Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

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

(September 1, 2011 – November 30, 2011)

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. PM_{10} (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. PM_{10} concentrations are then compared with federal and state PM_{10} standards. When PM_{10} exceedances occur, additional comparisons are made with the historical, regional, and annual ambient PM_{10} concentrations. At least annually, the PM_{10} 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 Sixteenth Quarterly Report summarizes the fall quarter monitoring results from the fourth year of continuous monitoring.

ES-2. Statistics

Data capture for the monitoring period of September 1, 2011, through November 30, 2011, was greater than 95% for all parameters at both sites. About 10 consecutive days of wind data were invalidated at the Van Gogh School site because a prop on the wind speed sensor was broken, decreasing the valid data percentage to about 88%. High winds at the Landfill site damaged the mast holding the wind speed sensor, and wind data from the last five days of November were invalidated at that location, reducing the valid data percentage by about 4%. There was one exceedance of the 150 $\mu g/m^3$ 24-hr federal PM_{10} standard at the Landfill site during this monitoring quarter, accompanied by elevated regional concentrations. The more stringent 24-hr California state PM_{10} standard (50 $\mu g/m^3$) was exceeded during this period on 22% of the days at the Landfill site and on 13% of the days at the Van Gogh School site. While average 24-hr BC concentrations at the Landfill have generally decreased during the fall quarters since the baseline year, the current fall quarter exhibited a slight increase. BC concentrations at the Van Gogh School have been variable during the fall quarter of the measurement years, but no distinct increasing or decreasing trend is obvious from the multiple years of fall quarter data.

ES-3. Landfill Gas Sampling

No landfill gas (LFG) samples were obtained during the 2011 fall period.

1. Introduction

This report provides a summary of data completeness, ambient PM_{10} (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, 2011, through November 30, 2011. Data from this quarterly period represent the fourth 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 1 gives completeness statistics for all measured variables for the period September 1, 2011, through November 30, 2011. Data capture rates remained high for all measured variables at both sites, except for the winds at the Landfill monitoring location, where data capture and percent of valid data were slightly lower due to extremely high winds that damaged the support mast for the wind sensor. (Permanent repairs to avoid this problem in the future are underway.) Capture of the wind data at Van Gogh School was 100%, but a broken prop on the wind speed sensor caused a contiguous segment of the 1-minute wind data time series to be invalidated, yielding only 88% valid data. A small percentage of PM_{10} data was invalidated because of downtime during equipment maintenance. Recovery of BC data was 100% at both sites.

Table 1. Data completeness statistics for the recent monitoring quarter, September 1, 2011, through November 30, 2011.

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	9/1/11–11/30/11	99.0%	100.0%	94.6%	99.4%	100.0%	96.3%	0.0%	0.0%	0.0%
Van Gogh Elem. School	9/1/11–11/30/11	99.0%	100.0%	100.0%	98.5%	100.0%	88.1%	0.0%	0.0%	0.0%

[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. PM_{10} Exceedances

The federal and state PM_{10} exceedances for the current quarter and the corresponding quarters of the previous three years (2008, 2009, and 2010) and the baseline year (November 22, 2001, to November 21, 2002), are summarized in **Table 2**. There was one exceedance of the federal 24-hr PM_{10} standard of 150 µg/m^3 at the Landfill monitoring site on November 2, 2011 (262 µg/m^3). Mira Loma, one of 12 sites in the Los Angeles basin where PM_{10} concentrations are measured, recorded an average concentration of 159 µg/m^3 on that day, and five other sites exceeded the California state standard of 50 µg/m^3. There were sustained winds of 20 to 40 mph at the landfill monitoring site throughout the day on November 2. Gusty winds throughout the region likely contributed to elevated PM_{10} concentrations at these other southern California sites as well. Exceedances at the Landfill site, but not at Van Gogh School, have occurred in the past and are generally accompanied by high winds or elevated regional concentrations. High winds can entrain soil particles and crustal material from the landfill surface, and these suspended particles augment concentrations locally (at the landfill) but have limited impact on a regional or neighborhood scale. The percentage of days exceeding the state standard of 50 µg/m^3 for the September–November quarter was 13% for the Van Gogh School site and 22% for the Sunshine Canyon Landfill site.

Table 2. Number of exceedances of federal and state 24-hr PM_{10} standards during the current quarter and the September through November quarterly periods of the baseline year and of 2008, 2009, and 2010. 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 having valid 24-hour averages* and the *percentage of exceedances* out of the total number of days having valid 24-hr average PM_{10} concentrations.

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	12/89 (13%)
	9/1/09–11/30/09	1 (10/27/09)	11/77 (14%)
	9/1/10–11/30/10	0	7/90 (8%)
	9/1/11–11/30/11	0	11/88 (13%)
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)	17/88 (19%)
	9/1/10–11/30/10	0	8/85 (9%)
	9/1/11–11/30/11	1 (11/2/11)	20/89 (22%)

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.

Table 3 provides the 24-hr average and maximum 24-hr BC concentrations for September 1, 2011, through November 30, 2011, and compares these concentrations with data from corresponding quarters of the three most recent years and the baseline year. The average 24-hr BC concentrations during this season of the year have generally been lower than those measured in the baseline year, but over the last four fall seasons the BC concentrations have been variable. At Van Gogh School, no distinct trend is noticeable. At the Landfill site, the data suggest a general decrease in average concentrations, until the current September–November period, when average BC concentrations were slightly higher than in the previous year's fall quarter. The maximum 24-hr BC concentrations are variable across the fall quarters of 2002 and 2008 through 2011.

Table 3. Comparison of 24-hr BC concentrations for the current quarter with those measured in the September 1 through November 30 quarterly periods of the baseline year and of 2008, 2009, and 2010.

Site	Quarterly Period	BC Concentrations (µg/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	.84	2.77
	9/1/10–11/30/10	.71	2.13
	9/1/11–11/30/11	0.85	2.24
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	.76	2.29
	9/1/11–11/30/11	0.98	2.44

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 South Coast Air Quality Management District (SCAQMD) indicates that odor complaints from the community are most frequent from October to January, suggesting that transport from the landfill may be occurring during those months. No LFG samples were obtained during the September-November period.

6. Field Operations

Tables 4 and 5 list dates and major tasks associated with visits to the Sunshine Canyon Landfill and Van Gogh School sites, respectively, between September 1, 2011, and November 30, 2011. **Table 6** shows the PM_{10} and BC monitors' flow rates as reported by the monitors and measured with a NIST-traceable flow standard. Routine field operations and maintenance were impacted by high winds at the Landfill site, preventing access to the trailer rooftop during a few regularly scheduled visits, and an infestation of bees in the trailer required a professional exterminator. The monitoring equipment was not impacted, but personnel could not access the trailer between the time the bees were discovered and the time they were exterminated. A Windows system file became corrupted at the Landfill site's computer, requiring removal and repair. At Van Gogh School, a broken prop on the wind speed sensor caused the loss of several days of data while a new part was ordered and installed. Meteorological sensors at both sites were calibrated in November.

Table 4. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from September 1, 2011, through November 30, 2011.

Date of Site Visit	Description of Work
Wednesday, September 7, 2011	Regular preventive maintenance. Flow checks on PM_{10} and BC samplers. Leak check on BAM. Collected PM_{10} and BC data. Inspected roller, vane, and nozzle.
Thursday, September 22, 2011	Emergency visit to retrieve station DAS; corrupt system file. Sent for repair.
Saturday, September 24, 2011	Unscheduled visit to replace repaired DAS PC.
Monday, October 17, 2011	Installed Envidas FW upgrade (v.14.1.179).
Tuesday, November 1, 2011	Infestation of bees (yellow jackets) in berm trailer prevented regularly scheduled flow checks and leak checks. Professional exterminator called in to eliminate bee problem.
Wednesday, November 16, 2011	Meteorological equipment calibration.

Table 5. Van Gogh School monitoring site visits and field maintenance and operations from September 1, 2011, through November 30, 2011.

Date of Site Visit	Description of Work
Wednesday, September 7, 2011	Regular preventive maintenance. Flow checks on PM_{10} and BC samplers. Leak check on BAM. Collected PM_{10} and BC data. Inspected roller, vane, and nozzle.
Saturday, September 24, 2011	Changed BAM tape, collected BC and PM_{10} data. Found broken prop on RMY 5305 wind sensor. Arranged repair.
Wednesday, September 28, 2011	Replaced prop on 5305 wind sensor.
Thursday, October 6, 2011	Membrane span foil test on BAM 1020.
Saturday, October 15, 2011	Installed new reference span membrane in BAM 1020; s/n 6877; ABS value 0.793
Tuesday, November 1, 2011	Regular preventive maintenance. Flow checks on PM_{10} and BC samplers. Leak check on BAM. Collected PM_{10} and BC data. Inspected roller, vane, and nozzle.
Wednesday, November 16, 2011	Meteorological equipment calibration.

Table 6. Flow rates for the BAM PM_{10} monitors and Aethalometer BC monitors at the Sunshine Canyon Landfill and Van Gogh School sites from September 1, 2011, through November 30, 2011. 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	9/7/11	16.7	16.7	16.7	16.7	2.8	2.9
	11/1/11	Yellow jacket infestation prevented scheduled flow checks					
Van Gogh Elementary School	9/7/11	16.7	16.7	16.7	16.7	3.2	3.1
	11/1/11	16.7	16.5	16.7	16.5	3.2	3.1