



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

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

June 1, 2013 – August 31, 2013

Quarterly Report
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Prepared by

David L. Vaughn
Angela L. Ekstrand
Sonoma Technology, Inc.
1455 N. McDowell Blvd., Suite D
Petaluma, CA 94954-6503
Ph 707.665.9900 | F 707.665.9800
sonomatech.com

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Planning Department, City of Los Angeles
City Hall, Room 525
200 N. Spring St.
Los Angeles, CA 90012
and
Los Angeles County Department of Regional Planning
320 West Temple Street, 13th Floor
Los Angeles, CA 90012

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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 and to the Los Angeles County Department of Regional Planning. This Twenty-Third Quarterly Report summarizes the summer quarter monitoring results from the sixth year of continuous monitoring.

ES-2. Statistics

The percent data capture for PM₁₀ at the Sunshine Canyon Landfill monitoring site and at Van Gogh Elementary School for this quarterly period was 100 percent. At the Landfill site, 1.0% of the captured PM₁₀ data were invalidated, but none were deemed suspect. At Van Gogh School, 1.9% of the captured data were invalidated, but none were deemed suspect. Data capture for BC was 99.0% at the Landfill site and 99.2% at Van Gogh School, with all captured data valid. The wind data capture percentage was 99.5% at both the Landfill site and Van Gogh School. Almost 100% of the captured wind data were valid at both locations, though 0.4% of wind speed data were suspect at the Landfill site, and 0.6% of wind speed data were suspect at Van Gogh School.

There were no exceedances of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at the Landfill site or at Van Gogh School. The percentage of days on which the state standard of 50 µg/m³ was exceeded for the June-August quarter was 15% for the Landfill site and 10% for the Van Gogh School site. Average BC concentrations during the 2013 summer quarter follow the pattern that has been previously noted for the summer quarter, when average concentrations have decreased each year since 2008.

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 June 1, 2013, through August 31, 2013. Data from this quarterly period represent the sixth consecutive year of summer season data collected from continuous monitoring at the Sunshine Canyon Landfill and Van Gogh Elementary School monitoring sites.

2. Data Completeness

Table 1 gives completeness statistics for all measured variables for the period June 1, 2013, through August 31, 2013. The percent data capture for PM₁₀ was 100% at the Landfill site and at Van Gogh School. At the Landfill monitoring site, about 1.0% of the captured PM₁₀ data were invalidated, and none were deemed suspect. At Van Gogh School, 1.9% of the captured data were invalidated, and none were deemed suspect. Suspect data are included in subsequent analyses (e.g., regional comparisons), while invalid data are not.

BC data capture was 99.0% at the Landfill site and 99.2% at the Van Gogh School, with all data valid. The wind data capture percentage was 99.5% at both sites. Almost 100% of the wind data were valid at each site, though 0.4% of wind speed data were suspect at the Landfill site, and 0.6% of the data were suspect at the Van Gogh School.

Table 1. Data completeness statistics for the recent monitoring quarter, June 1, 2013, through August 31, 2013.

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	6/1/2013 through 8/31/2013	100.0	99.0	99.5	99.0	100.0	100.0	0.0	0.0	0.4
Van Gogh Elem. School	6/1/2013 through 8/31/2013	100.0	99.2	99.5	98.1	100.0	100.0	0.0	0.0	0.6

^a Percent Data Capture is the number 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 number of data values that are either valid or suspect, divided by the number of captured data values.

^c Percent Data Suspect is the number 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 five years (2008, 2009, 2010, 2011, 2012), and of the baseline year (November 22, 2001, to November 21, 2002), are summarized in **Table 2**. There were no exceedances of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at Van Gogh School or the Landfill monitoring site. The percentage of days on which the state standard of 50 µg/m³ was exceeded for the June-August quarter was 10% for the Van Gogh School site and 15% for the Landfill site.

Table 2. Number of exceedances of federal and state 24-hr PM₁₀ standards during the current quarter and the June through August quarterly periods of the baseline year (2002) and each year from 2008 through 2012. 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
Sunshine Canyon Landfill	06/01/02–08/31/02	0	5/16 (31%)
	06/01/08–08/31/08	0	25/89 (28%)
	06/01/09–08/31/09	0	13/90 (14%)
	06/01/10–08/31/10	0	27/83 (33%)
	06/01/11–08/31/11	0	11/92 (12%)
	06/01/12–08/31/12	0	10/92 (11%)
	06/01/13–08/31/13	0	14/91 (15%)
Van Gogh School	06/01/02–08/31/02	0	44/67 (66%)
	06/01/08–08/31/08	0	28/92 (30%)
	06/01/09–08/31/09	0	16/87 (18%)
	06/01/10–08/31/10	0	11/91 (12%)
	06/01/11–08/31/11	0	23/92 (25%)
	06/01/12–08/31/12	0	10/76 (13%)
	06/01/13–08/31/13	0	9/90 (10%)

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 the South Coast Air Quality

Management District (SCAQMD), found DPM to be the most important toxic pollutant contributing to risk in the Los Angeles basin.¹

Table 3 provides the 24-hr average and maximum 24-hr BC concentrations collected from June 1, 2013, through August 31, 2013, and compares these concentrations with data from the corresponding quarters of the five previous years as well as the baseline year. Last year we reported that the June through August average and maximum 24-hr BC concentrations exhibited a consistent downward trend at the Landfill monitoring site from 2008 through 2012. This pattern continues for the summer quarter of 2013. This pattern is also observable when comparing data among different years for the fall quarter (September through November), but is not observable in the winter quarter (December to February) or the spring quarter (March to May).

One likely contributing factor is the meteorology that characterizes these different times of the year. In summer months, southerly (onshore) wind flows dominate, so for most of each day's diurnal cycle, the BC concentrations are heavily influenced by air masses moving northward from the greater metropolitan area. Ongoing efforts to reduce ambient concentrations of DPM in the South Coast Air Basin (SoCAB) may have contributed to reduced BC concentrations throughout the region and at the Landfill site. However, basinwide evidence of this reduction is lacking because BC is not a criteria pollutant, has no standard, and is not routinely measured at the California Air Resources Board (CARB) or SCAQMD air monitoring stations. In contrast, meteorological conditions during the winter period exhibit more northerly flow characteristics. The northerly flows during these periods can carry cleaner upwind air from north of the SoCAB, with variable contributions from the landfill operations and less significant contributions from the metropolitan area.

Figure 1 shows a notched box-whisker plot² of the summer quarter PM₁₀ and BC data for the six monitoring years. Each box indicates the interquartile range (IQR), where 50% of the data lie, with the notch at the median. If notches do not overlap, this indicates the data are statistically different at the 95% confidence level. The whiskers go to 1.5 times the IQR; points beyond this are shown individually as asterisks, or as circles if they are more than three times the IQR. For PM₁₀ these plots show no statistically significant trend in the concentrations over the last six years for the summer quarter, although for the last three years, summer quarter PM₁₀ concentrations have been significantly lower at Van Gogh School compared to the Landfill site. For BC, the trend of decreasing BC concentrations from regional influences during summertime is evident. In addition, for all years except 2010, summertime BC concentrations measured at the Van Gogh School have been significantly lower than those at the Landfill.

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 at <http://www.aqmd.gov/prdas/matesIII/Final/Document/aaa-covermates3.pdf>.

² A notched box-whisker plot shows the entire distribution of concentrations for each year. In box-whisker plots, each box shows the 25th, 50th (median), and 75th percentiles. The boxes are notched (narrowed) at the median and return to full width at the 95% lower and upper confidence interval values. These plots indicate that we are 95% confident that the median falls within the notch. If the 95% confidence interval is beyond the 25th or 75th percentile, then the notches extend beyond the box (hence a "folded" appearance).

Table 3. Comparison of 24-hr BC concentrations for the current quarter with those measured in the June through August quarterly periods of the baseline year (2002) and each year from 2008 through 2012.

Site	Quarterly Period	BC Concentrations ($\mu\text{g}/\text{m}^3$)	
		Average 24-hr	Maximum 24-hr
Sunshine Canyon Landfill	06/01/02–08/31/02	1.09	2.69
	06/01/08–08/31/08	1.41	3.01
	06/01/09–08/31/09	1.26	2.45
	06/01/10–08/31/10	1.06	1.88
	06/01/11–08/31/11	0.99	1.78
	06/01/12–08/31/12	0.93	1.79
	06/01/13–08/31/13	0.98	1.98
Van Gogh School	06/01/02–08/31/02	1.4	2.33
	06/01/08–08/31/08	0.98	1.71
	06/01/09–08/31/09	1.03	2.23
	06/01/10–08/31/10	1.08	1.75
	06/01/11–08/31/11	0.86	1.43
	06/01/12–08/31/12	0.81	1.63
	06/01/13–08/31/13	0.76	1.31

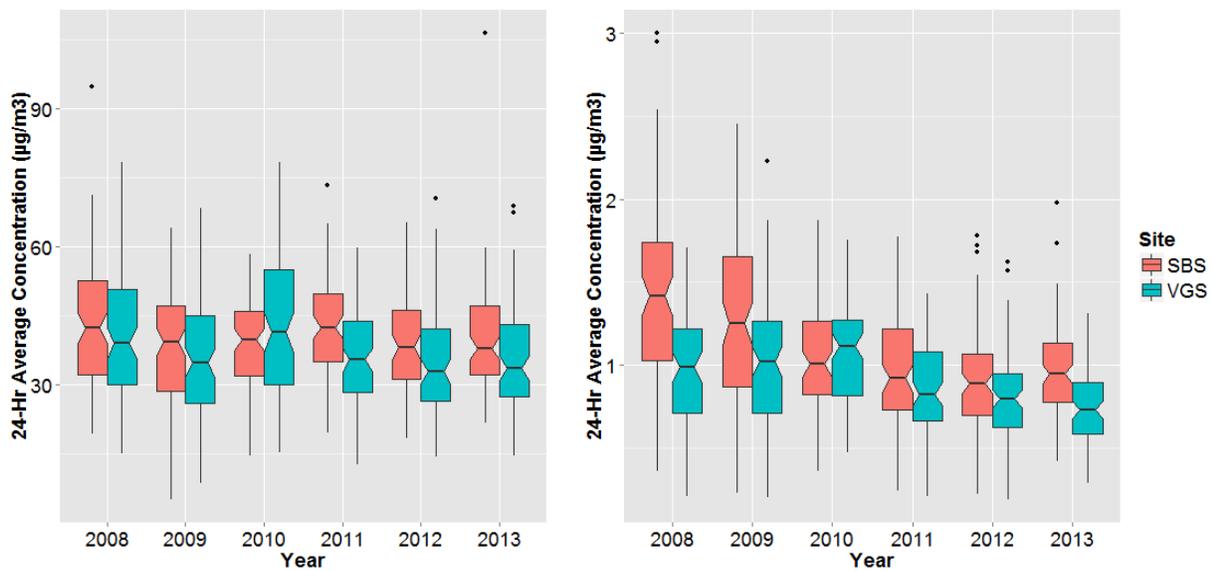


Figure 1. Notched box-whisker plot of daily 24-hr average concentrations for PM₁₀ (left) and BC (right) during summer season at Sunshine Canyon Landfill (SBS) and Van Gogh (VGS) in years 2008 to 2013.

5. Field Operations

Tables 4 and 5 list dates and major tasks associated with visits to the Sunshine Canyon Landfill and Van Gogh sites between June 1, 2013, and August 31, 2013.

Table 4. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from June 1, 2013, through August 31, 2013.

Date of Site Visit	Description of Work
June 22, 2013	Installed and calibrated new temperature sensor for BAM. Backed up BC data. Changed BAM tape; cleaned roller and vane; backed up PM ₁₀ data. Calibrated wind sensors.
July 24, 2013	PM ₁₀ data collected; cleaned cabinet, performed BAM flow/leak check. BC data collected; performed Aethalometer flow check. Repaired trailer door.
August 27, 2013	Replaced BAM tape, ran BAM self-test; backed up data.

Table 5. Van Gogh monitoring site visits and field maintenance and operations from June 1, 2013, through August 31, 2013.

Date of Site Visit	Description of Work
June 20, 2013	Aethalometer stuck on flow stabilization; restarted and data recovered. Installed and calibrated new temperature probe for BAM; adjusted configuration. Changed BAM tape, performed flow/leak check. Calibrated wind sensors; replaced anemometer bearings.
July 7, 2013	Problem with AC unit discovered.
July 24, 2013	PM ₁₀ data collected; cleaned roller and nozzle; performed BAM flow/leak check. BC data collected; performed aethalometer flow check. Added insulation around AC unit.
August 26, 2013	Replaced BAM tape; backed up data.

Table 6 shows the PM₁₀ and BC flow rates as reported by the monitors and measured with a NIST-traceable flow standard. 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. The 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.

Table 6. Flow rates for the BAM PM₁₀ monitors and Aethalometer BC monitors at the Sunshine Canyon Landfill and Van Gogh School sites from June 1, 2013, through August 31, 2013.

Location	Date	Flow Rates (lpm)					
		BAM as Found	Reference	BAM as Left	Reference	Aethalometer as Found	Reference
Sunshine Canyon Landfill	6/22/13	16.8	– ^a	16.8	– ^a	2.8	3.0
Sunshine Canyon Landfill	7/24/13	16.7	16.6	16.7	16.6	2.8	3.2
Van Gogh Elementary School	6/20/13	16.7	16.7	16.7	16.7	– ^a	– ^a
Van Gogh Elementary School	7/24/13	16.7	16.9	16.7	16.9	3.2	3.0

^a Not measured.