind Primary	Downwind Collocated	Upwind	School	2005 Fresno First Street	2005 Fresno Five Points
2,3,7,8-TCDF	5.3	3.60	3.97	8.1	1.97	0.96
1,2,3,7,8-PeCDF	3.9	4.73	3.80	6.6	1.42	0.71
2,3,4,7,8-PeCDF	5.4	7.85	5.62	15.3	1.8	0.9
1,2,3,4,7,8-HxCDF	6.5	10.2	5.94	14.2	3.07	1.6
1,2,3,6,7,8-HxCDF	8.6	15.8	6.57	15.2	2.85	1.43
2,3,4,6,7,8-HxCDF	8.3	17.1	6.63	16.1	2.5	1.3
1,2,3,7,8,9-HxCDF*	<LOD	<LOD	<LOD	<LOD	0.19	0.14
1,2,3,4,6,7,8-HpCDF	46.4	88.1	33.6	88.9	21	10.2
1,2,3,4,7,8,9-HpCDF	3.2	3.01	2.22	4.7	1.38	0.63
OCDF	33.6	34.3	28.8	54.4	18	8.8
2,3,7,8-TCDD	2.3	1.47	0.66	2.0	0.57	0.38
1,2,3,7,8-PeCDD	7.7	7.76	4.62	10.5	2.05	1.3
1,2,3,4,7,8-HxCDD	6.3	6.92	4.52	9.1	1.92	1.23
1,2,3,6,7,8-HxCDD	11.0	11.8	8.08	19.0	4.28	2.63
1,2,3,7,8,9-HxCDD	13.0	10.7	8.13	14.2	4.52	2.93
1,2,3,4,6,7,8-HpCDD	145	138	102	181	50.5	27
OCDD	1160	550	435	677	195	93.3

* The LOD for 1,2,3,7,8,9-HxCDF was 1-2 fg/m^3 at the Kettleman monitoring sites.

Appendix D

Regional Diesel Exhaust Exposure Assessment

Background Regarding Regional Assessment
Due to community concerns, ARB assessed the public's exposure to diesel particulate matter (DPM) in Kettleman City. DPM consists of a mixture of many chemical compounds, and because of this, there is no method of direct measurement for ambient concentrations. Therefore, ARB used two approaches previously used by ARB in other parts of the state: a population-weighted method for a regional scale assessment and air dispersion modeling for a local scale assessment.

Average Diesel Particulate Matter Concentration at the County Level
The population-weighted average DPM concentration at the county level was estimated by using the population-weighted average NO_x concentration in Kings County over a three-year period (2006-2008), scaled by a factor of 0.022. This factor was based on an analysis of the relationship between NO_x emissions and ambient DPM concentrations, as described below. The estimated population-weighted average DPM concentration for Kings County was 0.9 $\mu g/m^3$. For comparison purposes, the population-weighted average DPM concentration for Kern County was estimated to be 1.3 $\mu g/m^3$.

Because there are no markers that can distinguish DPM from the general mixture of PM2.5 in ambient air, the ambient concentration of DPM must be estimated using a surrogate or marker compound. The NO_x emissions inventory shows that approximately 50 percent of the total inventory and greater than 60 percent of the off-road emissions inventory is attributable to diesel engine emissions. In addition, the fraction of total NO_x emissions originating from diesel engines is relatively uniform across the counties of California. Based on this strong correlation between total ambient NO_x and diesel emissions, NO_x was selected as a surrogate to develop a methodology for estimating ambient concentrations of DPM.

Estimates of DPM were derived from data obtained from ARB's network of ambient NO_x monitoring sites. A basic assumption in this method was that the ambient concentration of a surrogate compound may be used to infer the ambient concentration of DPM. The ratio of DPM to total NO_x in the 2008 emissions inventory was determined to be 0.022, based on source apportionment studies and emissions inventory values. The following equation was used to estimate the average DPM concentration using the average NO_x concentration, at an uncertainty level (standard deviation) of 0.005:

$$DPM = 0.022\ NO_x$$

A number of caveats apply to estimates of DPM concentrations calculated by this method. Air monitoring analyzers for NO_x are situated so that measured concentrations are representative of annual county-wide concentrations, as required by U.S. EPA ambient air monitoring siting criteria. For example, monitors may not be sited near sources such as roadways or power plants. Consequently, the methodology cannot characterize localized spatial variability in DPM concentrations. Moreover, the

uncertainty estimate noted above is based on county-wide emission inventories, which may not accurately reflect local emissions.

Appendix E

Local Diesel Exhaust Exposure Assessment

Background Regarding Local Assessment

To assess the diesel particulate matter (DPM) contribution from local sources in Kettleman City, ARB used air dispersion modeling of emissions from trucks and other local diesel sources. ARB has used this method to estimate local exposure to diesel exhaust at ports, rail yards, freeways, and warehouse distribution centers.

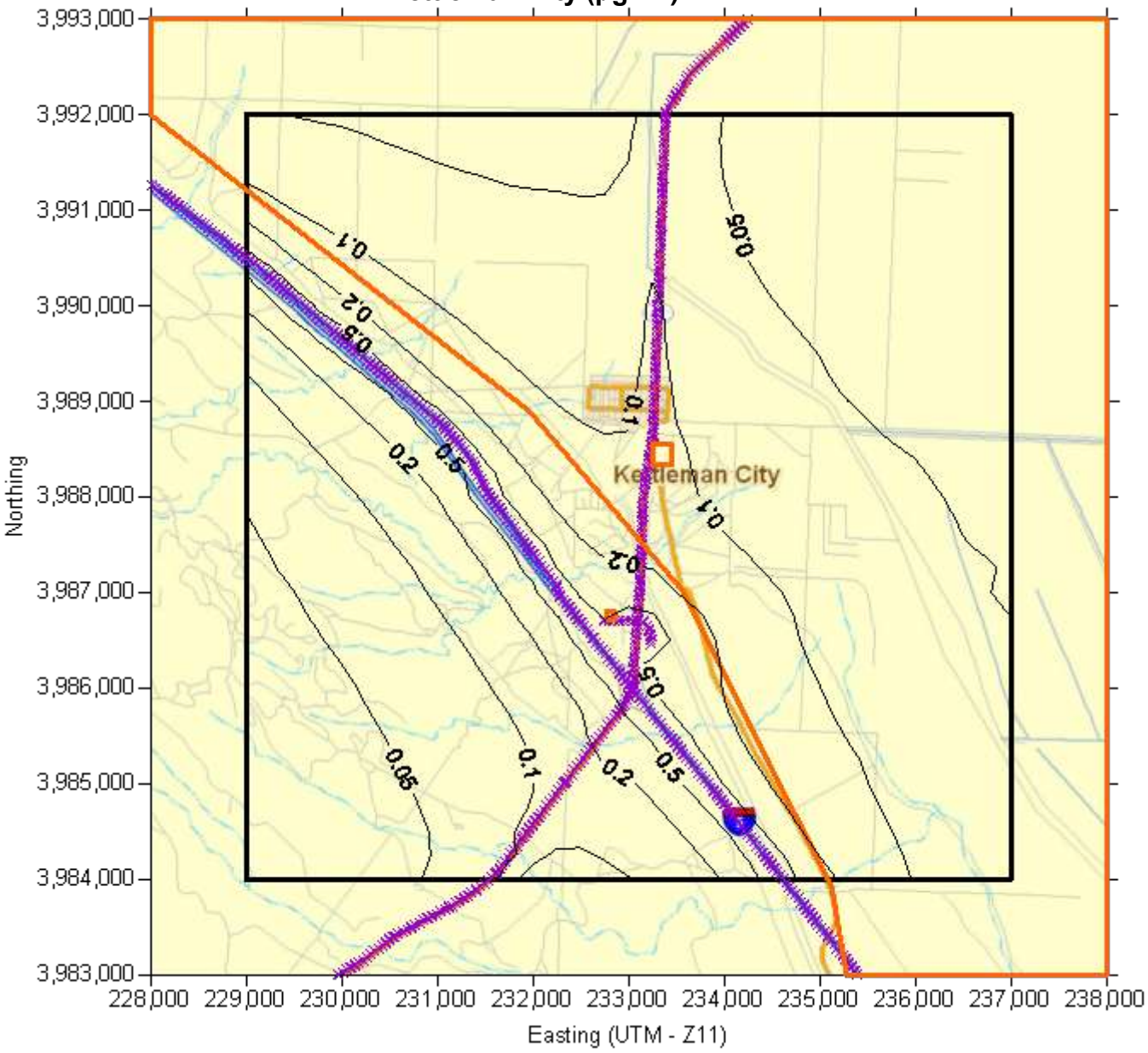
The latest version of AERMOD (Version 07026), the U.S. EPA's recommended air dispersion model for near field emission dispersion simulations, was used. AERMOD is a steady state plume model which is applicable in flat or complex terrain and in rural or urban environments. AERMOD requires hourly surface and upper air meteorological observations in addition to the site specific land use parameters. These data were provided by the San Joaquin Valley Air Pollution Control District.

In this local exposure analysis, local sources including estimated DPM emissions from Interstate 5 (I-5), Highway 41, and Transport Refrigeration Units (TRUs) at the interchange, two cross-dock freight distribution facilities, and general agriculture activity were used in the AERMOD simulation. The majority of emissions come from highway (I-5 and Highway 41) and agricultural emissions. Other DPM sources outside the region may also impact this region, but are not included in this analysis. The local sources are a subset of the county DPM emission sources and a contributor to the county-wide DPM concentration.

Figure 1 shows the isopleths of locally generated DPM exposure levels based on the AERMOD simulation. The outer domain on Figure 1 is the emission source domain (10 by 10 kilometers, km). The inner domain is 8 km by 8 km (area in which concentrations were estimated by the model). The series of magenta x's represent the location of roadway emissions. The blue line delineates the two lanes of I-5. The orange squares show the locations of cross-dock freight distribution facilities. The larger orange polygon indicates the area in which DPM emissions from agricultural activities were included as an area source.

The concentration isopleths illustrated in Figure 1 exhibit a sharp gradient of DPM concentrations that rapidly decreases with distance from the sources. Within the gridded street area of Kettleman City, the DPM concentrations attributed to all of the emission sources included in the modeling was approximately 0.09 $\mu g/m^3$.

Figure 1. Annual Average DPM Concentration Due to Local Sources in Kettleman City (µg/m^3)



Emissions Data Inputs

Air quality modeling requires emissions and meteorological input data that are representative of the emissions activities and meteorological conditions in the region of study. The emissions inputs used for this modeling are described in Table 1.

Table 1. DPM Emission Inputs

DPM Source	Description	DPM (lb/yr)	Year	Data Source
Highway 41	11.7 km of highway; 988 trucks/day	**2,911**	2008 activity 2010 fleet	Caltrans 2008 Data, EMFAC[1]
Interstate 5	11.1 km of freeway; 8,235 trucks/day	**23,400**	2004 activity 2010 fleet	Caltrans 2004 est., EMFAC
Con-way Freight cross-dock	60 trucks/day, 5 days/week	**10.9**	2010 activity 2010 fleet	Site Visit
OnTrac cross-dock	35 trucks/day, 5 days/week	**2.0**	2010 activity	Site Visit
TRU overnight at freeway interchange	24 trucks nightly	**779**	2010 activity 2010 ATCM plan	Site Visit
Ag Sources	Ag equipment in Kings County	**2,600**	2009 activity	Emissions Inventory

[1] EMFAC is an emissions factor model used to calculate emissions from motor vehicles operating on highways and local roads.

Figure 2 shows a vicinity plot for Kettleman City and nearby sources of DPM. Emissions for this analysis were estimated from trucks on Highway 41, Interstate 5, two cross-dock freight distribution facilities, nearby agricultural processing, and overnight trucks at the nearby freeway interchange.

Kettleman Hills Facility DPM emissions were not included in the analysis because a ridge and about six kilometers separate the Facility and Kettleman City, and the predominant wind direction carries Facility emissions away from Kettleman City.

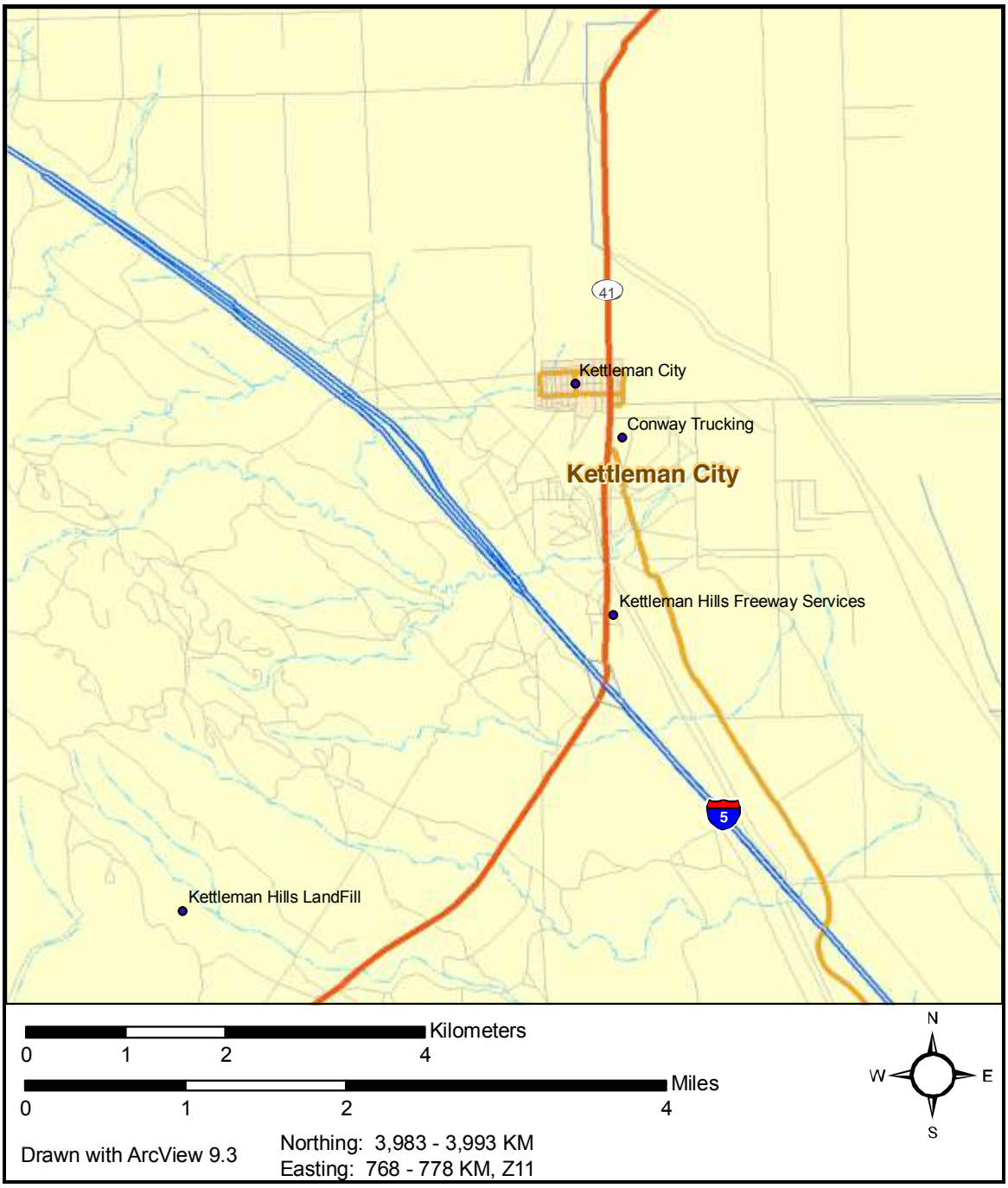


Figure 2. Kettleman City, 10 km Emissions Domain

Meteorological Data Inputs

Kettleman City is located in Kings County at 36º00'30"N 119º57'42". The town is approximately one kilometer east of Interstate 5 (I-5) and about six kilometers northeast of the Kettleman Hills facility. This region has a climate typical of the San Joaquin Valley with hot, dry summers and cool winters. The rainy season occurs from November through April. Because of its close proximity to the California Coast Range, the mountain ranges can have a profound impact on the wind field. Figure 3 is a Google map showing the major terrain features in the area.

The U.S. EPA's Guideline on Air Quality Models recommends the use of five years of National Weather Service (NWS) meteorological data or at least one year of site specific data. Based on this guidance, five years of NWS meteorological data are desired because the site specific data have been collected for only three months.

For the purposes of this assessment, meteorological data within Kettleman City were collected for a few months in the summer of 2010 (June 1 through September 6) at three locations: the Kettleman City Elementary School, a location upwind of the Facility, and a location downwind of the Facility. The two sites upwind and downwind of the Facility are likely subject to the immediate impact of local terrain on meteorology. Although the duration of this data collection effort is shorter than is called for in U.S. EPA air quality modeling guidelines, the pattern of wind speed and direction that is observed in the collected School data is useful in selecting a surrogate, long-term data set for use in modeling from other stations that are located close by.

Wind roses were used to compare the approximate three-month meteorological patterns observed at the School with other available, long-term meteorological data sets. Wind roses are diagrams that show the distribution of wind speed and direction for a specific location over a specific period of time. The length of each line of a wind rose is proportional to the frequency of wind from that direction.

There are several routine meteorological stations within a radius of 25 kilometers of Kettleman City. Based on our comparison of the wind roses for the available nearby sites to the site-specific data collected at the School from June 1 through September 6, 2010 (Figure 4), the meteorological station at Lemoore is the best available surrogate for long-term meteorology (Figure 5). The Lemoore station is a Federal Aviation Administration station and data for this station have already been processed for use in the AERMOD dispersion model by the San Joaquin Valley Air Pollution Control District for two years, 2007 and 2008. These District-processed datasets were used for air quality modeling. Table 2 provides a brief summary of information about the Lemoore station.

Summer data from the Lemoore station were also analyzed for years from 2005 through 2008. The wind rose patterns are quite similar to those shown in Figure 5 for 2010. This similarity supports the conclusion that Lemoore is a good surrogate station for

Kettleman City. The wind rose patterns in Figure 6 depict the aggregate winds from June 1 through September 6, 2010, for the School, and June 17 through September 9, 2010, at the upwind and downwind Facility sites. In addition, the winds were divided into different times of the day to show changes throughout the day. The upwind site generally has higher wind speeds.

Table 2. Meteorological Data Summary for the Lemoore Station

	Avg WS m/s	% Calm	Years Available	Station ID	Lat. Lon.	El. (m)	An Ht (m)	Alb	Bow Dry	Bow Ave	Bow Wet	Zo (m)
Lemoore (Lemoore NAS)	3.9	15%	2 Years 2007 – 2008	23110	36° 20' N 119° 57' W	72	10	0.18	1.65	0.59	0.35	0.290

Notes: An Ht = Anemometer Height ; Alb = Albedo ; Bow Dry = Dry Bowen Ratio
Bow Ave = Average Bowen Ratio ; Bow Wet = Wet Bowen Ratio ; Zo = Surface Roughness

Figure 3. Google map of Kettleman City area.

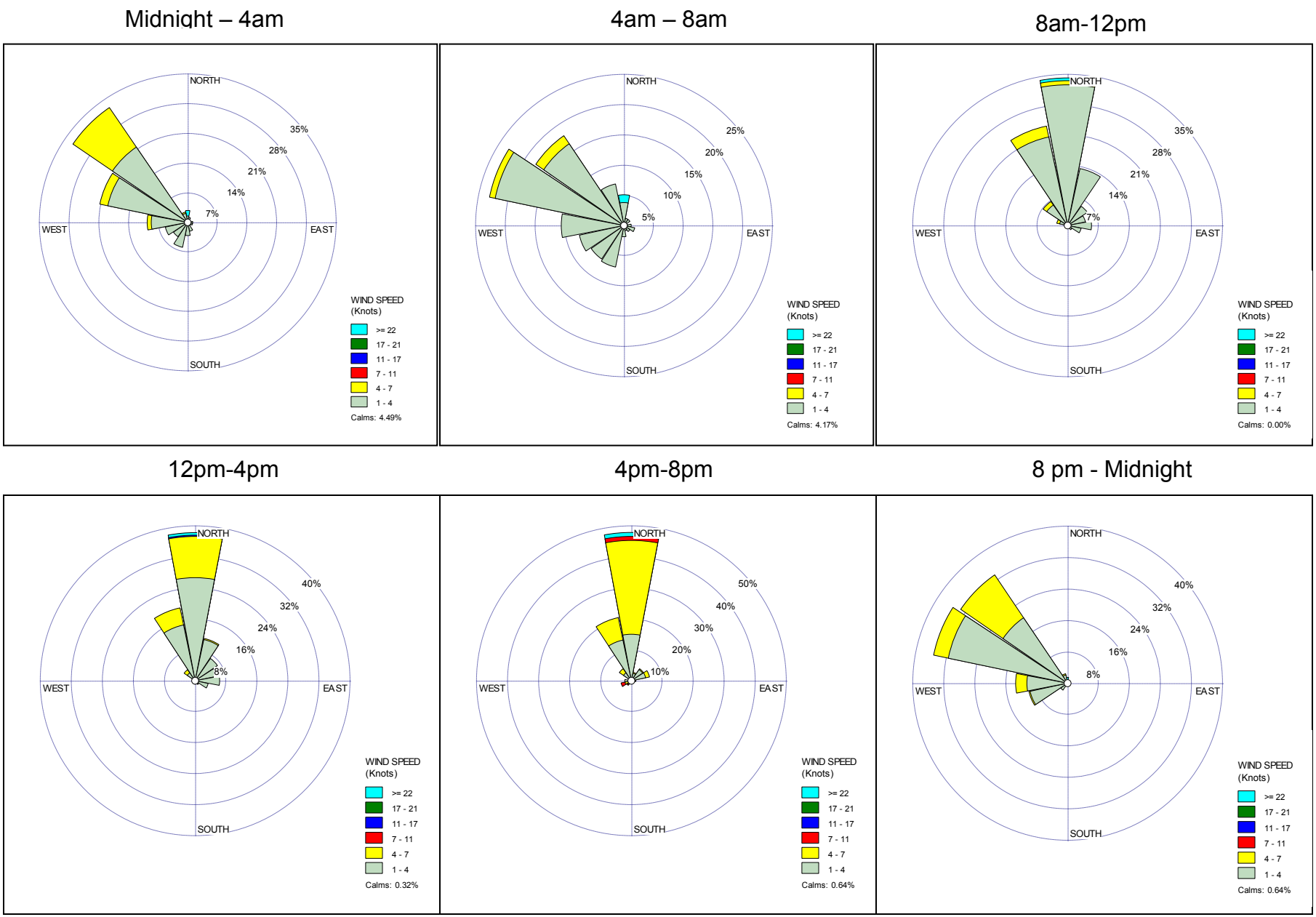
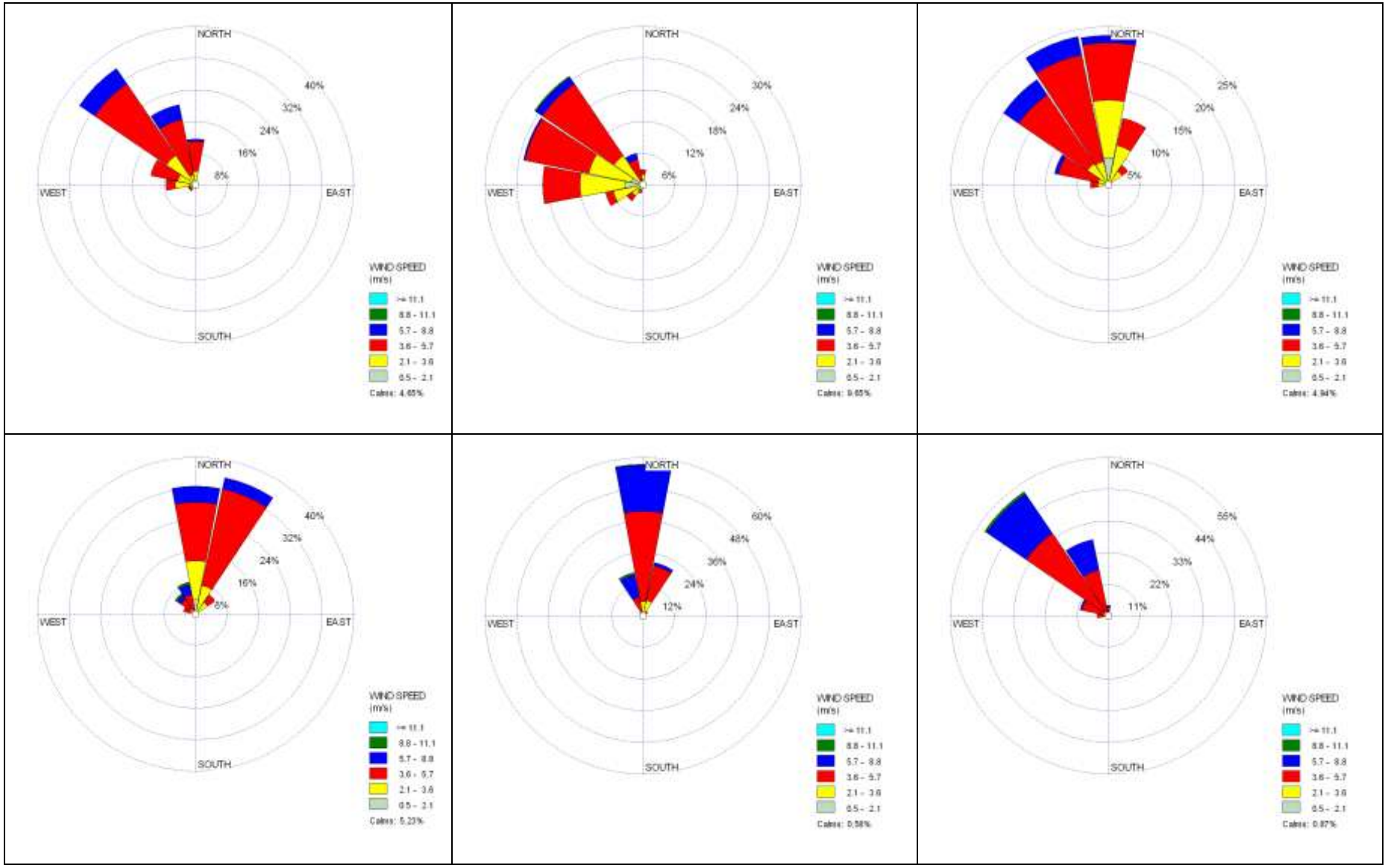


Figure 4. Station ID = Kettleman City School (June 1 – Sept. 6, 2010).

Midnight – 4am | 4am-8am | 8am-12pm



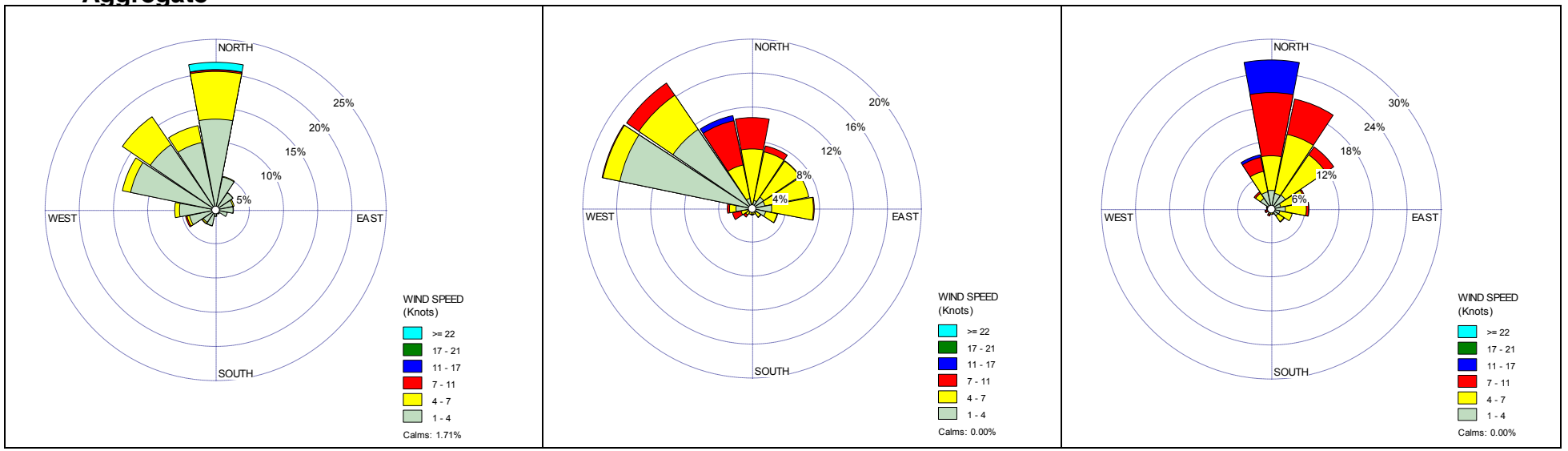
12pm-4pm | 4pm-8pm | 8pm-Midnight

Figure 5. Station ID = Lemoore (June 1 – Sept. 9, 2010).

Kettleman City School Aggregate

Downwind

Upwind



Midnight-4am

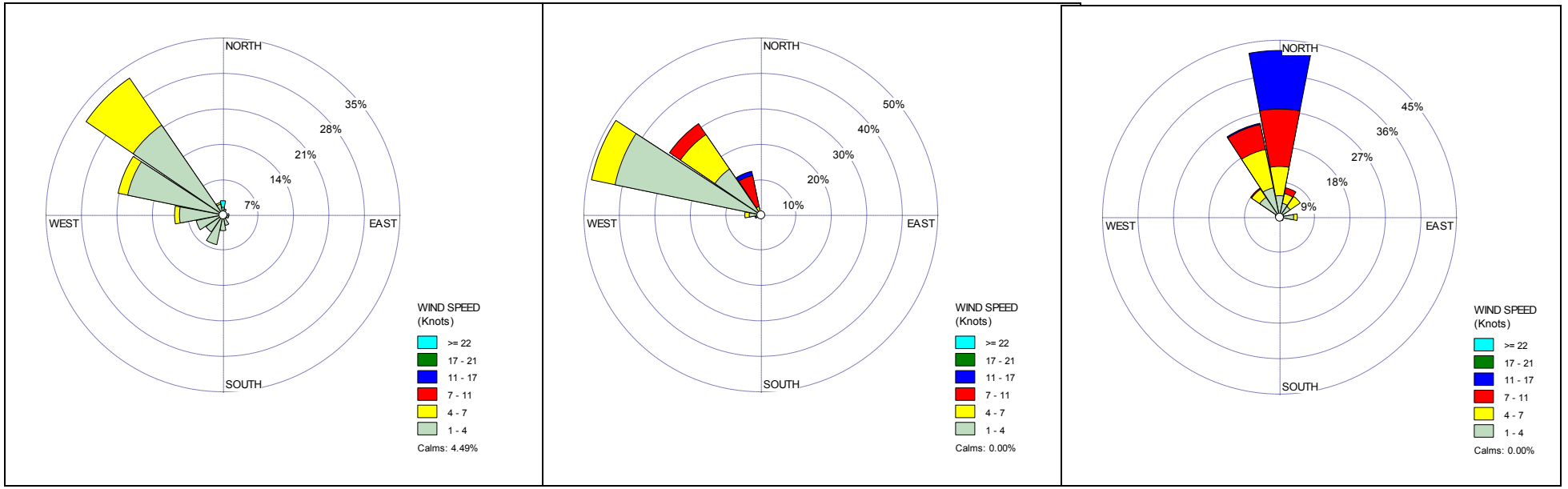


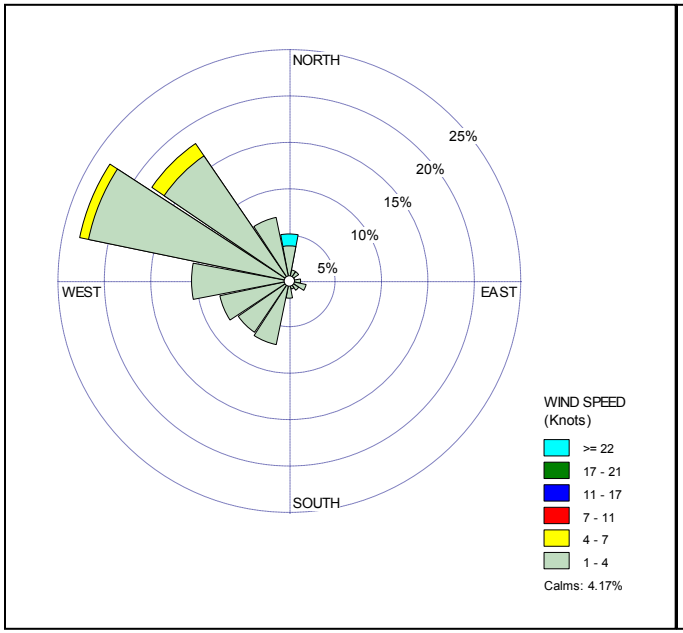
Figure 6. Station ID = Kettleman City School, Waste Mgt. NW Upwind, and Waste Mgt. SE Downwind (June 1 - Sept. 9, 2010).

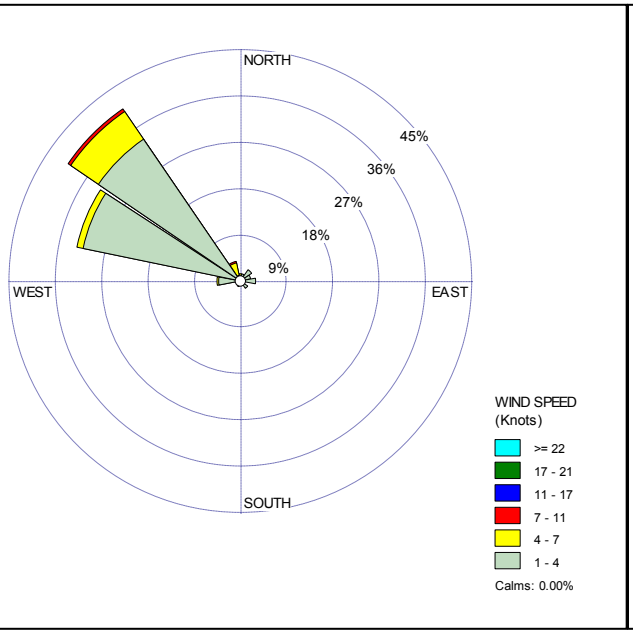
Kettleman City School

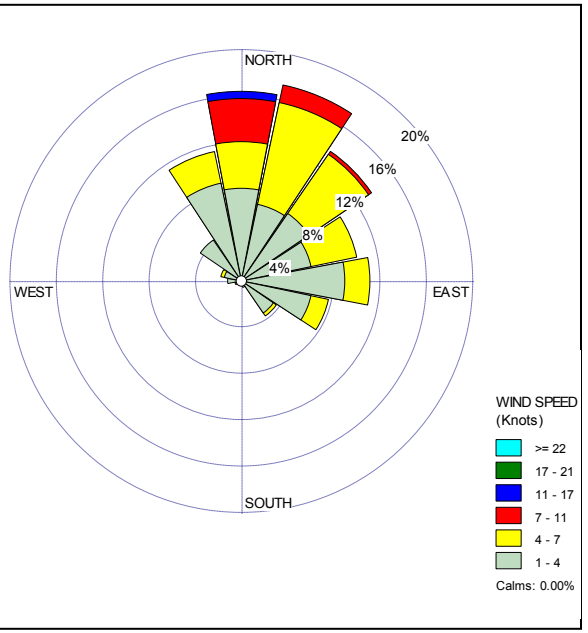
Downwind

Upwind

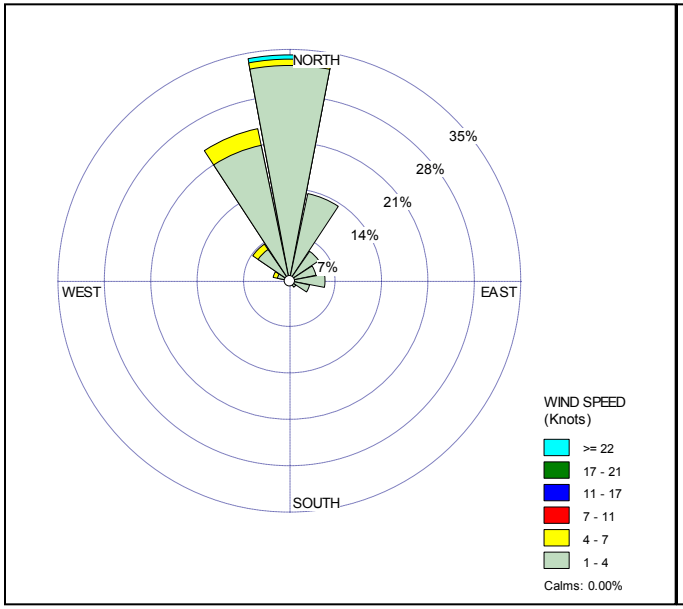
4am-8am

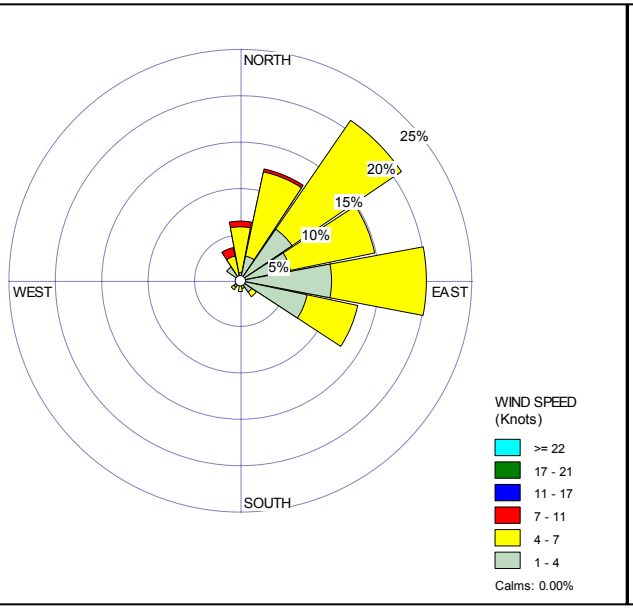


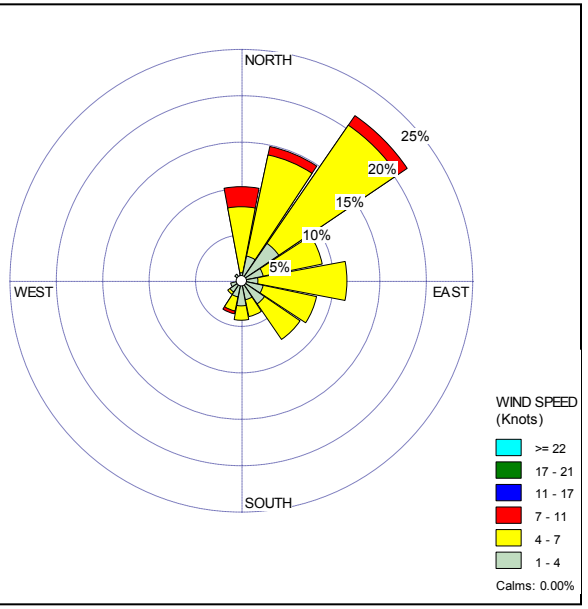




8am-12pm





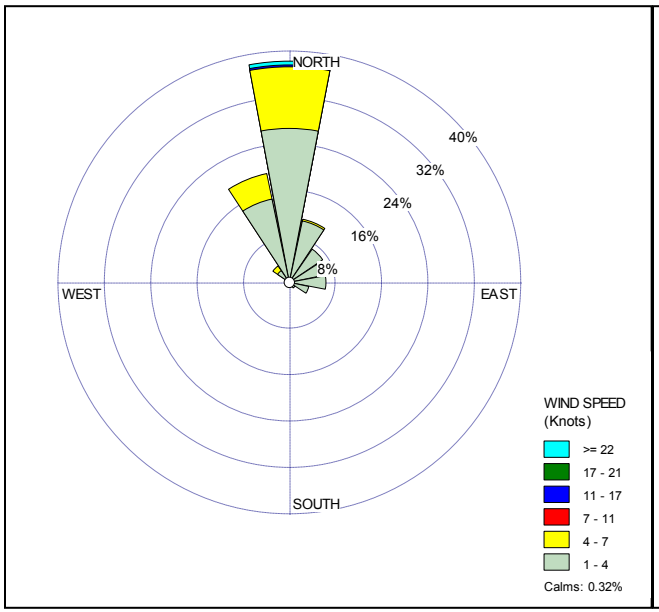


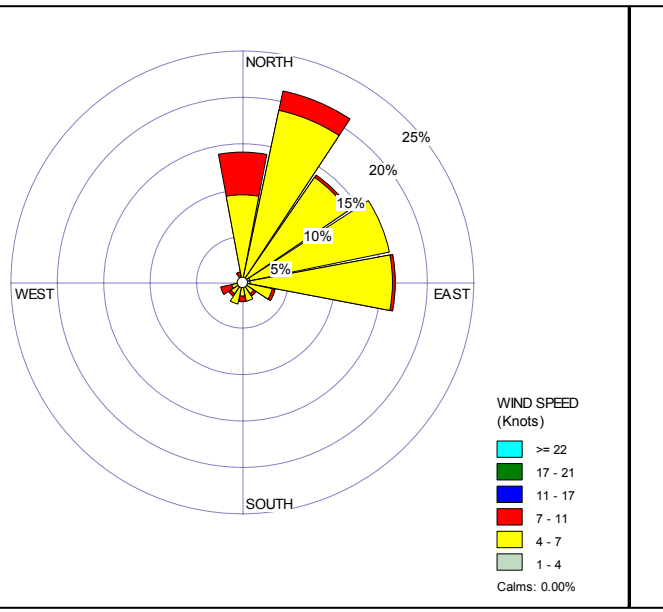
Kettleman City School

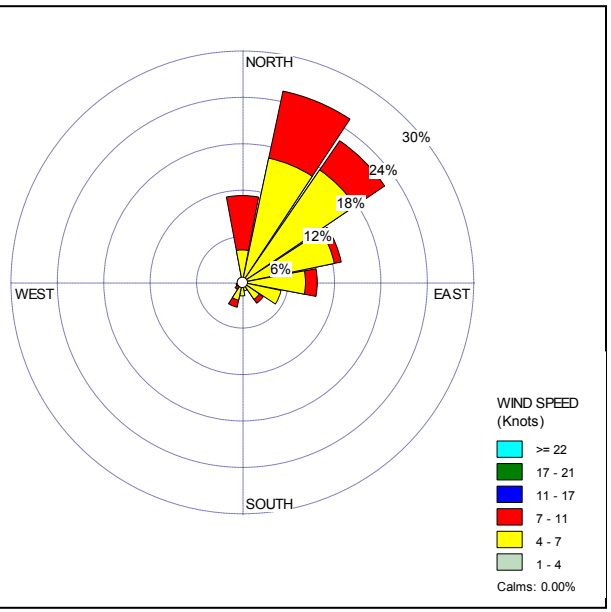
Downwind

Upwind

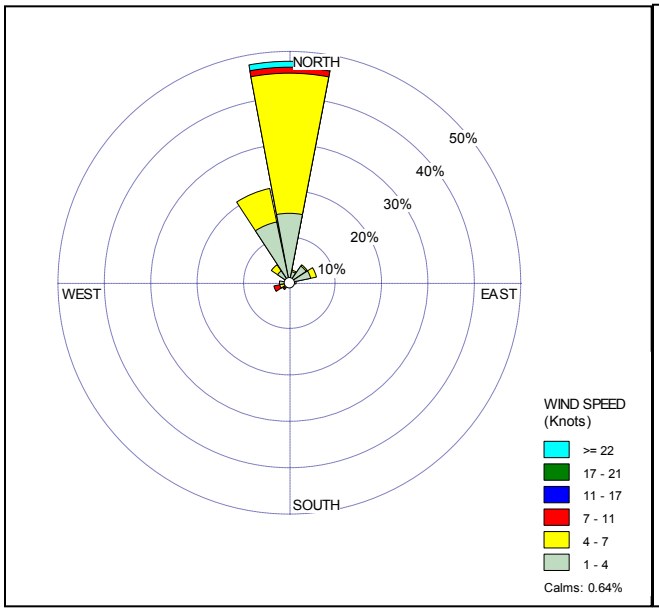
12pm-4pm

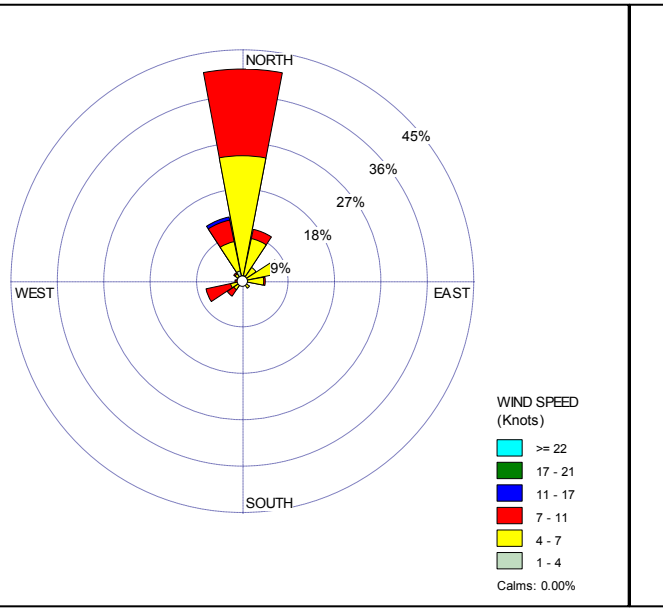


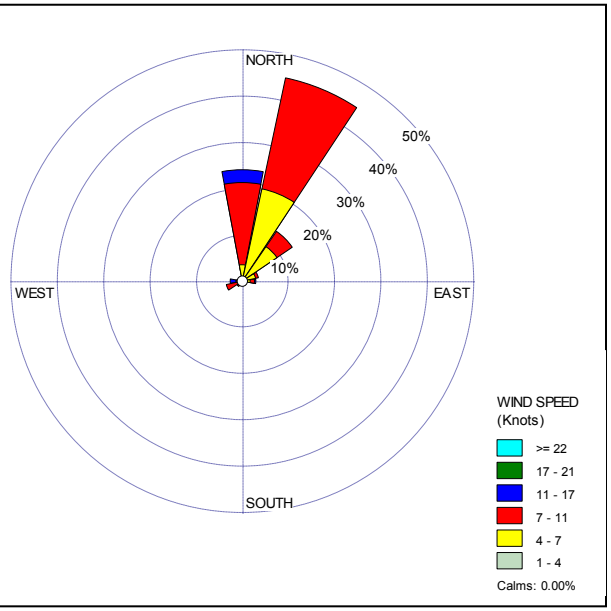




4pm-8pm

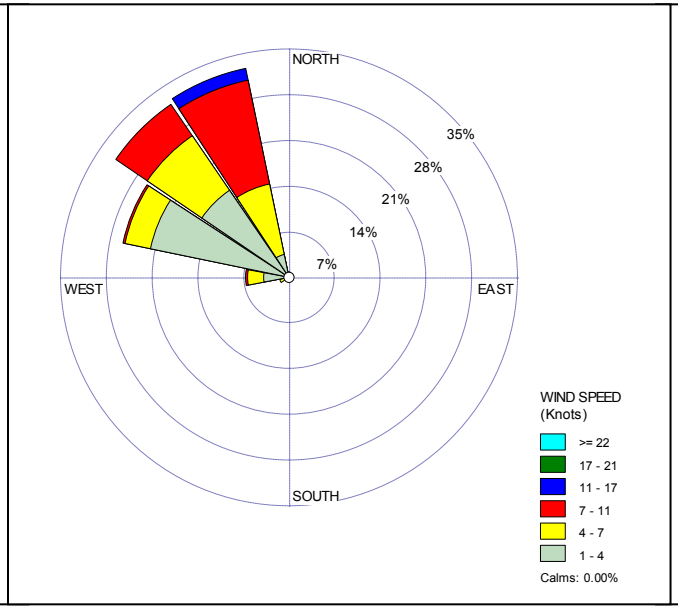




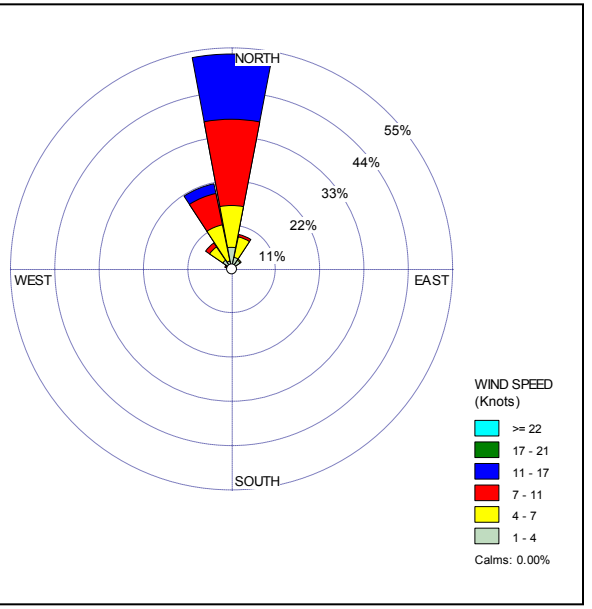


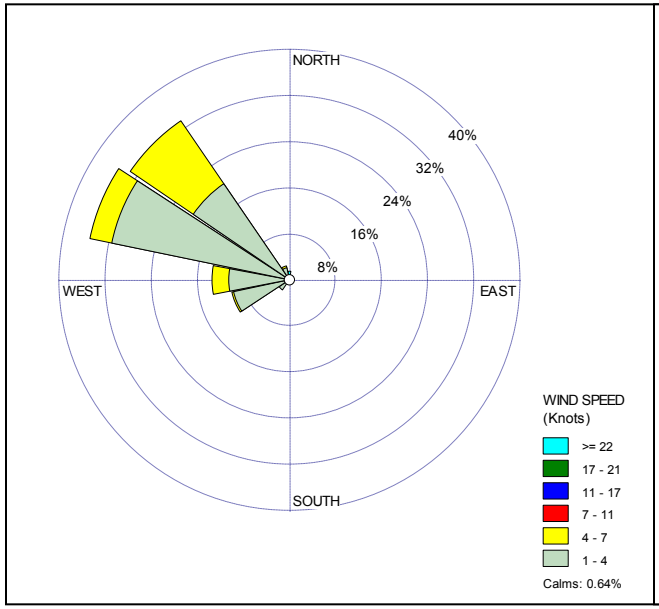
Kettleman City School
8pm-Midnight

Downwind



Upwind





Appendix F

Historical Monitoring Results at Chemical Waste Management Kettleman Hills Facility

Kettleman Hills Facility Air Monitoring Data – 2007
(concentrations in µg/m^3)

Quarter: January - March

	Upwind			Downwind			Statewide Monitoring (2007)		Fresno (2007)	
Chemical	Maximum	Mean of Detections	Number of Samples >LOD	Maximum	Mean of Detections	Number of Samples >LOD	Maximum	Mean	Maximum	Mean
Toluene	6.3	6.3	1/8	41	14	4/8	33	4.2	12	3.3
Benzene	-	-	0/8	2.9	2.9	1/8	9.1	1.2	3.9	1.2
Arsenic	0.004	0.004	2/7	0.004	0.003	4/8	0.005	0.0009	0.0048	-
Chromium	0.011	0.009	7/7	0.013	0.009	8/8	0.025	0.004	0.011	-
Lead	0.01	0.009	2/7	0.008	0.008	1/7	0.11	0.011	0.026	-
Nickel	0.005	0.004	7/7	0.007	0.005	7/7	0.046	0.008	0.017	-

Quarter: April - June

	Upwind			Downwind		
Chemical	Maximum	Mean of Detections	Number of Samples >LOD	Maximum	Mean of Detections	Number of Samples >LOD
Toluene	4.1	4.1	1/6	18	11	3/6
Benzene	-	-	0/6	-	-	0/6
Arsenic	-	-	0/7	0.004	0.004	2/7
Chromium	0.014	0.010	5/5	0.028	0.014	7/7
Lead	0.011	0.009	2/5	0.017	0.013	2/4
Nickel	0.008	0.007	2/5	0.010	0.008	7/7

Quarter: July - September

	Upwind			Downwind		
Chemical	Maximum	Mean of Detections	Number of Samples >LOD	Maximum	Mean of Detections	Number of Samples >LOD
Toluene	-	-	0/7	-	-	0/7
Benzene	-	-	0/7	-	-	0/7
Arsenic	0.003	0.003	1/8	0/004	0.004	1/8
Chromium	0.013	0.010	7/8	0.016	0.011	7/8
Lead	0.008	0.007	2/8	0.011	0.010	3/6
Nickel	0.014	0.009	5/8	0.014	0.009	5/6

Quarter: October - December

	Upwind			Downwind		
Chemical	Maximum	Mean of Detections	Number of Samples >LOD	Maximum	Mean of Detections	Number of Samples >LOD
Toluene	-	-	0/7	3.5	3.5	1/7
Benzene	-	-	0/7	-	-	0/7
Arsenic	-	-	0/6	0.004	0.004	2/6
Chromium	0.013	0.009	6/7	0.013	0.010	6/6
Lead	0.009	0.008	2/7	0.010	0.008	2/6
Nickel	0.008	0.006	7/7	0.010	0.006	7/7

Kettleman Hills Facility Air Monitoring Data – 2008
(concentrations in µg/m^3)

Quarter: January - March

	Upwind			Downwind			Statewide Monitoring (2007)		Fresno (2008)	
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean**	**Maximum**	**Mean**
Toluene	10.9	10.9	1/5	2.1	2.1	1/8	33	4.2	9.6	3.0
Benzene	2.7	2.7	1/5	2.5	2.5	1/8	9.1	1.2	3.3	1.2
Arsenic	-	-	0/8	0.003	0.003	2/8	0.005	0.0009	-	-
Chromium	0.010	0.009	7/7	0.012	0.009	8/8	0.025	0.004	-	-
Lead	0.007	0.007	1/7	0.009	0.009	2/8	0.11	0.011	-	-
Nickel	0.005	0.005	3/7	0.006	0.005	3/7	0.046	0.008	-	-

Quarter: April - June

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	4.7	4.7	1/6	27	27	1/8
Benzene	-	-	0/8	2.8	2.8	1/8
Arsenic	0.003	0.003	2/6	0.007	0.006	2/7
Chromium	0.014	0.010	6/6	0.022	0.014	7/7
Lead	-	-	0/7	0.015	0.011	2/7
Nickel	0.006	0.006	3/6	0.008	0.007	5/7

Quarter: July - September

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	-	-	0/7	14	8.0	2/7
Benzene	2.5	2.5	1/8	3.0	3.0	1/8
Arsenic	0.004	0.004	1/8	0.005	0.004	3/7
Chromium	0.016	0.013	8/8	0.016	0.013	8/8
Lead	0.008	0.008	1/8	0.011	0.010	2/7
Nickel	0.010	0.008	8/8	0.011	0.009	8/8

Quarter: October - December

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	56	21	3/8	2.6	2.5	2/8
Benzene	3.4	2.5	5/8	3.2	2.4	5/8
Arsenic	0.004	0.004	3/8	0.006	0.005	2/7
Chromium	0.017	0.011	8/8	0.020	0.014	7/7
Lead	-	-	0/7	0.014	0.013	2/7
Nickel	0.010	0.009	8/8	0.012	0.010	7/7

Kettleman Hills Facility Air Monitoring Data – 2009
(concentrations in µg/m^3)

Quarter: January - March

	Upwind			Downwind			Statewide Monitoring (2009)		Fresno (2009)	
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean**	**Maximum**	**Mean**
Toluene	3.8	3.1	2/6	20	7.4	4/7	18	3.4	10	3.1
Benzene	5.1	3.2	4/6	24	7.4	4/7	7.5	1.1	3.9	1.1
Arsenic	-	-	0/7	0.004	0.004	2/7	0.020	0.0008	0.0025	<LOD
Chromium	0.014	0.009	7/7	0.014	0.010	7/7	0.040	0.003	0.006	0.0024
Lead	0.032	0.022	2/7	0.021	0.015	2/7	0.13	0.007	0.014	0.005
Nickel	0.016	0.010	7/7	0.017	0.010	7/7	0.036	0.005	<LOD	<LOD

Quarter: April - June

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	2.3	2.2	4/7	2.6	2.3	5/8
Benzene	3.0	2.6	2/7	3.1	2.7	2/8
Arsenic	-	-	0/8	0.005	0.004	3/8
Chromium	0.015	0.012	8/8	0.023	0.014	8/8
Lead	-	-	0/8	0.010	0.010	2/8
Nickel	0.019	0.014	8/8	0.020	0.016	8/8

Quarter: July - September

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	4.0	2.7	3/7	68	18	5/8
Benzene	-	-	0/8	38	11	4/8
Arsenic	-	-	0/8	0.006	0.005	2/8
Chromium	0.018	0.013	8/8	0.019	0.015	8/8
Lead	0.007	0.007	1/8	-	-	0/8
Nickel	0.018	0.016	8/8	0.020	0.016	8/8

Quarter: October - December

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	11	5.3	3/7	3.1	2.6	3/7
Benzene	1.8	1.8	1/7	2.7	2.0	4/7
Arsenic	0.005	0.004	2/7	0.004	0.004	1/7
Chromium	0.016	0.012	7/7	0.018	0.013	7/7
Lead	-	-	0/7	0.014	0.014	1/7
Nickel	0.015	0.010	5/7	0.016	0.010	5/7

Kettleman Hills Facility Air Monitoring Data – 2010
(concentrations in µg/m^3)

Quarter: January - March

	Upwind			Downwind			Statewide Monitoring (2009)		Fresno (2009)	
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean**	**Maximum**	**Mean**
Toluene	3.1	3.1	1/8	9.9	9.9	1/8	18	3.4	10	3.1
Benzene	-	-	0/8	2.7	2.3	2/8	7.5	1.1	3.9	1.1
Arsenic	0.003	0.003	3/7	0.004	0.003	4/8	0.020	0.0008	0.0025	<LOD
Chromium	0.010	0.008	7/7	0.012	0.008	8/8	0.040	0.003	0.006	0.0024
Lead	-	-	0/7	-	-	0/7	0.13	0.007	0.014	0.005
Nickel	0.009	0.004	6/7	0.008	0.003	7/8	0.036	0.005	<LOD	<LOD

Quarter: April - June

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	3.4	3.4	1/7	5.0	4.3	2/7
Benzene	2.5	2.2	2/7	1.7	1.7	1/7
Arsenic	0.003	0.003	2/8	0.003	0.003	1/8
Chromium	0.011	0.009	8/8	0.011	0.010	8/8
Lead	0.010	0.010	1/8	0.009	0.007	4/8
Nickel	0.004	0.003	7/8	0.013	0.004	8/8

Quarter: July - August

	Upwind			Downwind		
Chemical	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**	**Maximum**	**Mean of Detections**	**Number of Samples >LOD**
Toluene	-	-	0/5	190	10	4/5
Benzene	-	-	0/5	19	3.9	3/5
Arsenic	0.003	0.003	2/5	0.004	0.004	2/5
Chromium	0.018	0.013	5/5	0.019	0.015	5/5
Lead	-	-	0/5	-	-	0/5
Nickel	0.011	0.008	5/5	0.012	0.008	5/5

Appendix G

Comparison of ARB and Chemical Waste Management Monitoring Results

Comparison of ARB and Kettleman Hills Facility Air Monitoring Data
(concentrations in $\mu g/m^3$)

Sampling Day: June 25, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	-	-	-	-	-
Benzene	-	-	-	-	-
Arsenic	-	0.003	-	-	-
Chromium	-	0.009	-	0.009	-
Lead	0.004	-	0.005	-	-
Nickel	-	0.002	-	0.003	-

Sampling Day: July 7, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	9.8	-	3.3	30	5.6
Benzene	0.58	-	0.36	2.8	0.65
Arsenic	-	-	-	-	-
Chromium	-	0.010	0.003	0.011	0.004
Lead	0.002	-	0.005	-	0.003
Nickel	-	0.004	-	0.004	-

Sampling Day: July 19, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	18	-	5.6	-	6.8
Benzene	0.97	-	0.55	-	0.68
Arsenic	-	-	-	-	-
Chromium	-	0.014	-	0.013	-
Lead	-	-	-	-	-
Nickel	-	0.011	-	0.010	-

Sampling Day: July 31, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	4.1	-	3.3	2.8	3.6
Benzene	0.39	-	0.45	-	0.45
Arsenic	-	0.003	-	0.004	-
Chromium	-	0.013	-	0.014	0.004
Lead	-	-	0.002	-	0.002
Nickel	-	0.010	-	0.011	-

Sampling Day: August 12, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	2.5	-	2.3	-	2.6
Benzene	0.32	-	0.49	3.4	0.45
Arsenic	-	-	-	-	-
Chromium	-	0.009	0.003	0.011	0.004
Lead	0.002	-	0.004	-	0.004
Nickel	-	0.003		0.003	

Sampling Day: August 24, 2010

Chemical	Upwind		Downwind		ARB Monitoring in Kettleman City
	ARB	Facility	ARB	Facility	
Toluene	4.9	-	3.4	3.9	4.9
Benzene	0.55	-	0.55	5.5	0.94
Arsenic	-	0.002	-	-	-
Chromium	0.003	0.018	0.004	0.019	0.006
Lead	0.003	-	0.005	-	0.005
Nickel	-	0.011	-	0.012	-