Sonoma Technology, Inc.
Innovative Environmental Solutions

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

June 1, 2016 – August 31, 2016

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 (Landfill South Site) and at Van Gogh Elementary School in the nearby community of Granada Hills in fall 2007. The Sunshine Canyon Landfill North site was installed in December 2015.[1] Sampling for volatile organic compounds (VOCs) and carbonyl compounds was initiated in July 2106 at the Landfill South Site and Van Gogh School. PM_{10} (particulate matter less than 10 microns in aerodynamic diameter) is measured hourly; wind speed (WS) and wind direction (WD) are measured as 1-minute averages; and black carbon (BC, a surrogate for diesel particulate matter [DPM]) is averaged over 5-minute intervals. The collected data undergo quarterly validation and are evaluated for completeness. BC data are compensated for filter tape saturation effects, which cause BC values to be underestimated.

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. The PM_{10} and BC data are analyzed at least once a year 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 Thirty-Fifth Quarterly Report summarizes the June-August (summer) quarter monitoring results from the ninth year of continuous monitoring.

ES-2. Statistics

The percent data capture for PM_{10} was 100.0% at the Landfill South, Landfill North, and Van Gogh School sites. Approximately 0.4%, 2.8%, and 0.4% of the captured PM_{10} data at the Landfill South, Landfill North, and Van Gogh School sites, respectively, were invalidated. No hourly PM_{10} values were deemed suspect at any of the sites. BC data capture was 91.5% at the Landfill South site, with none of the data invalidated and 0.1% deemed suspect. BC data capture was 89.8% at the Van Gogh School site, with 0.1% of the data invalidated and 0.3% deemed suspect. At the new Landfill North site, BC data capture was 91.8%, with none of the data invalidated and 0.1% deemed suspect.

There were two exceedances of the federal 24-hr PM_{10} standard of 150 $\mu g/m^3$ during this quarter at the Landfill South site, and one at the Landfill North site. The percentage of days on which the state PM_{10} standard of 50 $\mu g/m^3$ was exceeded during this spring quarter was 17% (16 days) at the Landfill South site, 64% (59 days) at the Landfill North site, and 4% (4 days) at Van Gogh School site.

[1] The Landfill North site is planned to run for a minimum of one year, at which time its utility will be assessed and a decision will be made whether to keep the site for the duration of the existing monitoring contract.

From 2008 to 2016, summer-quarter average 24-hr BC concentrations ranged from 0.16 µg/m^3 to 3.71 µg/m^3 at the Landfill South site, and from 0.18 µg/m^3 to 2.71 µg/m^3 at the Van Gogh site. This summer quarter, the Landfill South site had the lowest BC average (0.70 µg/m^3) of all the summer quarters. This is the first summer quarter during which the Landfill North site was operational; the average 24-hr BC concentration at this site was 0.86 µg/m^3.

1. Introduction

This report summarizes data completeness, ambient PM_{10} (particulate matter less than 10 microns in aerodynamic diameter) concentrations, average and maximum black carbon (BC, a surrogate for diesel particulate matter [DPM]) concentrations, instrument flow rate verification (quality control) data, and field operations for the summer quarterly period of June 1, 2016, through August 31, 2016. This is the ninth consecutive year that summer-season data have been collected from continuous monitoring at the Sunshine Canyon Landfill South (previously called the Berm Site) and Van Gogh School monitoring sites, and the first year that summer-season data have been collected from continuous monitoring at the Sunshine Canyon Landfill North monitoring site. PM_{10} was measured with a beta-attenuation monitor (BAM), and BC was measured with an Aethalometer. **Figure 1** shows the monitoring site locations. Starting on July 11, 2016, a one-year program of one-in-six day sampling of volatile organic compounds (VOCs) and carbonyl compounds began. This 35th Quarterly Report includes VOC and carbonyl data collected during July and August that have undergone quality assurance protocols and are considered final data (see **Section 5**).

Figure 1. View of Sunshine Canyon Landfill and the surrounding monitoring stations: Sunshine Canyon Landfill South, Sunshine Canyon Landfill North, and Van Gogh Elementary School.

2. Data Completeness

Table 1 gives completeness statistics for all measured variables during the 2016 summer quarter. The percent data capture for PM_{10} was 100.0% at all three sites. Approximately 0.4%, 2.8%, and 0.4% of the captured PM_{10} data were invalidated at the Landfill South, Landfill North, and Van Gogh School sites, respectively. No hourly values were deemed suspect at any of the three sites. Suspect data are included in subsequent analyses (e.g., regional comparisons), while invalid data are not.

Table 1. Data completeness statistics for hourly BC and PM_{10} data, and 1-min wind speed and wind direction data, for the 2016 summer monitoring quarter.

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 South	06/01/16-08/31/16	100.0	91.5	99.8	99.6	100.0	98.8	0.0	0.1	0.8
Sunshine Canyon Landfill North	06/01/16-08/31/16	100.0	91.8	99.9	97.2	100.0	98.8	0.0	0.1	0.3
Van Gogh School	06/01/16-08/31/16	100.0	89.8	100.0	99.6	99.9	98.8	0.0	0.3	0.9

[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 1-hr data, 24 data values per day are expected), assuming a start date of June 1, 2016.
[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.

BC data capture was 91.5% at the Landfill South site, with none of the data invalidated and 0.1% deemed suspect. BC data capture was approximately 89.8% at the Van Gogh School site, with 0.1% of the data invalidated and 0.3% deemed suspect. At the new Landfill North site, BC data capture was 91.8%, with none of the data invalidated and 0.1% deemed suspect.

The wind data capture percentage was 99.8%, 99.9%, and 100% at the Landfill South, Landfill North, and Van Gogh School sites, respectively. At all sites, 1.2% of the data were invalidated. Approximately 0.8%, 0.3%, and 0.9% of the wind data captured were deemed suspect at the Landfill South, Landfill North, and Van Gogh School sites, respectively.

3. PM_{10} Exceedances

The federal and state PM_{10} exceedances for the summer 2016 quarter, the summer quarters of the previous eight years (2008–2015), and the summer quarter of the baseline year (November 22, 2001–November 21, 2002) are summarized in **Table 2**. There were two exceedances of the federal 24-hr PM_{10} standard of 150 µg/m^3 during the June 2016–August 2016 quarter at the Landfill South site, one at the Landfill North site, and none at the Van Gogh School site. In this quarter, the percentage of days on which the state PM_{10} standard of 50 µg/m^3 was exceeded was 17% (16 days) at the Landfill South site, 64% (59 days) at the Landfill North site, and 4% (4 days) at Van Gogh School site.

Table 2. Number of exceedances of federal and state 24-hr PM_{10} standards during the summer quarters of the baseline year (2002) and 2008–2016. In the "Federal 24-Hr" column, the values are *number of exceedances* and the *date(s)* on which those exceedances occurred. In the "State 24-Hr" 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 PM_{10} concentrations were measured. The most recent summer quarter is shown in bold.

Site	Quarterly Period	Exceedances of PM_{10} Standard	
		Federal 24-Hr 150 µg/m^3	State 24-Hr 50 µg/m^3
Sunshine Canyon Landfill South	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	14/91 (15%)
	06/01/14–08/31/14	0	19/91 (21%)
	06/01/15–08/31/15	0	8/92 (9%)
	06/01/16–08/31/16	**2 (07/22/2016 & 07/30/2016)**	**16/92 (17%)**
Sunshine Canyon Landfill North	**06/01/16–08/31/16**	**1 (07/30/2016)**	**59/92 (64%)**
Van Gogh School	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	9/90 (10%)
	06/01/14–08/31/14	0	22/86 (26%)
	06/01/15–08/31/15	0	0/30 (0%)
	06/01/16–08/31/16	**0**	**4/92 (4%)**

The two exceedances of the federal 24-hr PM_{10} standard at the Landfill South site occurred within eight days of each other, on July 22 and July 30, 2016. The exceedance of the federal 24-hr PM_{10} standard at the Landfill North site also occurred on July 30, 2016. The time series of hourly PM_{10} observed at both of these sites during this period is shown in **Figure 2**, The high PM_{10} concentrations and associated exceedance days during this period were likely due to large forest fires that occurred north and west of the Sunshine Canyon Landfill (the Sand Fire in Santa Clarita).

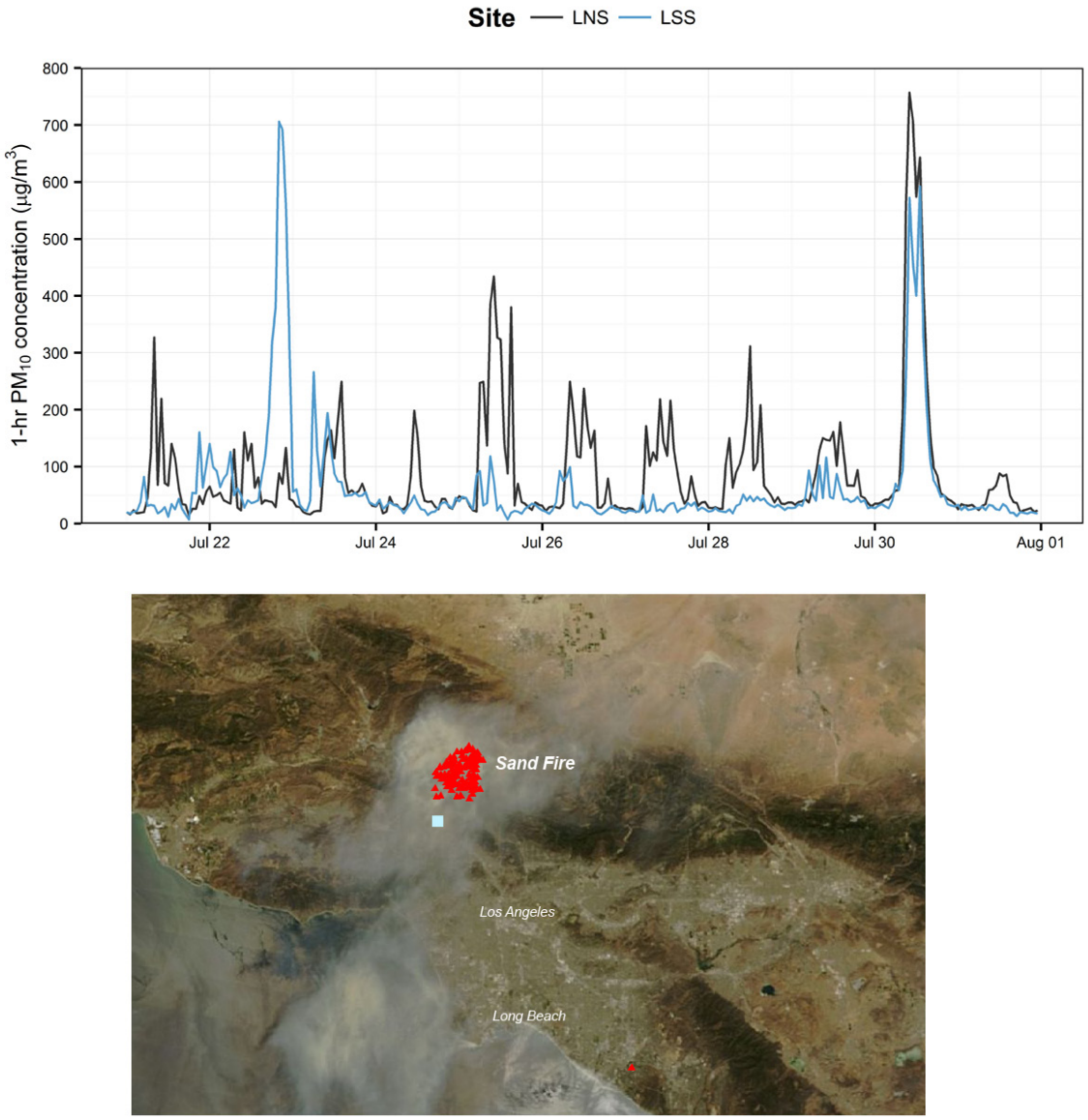

Figure 2. Time series of 1-hr PM_{10} concentrations measured at the Landfill South site (LSS) and Landfill North site (LNS) from July 21 through July 31, 2016 (top), and satellite imagery from MODIS Terra on the afternoon of July 23, 2016 (bottom). Individual fire hotspot locations of the Sand Fire are denoted by red triangles. The approximate location of the Sunshine Canyon Landfill is denoted by the blue square. Satellite imagery obtained from the AirNow-Tech database (information online at https://www.airnowtech.org).

4. Average and Maximum Black Carbon Concentrations and PM_{10} Concentrations

Although no federal or state standards exist for BC concentrations in ambient air, BC is a measurable component of ambient air that correlates well with 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 IV (MATES IV), conducted by the South Coast Air Quality Management District (SCAQMD), found DPM to be the most important toxic air pollutant contributing to risk in the Los Angeles basin (South Coast Air Quality Management District, 2015a).

Aethalometers are subject to a saturation effect, where the buildup of BC on the air sampling tape causes an artifact that affects the accuracy of the measured concentration (Drinovec et al., 2015; Allen, 2014). Instrument response is dampened with heavier loading (i.e., heavier concentrations) of BC aerosol. This artifact can cause BC concentration readings to be lower than the true concentration. However, mathematical methods to correct the BC concentration values are available and are widely used. All the reported BC values to date from the Landfill South, Landfill North, and Van Gogh School sites have been adjusted to compensate for this tape saturation effect; this compensation had not been performed in quarterly reports prior to the 29th Quarterly Report (winter 2015). Because the compensation process changes the reported concentration, and because uncompensated values were used in previous reports, prior-year BC concentrations shown in this report do not match concentrations reported in reports prior to the 29th Quarterly Report. All BC data shown in this report have been compensated, with the exception of data from the baseline year; raw data for the baseline year are unavailable for compensation.

Table 3 provides the 24-hr average and maximum compensated BC concentrations collected during the summer 2016 quarter and compares them to compensated BC data from the summer quarters of the eight previous years. (Note that the baseline year data are *not* compensated.) The summer 2016 quarter data at the Van Gogh School site are similar to those of previous summer quarters. The summer 2016 BC average at the Landfill South site is the lowest summer average recorded since the beginning of the study. The average 24-hr BC concentration at the Landfill North site is similarly low.

Table 3. Twenty-four-hour BC concentrations for the summer quarter of the baseline year (2002) and each year from 2008 through 2016. Asterisks (*) denote uncompensated BC values. The most recent summer quarter is shown in bold.

Site	Quarterly Period	BC Concentrations (µg/m^3)	
		Average 24-Hr	Maximum 24-Hr
Sunshine Canyon Landfill South	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
	06/01/14–08/31/14	0.79	1.34
	06/01/15–08/31/15	0.76	1.58
	06/01/16–08/31/16	**0.70**	**1.33**
Sunshine Canyon Landfill North	**06/01/16–08/31/16**	**0.86**	**2.17**
Van Gogh School	06/01/02–08/31/02	1.40*	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
	06/01/14–08/31/14	0.86	1.50
	06/01/15–08/31/15	0.92	1.48
	06/01/16–08/31/16	**0.79**	**1.42**

Figure 3 shows a notched box-whisker plot[2] of summer quarter PM_{10} and BC data for the Landfill South site and the Van Gogh School site for all nine monitoring years (2008–2016). 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 that the median concentrations are statistically different at the 95% confidence level. The whiskers go to 1.5 times the IQR; points beyond this (outliers) are shown individually.

[2] A notched box-whisker plot shows the entire distribution of concentrations for each year. Each box shows the 25th, 50th (median), and 75th percentiles. The whiskers indicate values that are up to 1.5 times the inter-quartile range from the 25th or 75th percentile. 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).

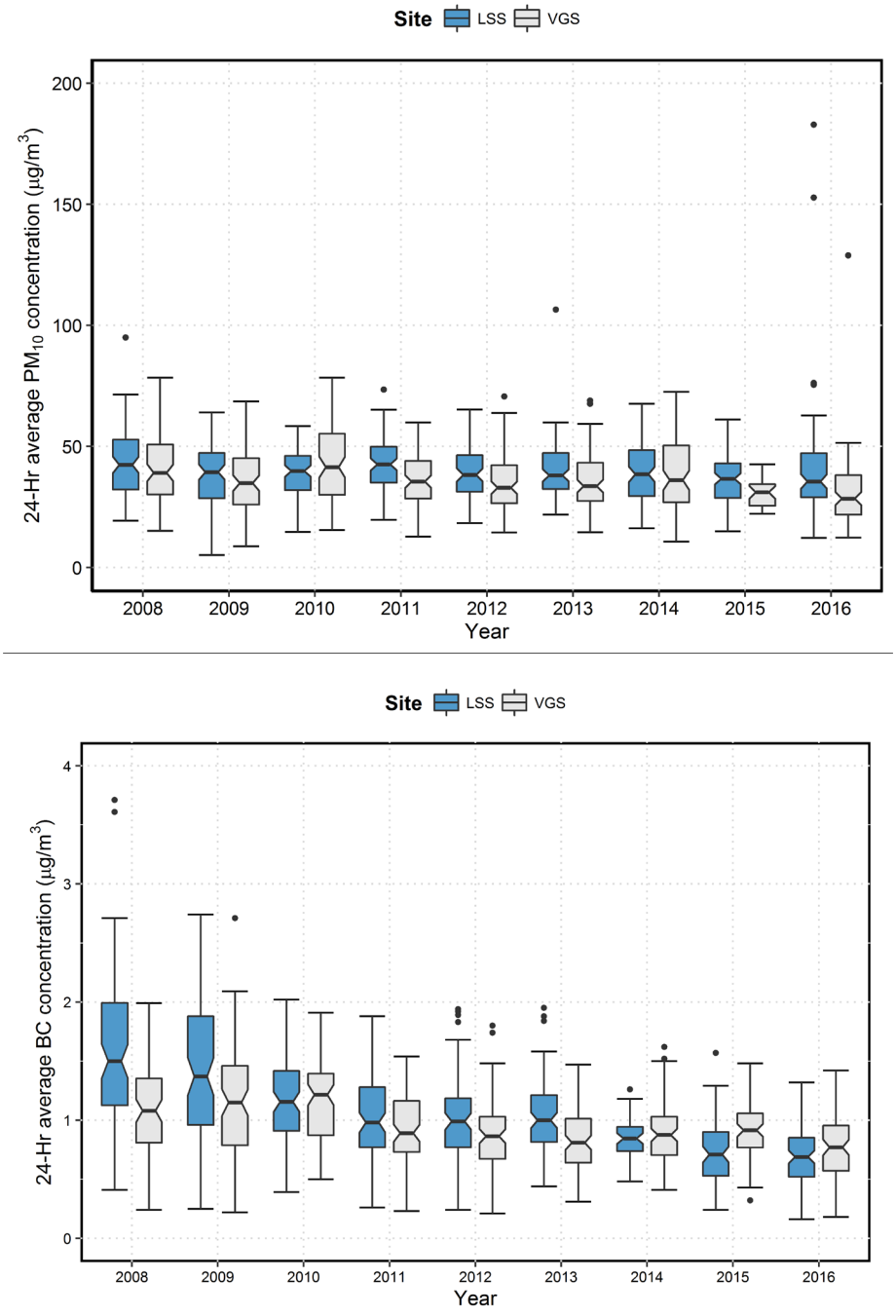

Figure 3. Notched box-whisker plot of daily 24-hr average concentrations of PM_{10} (top) and BC (bottom) at the Landfill South site (LSS) and the Van Gogh School site (VGS) during summer (June-August) quarters from 2008 to 2016.

Based on the top panel in Figure 3, there is no statistically significant temporal trend in PM_{10} concentrations over the last nine years for the summer quarter, although average PM_{10} concentrations measured at the Van Gogh School site are usually lower than those measured at the Landfill South site at this time of the year.

Table 3 and Figure 3 suggest that, while there is some year-to-year variability, there is no statistically significant trend in summer-quarter 24-hr average BC over the past nine years at either the Landfill South site or the Van Gogh School site. The average 24-hr summer-quarter BC concentrations and the maximum 24-hr BC concentration at the Landfill South site in 2016 are the lowest on record. The average and maximum 24-hr summer-quarter BC concentrations at the Landfill South site are also lower than those for the Landfill North site and the Van Gogh School site during the same period.

The 24-hr average PM_{10} and BC data from the three sites for the current summer quarter are shown in notched box-whisker plots in **Figures 4 and 5**, respectively. The median 24-hr average PM_{10} concentration is highest at the Landfill North site and lowest at the Van Gogh School site. There is strong evidence of a statistically significant decrease of median PM_{10} concentrations from approximately north to south across the study area (indicated by non-overlapping notches). The median 24-hr average BC concentrations are not significantly different among the Landfill South, Landfill North, and Van Gogh School sites.

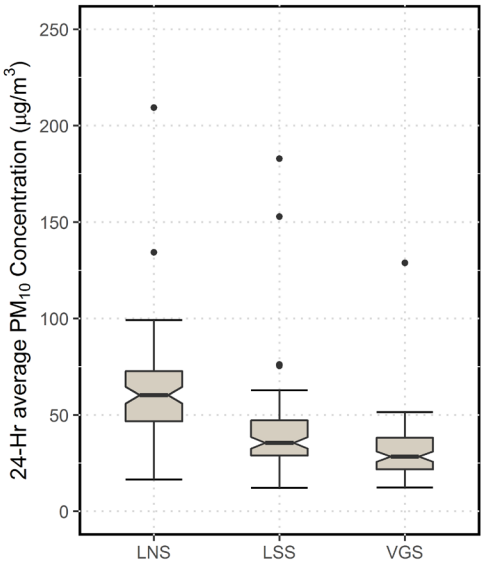

Figure 4. Notched box-whisker plot of daily 24-hr average PM_{10} concentrations measured during the summer 2016 quarter (June 1, 2016–August 31, 2016) at the Landfill North site (LNS), the Landfill South site (LSS), and the Van Gogh School site (VGS).

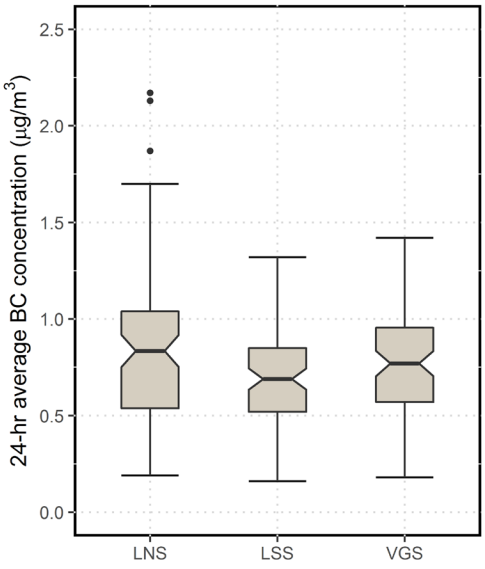

Figure 5. Notched box-whisker plot of daily 24-hr average BC concentrations measured during the summer 2016 quarter (June 1, 2016–August 31, 2016) at the Landfill North site (LNS), the Landfill South site (LSS), and the Van Gogh School site (VGS).

5. Volatile Organic Compounds and Carbonyl Sampling: Project Description

STI and its subcontractor are collecting one year of VOC and carbonyl measurements at the Landfill and Van Gogh sites on a one-in-six day U.S. Environmental Protection Agency (EPA) sampling schedule. Target VOCs include the air toxics in the Multiple Air Toxics Exposure Study (MATES) IV protocol (South Coast Air Quality Management District, 2015b), such as benzene, tetrachloroethene, 1,3-butadiene, carbon tetrachloride, dichloromethane, chloromethane, ethylbenzene, xylenes, toluene, and trichloroethene, as well as tracers of landfill emissions such as chlorobenzene, dichlorobenzenes, and vinyl chloride (Chiriac et al., 2007; Eklund et al., 1998). Carbonyl sampling primarily targets the key air toxics formaldehyde, acetaldehyde, and propionaldehyde, although other aldehydes and ketones are included.

The VOC samples are collected with a Xontec 910PC automated sampler, and the carbonyl samplers are collected with a custom built automated sampler, the STI Carbonyl Sampler (STICS).The automated samplers are capable of collecting duplicate samples.

5.1 Measurements and Samples

Sampling of VOCs is carried out with automated samplers that use mass flow controllers and pumps to fill evacuated 6-liter, stainless steel, electropolished SUMMA canisters. Using absolutely clean canisters is of paramount importance in this type of sampling because unclean canisters can cause false positive detects of compounds not actually present in the ambient air. Therefore, laboratory-conducted method-blank analyses are an important quality-control procedure for identifying any canister contamination.

The SUMMA canisters begin under vacuum, and then are pressurized with the pump over the 24-hour sampling period. The sampler's mass flow controller provides a constant flow rate of ambient air into the canister until the pressure approaches one atmosphere (ca 760 mmHg or 14.7 psi). Using pressurized canisters and an automated sampler has several advantages over using a passive flow sampler: it assures that the sample is uniformly integrated over the 24-hour period; it provides a higher volume of air, thus improving (lowering) method detection limits (MDLs); it avoids variable flow rates that can exist with passive sample flow control methods; and it allows for the sampling systems to be purged for several hours before the canister is filled. Pre-sample purging helps to flush the system of any contamination or residue. Filled canisters are shipped to the analysis laboratory (Environmental Analytical Services, Inc. [EAS], of San Luis Obispo, California) and analyzed using EPA method TO-15, which uses a gas chromatograph mass spectrometer (GC-MS). When this method is followed, detection limits have been demonstrated to be comparable to those required in the MATES IV monitoring protocol.

Sampling of carbonyls is carried out using dinitrophenylhydrazine (DNPH) cartridges. For 24-hour samples, air flows through the cartridges at a maintained rate of 0.8 slpm, controlled by dedicated mass flow controllers (MFC), check valves, solenoid valves, and a pump. The sampler employs a separate, independent MFC to handle duplicate samples for quality control. For each sample, one-minute average data are collected for mass flow rate,

volumetric flow rate, pressure, and temperature. Total air volume per sample is calculated automatically in both mass and volumetric terms. Cartridges are shipped to the analysis laboratory (EAS) and analyzed using EPA method TO-11, which uses high-performance liquid chromatography with ultraviolet detection (HPLC-UV). Detection limits are comparable to those in the MATES monitoring protocol.

Target analytes include the species shown in **Table 4**. Target hydrocarbons and chlorinated VOCs compounds are measured using EPA method TO-15. Target carbonyls and ketones are measured using EPA method TO-11.

Table 4. Target VOC and carbonyl species to be measured at the Sunshine Canyon Landfill sites.

Species		
1,1,1-Trichloroethane	Benzyl chloride	Tetrachloroethene
1,1,2,2-Tetrachloroethane	Carbon tetrachloride	Toluene
1,1-Dichloroethane	Chlorobenzene	Trichloroethene
1,1-Dichloroethene	Chloroform	Vinyl chloride
1,2-Dibromoethane	cis-1,2-Dichloroethene	1,2-Dichloropropane
1,2-Dichlorobenzene	Dichloromethane	Styrene
1,3-Butadiene	Ethylbenzene	Acetaldehyde
1,3-Dichlorobenzene	Hexane	Formaldehyde
1,4-Dichlorobenzene	m,p-Xylenes	Acetone
Benzene	o-Xylene	Methyl ethyl ketone

Table 5 shows the sampling counts and types.

Table 5. VOC and carbonyl samples measured at the Sunshine Canyon Landfill South site and Van Gogh School.

Site	Sample Date	Field Sample ID	
		VOC	Carbonyl
Sunshine Canyon Landfill South	07/11/16	BECM-20160711-Y BECM2-20160711-Y	C-1860 C-1861
	07/17/16	B-20160717-V	C-1862
	07/23/16	B-20160723-V	C-1863
	07/29/16	B-20160729-Y	C-1864
	08/04/16	B-20160804-V	C-1865
	08/10/16	B-20160810-Y	C-1866
	08/16/16	B-20160816-V	C-1867 C-1968
	08/22/16	B-20160822-V	C-1969
	08/28/16	B-20160828-V	C-1970
Van Gogh School	07/11/16	VG-20160711-Y VG2-20160711-Y	C-1857 C-1858
	07/17/16	V-20160717-V	C-1859
	07/23/16	V-20160723-V	C-1913
	07/29/16	VG-20160729-V	C-1914
	08/04/16	V-20160804-Y	C-1915
	08/10/16	V-20160810-Y	C-1916
	08/16/16	V-20160816-V	C-1932
	08/22/16	V-20160822-V	C-1931
	08/28/16	V-20160828-V	C-1930

Table 6 shows the sampling parameters, number of samples, frequency, duration, and start and end dates during the summer 2016 quarter.

Table 6. Sampling parameters, number of samples, frequency, duration, and start and end dates during the summer 2016 quarter (June 1, 2016–August 31, 2016) at the Landfill South site and the Van Gogh site.

Location	Parameter	Number of Samples	Frequency	Duration	Start Date	End Date
Landfill South site	VOCs, carbonyls	9	1-in-6 days	24 hours	July 11, 2016	August 28, 2016
Van Gogh site	VOCs, carbonyls	9	1-in-6 days	24 hours	July 11, 2016	August 28, 2016
Collocated samples, both sites	VOCs, carbonyls	1 per site	1-in-60 days	24 hours	July 11, 2016	August 28, 2016

5.2 Carbonyl and VOC Fingerprint Plots by Date

Figures 6 through 14 show VOC and carbonyl fingerprint plots of the one-in-six day samples collected during this quarter at the Landfill South Site and Van Gogh School site for the target parameters of this study. Target parameters include key air toxics that drive risk measured by the SCAQMD, such as formaldehyde and benzene, as well as pollutants identified in the literature as likely tracers of landfill emissions, such as dichlorobenzenes and chloroethanes. Each figure is organized to show the pollutant concentrations (ppb) on a log-scale y-axis. Pollutants are rank ordered from highest average concentration to lowest average concentration measured at the two sites. Red X symbols indicate the method detection limit (MDL) for the individual samples; these are usually the same for both sites but are sometimes slightly different. MDLs indicate the concentration at which the measurement is statistically different from zero; values below the MDL are qualitative and should be considered more uncertain than those above the MDL. We note that the analytical laboratory reports values measured below the MDL when the instrument detects signal; these values are shown. However, many of the species are not detected in a given sample and are reported as zeroes. We substituted the zeroes with a value of MDL/2 for display purposes.

In the figure legends, a site name followed by the number “2” indicates a collocated (duplicate) sample conducted as part of the quality control protocol. Comments regarding the quality control samples are included in the figure captions. These data have undergone quality assurance review and are considered final data for this reporting period.

No direct comparisons with historical regional averages are included because only nine one-in-six day samples have been completed for the July-August period of this quarter. Once a more statistically robust sample size is obtained, historical regional concentrations will be displayed. It is noted, however, that the concentrations measured to date are similar in magnitude to those measured in MATES IV by SCAQMD. No high outliers were observed.

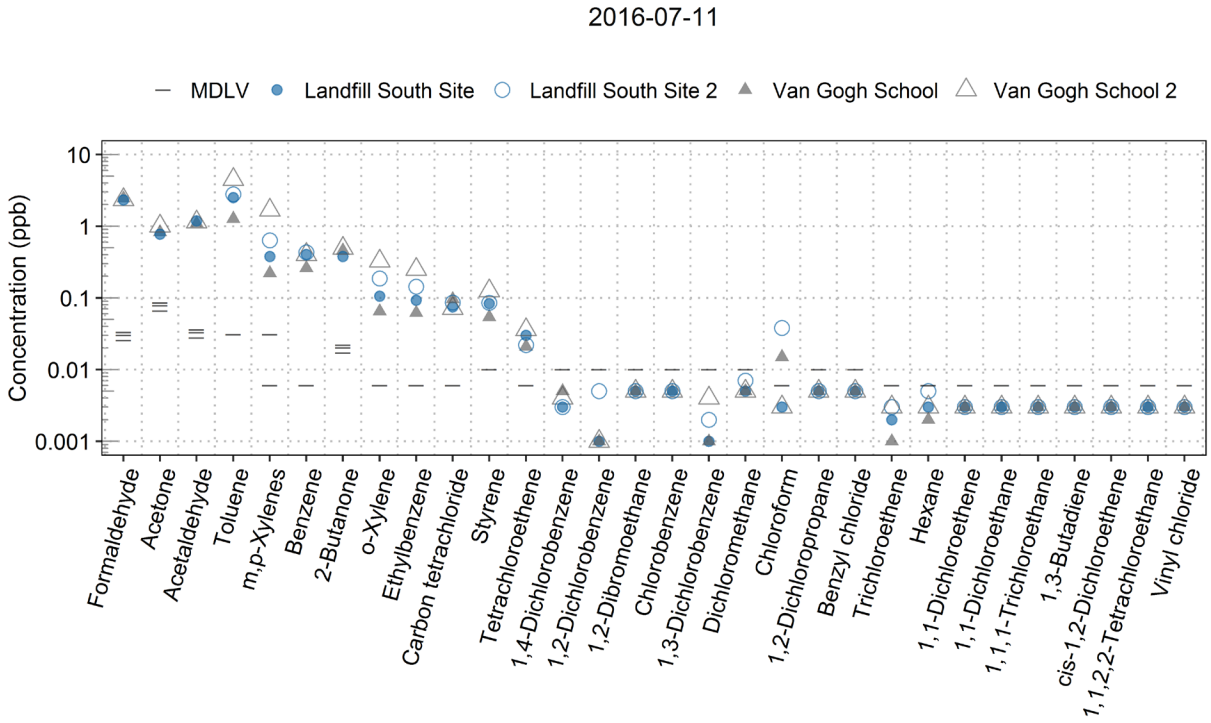

Figure 6. VOC and carbonyl fingerprint plots for the first sample date, July 11, 2016. The VOC duplicate sample at Van Gogh School was outside quality control criteria and will be redone. Contamination in the plumbing supporting the duplicate sample was suspected. This plumbing was replaced with new stainless steel fittings and PFA Teflon tubing. Note: there is no duplicate carbonyl sample on this day at Van Gogh. There was a flow failure on the duplicate sample line, and the sample was not analyzed. This sample will be redone.

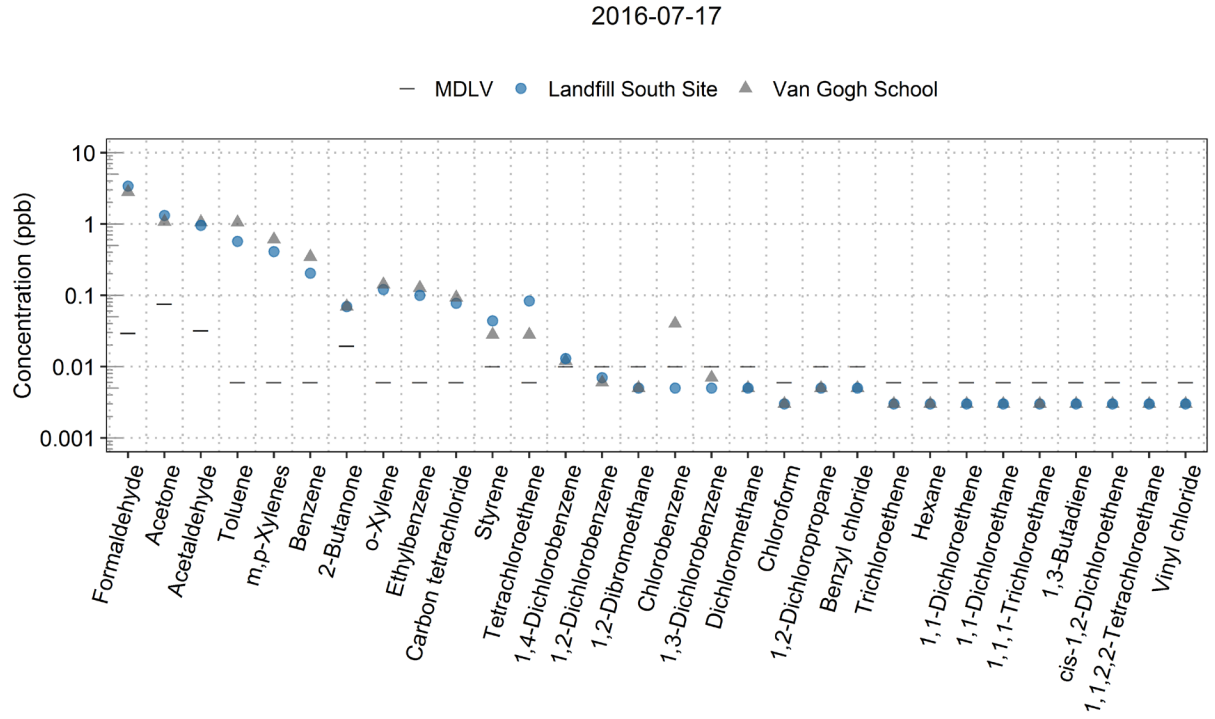

Figure 7. VOC and carbonyl fingerprint plots for July 17, 2016.

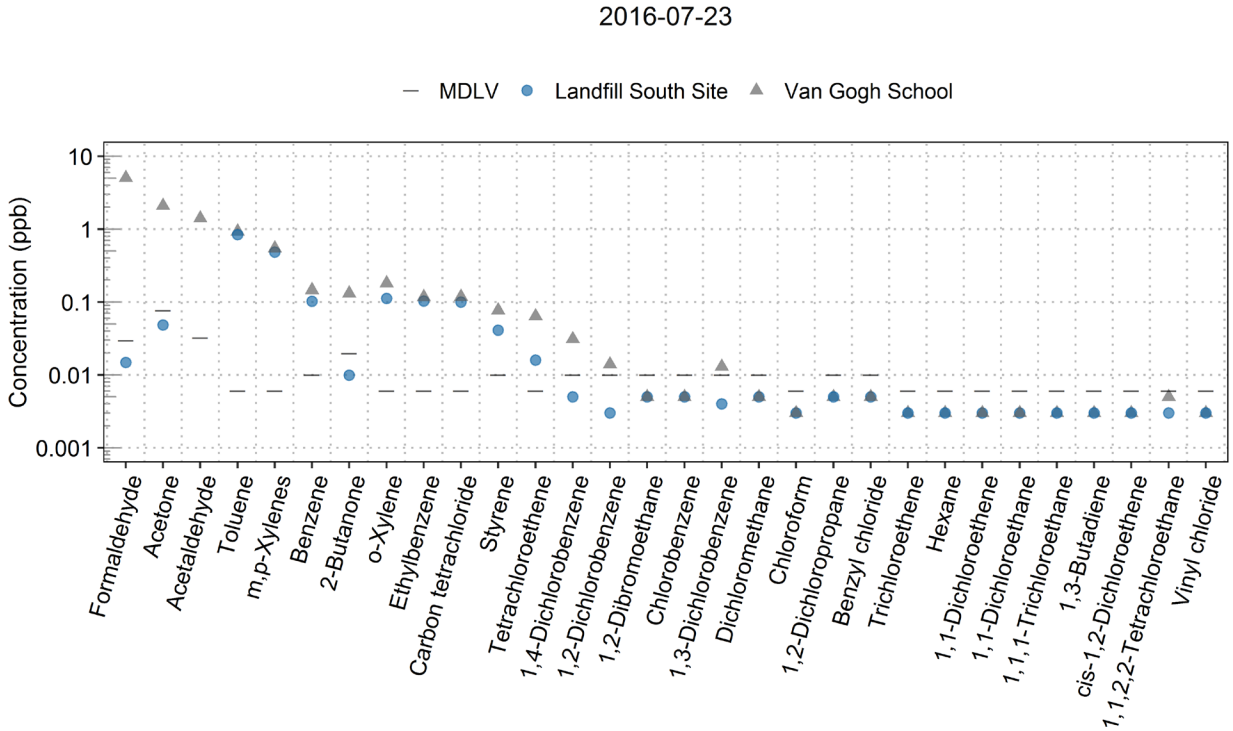

Figure 8. VOC and carbonyl fingerprint plots for July 23, 2016.

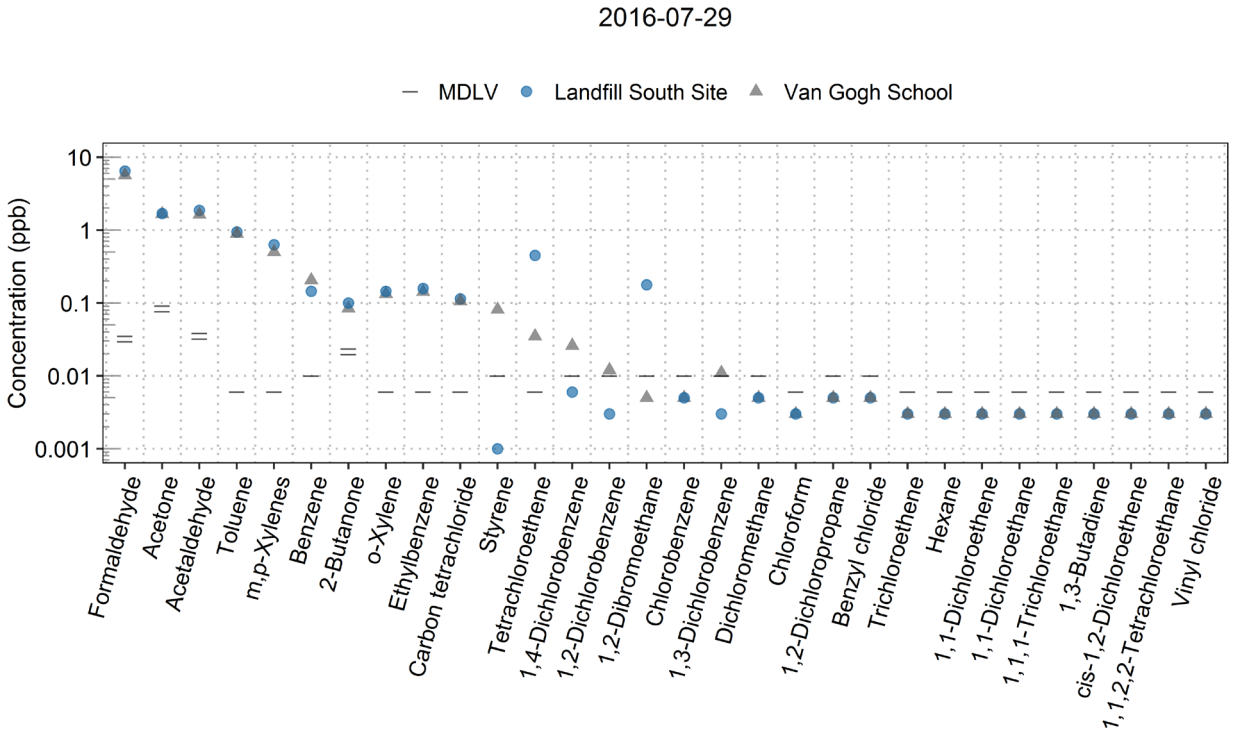

Figure 9. VOC and carbonyl fingerprint plots for July 29, 2016.

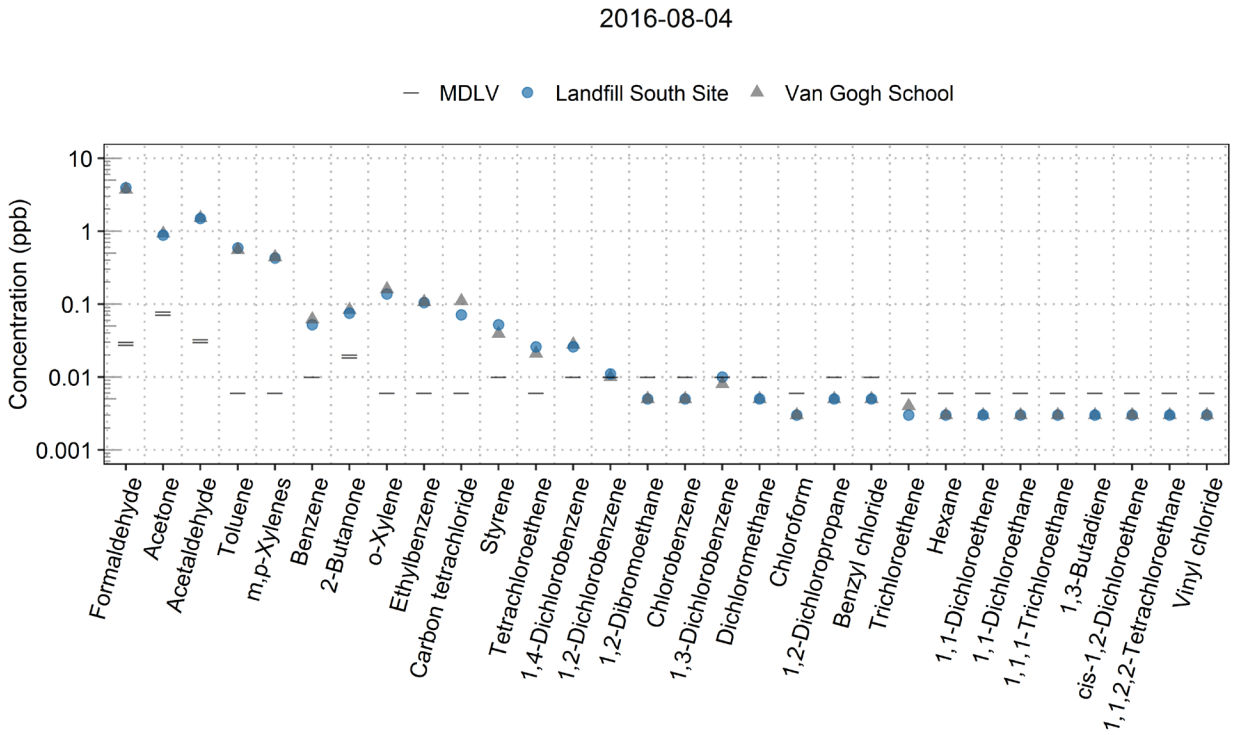

Figure 10. VOC and carbonyl fingerprint plots for August 4, 2016.

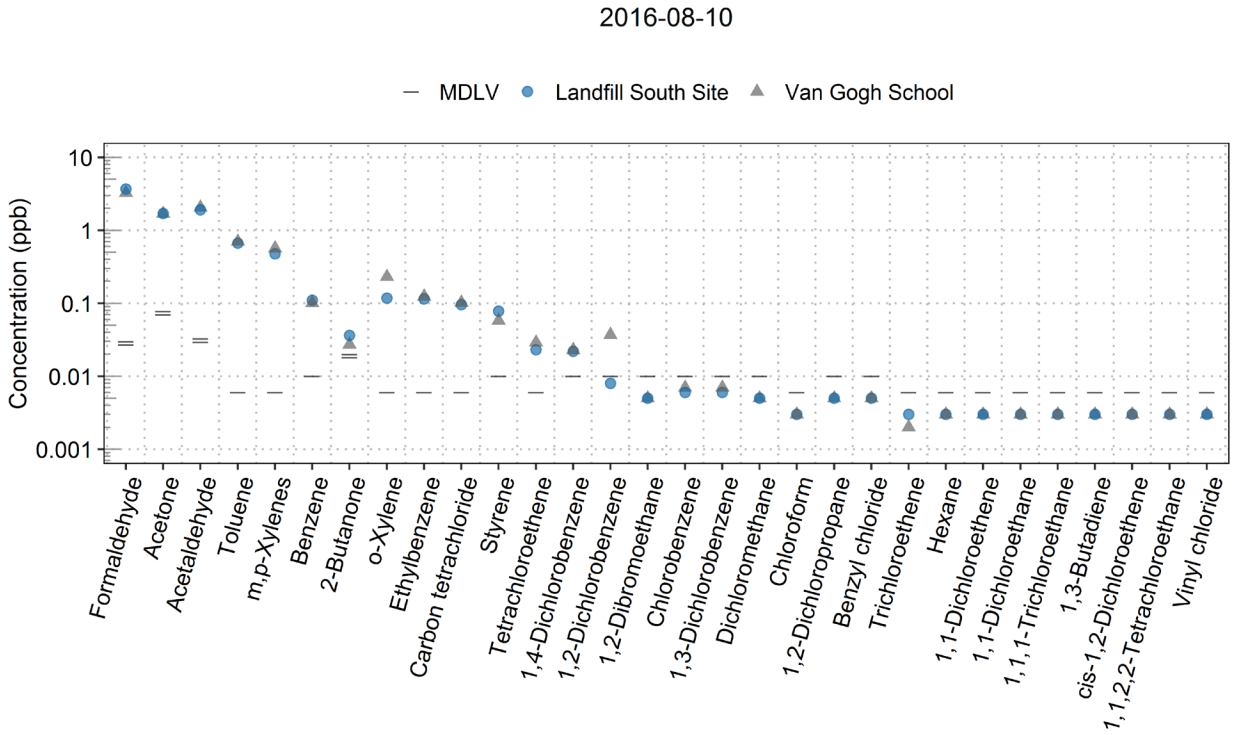

Figure 11. VOC and carbonyl fingerprint plots for August 10, 2016.

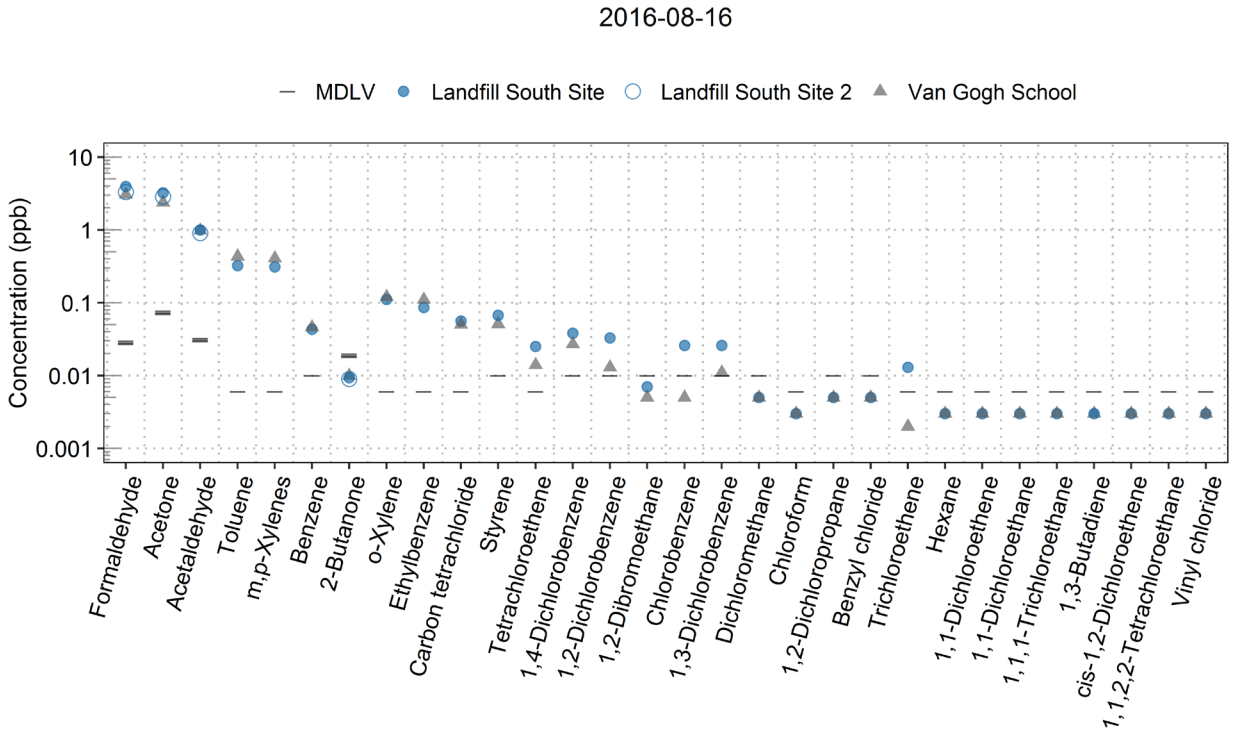

Figure 12. VOC and carbonyl fingerprint plots for August 16, 2016.

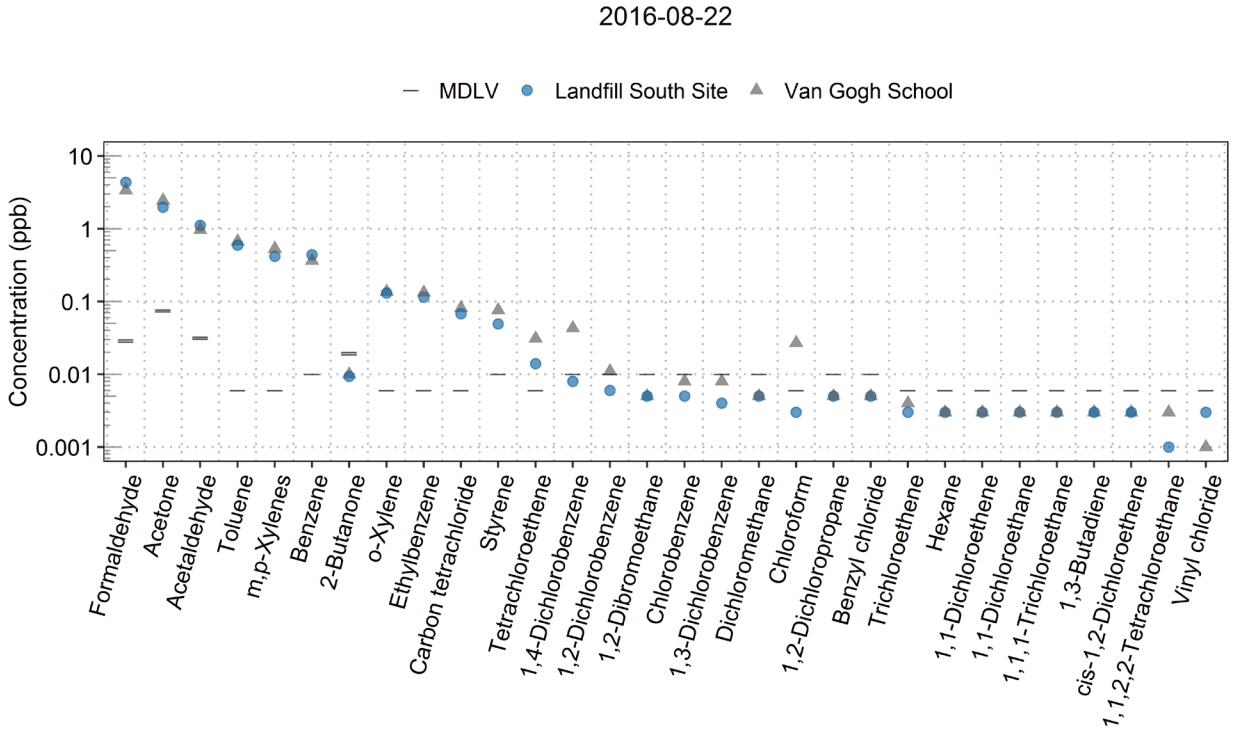

Figure 13. VOC and carbonyl fingerprint plots for August 22, 2016.

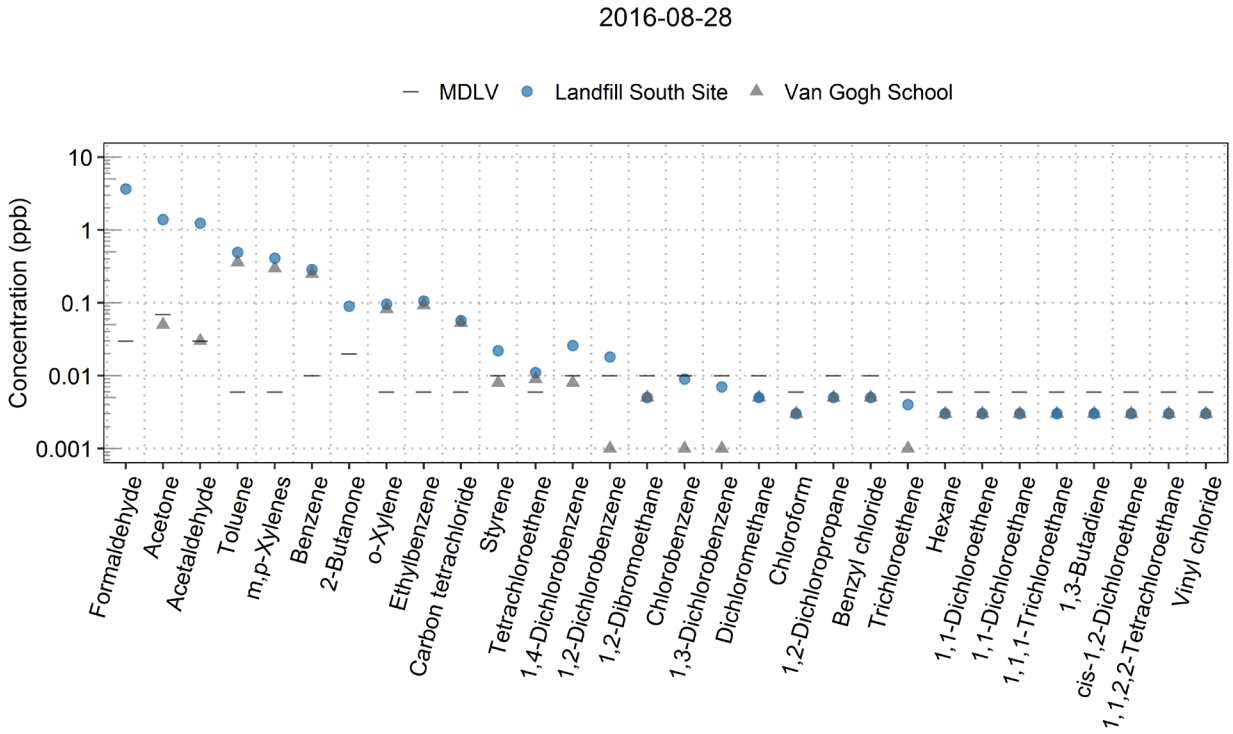

Figure 14. VOC and carbonyl fingerprint plots for August 28, 2016.

6. Field Operations

Tables 7 through 9 list dates and major tasks associated with visits to the Landfill South, Landfill North, and Van Gogh School sites during the 2016 summer quarter.

Table 7. Landfill South monitoring site visits, field maintenance, and operations.

Date of Site Visit	Description of Work
June 2, 2016	Collected PM_{10} and BC data.
June 20, 2016	Collected PM_{10} and BC data. Restarted BC sampler. Cleaned BAM roller, vane, and nozzle and performed leak check. Performed flow check on BC and BAM samplers. Calibrated BAM flow. Performed wind anemometer calibration.
July 20, 2016	Collected PM_{10} and BC data. Restarted BC sampler. Cleaned BAM roller, vane, and nozzle and performed leak check. Performed flow check on BC and BAM samplers. Calibrated BAM flow.
August 19, 2016	Collected PM_{10} and BC data. Checked BC sampler tape supply and cleaned cabinet. Restarted BC sampler. Cleaned BAM roller, vane, and nozzle and performed leak check. Left BAM tape with 40% supply. Performed flow check on BC and BAM samplers. Calibrated BAM flow.

Table 8. Landfill North monitoring site visits, field maintenance, and operations.

Date of Site Visit	Description of Work
July 20, 2016	Collected PM_{10} and BC data. Found BAM tape supply low; changed tape spool. Cleaned BAM roller, vane, and nozzle and performed leak check. Performed flow check on BC and BAM samplers.
August 19, 2016	Collected PM_{10} and BC data. Restarted Aethalometer and returned to normal operating mode. Left Aethalometer tape at 30% supply. Cleaned BAM roller and nozzle and performed leak check. Left BAM tape at 40% supply. Performed flow check on BC and BAM samplers.

Table 9. Van Gogh School monitoring site visits, field maintenance, and operations.

Date of Site Visit	Description of Work
June 2, 2016	Collected PM_{10} and BC data.
June 20, 2016	Found air conditioning unit not cooling. Collected PM_{10} and BC data. Checked tape supply and performed flow check on BC and BAM samplers. Cleaned BAM roller and nozzle and performed leak check. Calibrated BAM flow.
June 21, 2016	Performed flow and leak check on BAM sampler.
July 20, 2016	Replaced air conditioning unit. Collected PM_{10} and BC data. Powered down and restarted BC sampler. Cleaned BAM roller and nozzle and performed leak check. Performed flow check on BC and BAM samplers. Performed a second flow check on BAM. Calibrated BAM flow.
August 19, 2016	Collected PM_{10} and BC data. Checked tape supply. BAM sampler with 40% tape remaining. Cleaned BAM roller and nozzle and performed leak check. Performed flow check on BAM sampler. Calibrated BAM flow.

Table 10 shows the PM_{10} 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. The BAM target flow rate is 16.7 liters per minute (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 10. Flow rates for the BAM PM_{10} and Aethalometer BC monitors at the Landfill South, Landfill North, and Van Gogh School sites.

Location	Date	Flow Rates (lpm)					
		BAM as Found	Reference as Found	BAM as Left	Reference as Left	Aethalo-meter as Found	Reference as Found
Sunshine Canyon Landfill South	06/20/16	16.7	16.76	16.7	16.76	3.1	3.2
	07/20/16	16.7	16.88	16.7	16.88	2.9	3.2
	08/19/16	16.7	16.94	16.7	16.94	3.1	3.3
Sunshine Canyon Landfill North	07/20/16	16.7	16.86	16.7	16.86	4.0	4.1
	08/19/16	16.7	16.76	16.7	16.76	4.0	4.5
Van Gogh School	06/20/16	-	16.37	-	16.37	3.1	3.3
	06/21/16	-	16.70	-	16.70	-	-
	07/20/16	16.7	16.82	16.7	16.82	3.0	3.4
	08/19/16	16.7	16.92	16.7	16.92	3.0	3.6

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