



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

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

(September 1, 2012 – November 30, 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 Twentieth Quarterly Report summarizes the fall quarter monitoring results from the fifth year of continuous monitoring.

ES-2. Statistics

The percent data capture for PM₁₀ at the Landfill site and at Van Gogh School approached 100%. At Van Gogh School, only 0.1% of the captured data were invalidated due to routine preventative maintenance procedures, and no data were suspect. However, at the Landfill monitoring site 5% of the captured PM₁₀ data were invalidated, and 1.4% were deemed suspect. BC data capture was 100% at both monitoring sites, with all data valid. The wind data capture percentage was greater than 99% at both monitoring sites. All of the captured wind data were valid at both locations. There was one exceedance of the federal 24-hr PM₁₀ standard of 150 µg/m³ during this quarter at the Landfill monitoring site, but no exceedance of the federal standard at the Van Gogh School. The percentage of days exceeding the state standard of 50 µg/m³ for the September-November quarter was 6% for the Van Gogh School site and 11% for the Sunshine Canyon Landfill site. Average BC concentrations during the fall season are variable across multiple years and do not have any distinct year-to-year trend such as the trend 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 September 1, 2012, through November 30, 2012. Data from this quarterly period represent the fifth consecutive year of fall 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 September 1, 2012, through November 30, 2012. The percent data capture for PM₁₀ at the Landfill site and at Van Gogh School approached 100%. At Van Gogh School, only 0.1% of the captured data were invalidated due to routine preventative maintenance procedures, and no data were suspect. At the Landfill monitoring site, about 5% of the captured PM₁₀ data were invalidated, and 1.4% were deemed suspect. This was due to two factors related to flow control on the PM₁₀ monitor. The mass flow controller (MFC) was replaced on September 5, 2012, after having caused 13% of the previous quarter's PM₁₀ data to be invalidated. Following replacement of the MFC, perturbations of flow, albeit less severe, were still observed. This was due to deterioration in pump performance, so the pump was replaced on October 1, 2012. Suspect data are included in subsequent analyses (e.g., regional comparisons), while invalid data are not. Valid flow rates are within $\pm 5\%$ of the nominal flow rate of 16.7 lpm. Suspect flow rates differ from the nominal rate by greater than 5% but less than 10%, and flow rates that differ from the nominal rate by 10% or greater cause data to be invalidated. BC data capture was 100% at both monitoring sites, with all data 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. All of the captured wind data were valid at both locations.

Table 2-1. Data completeness statistics for the recent monitoring quarter, September 1, 2012, through November 30, 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	9/1/12–11/30/12	99.5	99.1	99.6	94.9	100.0	100.0	1.4	0.0	0.0
Van Gogh Elem. School	9/1/12–11/30/12	99.5	99.3	99.5	99.9	100.0	100.0	0.0	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 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, but no exceedance of the federal standard at the Van Gogh School. The percentage of days exceeding the state standard of 50 µg/m³ for the September-November quarter was 6% for the Van Gogh School site and 11% for the Landfill site.

The 24-hr average PM₁₀ concentration at the Landfill on October 26, 2012, was 227 µg/m³, while the average on that day at the Van Gogh School was 49 µg/m³. Wind speeds measured at the landfill were consistently high that day, with hourly averages ranging from 19.4 mph to 33.0 mph (with an average of 27.9 mph). Average daily wind speed at Van Gogh School was 5.6 mph. A trial revegetation project was still underway during this period on the southern berm of the old city portion of the Landfill. Large quantities of soil from the Landfill's front terminal basin had been stockpiled in the areas adjacent to the monitoring trailer (see 19th Quarterly Report). The distribution and grading of these large piles of soil around the top of the southern berm occurred sometime between October 1 and October 24, 2012 (dates of STI site visits); as of October 24, these areas were still without any vegetative cover. The short-term and highly localized elevated PM₁₀ concentrations are probably associated with this exposed surface, with an undetermined proportion potentially from the landfill proper. We have noted these surface emissions several times in previous reports. Revegetating this area should decrease fugitive emissions of surface material under high-wind conditions. Lower PM₁₀ concentrations under high winds in the future will demonstrate whether revegetation efforts are fruitful.

Table 3-1. Number of exceedances of federal and state 24-hr PM₁₀ standards during the current quarter and the September-November quarterly periods of the baseline year (2002) 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	9/1/02–11/30/02	0	9/33 (27%)
	9/1/08–11/30/08	0	12/90 (13%)
	9/1/09–11/30/09	1 (10/27/09)	11/78 (14%)
	9/1/10–11/30/10	0	7/91 (8%)
	9/1/11–11/30/11	0	11/88 (13%)
	9/1/12–11/30/12	0	5/90 (6%)
Sunshine Canyon Landfill	9/1/02–11/30/02	0	51/77 (66%)
	9/1/08–11/30/08	1 (10/9/08)	12/73 (16%)
	9/1/09–11/30/09	1 (10/27/09)	17/89 (19%)
	9/1/10–11/30/10	0	8/86 (9%)
	9/1/11–11/30/11	1 (11/2/11)	20/89 (22%)
	9/1/12–11/30/12	1 (10/26/12)	9/83 (11%)

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 September 1, 2012, through November 30, 2012, and compares these concentrations with data from corresponding quarters of the four previous years as well as the baseline year. During the previous quarter (June-August), we reported that, at the Landfill monitoring site, the June-August average and maximum 24-hr BC concentrations exhibited a consistent downward trend from 2008 through 2012. This pattern is not observable when comparing data among

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>.

different years for the fall period of September through November. 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) have potentially 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 as the activity levels there vary throughout the work day and between work days and non-work days.

Table 4-1. Comparison of 24-hr BC concentrations for the current quarter with those measured in the June-August quarterly periods of the baseline year (2002) 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	9/1/02–11/30/02	1.31	2.92
	9/1/08–11/30/08	0.73	4.88
	9/1/09–11/30/09	0.84	2.77
	9/1/10–11/30/10	0.71	2.13
	9/1/11–11/30/11	0.85	2.24
	9/1/12–11/30/12	0.69	1.80
Sunshine Canyon Landfill	9/1/02–11/30/02	1.26	2.83
	9/1/08–11/30/08	1.19	2.32
	9/1/09–11/30/09	1.04	2.98
	9/1/10–11/30/10	0.77	2.29
	9/1/11–11/30/11	0.98	2.45
	9/1/12–11/30/12	0.85	2.24

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 School sites, respectively, between September 1, 2012, and November 30, 2012.

Table 5-3 shows the PM₁₀ and BC flow rates as reported by the monitors and measured with a NIST-traceable flow standard.

Table 5-1. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from September 1, 2012, through November 30, 2012.

Date of Site Visit	Description of Work
Wednesday, September 5, 2012	Replaced mass flow controller on Beta Attenuation Monitor (BAM) and calibrated flow rate. Performed flow check on BC samplers. Collected PM ₁₀ and BC data. Changed tape supply in BAM and conducted BAM self-test; passed.
Monday, October 1, 2012	Replaced BAM pump. Replaced bearings on RMY 5305 wind speed sensor. Performed flow check on PM ₁₀ and BC samplers. Collect PM ₁₀ and BC data.
Wednesday, October 24, 2012	Replaced Aethalometer tape. Performed flow check on PM ₁₀ and BC samplers. Cleaned BAM nozzle, roller, and vane; self-test passed. Collected PM ₁₀ and BC data.
Tuesday, November 13, 2012	Replaced BAM tape and conducted self-test. Performed flow and leak checks on BAM. Cleaned BAM nozzle, roller, and vane; self-test passed. BC flow checked.
Friday, November 30, 2012	Collected PM ₁₀ and BC data. No other maintenance conducted due to heavy rain.

Table 5-2. Van Gogh School monitoring site visits and field maintenance and operations from September 1, 2012, through November 30, 2012.

Date of Site Visit	Description of Work
Wednesday, September 5, 2012	Collected PM ₁₀ and BC data.
Wednesday, October 24, 2012	Leak and flow checked on BAM. Collected PM ₁₀ and BC data. Aethalometer flow checked. Cleaned BAM roller, vane, and nozzle. Changed BAM tape. Self-test passed.
Tuesday, November 13, 2012	Flow checked on PM ₁₀ and BC samplers.
Friday, November 30, 2012	Collected PM ₁₀ and BC data. No other maintenance conducted due to heavy rain.

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 September 1, 2012, through November 30, 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. Visits to the Landfill Site occurred on 9/5/12 and 10/1/12 to address specific instrument problems. Van Gogh School was not visited on those dates.

Location	Date	Flow Rates (lpm)					
		BAM as Found	Reference	BAM as Left	Reference	Aethalometer as Found	Reference
Sunshine Canyon Landfill	9/5/12 ^a	16.7	17.1	16.7	16.7	– ^b	– ^b
	10/1/12 ^c	16.7	16.6	16.7	16.6	– ^b	– ^b
	10/24/12	16.1	16.4	16.1	16.4	2.5	2.7
	11/13/12	16.7	16.9	16.7	16.9	2.6	2.8
Van Gogh Elementary School	10/24/12	16.7	16.5	16.7	16.5	3.0	2.9
	11/13/12	16.7	16.7	16.7	16.7	3.0	2.8

^aBAM mass flow controller replaced

^bNot measured

^cBAM pump replaced