



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

Eighteenth Quarterly Report of Ambient Air Quality Monitoring at Sunshine Canyon Landfill and Van Gogh Elementary School

(March 1, 2012 – May 31, 2012)

Quarterly Report
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Executive Summary

ES-1. Background

Continuous monitoring of meteorological and air quality parameters began at the Sunshine Canyon Landfill (the Landfill) and at Van Gogh Elementary School in the nearby community of Granada Hills in fall 2007. PM₁₀ (particulate matter less than 10 microns in aerodynamic diameter) is measured hourly. Wind speed and wind direction are measured as 1-minute averages, and black carbon (BC, a surrogate for diesel particulate matter) is averaged over 5-minute intervals. The collected data undergo quarterly validation and are evaluated for completeness.

Following data validation, all data are reported as hourly averages. PM₁₀ concentrations are then compared with federal and state PM₁₀ standards. When PM₁₀ exceedances occur, additional comparisons are made with the historical, regional, and annual ambient PM₁₀ concentrations. At least annually, the PM₁₀ and BC data are analyzed to characterize the impact of landfill operations on ambient air quality on a neighborhood scale. The validated hourly data and a summary of the analytical results and field operations are reported to the Planning Department of the City of Los Angeles. This Eighteenth Quarterly Report summarizes the spring quarter monitoring results from the fifth year of continuous monitoring.

ES-2. Statistics

Data capture for the monitoring period of March 1, 2012, through May 31, 2012, was greater than 97% for all parameters at both sites, with one exception: the PM₁₀ monitor at the Community site had a flow controller failure requiring factory repair, reducing data capture to 77% for this quarter. About 34% of wind data collected at the Community site were judged as suspect because of some damage to a newly installed prop on the wind speed sensor. This follows a 16% loss of wind data from the previous quarter, attributable to the same problem. The wind prop has been replaced once each quarter over the last three quarterly periods. There was one exceedance of the 150 µg/m³ 24-hr federal PM₁₀ standard during this monitoring quarter, at the Landfill monitoring site only, and was attributed to locally derived surface material. Community PM₁₀ concentrations were not impacted and reflected regional concentrations reported by South Coast Air Quality Management District (SCAQMD) monitors. The more stringent 24-hr California state PM₁₀ standard (50 µg/m³) was exceeded during this period on 15% of days at the Landfill site and on 13% of days at the Van Gogh School site. Average 24-hr BC concentrations for the spring quarter were similar to the last few spring quarters. A multi-year comparison of BC concentrations by season is also presented.

ES-3. Landfill Gas Sampling

Landfill gas (LFG) sampling for non-methane organic carbon compounds (NMOC) and methane was conducted on March 7, 2012. All NMOC concentrations for these samples were within or below the Los Angeles and Ventura County range, and methane concentrations were close to the northern hemisphere ambient levels of 1.8 ppmv.

1. Introduction

This report provides a summary of data completeness, ambient PM₁₀ (particulate matter less than 10 microns in aerodynamic diameter) concentrations, average and maximum black carbon (BC) concentrations, instrument flow rate verification (quality control) data, and field operations for the quarterly period of March 1, 2012, through May 31, 2012. Data from this quarterly period represent the fifth consecutive year of spring season data collected from continuous monitoring at the Sunshine Canyon Landfill and Van Gogh Elementary School monitoring sites.

2. Data Completeness

Table 2-1 gives completeness statistics for all measured variables for the period March 1, 2012, through May 31, 2012. The percent data capture for PM₁₀ at the Landfill site was greater than 97%, with greater than 99% valid data. A fractional percentage of PM₁₀ data were invalidated because of downtime during equipment maintenance. Percent data capture for PM₁₀ at the Community site was lower this quarter (77%) due to a flow controller failure in the monitor, which required factory repair. The Community PM₁₀ monitor was out of service from April 5 to April 26. BC data capture exceeded 99% at both monitoring locations, with 100% of the captured data deemed valid. The wind data capture percentage was greater than 99% at both monitoring sites. Intermittent, but brief, interruptions with digital data capture caused a small fraction of the 1-minute wind data to be missed. The percent valid wind data was just under 100% at both locations. About one-third of the wind data captured at the Community monitoring site during the month of March was flagged as suspect due to a minor damage of the wind sensor propeller. The time series of these 1-minute wind data from the Community site were compared to the wind data from the Landfill site and evaluated in the context of the multiple years of data. The data were reasonable in this context, and thus were not invalidated but flagged as “suspect” in acknowledgement of the observed physical damage of the sensor’s propeller. The suspect designation allows the 1-minute data to be included in the hourly averaging. A new propeller (the third in nine months) was installed at the end of March. The cause of this damage remains speculative.

Table 2-1. Data completeness statistics for the recent monitoring quarter, March 1, 2012, through May 31, 2012.

| Monitoring Location | Dates | Percent Data Capture (%) ^a | | | Percent Data Valid or Suspect (%) ^b | | | Percent Data Suspect (%) ^c | | |
|--------------------------|----------------|---------------------------------------|-------|-------|--|------|-------|---------------------------------------|----|-------|
| | | PM ₁₀ | BC | WS/WD | PM ₁₀ | BC | WS/WD | PM ₁₀ | BC | WS/WD |
| Sunshine Canyon Landfill | 3/1/12–5/31/12 | 97.7% | 99.4% | 99.7% | 99.8% | 100% | 99.8% | 0.0% | 0% | 0.0% |
| Van Gogh Elem. School | 3/1/12–5/31/12 | 77.1% | 99.4% | 99.9% | 99.5% | 100% | 99.9% | 0.0% | 0% | 33.7% |

^a Percent Data Capture is the percentage of collected data values divided by the total number of expected data intervals in the date range (e.g., for the raw BC 5-minute data, 12 data values are expected per hour and 288 data values are expected per day).

^b Percent Data Valid or Suspect is the percentage of data values that are either valid or suspect, divided by the number of captured data values.

^c Percent Data Suspect is the percentage of data values labeled as suspect divided by the number of captured data values.

3. PM₁₀ Exceedances

The federal and state PM₁₀ exceedances for the current quarter, the corresponding quarters of the previous four years (2008, 2009, 2010, and 2011), and the baseline year (November 22, 2001, to November 21, 2002), are summarized in **Table 3-1**. There was one exceedance of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at the Landfill monitoring site, on May 22 (186 µg/m³). The Community monitor measured 61 µg/m³ PM₁₀ on that day. Ten of the South Coast Air Quality Management District's (SCAQMD) monitoring sites reported PM₁₀ concentrations that day, with a maximum reported 24-hr concentration of 69 µg/m³. The high PM₁₀ concentration measured at the Landfill was locally derived material that did not have a measureable impact on neighborhood or regional concentrations. The percentage of days exceeding the state standard of 50 µg/m³ for the March-May quarter was 13% for the Van Gogh School site and 17% for the Sunshine Canyon Landfill site.

Table 3-1. Number of exceedances of federal and state 24-hr PM₁₀ standards during the current quarter and the March-May quarterly periods of the baseline year and of 2008, 2009, 2010, and 2011. In the “Federal” column, the values are *number of exceedances* and the *date* on which those exceedances occurred. In the “State” column, the values are *number of exceedances/total days on which valid 24-hr averages were measured* and the *percentage of exceedances* out of the total number of days on which valid 24-hr average PM₁₀ concentrations were measured.

| Site | Quarterly Period | PM ₁₀ Standard | |
|-----------------------------|------------------|--|-------------------------------------|
| | | Federal 24-hr 150 µg/m ³ | State 24-hr 50 µg/m ³ |
| Van Gogh School | 3/1/02-5/31/02 | 0 | 17/55 (31%) |
| | 3/1/08-5/31/08 | 1 (5/21/08) | 6/91 (7%) |
| | 3/1/09-5/31/09 | 0 | 6/85 (7%) |
| | 3/1/10-5/31/10 | 0 | 6/88 (7%) |
| | 3/1/11-5/31/11 | 0 | 3/91 (3%) |
| | 3/1/12-5/31/12 | 0 | 9/70 (13%) |
| Sunshine Canyon Landfill | 3/1/02-5/31/02 | 0 | 21/56 (38%) |
| | 3/1/08-5/31/08 | 1 (5/21/08) | 20/88 (23%) |
| | 3/1/09-5/31/09 | 1 (5/6/09) | 24/88 (27%) |
| | 3/1/10-5/31/10 | 0 | 10/89 (11%) |
| | 3/1/11-5/31/11 | 1 (4/30/11) | 7/48 (15%) |
| | 3/1/12-5/31/12 | 1 (5/22/12) | 15/89 (17%) |

4. Average and Maximum Black Carbon Concentrations

While no federal or state standards exist for BC concentrations in ambient air, BC is a measurable component of ambient air that correlates well with diesel particulate matter (DPM). Because of growing evidence that DPM is associated with several negative health effects, BC is often measured in an attempt to quantify the relative amounts of DPM in ambient air. Findings from the Multiple Air Toxics Exposure Study III, conducted by SCAQMD, found DPM to be the most important toxic pollutant contributing to risk in the Los Angeles basin.¹

Table 4-1 provides the 24-hr average and maximum 24-hr BC concentrations collected during March 1, 2012, through May 31, 2012, and compares these concentrations with data from corresponding quarters of the four previous years as well as the baseline year. The average and maximum 24-hr BC concentrations during springtime measurement periods only do not reflect a consistent upward or downward trend through the years. Observing the concentrations over years and seasons provides a more complete picture.

¹ South Coast Air Quality Management District (2008) MATES-III: Multiple air toxics exposure study in the South Coast Air Basin. Final report prepared for the South Coast Air Quality Management District, Diamond Bar, CA, September. Available on the Internet at <http://www.aqmd.gov/prdas/matesIII/Final/Document/aaa-covermates3.pdf>.

Table 4-1. Comparison of 24-hr BC concentrations for the current quarter with those measured in the March-May quarterly periods of the baseline year and of 2008, 2009, 2010, and 2011.

| Site | Quarterly Period | BC Concentrations ($\mu\text{g}/\text{m}^3$) | |
|--------------------------|------------------|--|---------------|
| | | Average 24-hr | Maximum 24-hr |
| Van Gogh School | 3/1/02-5/31/02 | 0.72 | 2.22 |
| | 3/1/08-5/31/08 | 0.51 | 1.26 |
| | 3/1/09-5/31/09 | 0.72 | 1.64 |
| | 3/1/10-5/31/10 | 0.61 | 1.68 |
| | 3/1/11-5/31/11 | 0.51 | 1.37 |
| | 3/1/12-5/31/12 | 0.59 | 1.52 |
| Sunshine Canyon Landfill | 3/1/02-5/31/02 | 0.72 | 2.18 |
| | 3/1/08-5/31/08 | 0.65 | 1.73 |
| | 3/1/09-5/31/09 | 0.90 | 2.97 |
| | 3/1/10-5/31/10 | 0.60 | 1.81 |
| | 3/1/11-5/31/11 | 0.57 | 1.51 |
| | 3/1/12-5/31/12 | 0.62 | 1.44 |

The seasonal variation in quarterly averaged BC concentrations for the baseline year and for the subsequent years is shown for each site in **Figure 4-1**. **Figure 4-2** shows that in most seasons and years, BC concentrations at the Community site are slightly lower than at the Landfill site. Additionally, higher concentrations are usually exhibited during the summer and fall seasons than other times of the year.

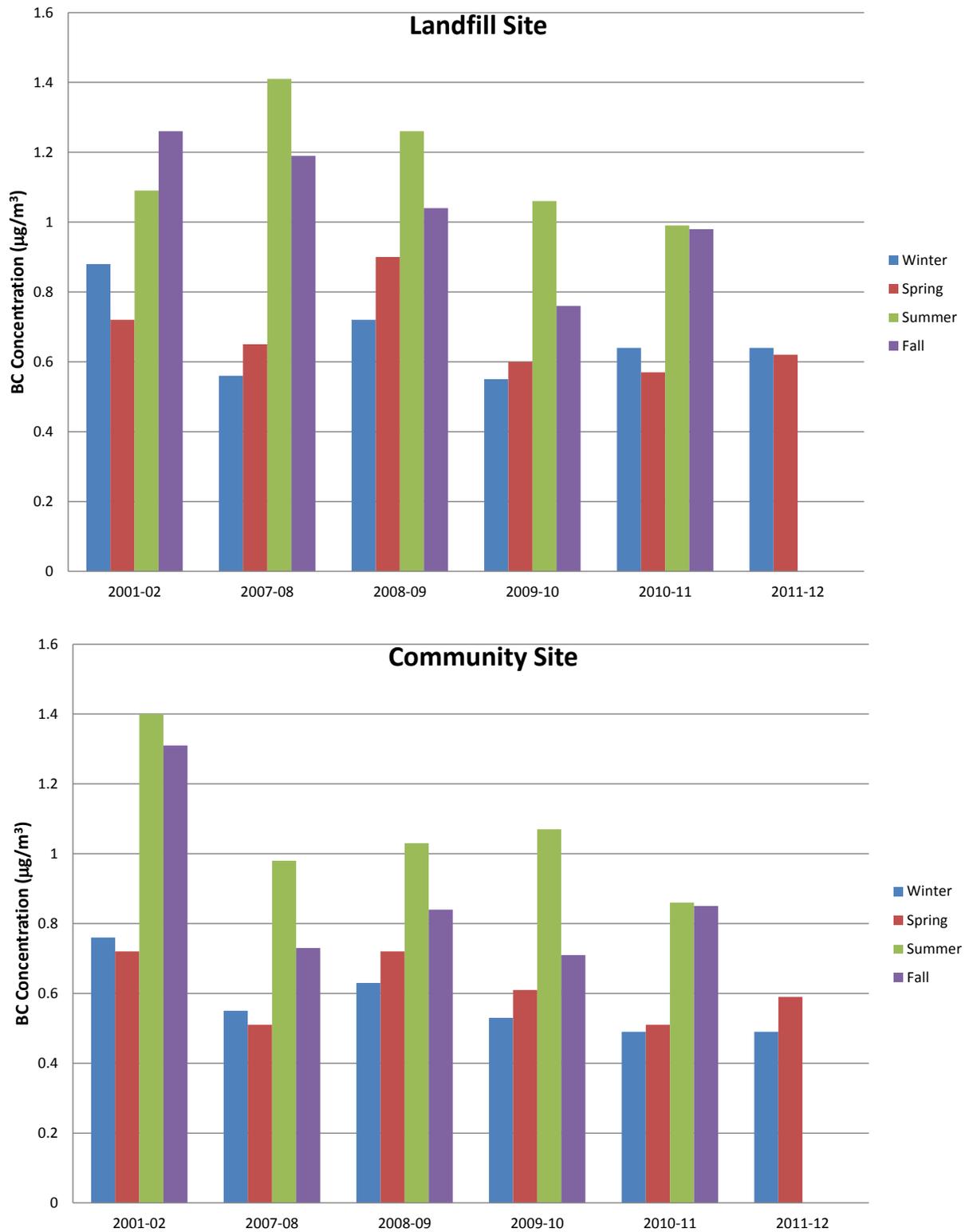


Figure 4-1. Seasonally averaged BC concentrations at the Landfill and Community monitoring sites showing the seasonal and year-to-year variability. Note that the years are defined as November 22-November 21 in order to match the data available for the baseline year.

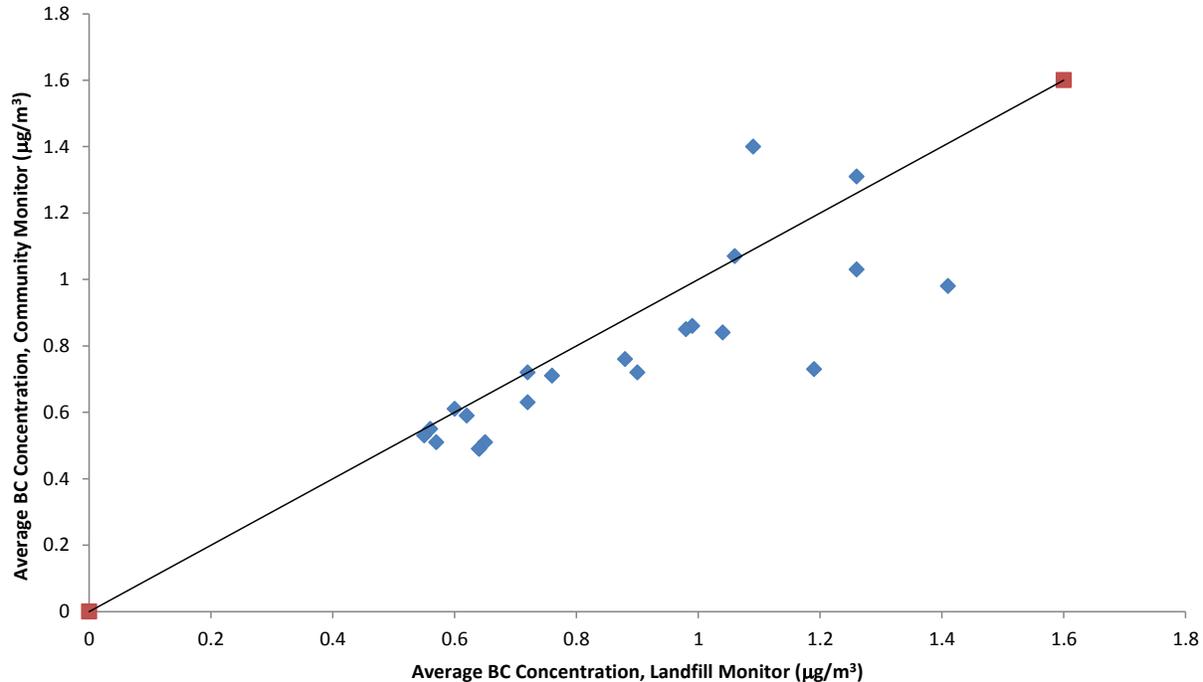


Figure 4-2. Comparison of seasonally arranged BC concentrations of the Landfill and Community monitoring sites.

5. Landfill Gas (LFG) Sampling

The ambient air quality monitoring work conducted during 2008 through 2011 at these sites has demonstrated that landfill impacts on the neighboring communities have seasonal, as well as diurnal, components. Given the limited number of LFG sampling periods (four per year) prescribed by the Conditions of Approval (C.10.a), we have chosen to focus on sampling LFG during the fall and winter months, when winds change from an onshore (southerly) flow to an offshore (northerly) flow, and when early morning meteorological conditions favor downslope air flow patterns that may carry pollutants from the landfill to the community. The complaint registry at the SCAQMD indicates that odor complaints from the community are most frequent in winter months.

The current contract year's fourth sample for methane and non-methane organic compounds (NMOC) was conducted on March 7, 2012. Between 7:00 and 9:00 a.m., a total of four separate, integrated (hourly) samples were obtained: consecutive 1-hr samples were collected from 7:00 to 8:00 a.m. and 8:00 to 9:00 a.m. local time at each of the two monitoring sites. The samples were analyzed for methane by the American Society for Testing and Materials (ASTM) method D1946, and for NMOC by TO-15 using a Full Scan at Low Level and by Selective Ion Monitoring. Target compounds included NMOC commonly associated with landfills, including those compounds specified in SCAQMD's Core Group of "Carcinogenic and Toxic Air Contaminants" listed in Rule 1150.1. Some other compounds included are not listed in

SCAQMD's Core Group but appear in the list of the Agency for Toxic Substances and Disease Registry (ATSDR), part of the Centers for Disease Control (CDC).

These sample results represent the final methane and NMOC sampling and analysis to be conducted by STI. Modifications to the April 2010 Stipulated Order for Abatement covering landfill operations now require the Landfill operator to conduct NMOC sampling on the U.S. Environmental Protection Agency's (EPA) 1-in-6 day sampling schedule. This work was funded by the Landfill operator and is conducted by a separate contractor.

5.1 Methane

Methane data from the March 7, 2012, sample are shown in **Table 5-1**. The samples exhibited methane concentrations slightly above the average ambient concentration for the northern hemisphere of 1.8 ppmV.

Table 5-1. Ambient concentrations of methane measured at the Landfill monitoring site and the Community site on March 7, 2012.

| | Sample Date | Methane Concentration (ppmV) | |
|----------------|-------------|------------------------------|----------------|
| | | 7:00-8:00 a.m. | 8:00-9:00 a.m. |
| Landfill Site | 3/7/12 | 2.33 | 2.35 |
| Community Site | 3/7/12 | 1.96 | 2.03 |

5.2 Non-Methane Organic Compounds

The concentrations of NMOC from the March 7, 2012, sample are shown in **Figure 5-1**, illustrating how the measured concentrations of NMOC compare to annually averaged Los Angeles and Ventura County data from 2008-2010, obtained from the EPA's Airdata system. Averages are based on methodology described by McCarthy et al. (2007).² Figure 5-1 also allows comparison of the sample data with the method detection limit (MDL) for the compounds.

Some of the compounds associated with landfill emissions have been classified by the EPA as environmental and health hazards, or air toxics. Cancer and noncancer health benchmarks have been established for many of these compounds.³ Sample concentrations are compared to cancer benchmarks in Figure 5-1. Exposure to concentrations at this level for 70 years would be expected to result in one additional case of cancer per million people. Concentrations below this level would result in a lower rate and concentrations above this level would result in a higher rate. The data also show the chronic hazard values for the compounds. These values are also for a 70-year exposure, but the health effects are noncancer, such as asthma, neurological effects, or reproductive effects. All NMOC concentrations for these samples are within or below the Los Angeles and Ventura County range, or are below the MDL.

² McCarthy M.C., Hafner H.R., Chinkin L.R., and Charrier J.G. (2007) Temporal variability of selected air toxics in the United States. *Atmos. Environ.* 41 (34), 7180-7194 (STI-2894). Available on the Internet at <http://dx.doi.org/10.1016/j.atmosenv.2007.05.037>.

³ <http://www.epa.gov/ttn/atw/toxsource/table1.pdf>

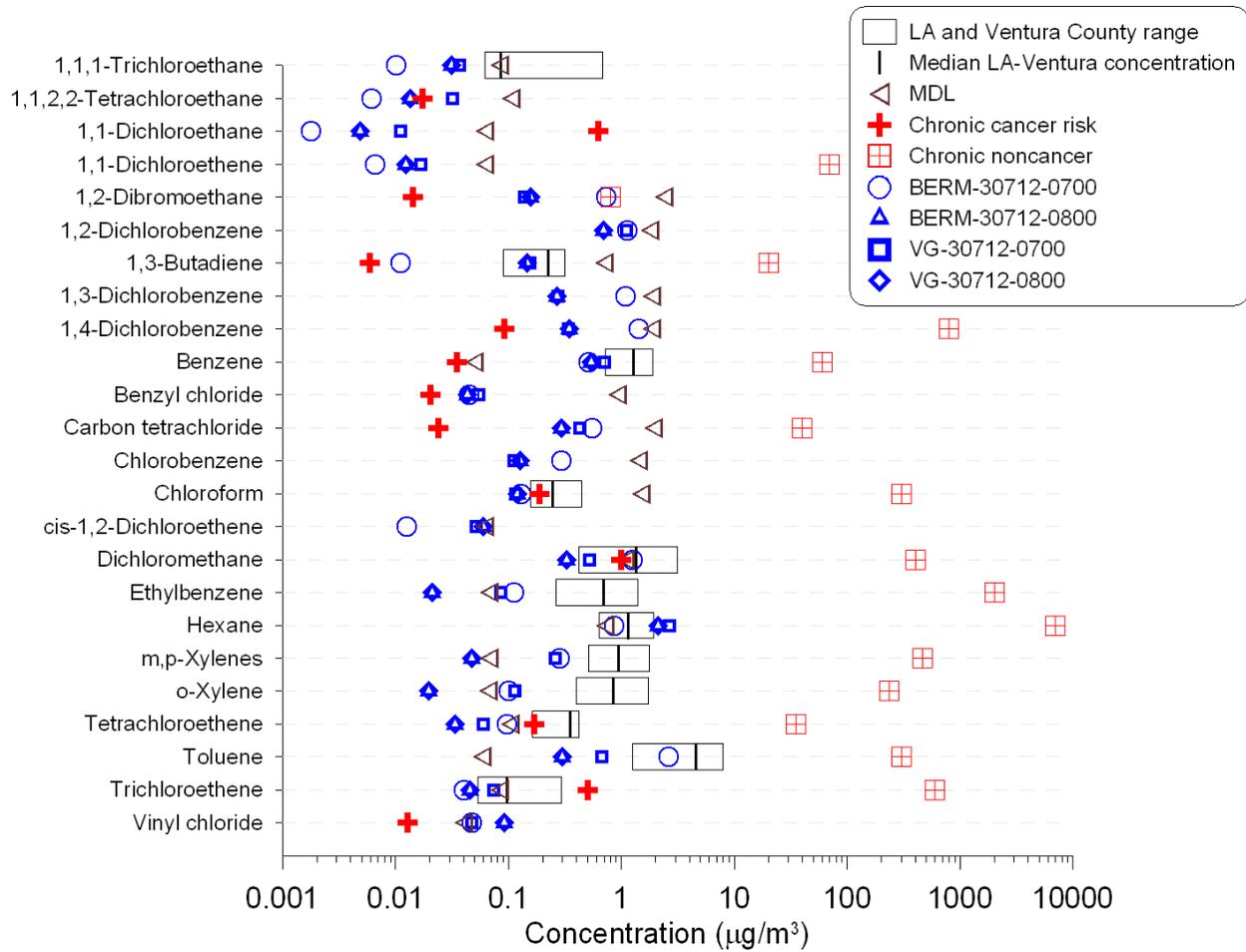


Figure 5-1. Ranges of the 10th to 90th percentile quarterly averages and median values for Los Angeles and Ventura County NMOC data from 2008-2010, as available. Concentrations determined from the March 7, 2012, samples collected at the Landfill site (BERM) and the Community site at Van Gogh Elementary School site (VG); MDLs; chronic cancer risk; and chronic noncancer hazard levels. Data not shown were not detected by the analytical laboratory. Data below the MDL that were reported are shown.

6. Field Operations

Tables 6-1 and 6-2 list dates and major tasks associated with visits to the Sunshine Canyon Landfill and Van Gogh School sites, respectively, between March 1, 2012, and May 31, 2012. **Table 6-3** shows the PM₁₀ and BC monitors' flow rates as reported by the monitors and measured with a NIST-traceable flow standard.

Table 6-1. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from March 1, 2012, through May 31, 2012.

| Date of Site Visit | Description of Work |
|------------------------|--|
| Friday, March 30, 2012 | Replace BAM tape and conduct self-test. Clean BAM vane and nozzle. Flow checks on PM ₁₀ and BC samplers. Collect PM ₁₀ and BC data. |
| Monday, April 23, 2012 | BAM "transport busy" error (hung up) and flow error. Reboot. Conduct BAM flow check, leak check and self-test. BC flow check. Collect PM ₁₀ and BC data. |
| Monday, May 21, 2012 | Unscheduled visit for loss of communications. Reboot cell modem. Change BAM tape and self-test. |
| Friday, May 25, 2012 | Leak check on BAM. Collected PM ₁₀ and BC data. Aethalometer flow check. Clean BAM vane and nozzle. Shuttle error on self-test. Reboot and retest. OK. Leak check failure but suspect TriCal reference meter problem. Will recommend replacement to BFI. Check again within one week. |

Table 6-2. Van Gogh School monitoring site visits and field maintenance and operations from March 1, 2012, through May 31, 2012.

| Date of Site Visit | Description of Work |
|--------------------------|---|
| Friday, March 16, 2012 | Inspection of RMY 5305 wind propeller (replacement ordered). Collect PM ₁₀ and BC data. |
| Friday, March 30, 2012 | Regular preventive maintenance. Flow checks on PM ₁₀ and BC samplers. Leak check on BAM. Install new BAM tape and self-test. Collect PM ₁₀ and BC data. Replaced RMY 5305 wind propeller. |
| Thursday, April 5, 2012 | BAM sample air volume dropped early on April 5, so visit to troubleshoot. Inconclusive, but Flow Controller failure suspected. Remove BAM and send back to Met One for evaluation. Also remove wind vane alignment rod (potential perch for birds, possible cause of wind prop damage). |
| Thursday, April 26, 2012 | Reinstall repaired BAM and test. Calibrate BAM temperature, pressure, and flow. Conduct leak check. BAM self-test. Flow check Aethalometer. |
| Friday, May 25, 2012 | Leak check on BAM. Collected PM ₁₀ and BC data. Aethalometer flow check. Clean BAM nozzle and vane. |

Table 6-3. Flow rates for the BAM PM₁₀ monitors and Aethalometer BC monitors at the Sunshine Canyon Landfill and Van Gogh School sites from March 1, 2012, through May 31, 2012. BAM flow rates are volumetric (local temperature and pressure), and Aethalometer flow rates are at standard temperature and pressure. Reference flows were measured with a NIST-traceable flow standard. BAM target flow rate is 16.7 lpm volumetric to meet the 10-micron cut point of the inlet, with an acceptable range of 16.0 to 17.3 lpm. The Aethalometer has no size cut point.

| Location | Date | Flow Rates (lpm) | | | | | |
|----------------------------|---------|------------------|-----------------|-----------------|-----------------|-----------------------|-----------------|
| | | BAM as Found | Reference | BAM as Left | Reference | Aethalometer as Found | Reference |
| Sunshine Canyon Landfill | 3/30/12 | 16.8 | 16.9 | 16.8 | 16.9 | 2.5 | 2.7 |
| | 4/23/12 | 16.6 | 19.7 | 16.6 | 16.7 | 2.6 | 2.7 |
| | 5/25/12 | 16.8 | -- ^a | 16.6 | -- ^a | 2.7 | -- ^a |
| Van Gogh Elementary School | 3/30/11 | 16.7 | 17.3 | 16.7 | 17.3 | 3.0 | 2.8 |
| | 4/5/12 | 5.8 ^b | -- ^b | -- ^b | -- ^b | -- ^c | -- ^c |
| | 4/26/12 | 16.7 | 16.8 | 16.7 | 16.8 | 3.1 | 3.1 |
| | 5/25/12 | 16.7 | 16.6 | 16.7 | 16.6 | 3.0 | 2.7 |

^a TriCal reference flow meter unable to recognize venturi. Replacement recommended to BFI.

^b BAM removed and sent to Met One for repair.

^c Not measured.