

# Ambient Air Quality Monitoring at Sunshine Canyon Landfill and Van Gogh Elementary School

Continuous monitoring of particulate matter, black carbon, wind speed, and wind direction began at the Sunshine Canyon Landfill (Landfill Site) and at Van Gogh Elementary School (Community Site) in Granada Hills in fall 2007.

These data are used to characterize ambient air pollution concentrations on a neighborhood scale in the context of the Los Angeles basin and to evaluate the impact of landfill operations on air quality in the community.

## Particulate Matter (PM<sub>10</sub>)

PM<sub>10</sub> is particulate matter less than 10 microns in diameter. A human hair is about 100 micrometers in diameter. Its width could hold roughly 10 PM<sub>10</sub> particles. PM<sub>10</sub> is present in dust, smoke, soot, and dirt. It can be inhaled and drawn into the lungs, causing health problems for some people.

## Black Carbon (BC)

Black carbon is a sooty black material emitted from gas and diesel engines, coal-fired power plants, and other sources that burn fossil fuel. Many BC particles are too small to be visible. BC emissions can cause adverse health and climate effects.

## Wind

Wind Speed and Wind Direction are measured because they can significantly affect when and how far airborne pollutants travel from their sources.



Wind-Blown  
Dust



Landfill  
Operations



Dirt Roads



Vehicular  
Traffic



Diesel  
Engines



Industrial  
Activities



# Statistical Summary for the Summer 2022 Quarter

## PM<sub>10</sub> Exceedances

Total PM<sub>10</sub> Summer  
Quarter Exceedances  
over 14 Years

2 Landfill Site  
Federal  
Exceedances

0 Community  
Site Federal  
Exceedances

462 Landfill Site  
State  
Exceedances

131 Community  
Site State  
Exceedances

Total Exceedances in  
the 59<sup>th</sup> Quarter

0 Landfill Site  
Federal  
Exceedances

0 Community  
Site Federal  
Exceedances

75 Landfill Site  
State  
Exceedances

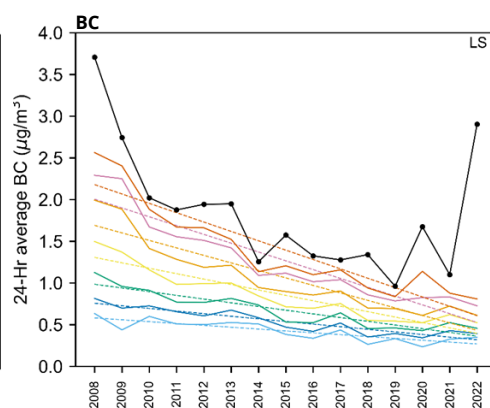
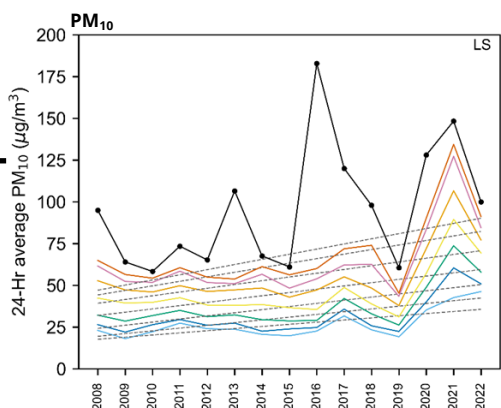
0 Community  
Site State  
Exceedances

### PM<sub>10</sub>

#### Landfill Site

There is a statistically significant increasing trend in most of the 24-hr average PM<sub>10</sub> percentiles and the maximum. However, all percentiles, except the 5th percentile and the maximum of the 24-hr average PM<sub>10</sub> concentration, have decreased since the 2022 summer quarter.

### Average and Maximum Black Carbon and PM<sub>10</sub> Concentrations



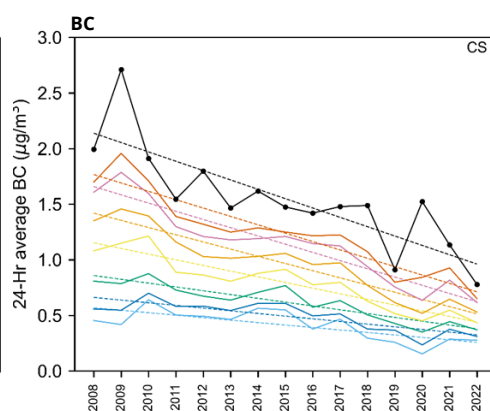
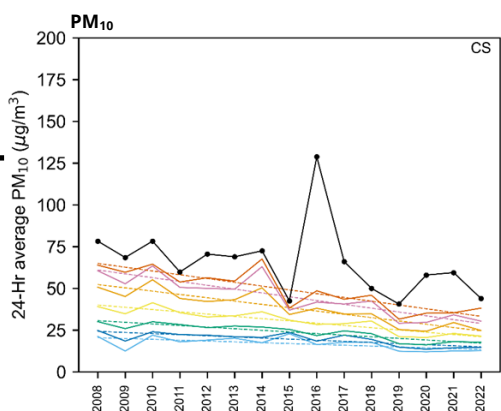
### Black Carbon

#### Landfill Site

There is a statistically significant decreasing trend in all BC percentiles at the Landfill site during summer quarters. There is a notable sharp increase in the maximum 24-hr average BC concentration at the Landfill site from the previous several years.

#### Community Site

There is a statistically significant decreasing trend for all the 24-hr average PM<sub>10</sub> percentiles, but not for the maximum value.



#### Community Site

There is a statistically significant declining trend in summer quarter 24-hr BC concentrations at all percentiles and the maximum; all percentiles and the maximum 24-hr BC were lower in the 2022 summer quarter than in the previous one.

## Data Completeness

### Data Capture

	PM <sub>10</sub>	BC	Wind Speed & Direction
Landfill Site	93.6%	99.8%	98.9%

### Valid Data Used for

	PM <sub>10</sub>	BC	Wind Speed & Direction
Landfill Site	95.6%	100%	100%

#### Community Site

98.9%	97.8%	98.9%	99.9%	100%	100%
-------	-------	-------	-------	------	------

# Fifty-Ninth Quarterly Report of Ambient Air Quality Monitoring at Sunshine Canyon Landfill and Van Gogh Elementary School

June 1, 2022 – August 31, 2022

## Prepared by

Charles Scarborough  
Bryan Penfold

Sonoma Technology  
1450 N. McDowell Blvd., Suite 200  
Petaluma, CA 94954  
Ph 707.665.9900 | F 707.665.9800  
[sonomatech.com](http://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 Dept. of  
Regional Planning  
320 West Temple St., 13th Floor  
Los Angeles, CA 90012

Quarterly Report

STI-922030-7805

October 31, 2022

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

# Contents

Contents.....	iii
Figures .....	iv
Tables.....	iv
<b>Executive Summary.....</b>	<b>1</b>
Background.....	1
Statistics .....	1
<b>1. Introduction.....</b>	<b>3</b>
<b>2. Data Completeness.....</b>	<b>5</b>
<b>3. PM<sub>10</sub> Exceedances.....</b>	<b>7</b>
<b>4. Average and Maximum Black Carbon and PM<sub>10</sub> Concentrations .....</b>	<b>11</b>
<b>5. Field Operations .....</b>	<b>19</b>
<b>6. References.....</b>	<b>23</b>

# Figures

1. View of Sunshine Canyon Landfill and the surrounding monitoring stations.....	4
2. Distribution of 24-hr average PM <sub>10</sub> concentrations at the Sunshine Canyon Landfill North site, Landfill site, and Community site during summer quarters from 2008 to 2022. ....	14
3. Trends of 24-hr average PM <sub>10</sub> maxima and percentiles at the Sunshine Canyon Landfill site and Community site during summer quarters from 2008 to 2022.....	15
4. Distribution of 24-hr average BC concentrations at the Sunshine Canyon Landfill North site, Landfill site, and Community site during summer quarters from 2008 to 2022.....	16
5. Trends of 24-hr average BC maxima and percentiles at the Sunshine Canyon Landfill site and Community site during summer quarters from 2008 to 2022.....	17

# Tables

1. Data completeness statistics for hourly PM <sub>10</sub> , hourly BC, and 1-min wind speed and wind direction data for the 2022 summer quarter monitoring period.....	5
2. Number of exceedances of federal and state 24-hr PM <sub>10</sub> standards during the summer quarters of the baseline year and years from 2008 to 2022.....	8
3. 24-hr BC concentrations for the summer quarter of the baseline year and each year from 2008 to 2022.. ....	12
4. Landfill monitoring site.....	19
5. Community site visits, field maintenance, and operations.....	20
6. Flow rates for the BAM PM <sub>10</sub> and Aethalometer BC monitors at the Landfill and Community sites.....	21

# Executive Summary

## Background

---

Continuous monitoring of meteorological and air quality parameters began at the Sunshine Canyon Landfill (Landfill site) and at Van Gogh Elementary School (Community site) in the nearby community of Granada Hills in fall 2007. At these sites, the following are measured: particulate matter less than 10 microns in aerodynamic diameter (PM<sub>10</sub>), wind speed (WS) and wind direction (WD), and black carbon (BC) as a surrogate for diesel particulate matter (DPM). The collected data are validated and evaluated for completeness quarterly. Monitoring is conducted to fulfill stipulations in the City of Los Angeles' Conditions of Approval for the expansion of the landfill.<sup>1</sup> Similar conditions cover the County of Los Angeles' portion of the landfill.<sup>2</sup>

PM<sub>10</sub> concentrations are compared with federal and state PM<sub>10</sub> standards. When PM<sub>10</sub> concentrations are above the standard (i.e., an exceedance), additional comparisons are made with the historical, regional, and annual ambient PM<sub>10</sub> concentrations. The PM<sub>10</sub> and BC data are analyzed annually to characterize the impact of landfill operations on ambient air quality as observed at the Community site by quantifying PM<sub>10</sub> and BC concentrations and exceedances, and comparing concentrations between the Landfill and Community sites. A more in-depth analysis is performed for the annual report.

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 Fifty-Ninth Quarterly Report summarizes the June 1, 2022–August 31, 2022, (2022 summer quarter) monitoring results from the fifteenth year of continuous data collection.

## Statistics

---

For this quarter, the percent data capture for hourly PM<sub>10</sub> was 93.57% at the Landfill site and 98.91% at the Community site. Of the captured PM<sub>10</sub> data, 4.36% were invalidated at the Landfill site, and 0.14% were invalidated at the Community site. None of the PM<sub>10</sub> data were deemed suspect at the Landfill site or at the Community site.

Hourly BC data capture was 99.82% at the Landfill site and 97.78% at the Community site. Of the captured hourly BC data, no data were deemed invalid at the Landfill site or at the Community site.

---

<sup>1</sup> Section C.10.a of Ordinance No. 172,933.

<sup>2</sup> County Condition 81.

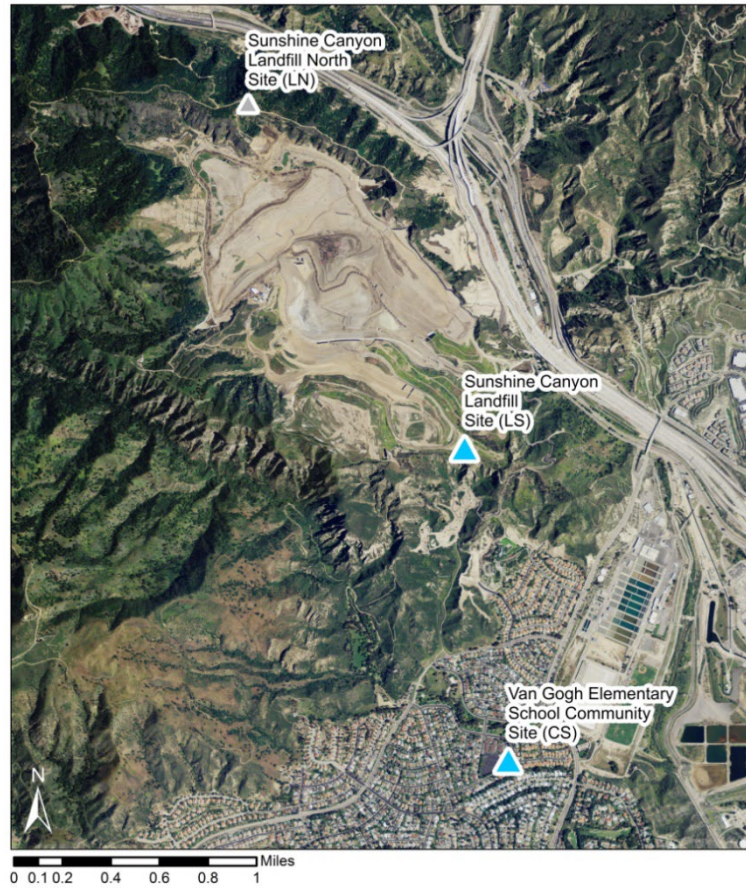
Of the captured hourly BC data, 5.22% were deemed suspect at the Landfill site, and 6.53% were deemed suspect at the Community site.

Minute WS and WD data capture was 98.89% at the Landfill site and 98.91% at the Community site. Of the captured minute WS and WD data, none were deemed invalid at the Landfill site or the Community site. Of the captured minute WS and WD data, less than 0.01% were deemed suspect at the Landfill site, and no data were deemed suspect at the Community site.

During this quarter, the state 24-hr PM<sub>10</sub> standard (50 µg/m<sup>3</sup>) was exceeded on 92% of days (75 days out of the valid 82 days of the quarter) at the Landfill site and on no days at the Community site (there were 90 valid days of PM<sub>10</sub> data at the Community site this quarter). There were no federal exceedances of 24-hour PM<sub>10</sub> at the Landfill site or the Community site. In the summer 2022 quarter, the 24-hr average BC concentration was 0.58 µg/m<sup>3</sup> at the Landfill site and 0.45 µg/m<sup>3</sup> at the Community site. Both sites exhibited ranges of 24-hr average BC concentrations on the low end among the 15 monitored summer quarters (2008–2022), and both sites showed a slight decrease in average concentrations from the previous summer quarter (2021).

# 1. Introduction

This report summarizes data completeness, ambient particulate matter less than 10 microns in aerodynamic diameter (PM<sub>10</sub>) concentrations, average and maximum ambient black carbon (BC, a surrogate for diesel particulate matter [DPM] concentrations), instrument flow rate verification (quality control) data, and field operations for the quarterly period of June 1, 2022, through August 31, 2022. The collected data are validated and evaluated quarterly for completeness. This is the fifteenth year that continuous data were collected in the summer from continuous monitors at the Sunshine Canyon Landfill site (previously called the Berm site) and the Van Gogh Elementary School Community site. The monitoring site locations are shown in [Figure 1](#). PM<sub>10</sub> is measured with a beta attenuation monitor (BAM), and BC is measured with an Aethalometer. The Sunshine Canyon Landfill North monitoring site shown in Figure 1 was installed in December 2015 and decommissioned on May 31, 2017.



**Figure 1.** View of Sunshine Canyon Landfill and the surrounding monitoring stations (blue triangles): Landfill site and Community site. The Sunshine Canyon Landfill North site (gray triangle) collected data from December 1, 2015, through May 31, 2017, and has since been decommissioned.

Monitoring is conducted to fulfill stipulations in the City of Los Angeles' Conditions of Approval for the expansion of the landfill.<sup>3</sup> Similar conditions cover the County of Los Angeles' portion of the landfill.<sup>4</sup>

<sup>3</sup> Section C.10.a of Ordinance No. 172,933.

<sup>4</sup> County Condition 81.

## 2. Data Completeness

Completeness statistics for all measured variables during the 2022 summer quarter are shown in [Table 1](#). Data deemed as suspect are included in subsequent analyses (e.g., regional comparisons), while invalid data are not. The percent data capture for PM<sub>10</sub> was 93.57% at the Landfill site and 98.91% at the Community site. Of the captured PM<sub>10</sub> data, 4.36% were invalidated at the Landfill site, and 0.14% were invalidated at the Community site. No hourly PM<sub>10</sub> values were deemed suspect at either of the monitoring sites in this quarter.

**Table 1.** Data completeness statistics for hourly PM<sub>10</sub>, hourly BC, and 1-min wind speed and wind direction data for the 2022 summer quarter monitoring period.

Monitoring Location	Dates	Data Capture (%) <sup>a</sup>			Data Valid or Suspect (%) <sup>b</sup>			Data Suspect (%) <sup>c</sup>		
		PM <sub>10</sub>	BC	WS/WD	PM <sub>10</sub>	BC	WS/WD	PM <sub>10</sub>	BC	WS/WD
Sunshine Canyon Landfill	06/01/22-08/31/22	93.57	99.82	98.89	95.64	100	100	0	5.22	< 0.01
Community Site	06/01/22-08/31/22	98.91	97.78	98.91	99.86	100	100	0	6.53	0

<sup>a</sup> Data Capture is the number of collected data values divided by the total number of expected data intervals during the date range indicated in the "Dates" column (e.g., for the raw BC 1-hr data, 24 data values per day are expected), multiplied by 100.

<sup>b</sup> Data Valid or Suspect is the number of data values that are either valid or suspect divided by the number of captured data values, multiplied by 100.

<sup>c</sup> Data Suspect is the number of data values labeled as suspect divided by the number of captured data values, multiplied by 100.

Hourly BC data capture was 99.82% at the Landfill site and 97.78% at the Community site. No data were deemed invalid at the Landfill site or at the Community site. At the Landfill site, 5.22% of hourly BC data were deemed suspect. At the Community site, 6.53% hourly BC data were deemed suspect.

The wind data capture percentages were 98.89% at the Landfill site and 98.91% at the Community site. None of the captured wind data were invalidated at the Landfill site, with less than 0.01% deemed suspect; at the Community site, none of the wind data were invalidated, and none were deemed suspect.



### 3. PM<sub>10</sub> Exceedances

The federal and state PM<sub>10</sub> exceedances for the summer quarter of the baseline year (2002), the summer quarters of the previous 14 years (2008–2021), and the current summer quarter (2022) are summarized in [Table 2](#). In this quarter, the state PM<sub>10</sub> standard of 50 µg/m<sup>3</sup> was exceeded on 92% of days (75 days) at the Landfill site and on no days at the Community site. The percentage of state exceedances at the Landfill site for this current quarter is the second highest on record, behind the previous summer quarter (2021). This is the fifth summer quarter in a row with either one or no state exceedances at the Community site.

**Table 2.** Number of exceedances of federal and state 24-hr PM<sub>10</sub> standards during the summer quarters of the baseline year (2002) and years from 2008 to 2022. 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<sub>10</sub> concentrations were measured. The most recent summer quarter is shown in **bold**.

Site	Quarter Period	Quarter Name	Exceedances of PM <sub>10</sub> Standard	
			Federal 24-hr 150 µg/m <sup>3</sup>	State 24-hr 50 µg/m <sup>3</sup>
Sunshine Canyon Landfill (LS)	06/01/02–08/31/02	Baseline Year	0	44/67 (66%)
	06/01/08–08/31/08	2008 Summer	0	28/92 (30%)
	06/01/09–08/31/09	2009 Summer	0	16/87 (18%)
	06/01/10–08/31/10	2010 Summer	0	11/91 (12%)
	06/01/11–08/31/11	2011 Summer	0	23/92 (25%)
	06/01/12–08/31/12	2012 Summer	0	10/76 (13%)
	06/01/13–08/31/13	2013 Summer	0	14/91 (15%)
	06/01/14–08/31/14	2014 Summer	0	19/91 (21%)
	06/01/15–08/31/15	2015 Summer	0	8/92 (9%)
	06/01/16–08/31/16	2016 Summer	2 (07/22/2016 & 07/30/2016)	16/92 (17%)
	06/01/17–08/31/17	2017 Summer	0	41/91 (46%)
	06/01/18–08/31/18	2018 Summer	0	19/91 (21%)
	06/01/19–08/31/19	2019 Summer	0	2/91 (3%)
	06/01/20–08/31/20	2020 Summer	0	63/91 (70%)
	06/01/21–08/31/21	2021 Summer	0	73/78 (94%)
	<b>06/01/22–08/31/22</b>	<b>2022 Summer</b>	<b>0</b>	<b>75/82 (92%)</b>

Site	Quarter Period	Quarter Name	Exceedances of PM <sub>10</sub> Standard	
			Federal 24-hr 150 µg/m <sup>3</sup>	State 24-hr 50 µg/m <sup>3</sup>
Community Site (CS)	06/01/02–08/31/02	Baseline Year	0	5/16 (31%)
	06/01/08–08/31/08	2008 Summer	0	25/89 (28%)
	06/01/09–08/31/09	2009 Summer	0	13/90 (14%)
	06/01/10–08/31/10	2010 Summer	0	27/83 (33%)
	06/01/11–08/31/11	2011 Summer	0	11/92 (12%)
	06/01/12–08/31/12	2012 Summer	0	10/92 (11%)
	06/01/13–08/31/13	2013 Summer	0	9/90 (10%)
	06/01/14–08/31/14	2014 Summer	0	22/86 (26%)
	06/01/15–08/31/15	2015 Summer	0	0/30 (0%)
	06/01/16–08/31/16	2016 Summer	0	4/92 (4%)
	06/01/17–08/31/17	2017 Summer	0	2/92 (3%)
	06/01/18–08/31/18	2018 Summer	0	1/92 (2%)
	06/01/19–08/31/19	2019 Summer	0	0/91 (0%)
	06/01/20–08/31/20	2020 Summer	0	1/90 (2%)
	06/01/21–08/31/21	2021 Summer	0	1/84 (2%)
	<b>06/01/22-08/31/22</b>	<b>2022 Summer</b>	<b>0</b>	<b>0/90 (0%)</b>

There were no exceedances of the federal PM<sub>10</sub> standard of 150 µg/m<sup>3</sup> at the Landfill site or the Community site this quarter.



## 4. Average and Maximum Black Carbon and PM<sub>10</sub> 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 (South Coast AQMD), found DPM to be the most important toxic air pollutant contributing to negative health impacts in the Los Angeles basin (South Coast Air Quality Management District, 2015).

BC is measured by an Aethalometer, which passes air through a filter tape trapping the suspended particles. Light-absorbing particles attenuate a light beam projected through the deposit. 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), subjecting Aethalometers to a saturation effect. Instrument response is dampened with heavier loading (i.e., higher 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 widely used. All the reported BC values to date from the Landfill, Landfill North, and Community sites have been adjusted in this report to compensate for this tape saturation effect; this compensation was not 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 prior to the 29th Quarterly Report. All BC data shown in this Quarterly Report have been compensated, except unavailable data from the baseline year.

The 24-hr average and maximum compensated BC concentrations collected during the 2022 summer quarter, the compensated BC data from the summer quarters of the 14 previous years, and the uncompensated data from the baseline year are provided in [Table 3](#). The 2022 summer quarter 24-hr average BC concentration at the Landfill site is slightly lower than the previous summer quarter, and approximately equal to the 2018-2020 summer quarters. The 2022 summer quarter 24-hr maximum BC concentration at the Landfill site is the second highest summer concentration on record. The 2022 summer quarter 24-hr BC concentration average at the Community site is the lowest summer concentration on record.

**Table 3.** 24-hr BC concentrations for the summer quarter of the baseline year (2002) and each year from 2008 to 2022. Uncompensated BC values are reported for the 2002 summer quarter. The most recent summer quarter is shown in **bold**.

Site	Quarterly Period	Quarter Name	BC Concentrations (µg/m <sup>3</sup> )	
			Average 24-Hr	Maximum 24-Hr
Sunshine Canyon Landfill (LS)	06/01/02–08/31/02	Baseline Year	1.09*	2.69*
	06/01/08–08/31/08	2008 Summer	1.41	3.01
	06/01/09–08/31/09	2009 Summer	1.26	2.45
	06/01/10–08/31/10	2010 Summer	1.06	1.88
	06/01/11–08/31/11	2011 Summer	0.99	1.78
	06/01/12–08/31/12	2012 Summer	0.93	1.79
	06/01/13–08/31/13	2013 Summer	0.98	1.98
	06/01/14–08/31/14	2014 Summer	0.79	1.34
	06/01/15–08/31/15	2015 Summer	0.76	1.58
	06/01/16–08/31/16	2016 Summer	0.70	1.33
	06/01/17–08/31/17	2017 Summer	0.77	1.28
	06/01/18–08/31/18	2018 Summer	0.59	1.34
	06/01/19–08/31/19	2019 Summer	0.57	0.97
	06/01/20–08/31/20	2020 Summer	0.58	1.68
	06/01/21–08/31/21	2021 Summer	0.62	1.10
	<b>06/01/22–08/31/22</b>	<b>2022 Summer</b>	<b>0.58</b>	<b>2.90</b>
Community Site (CS)	06/01/02–08/31/02	Baseline Year	1.40*	2.33*
	06/01/08–08/31/08	2008 Summer	0.98	1.71
	06/01/09–08/31/09	2009 Summer	1.03	2.23
	06/01/10–08/31/10	2010 Summer	1.08	1.75
	06/01/11–08/31/11	2011 Summer	0.86	1.43
	06/01/12–08/31/12	2012 Summer	0.81	1.63
	06/01/13–08/31/13	2013 Summer	0.76	1.31
	06/01/14–08/31/14	2014 Summer	0.86	1.50
	06/01/15–08/31/15	2015 Summer	0.92	1.48
	06/01/16–08/31/16	2016 Summer	0.79	1.42

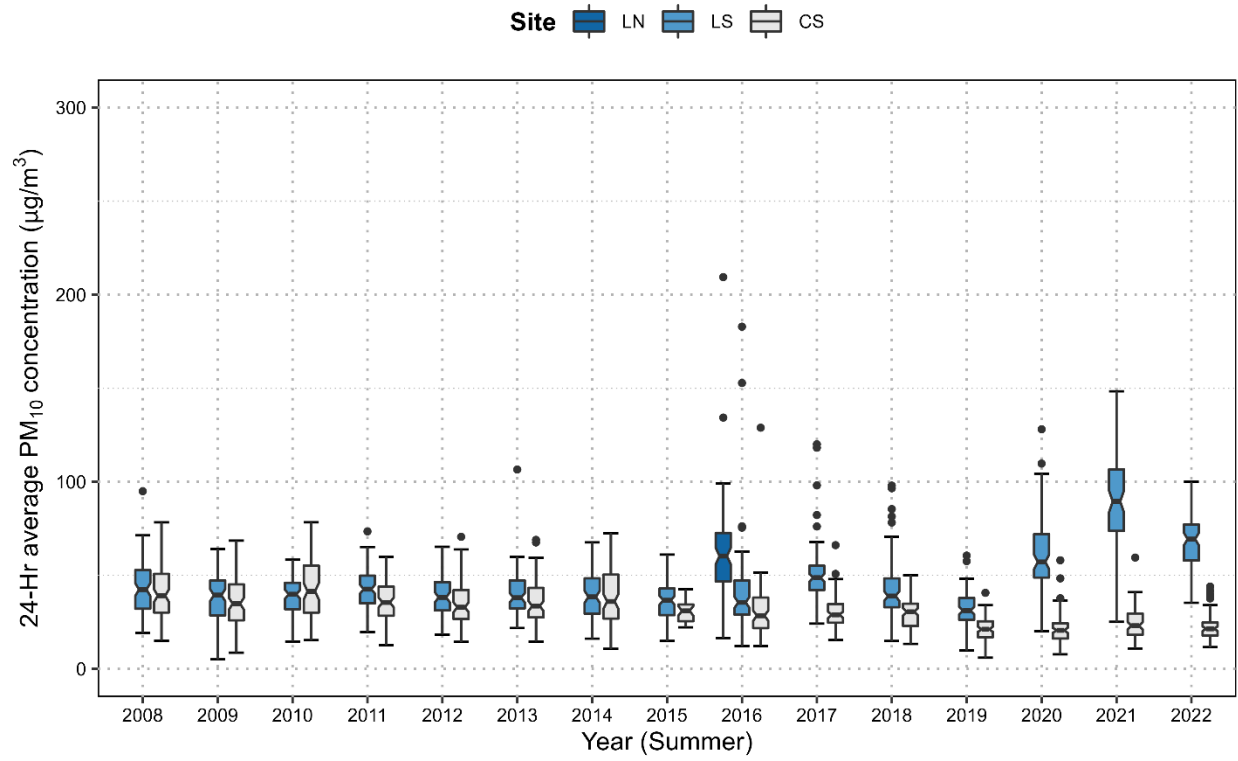
Site	Quarterly Period	Quarter Name	BC Concentrations (µg/m <sup>3</sup> )	
			Average 24-Hr	Maximum 24-Hr
	06/01/17–08/31/17	2017 Summer	0.81	1.48
	06/01/18–08/31/18	2018 Summer	0.66	1.49
	06/01/19–08/31/19	2019 Summer	0.54	0.92
	06/01/20–08/31/20	2020 Summer	0.47	1.53
	06/01/21–08/31/21	2021 Summer	0.57	1.13
	<b>06/01/22–08/31/22</b>	<b>2022 Summer</b>	<b>0.45</b>	<b>0.78</b>

<sup>a</sup> Uncompensated BC values.

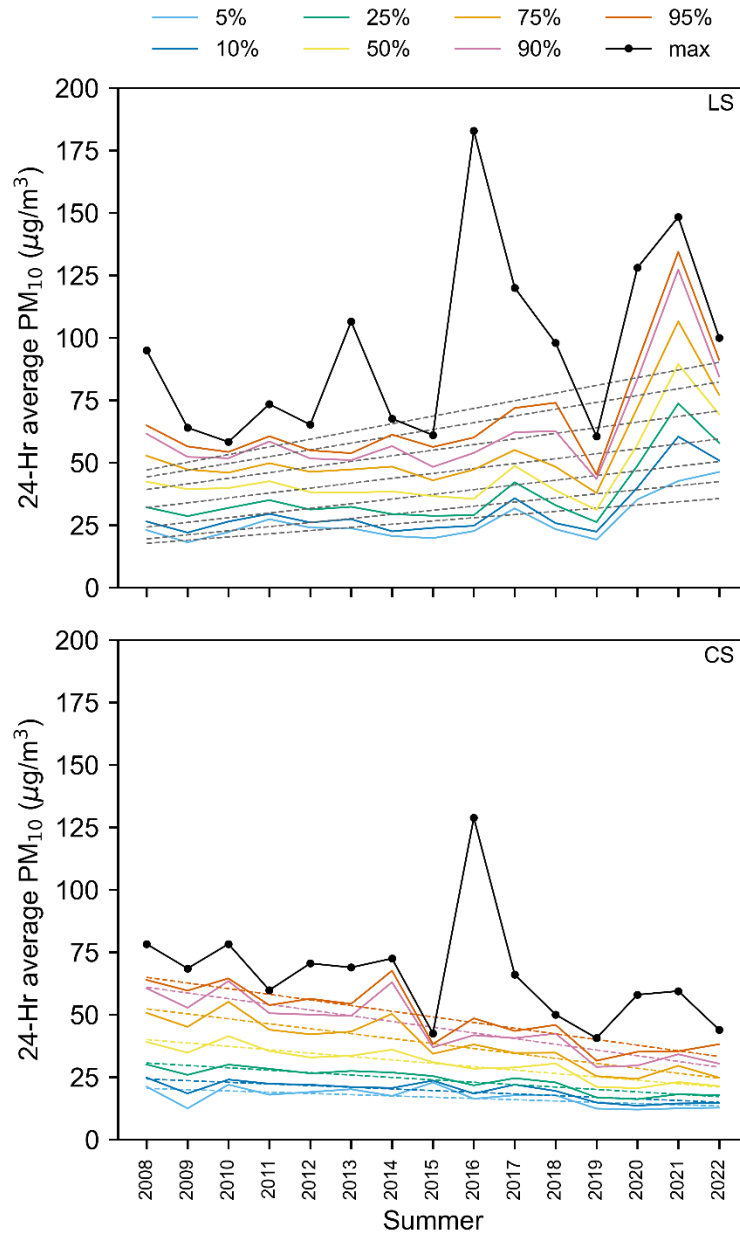
<sup>b</sup> Data taken from the secondary Aethalometer between April 20 and May 24, 2019, were used without corrections.

Distributions of 24-hour average PM<sub>10</sub> and BC data from summer quarters of 2008 through 2022 (presented as notched box-whisker plots<sup>5</sup>), and percentile trends for these metrics, are shown in [Figures 2 through 5](#).

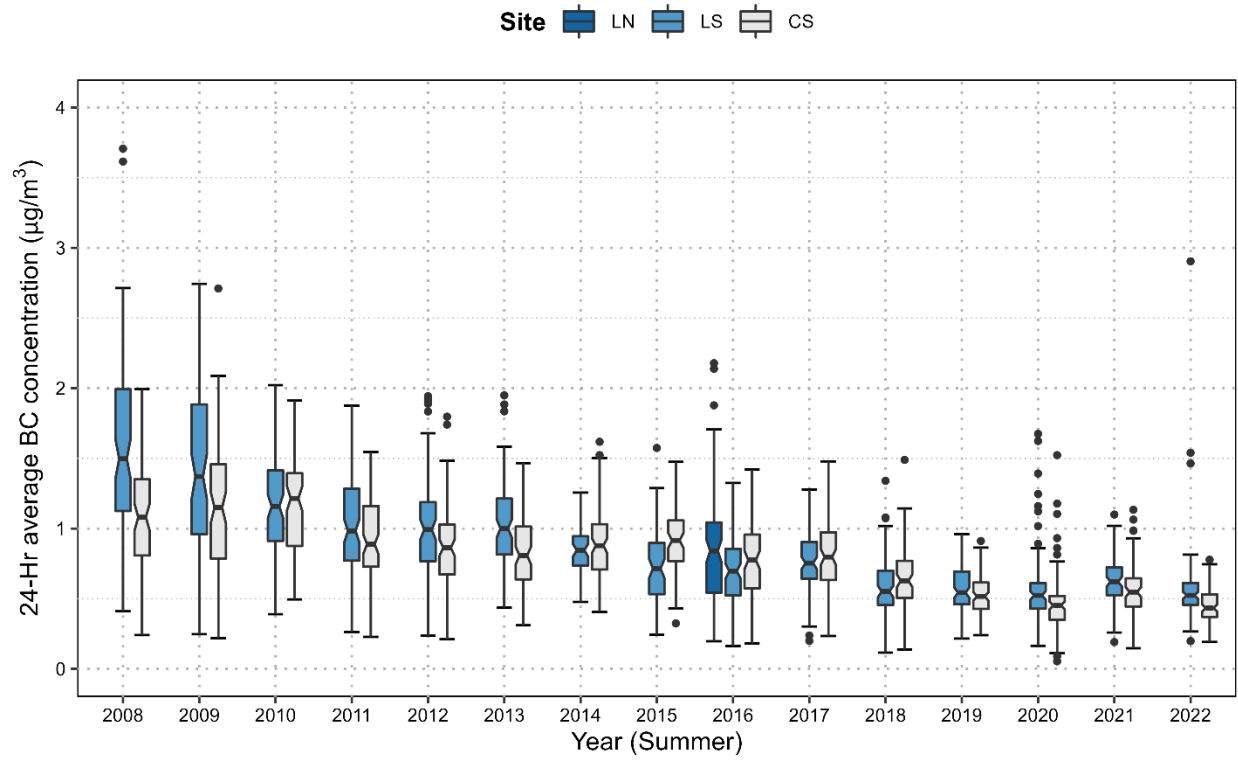
<sup>5</sup> A notched box-whisker plot shows the entire distribution of concentrations for each year. Each box illustrates the 25th (lower box extent), 50th (median, midline), and 75th (upper box extent) percentiles. The extent of the box indicates the interquartile range (IQR), where 50% of the data lie. The whiskers indicate values that are up to 1.5 times the IQR from the 25th or 75th percentile. Data outside of the IQR are referred to as “outliers” and are plotted individually. The boxes are notched (narrowed) at the median and return to full width at the 95% lower- and upper-confidence interval values (i.e., the extents of the notches indicate the range in which the median falls with 95% confidence). If the notches of any two boxes do not overlap, there is strong evidence that the medians are statistically different at the 95% confidence level.



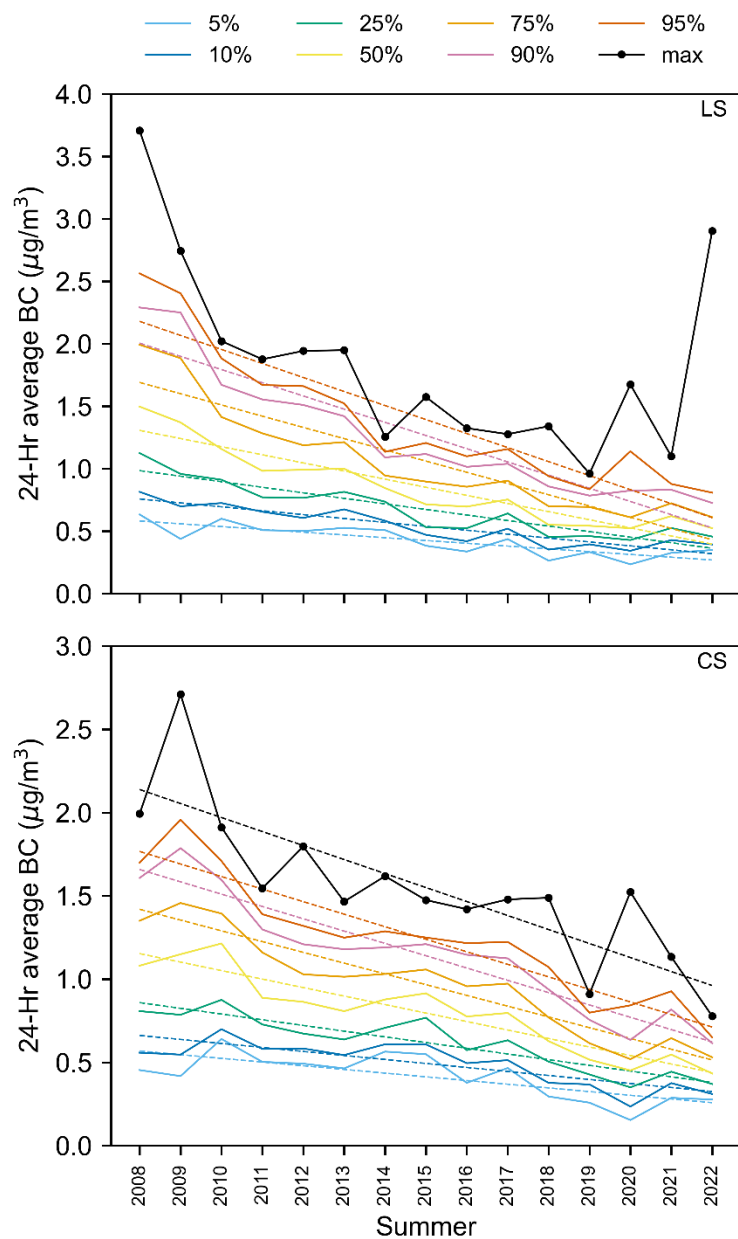
**Figure 2.** Distribution of 24-hr average PM<sub>10</sub> concentrations at the Sunshine Canyon Landfill North site, Landfill site, and Community site during summer (June-August) quarters from 2008 to 2022.



**Figure 3.** Trends of 24-hr average PM<sub>10</sub> maxima and percentiles at the Sunshine Canyon Landfill site (top) and Community site (bottom) during summer (June-August) quarters from 2008 to 2022. The dashed lines denote statistically significant decreasing linear trends. Statistical significance was defined at the 95% confidence level ( $p\text{-value} \leq 0.05$ ).



**Figure 4.** Distribution of 24-hr average BC concentrations at the Sunshine Canyon Landfill North site, Landfill site, and Community site during summer (June-August) quarters from 2008 to 2022.



**Figure 5.** Trends of 24-hr average BC maxima and percentiles at the Sunshine Canyon Landfill site (top) and Community site (bottom) during summer (June-August) quarters from 2008 to 2022. The dashed lines denote statistically significant decreasing linear trends. Statistical significance was defined at the 95% confidence level ( $p\text{-value} \leq 0.05$ ).

At this time of year, the median 24-average PM<sub>10</sub> concentrations measured at the Community site are usually lower than those measured at the Landfill site (Figure 2). This remained true in the 2022 summer quarter. As indicated by the non-overlapping notches (and the entire interquartile range) in the box-whisker plot, the difference between the median 24-hour PM<sub>10</sub> concentrations at the Community and the Landfill sites is statistically significant. At the Landfill site, there is a statistically

significant increasing trend in most of the 24-hr average percentiles and the maximum (Figure 3). However, all percentiles, except the 5th percentile and the maximum of the 24-hr average PM<sub>10</sub> concentration, have decreased since the 2022 summer quarter. At the Community site, there is a statistically significant decreasing trend for all the 24-hr average PM<sub>10</sub> percentiles, but not for the maximum value.

During the summer quarters, the median 24-hr average BC concentrations are not usually significantly different between the Landfill and the Community sites, as indicated by overlapping notches in the box-whisker plot (Figure 4). In the summer 2022 quarter, the median 24-hr average BC concentration at the Landfill site was not statistically higher than at the Community site. There is some year-to-year variability in median 24-hr average BC concentrations over the 15 recorded consecutive years, but the range of 24-hr average BC values has generally decreased over time at both monitoring sites. In the summer 2022 quarter, both the Landfill site and the Community site saw slightly lower median 24-hr average BC concentrations than in the previous summer quarter.

There is a statistically significant decreasing trend in all percentiles at the Landfill site during summer quarters over the observational record (Figure 5). There is a notable sharp increase in the maximum 24-hr average BC concentration at the Landfill site from the previous several years. All percentiles, except the 5th percentile and the maximum of 24-hr average BC concentrations, slightly decreased at the Landfill site from the summer quarter of 2021 to the summer quarter of 2022. At the Community site, there is a statistically significant declining trend in summer quarter 24-hr BC concentrations at all percentiles and the maximum; all percentiles and the maximum 24-hr BC were lower in the 2022 summer quarter than in the previous one.

## 5. Field Operations

Tables 4 and 5 list dates and major tasks associated with visits to the Landfill site and the Community site during the 2022 summer quarter.

**Table 4.** Landfill monitoring site (visits, field maintenance, and operations).

Date of Site Visit	Description of Work
7/1/2022	Collected and backed up PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Cleaned roller, vane, and nozzle on BAM
8/2/2022	Collected PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Cleaned roller, vane, and nozzle on BAM and Aethalometer
8/8/2022	Found BAM motor not working Replaced primary BAM with spare unit
9/13/2022 <sup>a</sup>	Collected PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Cleaned roller, vane, and nozzle on BAM

<sup>a</sup> The next site visit that occurred after the current quarter is included in this report. The information from this site visit is used to assess the quality of the last portion of data from the current quarter.

**Table 5.** Community site visits, field maintenance, and operations.

Date of Site Visit	Description of Work
6/3/2022	Investigated communications issue; rebooted router
7/1/2022	Collected and backed up PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Replaced BAM tape Cleaned roller, vane, and nozzle on BAM
8/2/2022	Collected PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Cleaned roller, vane, and nozzle on BAM and Aethalometer
9/12/2022 <sup>a</sup>	Collected PM <sub>10</sub> and BC data Performed flow checks on BAM and Aethalometer Restarted Aethalometer Cleaned roller, vane, and nozzle on BAM Replaced BAM tape

<sup>a</sup> The next site visit that occurred after the current quarter is included in this report. The information from this site visit is used to assess the quality of the last portion of data from the current quarter.

Aethalometer and BAM flow rates measured with a National Institute of Standards and Technology (NIST)-traceable flow standard are shown in [Table 6](#). BAM flow rates are volumetric (i.e., they depend on local temperature and pressure), and Aethalometer flow rates are at standard temperature and pressure. The target flow rate of the BAM is 16.7 liters per minute (lpm) volumetric to meet the 10-micron particle cut point of the inlet, with an acceptable range of 16.0 lpm to 17.3 lpm. The Aethalometer has no particle size cut point.

**Table 6.** Flow rates for the BAM PM<sub>10</sub> and Aethalometer BC monitors at the Landfill and Community sites. “Ref.” is the Reference and “Aeth.” is the Aethalometer.

Location	Date	Flow Rate (lpm)					
		As Found		As Left		As Found	
		BAM	Ref.	BAM	Ref.	Aeth.	Ref.
Sunshine Canyon Landfill (LS)	7/1/2022	16.7	16.7	16.93	16.7	4.0	3.87
	8/2/2022	16.7	16.7	17.04	16.7	4.0	3.74
	9/13/2022 <sup>a</sup>	16.7	16.7	16.81	16.7	4.0	4.16
Sunshine Canyon Community (CS)	7/1/2022	16.7	16.7	16.83	16.7	3.9	4.0
	8/2/2022	16.7	16.7	16.89	16.7	4.1	4.19
	9/13/2022 <sup>a</sup>	16.7	16.7	16.66	16.7	4.2	4.01

<sup>a</sup> The next site visit that occurred after the current quarter is included in this report. The information from this site visit is used to assess the quality of the last portion of data from the current quarter.



## 6. References

- Allen G. (2014) Analysis of spatial and temporal trends of black carbon in Boston. Report prepared by Northeast States for Coordinated Air Use Management (NESCAUM), Boston, MA, January. Available at <http://www.nescaum.org/documents/analysis-of-spatial-and-temporal-trends-of-black-carbon-in-boston/nescaum-boston-bc-final-rept-2014.pdf/>.
- Drinovec L., Močnik G., Zotter P., Prévôt A.S.H., Ruckstuhl C., Coz E., Rupakheti M., Sciare J., Müller T., Wiedensohler A., and Hansen A.D.A. (2015) The "dual-spot" Aethalometer: an improved measurement of aerosol black carbon with real-time loading compensation. *Atmospheric Measurement Techniques*, 8, 1965-1979, doi: 10.5194/amt-8-1965-2015. Available at <http://www.atmos-meas-tech.net/8/1965/2015/amt-8-1965-2015.pdf>.
- South Coast Air Quality Management District (2015) Multiple Air Toxics Exposure Study in the South Coast Air Basin: MATES IV. Final report, August. Available at <http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-iv/mates-iv-final-draft-report-4-1-15.pdf?sfvrsn=7>.