



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

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

March 1, 2013 – May 31, 2013

Quarterly Report
STI-910038-5741-QR

Prepared by

David L. Vaughn
Yuan Du
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

Prepared for

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

August 19, 2013

This document contains blank pages to accommodate double-sided printing.

Table of Contents

Section	Page
List of Figures	iv
List of Tables	iv
Executive Summary	ES-1
1. Introduction.....	1
2. Data Completeness	1
3. PM ₁₀ Exceedances	2
4. Average and Maximum Black Carbon Concentrations	2
5. Field Operations	5

List of Figures

Figure	Page
4-1. Notched box-whisker plot of daily 24-hr average concentrations during spring season at Sunshine Canyon Landfill and Van Gogh in years 2008 to 2013 for PM ₁₀ and BC.....	4

List of Tables

Table	Page
2-1. Data completeness statistics for the recent monitoring quarter, March 1, 2013, through May 31, 2013.....	1
3-1. Number of exceedances of federal and state 24-hr PM ₁₀ standards during the current quarter and the March through May quarterly periods of the baseline year (2002) and of 2008, 2009, 2010, 2011, 2012.....	2
4-1. Comparison of 24-hr BC concentrations for the current quarter with those measured in the March through May quarterly periods of the baseline year (2002) and of 2008, 2009, 2010, 2011, 2012, and 2013.....	4
5-1. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from March 1, 2013, through May 31, 2013.	5
5-2. Van Gogh monitoring site visits and field maintenance and operations from March 1, 2013, through May 31, 2013.....	5
5-3. Flow rates for the BAM PM ₁₀ monitors and Aethalometer BC monitors at the Landfill and Van Gogh School sites from March 1, 2013, through May 31, 2013.	6

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-Second Quarterly Report summarizes the spring 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 was 99.5% and 100% at Van Gogh Elementary School for this quarterly period. At Van Gogh School, 0.4% of the captured data were invalidated and 0.5% were deemed suspect. At the Landfill site, about 1.0% of the captured PM₁₀ data were invalidated and 0.6% were deemed suspect. BC data capture was 98.7% at the Landfill site, and 99.4% at Van Gogh School, with all captured data valid. The wind data capture percentage was 100% at Van Gogh School and 98.3% at the Landfill site. About 99.8% of the captured wind data were valid at both locations, though 0.1% of wind speed data were suspect at the Landfill site. There were two exceedances of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at the Landfill site, but none at Van Gogh School. The percentage of days on which the state standard of 50 µg/m³ was exceeded for the March-May quarter was 20% for the Van Gogh School site and 37% for the Sunshine Canyon Landfill site. Average BC concentrations during the spring season are variable across multiple years and do not have any distinct year-to-year trend, unlike the pattern that has been noted for the summer quarter, when average concentrations have decreased each year from 2008 to 2012.

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, 2013, through May 31, 2013. Data from this quarterly period represent the sixth 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, 2013, through May 31, 2013. The percent data capture for PM₁₀ at the Landfill site was 99.5% and 100% at Van Gogh School. At Van Gogh School, 0.4% of the captured data were invalidated and 0.5% were deemed suspect. At the Landfill monitoring site, about 1.0% of the captured PM₁₀ data were invalidated and 0.6% were deemed suspect. Suspect data are included in subsequent analyses (e.g., regional comparisons), while invalid data are not. BC data capture was 98.7% at the Landfill site and 99.4% at the Van Gogh School, with all data valid. The wind data capture percentage was 98.3% at the Landfill site and 100% at Van Gogh School. About 99.8% of the wind data were valid at each site, though 0.1% of wind speed data were suspect at the Landfill site.

Table 2-1. Data completeness statistics for the recent monitoring quarter, March 1, 2013, through May 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	3/1/2013 through 5/31/2013	99.5	98.7	98.3	99.0	100.0	99.8	0.6	0.0	0.1
Van Gogh Elem. School	3/1/2013 through 5/31/2013	100	99.4	100.0	99.6	100.0	99.8	0.5	0.0	0.0

^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 3-1**. There were no exceedances of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at Van Gogh School, but there were two at the Landfill monitoring site: 181 µg/m³ and 175 µg/m³ on March 21 and April 8, respectively. The percentage of days on which the state standard of 50 µg/m³ was exceeded for the March-May quarter was 20% for the Van Gogh School site and 37% for the Landfill site.

Table 3-1. Number of exceedances of federal and state 24-hr PM₁₀ standards during the current quarter and the March through May quarterly periods of the baseline year (2002) and of 2008, 2009, 2010, 2011, 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	03/01/02–05/31/02	0	21/56 (38%)
	03/01/08–05/31/08	1 (5/21/2008)	20/89 (22%)
	03/01/09–05/31/09	1 (5/6/2009)	24/89 (27%)
	03/01/10–05/31/10	0	10/90 (11%)
	03/01/11–05/31/11	1 (4/30/2011)	8/49 (16%)
	03/01/12–05/31/12	1 (5/22/2012)	15/89 (17%)
	03/01/13–05/31/13	2 (3/21/2013 & 4/8/2013)	34/91 (37%)
Van Gogh School	03/01/02–05/31/02	0	17/55 (31%)
	03/01/08–05/31/08	1 (5/21/2008)	6/92 (7%)
	03/01/09–05/31/09	0	17/88 (19%)
	03/01/10–05/31/10	0	7/91 (8%)
	03/01/11–05/31/11	0	3/92 (3%)
	03/01/12–05/31/12	0	9/70 (13%)
	03/01/13–05/31/13	0	18/92 (20%)

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 4-1 provides the 24-hr average and maximum 24-hr BC concentrations collected from March 1, 2013, through May 31, 2013, and compares these concentrations with data from the corresponding quarters of the five previous years as well as the baseline year. During the June through August 2012 quarter, we reported that, at the Landfill monitoring site, the June through August average and maximum 24-hr BC concentrations exhibited a consistent downward trend from 2008 through 2012. This pattern is also observable when comparing data among different years for the fall quarter of September through November, but is not observable in the winter (November to February) quarter or the spring (March to May) quarter. 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 the majority of each day's diurnal cycle, the BC concentrations are influenced heavily 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 on a regional scale. However, basin-wide evidence of this is lacking because BC has no standard and is not a criteria pollutant, and it is not routinely measured at the California Air Resources Board (CARB) or SCAQMD air monitoring stations. During the fall period, meteorological conditions are more mixed, with diurnal patterns exhibiting both onshore and offshore flow characteristics. The northerly flows that occur during these time periods can carry cleaner upwind air from north of the SoCAB, with variable contributions from the landfill operations (variable because landfill activity levels vary throughout the work day and between work days and non-work days).

Figure 4-1 shows a notched box-whisker plot² of the spring quarter 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. These plots show no statistically significant trend in the concentrations over the last six years for the spring quarter for either PM₁₀ or BC.

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 whiskers have a maximum length equal to 1.5 times the length of the box (the interquartile range, IQR). If data are outside this range, the data points are shown on the plot. These "outliers" are further identified with asterisks (representing the points that fall within three times the IQR from the end of the box) and circles (representing the points beyond). These plots also include notches that mark confidence intervals. 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 4-1. Comparison of 24-hr BC concentrations for the current quarter with those measured in the March through May quarterly periods of the baseline year (2002) and of 2008, 2009, 2010, 2011, 2012, and 2013.

Site	Quarterly Period	BC Concentrations ($\mu\text{g}/\text{m}^3$)	
		Average 24-hr	Maximum 24-hr
Sunshine Canyon Landfill	03/01/02–05/31/02	0.72	2.18
	03/01/08–05/31/08	0.65	1.73
	03/01/09–05/31/09	0.90	2.97
	03/01/10–05/31/10	0.60	1.81
	03/01/11–05/31/11	0.57	1.51
	03/01/12–05/31/12	0.62	1.38
	03/01/13–05/31/13	0.77	2.96
Van Gogh School	03/01/02–05/31/02	0.72	2.22
	03/01/08–05/31/08	0.51	1.26
	03/01/09–05/31/09	0.72	1.64
	03/01/10–05/31/10	0.61	1.68
	03/01/11–05/31/11	0.51	1.37
	03/01/12–05/31/12	0.59	1.52
	03/01/13–05/31/13	0.58	1.30

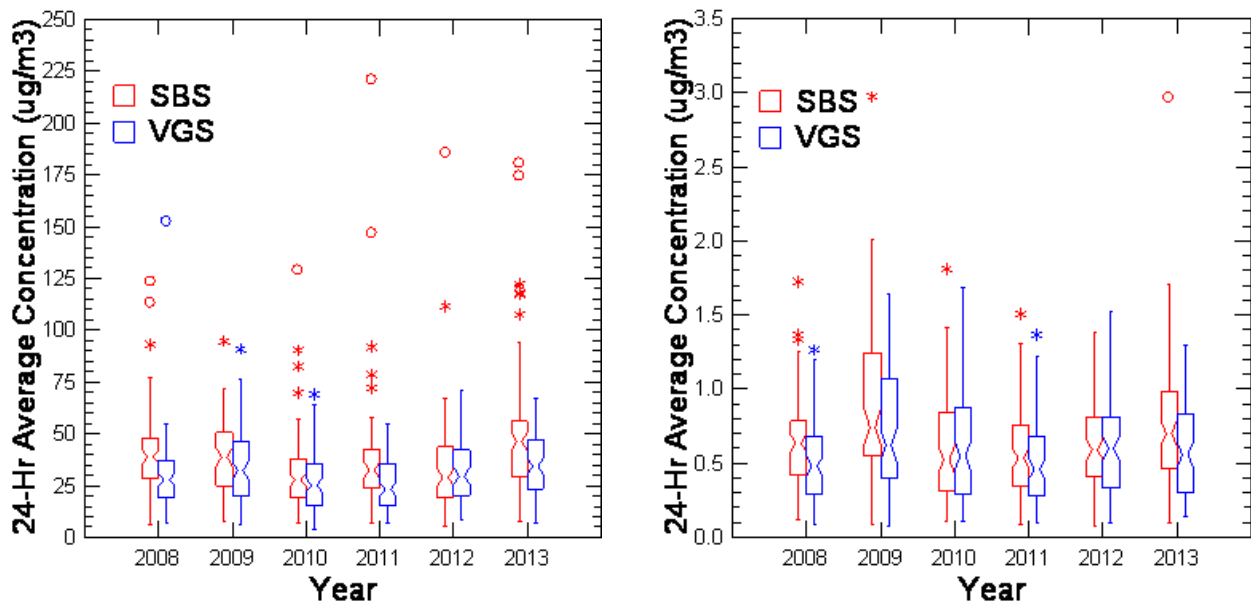


Figure 4-1. Notched box-whisker plot of daily 24-hr average concentrations during spring season at Sunshine Canyon Landfill (SBS) and Van Gogh (VGS) in years 2008 to 2013 for PM_{10} (left) and BC (right).

5. Field Operations

Tables 5-1 and 5-2 list dates and major tasks associated with visits to the Sunshine Canyon Landfill and Van Gogh sites between March 1, 2013, and May 31, 2013.

Table 5-1. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from March 1, 2013, through May 31, 2013.

Date of Site Visit	Description of Work
March 15, 2013	Performed flow check on BC and BAM samplers. Collected PM ₁₀ and BC data. Adjusted BAM ambient temperature; changed BAM tape.
April 20, 2013	Performed flow check on BC and BAM samplers. Collected PM ₁₀ and BC data. Cleaned dust settled in BAM cabinet; cleaned BAM roller vane and nozzle.
May 11, 2013	Performed flow check on BC and BAM samplers. Collected PM ₁₀ and BC data. Cleaned BAM cabinet, roller and vane; blew out BAM nozzle with can air.

Table 5-2. Van Gogh monitoring site visits and field maintenance and operations from March 1, 2013, through May 31, 2013.

Date of Site Visit	Description of Work
March 7, 2013	Performed flow check on BC sampler. Collected BC data.
March 15, 2013	Performed flow check on BAM sampler. Collected PM ₁₀ data. Changed BAM tape.
April 19, 2013	Performed flow check on BC and BAM samplers. Collected PM ₁₀ and BC data. Adjusted BAM ambient temperature; cleaned BAM roller and vane; changed BC tape.
May 10, 2013	Performed flow check on BC and BAM samplers. Collected PM ₁₀ and BC data. Changed BAM tape; cleaned BAM roller and vane; blew out BAM nozzle with can air.

Table 5-3 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. 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 5-3. Flow rates for the BAM PM₁₀ monitors and Aethalometer BC monitors at the Sunshine Canyon Landfill and Van Gogh School sites from March 1, 2013, through May 31, 2013.

Location	Date	Flow Rates (lpm)					
		BAM as Found	Reference	BAM as Left	Reference	Aethalometer as Found	Reference
Sunshine Canyon Landfill	3/15/13	16.7	16.7	16.7	16.8	2.6	2.9
Sunshine Canyon Landfill	4/20/13	16.7	16.7	16.7	16.7	2.5	2.9
Sunshine Canyon Landfill	5/11/13	16.6	16.7	16.6	16.7	2.7	3.0
Van Gogh Elementary School	3/7/13	-- ^a	-- ^a	-- ^a	-- ^a	3.0	2.8
Van Gogh Elementary School	3/15/13	16.7	16.7	16.7	16.7	3.0	2.8
Van Gogh Elementary School	4/19/13	16.7	16.8	16.7	16.8	2.9	2.9
Van Gogh Elementary School	5/10/13	16.7	16.7	16.7	16.7	3.0	2.9

^a Not measured.