

**SUMMARY REPORT: 2023 AMBIENT AIR
MONITORING FOR ASBESTOS, METALS AND
RESPIRABLE DUSTS
BAY AREA RAPID TRANSIT
M-LINE, OAKLAND AND SAN FRANCISCO, CA**

PREPARED FOR:

**MR. JONATHAN S. ROSSEN, CIH, CSP
MANAGER, EMPLOYEE/PATRON SAFETY DIVISION
BAY AREA RAPID TRANSIT (BART)
SYSTEM SAFETY DEPARTMENT
2150 WEBSTER STREET, 3RD FLOOR
OAKLAND, CA 94612**

PREPARED BY:



ENVIRONMENTAL, INC.

**3637 GRAND AVENUE, #C
OAKLAND, CA 94610
TEL: (510) 645-6200
EFAX: (415) 962-0736**

SCA PROJECT NO.: B-13885

AUGUST 24, 2023

**SUMMARY REPORT
2023 AMBIENT AIR MONITORING FOR ASBESTOS, METALS & RESPIRABLE DUST
BAY AREA RAPID TRANSIT
M-LINE, OAKLAND AND SAN FRANCISCO, CA**

CONDUCTED FOR

**MR. JONATHAN S. ROSSEN, CIH, CSP
MANAGER, EMPLOYEE/PATRON SAFETY DIVISION
BAY AREA RAPID TRANSIT (BART)
SYSTEM SAFETY DEPARTMENT
2150 WEBSTER STREET, 3RD FLOOR
OAKLAND, CA 94612**

AUGUST 24, 2023

SCA PROJECT NO. B-13885

PREPARED BY:



**DAN LEUNG, CIH, CSP, CAC #07-4175
SENIOR PROJECT CONSULTANT**

**SCA ENVIRONMENTAL, INC.
3637 GRAND AVENUE, #C
OAKLAND, CA 94610
TEL: (510) 645-6200
EFAX: (415) 962-0736**

Abstract

This report summarizes the observations and results of ambient air testing for asbestos, metals and total respirable dust conducted at the various Bay Area Rapid Transit (BART) stations with asbestos-containing fireproofing and/or vinyl asbestos floor tiles and mastics. The monitoring was conducted from August 8 - 10, 2023. The purpose of monitoring the stations with asbestos-containing fireproofing and/or vinyl asbestos floor tiles and mastic was to determine the level of airborne asbestos in the stations and to assess the potential hazards to occupants.

The sample results revealed airborne asbestos fiber levels were between <0.001 and 0.004 fibers/cc based on Phase Contrast Microscopy (PCM) analyses. These results indicate that the airborne asbestos concentration at all sites tested is statistically comparable to background levels, and is not affected by the presence of asbestos-containing construction materials, such as asbestos-containing fireproofing found throughout the structural members.

The downtown San Francisco stations experience black settled dust from the Muni-Metro system sharing a similar tunnel and ventilation system and from rail grinding activities. Airborne sampling was conducted for total respirable dust. In summary, total respirable dust concentrations were found to be as follows:

- Total respirable dust levels at the Embarcadero Center Northeast Station's Booth adjacent to the Clipper Service Station on the Concourse Level had a concentration ranging from <0.001 to 0.120 mg/m³ with an average concentration of 0.047 mg/m³, or well under the OSHA Permissible Exposure Limit of 5.0 mg/m³.
- Total respirable dust levels at the Embarcadero Center Station's Southwest Station Agent's Booth on the Concourse Level had a concentration ranging from 0.001 to 0.123 mg/m³ with an average concentration of 0.046 mg/m³, or well under the OSHA Permissible Exposure Limit of 5.0 mg/m³.
- Total respirable dust levels at the Montgomery Station's Train Control Room 101C (Fan Room 107 was under construction, therefore sample location was relocated) on the Concourse Level had a concentration ranging from <0.001 to 0.007 mg/m³ with an average concentration of 0.002 mg/m³, or well under the OSHA Permissible Exposure Limit of 5.0 mg/m³.
- Total respirable dust levels at the Montgomery Station's South Station Agent's Booth on the Concourse Level had a concentration ranging from <0.001 to 0.038 mg/m³ with an average concentration of 0.005 mg/m³, or well under the OSHA Permissible Exposure Limit of 5.0 mg/m³.

Finally, settled dust samples from the Montgomery, Powell and Civic Center Station trackside Fan Rooms were analyzed for metal content with the following results (see Table 1):

- The Montgomery Street trackside settled dust sample has an elevated concentration (5,400 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of cadmium, chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.
- The Powell Street trackside settled dust sample has an elevated concentration (5,400 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.
- The Civic Center trackside settled dust sample has an elevated concentration (3,500 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of cadmium, chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.

Table 1: CAM-17 Settled Dust Analyses

Metal	Montgomery Settled dust TTLC (mg/kg)	Powell Station Settled dust TTLC (mg/kg)	Civic Center Settled dust TTLC (mg/kg)	Title 22 Hazardous Waste TTLC Standard (mg/kg)	Title 22 Hazardous Waste STLC Std. (mg/l)	Comments
Antimony	17	13	17	500	1.5	Below Title 22 TTLC Std.
Arsenic	16	8.6	18	500	5.0	Below Title 22 TTLC Std.
Barium	460	210	290	10000	100	Below Title 22 TTLC Std.
Beryllium	ND	ND	ND	75	0.75	Below Title 22 TTLC Std.
Cadmium	18	9.2	10	100 ⁽¹⁾	1.0	Below Title 22 TTLC Std.
Chromium	79	99	90	500 (CrVI)	5	Below Title 22 TTLC Std.
Cobalt	16	13	13	8000	80	Below Title 22 TTLC Std.
Copper	740	790	740	2,500	25	Below Title 22 TTLC Std.
Lead	370	530	390	1,000	5.0	Below Title 22 TTLC Std.
Mercury	0.70	0.11	0.30	20	0.2	Below Title 22 TTLC Std.
Molybdenum	17	18	13	3500	350	Below Title 22 TTLC Std.
Nickel	81	88	69	2000	20	Below Title 22 TTLC Std.
Selenium	ND	ND	ND	100	1.0	Below Title 22 TTLC Std.
Silver	0.65	1.8	0.58	500	5	Below Title 22 TTLC Std.
Thallium	ND	ND	ND	700	7.0	Below Title 22 TTLC Std.
Vanadium	27	26	47	5000	24	Below Title 22 TTLC Std.
Zinc	5,400⁽¹⁾	5,400⁽¹⁾	3,500⁽¹⁾	2400	250	Above Title 22 TTLC Std. for Montgomery, Powell and Civic Center

ND = None Detected

N/A = Not Applicable

(1) Requires STLC and TCLP analyses to fully characterize waste disposal requirement, but generally is considered a hazardous waste

Project Personnel

BAY AREA RAPID TRANSIT (BART)

District Industrial Hygienist Jonathan S. Rossen, CIH, CSP

SCA ENVIRONMENTAL, INC. (SCA)

Certified Industrial Hygienist Dan Leung, CIH, CSP, CAC #07-4175

Industrial Hygienist Chaowen (Stanley) Huang, CSST, CDPH

Table of Contents

Tables

1. CAM-17 Settled Dust Analyses
2. Summary of Asbestos Standards
3. Summary of Respirable Dust Standards
4. Summary of Airborne Asbestos Sampling Results
5. Respirable Dust Concentrations
6. Spot PM₁₀ and PM_{2.5} Readings
7. Settled Dust CAM-17 TTLC Metal Analyses

Attachments

1. Laboratory Results – Airborne Asbestos
2. Respirable Dust (PM₁₀) Sampling Results – Embarcadero & Montgomery Street Stations
3. Spot Respirable Dust (PM₁₀ and PM_{2.5}) Sampling Results.
4. CAM-17 Settled Dust Metals Analyses – Montgomery, Powell & Civic Center Stations
5. SCA Personnel Certifications

1.0 Introduction

This report summarizes the sampling results collected during the ambient air monitoring for asbestos conducted in the Bay Area Rapid Transit's system-wide stations with asbestos-containing fireproofing and/or vinyl asbestos floor tiles and mastic. The airborne asbestos sampling included the following stations:

- Powell Street Station, San Francisco, CA
- Montgomery Street Station, San Francisco, CA
- 12th Street Station, Oakland, CA
- 19th Street Station, Oakland, CA
- MacArthur Station, Oakland, CA
- Berkeley Main Station, Berkeley, CA
- Ashby Station, Berkeley, CA
- 16th Street Station, San Francisco, CA
- 24th Street Station, San Francisco, CA
- Rockridge Station, Oakland, CA
- Lafayette Station, Lafayette, CA

SCA Environmental, Inc. (SCA) conducted the monitoring from August 8 - 10, 2023 at the request of the Bay Area Rapid Transit District's System Safety Department.

Portions of the systems' structural steel are protected with fireproofing that contains 5 to 10% Chrysotile asbestos. In addition, several other construction materials contain asbestos (including various vinyl floor tiles and mastics in various Train Control Rooms throughout the legacy stations. Asbestos is regulated as a respiratory carcinogen. In order to verify that the operations and maintenance program implemented for this building are working properly, testing for the levels of airborne asbestos fibers is conducted periodically.

2.0 Methodology

Asbestos

Ambient air samples for asbestos were collected at the following stations and quantities:

- San Francisco
- Powell Street Station (2)
- Montgomery Street Station (2)

- Oakland
- 12th Street Station (1)
- 19th Street Station (1)
- MacArthur Station (1)
- Berkeley Main Station (1)
- Ashby Station (1)

- M-Line
- 16th Street (1)
- 24th Street (1)

- C-Line
- Rockridge (1)
- Lafayette (1)

All the asbestos samples were analyzed by Phase Contrast Microscopy (PCM), except for the project blanks, in accordance with the National Institute for Occupational Safety and Health (NIOSH) method 7400. PCM results are calculated in fibers per cubic centimeter (f/cc).

All air samples were collected for an approximately 24-hour period using Buck Libra low flow, AC-operated or similar air pumps to maintain even flow rates. Samples were collected on Zefon International Inc. Model Z008BA 25-millimeter, 0.8-micrometer pore size, mixed cellulose ester membrane filters in open-faced cassettes with conductive cowls. Pump flow rates were calibrated against a primary standard.

The contract laboratories that provided analytical asbestos services for the project are summarized below:

Laboratory	Analysis Type	Accreditation
EMSL Analytical, Inc. San Leandro, CA	Phase Contrast Microscopy (PCM) Analysis	<ul style="list-style-type: none"> • National Voluntary Laboratory Accreditation Program (NVLAP # 101048-3). • California Environmental Laboratory Accreditation Program (ELAP #1620).
McC Campbell Analytical, Inc. Pittsburg, CA	CAM-17 Metals Analysis	<ul style="list-style-type: none"> • AIHA Laboratory Accreditation Program (LAP# 232255). • California Environmental Laboratory Accreditation Program (ELAP #1644).

Respirable Dust

Ambient sampling for total respirable dust was conducted at two downtown San Francisco stations, which experience black settled dust deposits associated with the Muni-Metro system within the same tunnels and ventilation system and wheel grinding activities. Total respirable dust sampling was conducted at:

- Montgomery Street Station, San Francisco, CA
- Embarcadero Station, San Francisco, CA

Particulate readings were made utilizing a TSI Dust-Trak, which measures respirable dust or PM₁₀ levels. Measurements are reported as mg/m³.

Particulate matter (PM) is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in size, shape and chemical composition, and can be made up of many different materials, such as metals, settled dust, soil, dust, mold and fungi. Particles 10 microns or less in diameter are defines as “respirable particulate matter” or PM₁₀. Fine particles are 2.5 microns or less in diameter (PM_{2.5}) and can contribute significantly to regional haze and reduction in visibility.

Spot Particulate Sampling.

In addition to the longer-term respirable dust sampling at the two BART stations noted above, SCA conducted spot sampling at agent booths, ticket machines and trackside to determine typical PM₁₀ and PM_{2.5} concentrations for BART passengers and employees. Stations sampled included 24th Street through Embarcadero in San Francisco, and the 12th Street and 19th Street in Oakland.

Particulate readings were made utilizing a TSI Dust-Trak, which measures PM_{2.5} and PM₁₀ levels.

Settled Dust Sampling

CAM-17 metal analyses were completed for settled dust samples collected in the Montgomery, Powell and Civic Center stations trackside Fan Rooms by EPA Method 6010B/7470A by McCampbell Analytical Inc.’s ELAP-accredited laboratory in Pittsburg, CA.

3.0 Applicable Standards

Asbestos

A summary of airborne asbestos standards applicable to this project is tabulated in Table 2 as follows:

Table 2: Summary of Asbestos Standards

Source	Level	Nature	Comments
Cal/OSHA ¹	0.1 f/cc	Occupational & mandatory	8-hour Time Weighted Average (TWA) Permissible Exposure Level (PEL) (triggers OSHA required training, medical examinations, etc.)
	1.0 f/cc		Excursion Limit (EL) for 30 minutes sampling duration
NIOSH ²	0.1 f/cc	Recommended	Occupational PEL
ACGIH ³	0.2 f/cc	Recommended	Occupational Threshold Limit Value (TLV) Notice of Intended Changes
Bay Area Rapid Transit	0.01 f/cc (PCM)	Contractual & mandatory	Ambient air action level for occupied areas via PCM. Originating from AHERA ⁴ regulations and adopted by Bay Area Rapid Transit.
	70 str/mm ² (TEM)	Contractual & mandatory	Ambient air action level for occupied areas via TEM. Originating from AHERA ⁴ regulations and adopted by Bay Area Rapid Transit.

1 California Department of Industrial Relations, Division of Occupational Safety and Health, 8 CCR 1529.

2 National Institute of Occupational Safety and Health

3 American Conference of Governmental Industrial Hygienists, 2004

4 Asbestos Hazard Emergency Response Act (AHERA); 40 CFR Part 763

Respirable Dust

Extensive research indicates that exposure to PM₁₀ and PM_{2.5} levels exceeding current air quality standards is associated with increased risk of hospitalization for lung and heart-related respiratory illness, including emergency room visits for asthma. PM exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and reduced lung function and increased respiratory symptoms and illnesses.

Table 3 below summarizes the applicable published Cal/OSHA and ACGIH permissible exposure limits for respirable dust as well as the California Air Resources Board's standards. Note that some of the addressed standards cover office environments and are not occupational exposure standards for BART station employees. In addition, many of these standards are arithmetic mean levels over a 24-hour or annual period; therefore, exposure within the BART system needs to be time-weighted against other daily or annual exposures outside the BART system.

Table 3: Summary of Respirable Dust Standards

Contaminant	Source	Level	Nature	Comments
Particulate	N/A	ambient	N/A	Compare against outdoor readings to indicate effectiveness of filter units in air handling system
	Cal/OSHA ¹	5 mg/m ³	Mandatory/ Occupational	8-hour TWA PEL for respirable dust
		10 mg/m ³		8-hour TWA PEL for total dust
	ACGIH ²	10 mg/m ³	Recommended/ Occupational	8-hour TWA TLV resulting in lung disorders
	EPA ³	0.05 mg/m ³	Recommended/ Indoor Occupancy (Offices)	National Ambient Air Quality Standard
Respirable Particles (PM ₁₀)	ASHRAE ⁴	0.05 mg/m ³	Recommended Indoor Occupancy (Offices)	Based on protecting office environments against respiratory morbidity in the general population and avoiding exacerbation of asthma with no carcinogens. Indoor concentrations are normally lower. Guideline level may lead to unacceptable deposition of "dust."
	CARB ⁵	0.05 mg/m ³	Recommended by CARB	24 hour California Air Resources Board Maximum Indoor Level
		0.02 mg/m ³		Annual arithmetic mean level
	EPA ³	0.15 mg/m ³	Recommended by LEED Program (for Offices)	National Ambient Air Quality Standard
	LEED ⁶	0.05 mg/m ³	Recommended by LEED Program (for Offices) ⁶	8-hour TWA PEL for respirable dust for office environments using a TSI Sidepak Aerosol Monitor or PEM Sampler with PM ₁₀ lab analyses
Respirable Particles (PM _{2.5})	CARB ⁵	0.02 mg/m ³	Recommended by CARB	Annual arithmetic mean level
	EPA ³	0.035 mg/m ³	Recommended by EPA	24-hr arithmetic mean level

Table 1 Footnotes:

1. California Department of Industrial Relations, Division of Occupational Safety and Health, Title 8 General Safety Orders §5155.
2. American Conference of Governmental Industrial Hygienists, 2016, Threshold Limit Values for Chemical Substances and Physical Agents
3. U.S. Environmental Protection Agency, National Ambient Air Quality Standard.
4. ASHRAE Standards 62-1989R, Appendix C-1, August 1996, and 62.1-2004, Appendix B.
5. California Air Resources Board, June 2005, "Draft for Public Review – Report to the California Legislature Indoor Air Pollution in California," Table 4.1.
6. U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED), Indoor Air Quality testing, credit 3.2, November 2008.

CAM-17 Metals

Total Threshold Limit Concentrations (TTLC), Soluble Threshold Limit Concentrations (STLC), and Toxicity Characteristic Leaching Procedure (TCLP) limits are published under Title 22 of the California Code of Regulations §662261.24 for classifying hazardous waste. Applicable standards for the CAM-17 metals are included in Tables 1, 7 and 8 herein.

4.0 Results and Discussion

Asbestos

Sampling was conducted as part of the BART’s Ambient Air Quality Monitoring Program, since the listed stations have asbestos-containing fireproofing. Sampling was conducted for an approximately 24-hour period from August 8 to August 9, 2023 in the San Francisco stations and August 9 to August 10, 2023 in the East Bay Stations.

At the request of Mr. Jonathan S. Rossen within BART’s System Safety Department, SCA Environmental, Inc. (SCA) conducted visual inspections and ambient air testing. SCA’s Environmental Scientist, Mr. Chaowen “Stanley” Huang (Certified Site Surveillance Technician), conducted work under the direct supervision of Mr. Dan Leung, CIH, CSP of SCA. Mr. Leung is a Cal/OSHA registered Certified Asbestos Consultant (CAC #07-4175) and a Certified Industrial Hygienist (CIH).

The ambient air sampling results for the Stations are summarized in Table 4 below. The laboratory reports and field data sheets are included as Attachment 1. All observed asbestos-containing fireproofing was noted to be in "good" condition. No notable areas of imminent danger were observed within the representative areas viewed by SCA’s Surveyor. Asbestos fireproofing on the Concourse Level of the Powell Street Station was significantly abated since the prior ambient air sampling in May 2011.

Background airborne fiber concentrations by PCM were as follows:

Table 4: Summary of Airborne Asbestos Results

Station	Location	Sample I.D.	Results (fibers/cc)	Comments
Lafayette	Train Control Room 103	LAF-TC103	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Rockridge	Janitor’s Room 203	ROCK-203	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
MacArthur	Break Room 102	MAC-102	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Berkeley	Break Room 108	BERK-108	0.002	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Ashby	Elevator Room 204	ASH-204	0.004	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
19 th St. Oakland	Mech. Room 108A	19-108A	0.002	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
12 th St. Oakland	Electrical Room 107C	12-107C	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Montgomery	Coffee Shop Storage/Elect Room 110.	MONT-110	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Montgomery	Storage Room 111	MONT-111	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Powell	Police Break Room	POW-POL-BK	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
Powell	Electrical Room 110	POW-110	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
16 th St. Mission	Mech. Room 101A	16-101A	0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc
24 th St. Mission	Mech. Room 101A	24-101A	<0.001	Well below the EPA’s PCM Reoccupancy Air Standard of 0.01 f/cc

All ambient station air samples were below BART’s Perimeter Action Level of 0.01 fibers per cubic centimeter (fibers/cc). The results were generally found to be comparable to the previous sampling rounds completed by SCA.

Respirable Dust (PM₁₀)

SCA sampled for respirable dust at two San Francisco Stations to determine typical airborne dust concentrations. Sampling occurred during typical daytime and nighttime operations with the fans on as well as overnight. The purpose of this sampling was to determine the concentrations of black carbon settled dust arising from the Muni-Metro system, which shares a common ventilation system.

Total respirable dust concentrations were found to be as follows:

Table 5: Respirable Dust Concentrations

Location	Start Date	Sampling Time	Respirable Dust Concentration			Permissible Exposure Limit (mg/m ³)	Comments
			Max. Level (mg/m ³)	Min. Level (mg/m ³)	Average Level (mg/m ³)		
Embarcadero Concourse Level Northeast Station Agent's Booth	8/9/23	22:00 hrs.	0.120	<0.001	0.047	5.0	Well Below 8-hr. PEL
Embarcadero Concourse Level Southwest Station Agent's Booth	8/9/23	22:20 hrs.	0.123	0.001	0.046	5.0	Well Below 8-hr. PEL
Montgomery Station Train Control Rm 101C (Original Fan Rm 107 is under construction)	8/8/23	20:20 hrs.	0.007	<0.001	0.002	5.0	Well Below 8-hr. PEL
Montgomery Concourse Level South Station Agent's Booth	8/28/23	21:00 hrs.	0.038	<0.001	0.005	5.0	Well Below 8-hr. PEL

All sample results were found to be well under Cal/OSHA's occupational exposure standard of 5.0 mg/m³.

Spot PM₁₀ and PM_{2.5} Reading

The results of spot PM₁₀ and PM_{2.5} readings for various San Francisco and Oakland Line stations are presented in Table 6.

Table 6: Spot PM₁₀ and PM_{2.5} Readings

Station	Date	Time	Location	PM ₁₀ Concentrations (mg/m ³)			PM _{2.5} Concentrations (mg/m ³)		
				Max	Avg.	Min.	Max	Avg.	Min
CAAQS Std. ⁽¹⁾					0.05			0.035	
Cal/OSHA 8-hr. PEL Respirable Dust ⁽²⁾					5			---	
19th St.	8/10/2023	10:55 a.m.	Northeast Ticket Machines	0.014	0.011	0.009	0.011	0.010	0.009
19 th St.	8/10/2023	11:01 a.m.	Central Agent Booth	0.014	0.013	0.012	0.012	0.012	0.012
19th St.	8/10/2023	10:49 a.m.	Lower Platform Trackside	0.015	0.013	0.011	0.010	0.010	0.010
12th St.	8/10/2023	11:27 a.m.	Central Agent Booth	0.025	0.014	0.008	0.010	0.009	0.009
12th St.	8/10/2023	11:17 a.m.	North Ticket Machines	0.014	0.011	0.009	0.013	0.012	0.010
12th St.	8/10/2023	11:33 a.m.	Upper Platform Trackside	0.012	0.010	0.006	0.012	0.010	0.008
Montgomery	8/8/2023	12:21 p.m.	North Agent Booth	0.008	0.005	0.003	0.011	0.009	0.008
Montgomery	8/8/2023	12:16 p.m.	North Ticket Machines	0.008	0.003	0.001	0.010	0.007	0.006
Montgomery	8/8/2023	12:00 p.m.	Trackside	0.015	0.011	0.007	0.018	0.014	0.012
Powell	8/8/2023	11:27 a.m.	Police Break Rm/Squad Rm	0.005	0.004	0.003	0.011	0.011	0.011
Powell	8/8/2023	11:34 a.m.	South Agent Booth	0.017	0.009	0.005	0.020	0.014	0.011
Powell	8/8/2023	11:09 a.m.	North Ticket Machines	0.055	0.047	0.043	0.046	0.038	0.034
16th St.	8/8/2023	9:48 a.m.	Agent Booth	0.082	0.072	0.063	0.068	0.059	0.049
16th St.	8/8/2023	9:53 a.m.	Ticket Machines	0.075	0.031	0.012	0.061	0.025	0.010
16th St.	8/8/2023	9:39 a.m.	Trackside	0.168	0.114	0.066	0.137	0.093	0.057
24th St.	8/8/2023	8:38 a.m.	Agent Booth	0.074	0.045	0.029	0.060	0.037	0.022
24th St.	8/8/2023	8:46 a.m.	Ticket Machines	0.040	0.014	0.004	0.037	0.013	0.004
24th St.	8/8/2023	8:29 a.m.	Trackside	0.146	0.137	0.119	0.114	0.103	0.086
Civic Center	8/8/2023	10:32 a.m.	North Primary Agent Booth	0.053	0.049	0.042	0.053	0.051	0.046
Civic Center	8/8/2023	10:38 a.m.	North Ticket Machines	0.074	0.064	0.053	0.060	0.055	0.046
Civic Center	8/8/2023	10:18 a.m.	Trackside	0.196	0.155	0.109	0.159	0.128	0.089
Embarcadero	8/9/2023	10:23 a.m.	Southwest Agent Booth	0.076	0.070	0.065	0.059	0.055	0.050
Embarcadero	8/9/2023	10:17 a.m.	Southwest Ticket Machines	0.080	0.072	0.058	0.062	0.054	0.044
Embarcadero	8/9/2023	10:06 a.m.	Trackside	0.120	0.108	0.095	0.087	0.080	0.073
			Maximum	0.196	0.155	0.119	0.159	0.128	0.089
			Minimum	0.005	0.003	0.001	0.010	0.007	0.004

Station	Date	Time	Location	PM ₁₀ Concentrations (mg/m ³)			PM _{2.5} Concentrations (mg/m ³)		
				Max	Avg.	Min.	Max	Avg.	Min
CAAQS Std. ⁽¹⁾					0.05			0.035	
Cal/OSHA 8-hr. PEL Respirable Dust ⁽²⁾					5			---	
			Average	0.058	0.045	0.035	0.048	0.038	0.030

Source: (1) California Environmental Protection Agency Air Resources Board, April 25, 2005
<http://www.arb.ca.gov/research/aaqs/caaqs/pm/pm.htm>
 (2) Table AC-1 Permissible Exposure Limits for Chemical Contaminants
https://www.dir.ca.gov/title8/5155table_ac1.html

None of the spot measurements found PM₁₀ levels exceeding Cal/OSHA's 8-hr. Permissible Exposure Limit of 5.0 mg/m³; Cal/OSHA has no established occupational standard for PM_{2.5}. While the short-term PM_{2.5} exposures exceed the EPA/CARB level of 0.035 mg/m³, the EPA/CARB standard is an annual average concentration. Passengers and employees need to weigh their exposures outside of the station with the time-weighted exposures indoors. Note that the airborne levels within the BART system largely contain carbon, cellulose, silica and iron as contaminants, based on previous bulk sample analyses.

Cleanup of the stations with HEPA-filtered vacuums would help reduce the airborne dust concentrations. Use of power washing would require proper filtering and disposal of the waste water because of its metal content.

Settled Dust

Settled dust samples were collected within the trackside fan rooms at three San Francisco Stations to determine their metal content. Analyses were completed by McCampbell Analytical Inc.'s ELAP-accredited laboratory. The results of the CAM-17 analyses are as follows:

Table 7: Settled Dust CAM-17 TTLC Metal Analyses

CAM-17 Metal	Sample MONT-305		Sample POW-304		Sample CIVIC-301A/B		Title 22 Hazardous Waste TTLC/ STLC Standard*
	TTLC (ppm)	STLC/ TCLP (mg/l)	TTLC (ppm)	STLC/ TCLP (mg/l)	TTLC (ppm)	STLC/ TCLP (mg/l)	
Antimony	17	N/A	13	N/A	17	N/A	500 / 15
Arsenic	16	N/A	8.6	N/A	18	N/A	500 / 5.0
Barium	460	N/A	210	N/A	290	N/A	10000 / 100
Beryllium	ND	N/A	ND	N/A	ND	N/A	75 / 0.75
Cadmium	18	TBD	9.2	TBD	10	N/A	100 / 1.0
Chromium	79	TBD	99	TBD	90	TBD	500 (CrVI) / 5
Cobalt	16	N/A	13	N/A	13	N/A	8000 / 80
Copper	740	TBD	790	TBD	740	TBD	2500 / 25
Lead	370	TBD	530	TBD	390	TBD	1,000 / 5.0
Mercury	0.70	N/A	0.11	N/A	0.30	N/A	20 / 0.2
Molybdenum	17	N/A	18	N/A	13	N/A	3500 / 350
Nickel	81	N/A	88	N/A	69	N/A	2000 / 20
Selenium	ND	N/A	ND	N/A	ND	N/A	100 / 1.0
Silver	0.65	N/A	1.8	N/A	0.58	N/A	500 / 5
Thallium	ND	N/A	ND	N/A	ND	N/A	700 / 7.0
Vanadium	27	N/A	26	N/A	47	N/A	2400 / 24
Zinc	5,400	TBD	5,400	TBD	3,500	TBD	5000 / 250

ND = None Detected

N/A = TTLC results under 10% of standard, so extraction testing is not required

TBD = To Be Determined

TTLC = Total Threshold Limit Concentration in ppm or mg/kg

STLC = Soluble Threshold Limit Concentrations in mg/liter

TCLP = Toxicity Characteristic Leaching Procedure in mg/liter

The results of the CAM-17 analyses are as follows:

- The Montgomery Street trackside settled dust sample has an elevated concentration (5,400 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of cadmium, chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.
- The Powell Street trackside settled dust sample has an elevated concentration (5,400 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.
- The Civic Center trackside settled dust sample has an elevated concentration (3,500 mg/kg) of zinc above the TTLC concentration of 2,400 mg/kg; defining this material as a hazardous waste. STLC testing of cadmium, chromium, copper, lead and zinc are needed to determine the leachability of these metals, since the results were above 10% of the TTLC standard.

No suspect materials were collected for Polarized Light Microscopy (PLM) analysis.

For informational purposes the metal concentrations in May 2011 for the Powell, Montgomery and Embarcadero Stations were as follows:

- Airborne lead concentrations during the sampling periods were all below 0.014 µg/m³, or less than the

analytical detection limit. All perimeter airborne lead concentrations were well below Cal/OSHA's Action Level or Permissible Exposure Level (PEL) of $30 \mu\text{g}/\text{m}^3$ and $50 \mu\text{g}/\text{m}^3$, respectively, as well as the National Ambient Air Quality Standard (NAAQS) of $1.5 \mu\text{g}/\text{m}^3$.

- Airborne iron concentrations during the sampling period ranged from <4.6 to $80 \mu\text{g}/\text{m}^3$. All airborne iron concentrations were well below Cal/OSHA's Permissible Exposure Level (PEL) of $5,000 \mu\text{g}/\text{m}^3$.
- Airborne copper concentrations during the sampling period ranged from <0.11 to $1.1 \mu\text{g}/\text{m}^3$, or well below Cal/OSHA's Permissible Exposure Level (PEL) of $100 \mu\text{g}/\text{m}^3$ for copper fume.
- Airborne zinc concentrations during the sampling period were all below $1.4 \mu\text{g}/\text{m}^3$, or less than the analytical detection limit, or well below Cal/OSHA's Permissible Exposure Level (PEL) of $5,000 \mu\text{g}/\text{m}^3$ for zinc fumes.
- Airborne nickel concentrations during the sampling period ranged from <0.11 to $0.39 \mu\text{g}/\text{m}^3$, or well below Cal/OSHA's Permissible Exposure Level (PEL) of $1,000 \mu\text{g}/\text{m}^3$.
- Airborne chromium concentrations during the sampling period all ranged from 0.12 to $0.21 \mu\text{g}/\text{m}^3$, or well below Cal/OSHA's Permissible Exposure Level (PEL) of $500 \mu\text{g}/\text{m}^3$.

Please feel free to contact me directly if you have any questions.

Sincerely,
SCA ENVIRONMENTAL, INC.



Dan Leung, CIH, CSP, CAC #07-4175, CDPH #7329
Vice-President, Industrial Hygiene
(415) 867-9544
dleung@sca-enviro.com

Attachment 1

Laboratory Results – Airborne Asbestos

Station	Location	Level	Sample ID	Start (LPM)	Stop (LPM)	Average Flow Rate (LPM)	Height (ft)	Pump ID	Sampled Date	Time On	Time Off	Sampled Time (min)	Sample Volume (L)	PCM Results (f/cc)
24th St Mission	Mech Rm 101A	Concourse	24-101A	1.8	1.8	1.8	5	SCA1080	8/8/23-8/9/23	9:29	8:39	1390	2502	<0.001
16th St Mission	Mech Rm 101A	Concourse	16-101A	1.8	1.9	1.85	5	SCA1100	8/8/23-8/9/23	10:03	8:53	1370	2535	<0.001
Powell Street	Police Break Rm	Concourse	POW-PBR	1.8	1.8	1.8	5	SCA1079	8/8/23-8/9/23	11:22	9:21	1319	2374	<0.001
	Electrical Rm 110	Concourse	POW-110	1.8	1.9	1.85	5	SCA1001	8/8/23-8/9/23	11:49	9:15	1286	2379	0.002
Montgomery Street	Coffee Shop Stor Rm 110 (enter from restroom)	Concourse	MONT-110	1.8	1.8	1.8	5	SCA1500	8/8/23-8/9/23	12:51	9:56	1265	2277	0.004
	Storage Rm 111	Concourse	MONT-111	1.8	2	1.9	5	SCA1497	8/8/23-8/9/23	12:12	9:36	1284	2440	0.002
12th Street	Electrical Rm 107C	Concourse	12-107C	1.8	1.9	1.85	5	SCA1497	8/9/23-8/10/23	13:37	11:25	1308	2420	<0.001
19th Street	Mech Rm 108A	Concourse	19-108A	1.8	1.8	1.8	5	SCA1041	8/9/23-8/10/23	13:02	11:07	1325	2385	<0.001
MacArthur	Break Rm 102	Ground	MAC-102	1.8	1.8	1.8	5	SCA1079	8/9/23-8/10/23	11:50	10:15	1345	2421	<0.001
Berkeley Main	Break Rm 108	Concourse	BERK-108	1.8	1.7	1.75	5	SCA1500	8/9/23-8/10/23	11:18	10:28	1390	2433	<0.001
Ashby	Elevator Rm 204	Platform	ASH-204	1.8	1.7	1.75	5	SCA1001	8/9/23-8/10/23	11:33	10:34	1381	2417	<0.001
Rockridge	Janitor's Rm 203	Concourse	ROCK-203	1.8	1.8	1.8	5	SCA1080	8/9/23-8/10/23	12:40	9:55	1275	2295	0.001
Lafayette	Train Control Rm 103	Ground	LAFA-103	1.8	1.8	1.8	5	SCA1100	8/9/23-8/10/23	12:20	9:38	1278	2300	<0.001



EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Tel/Fax: (510) 895-3675 / (510) 895-3680

<http://www.EMSL.com> / sanleandrolab@emsl.com

EMSL Order: 092317868

Customer ID: SCAE50

Customer PO: B13885

Project ID:

Attention: Dan Leung
SCA Environmental, Inc.
320 Justin Drive
San Francisco, CA 94112

Phone: (415) 867-9544
Fax: (415) 962-0736
Received Date: 08/11/2023 12:00 PM
Analysis Date: 08/17/2023
Collected Date:

Project: B13885 - DL - BART M LINE - 8.10

Test Report: Fiber Count by Phase Contrast Microscopy (PCM), NIOSH 7400 Method - A Rules, Revision 3, Issue 3, 6/15/2019

Sample	Location	Sample Date	Volume (L)	Fibers	Fields	LOD (fib/cc)	Fibers/mm ²	Fibers/cc	Notes
24-101A 092317868-0001			2502	<5.5	100	0.0011	<7.01	<0.0011	
16-101A 092317868-0002			2535	<5.5	100	0.0011	<7.01	<0.0011	
POW-PBR 092317868-0003			2374	<5.5	100	0.0011	<7.01	<0.0011	
POW-110 092317868-0004			2379	9	100	0.0011	11.5	0.0019	
MONT-110 092317868-0005			2277	20.5	100	0.0012	26.1	0.0044	
MONT-111 092317868-0006			2440	7.5	100	0.0011	9.55	0.0015	
12-107C 092317868-0007			2420	<5.5	100	0.0011	<7.01	<0.0011	
19-108A 092317868-0008			2385	<5.5	100	0.0011	<7.01	<0.0011	
MAC-102 092317868-0009			2421	<5.5	100	0.0011	<7.01	<0.0011	
BERK-108 092317868-0010			2433	<5.5	100	0.0011	<7.01	<0.0011	
ASH-204 092317868-0011			2417	<5.5	100	0.0011	<7.01	<0.0011	
ROCK-203 092317868-0012			2295	6.5	100	0.0012	8.28	0.0014	
Lafa-103 092317868-0013			2300	<5.5	100	0.0012	<7.01	<0.0012	
BLANK - HOLD 092317868-0014									Field Blank Not Analyzed

The results reported have been blank corrected as applicable.

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. Limit of detection is 7 fibers/mm². Fiber counts outside the recommended fiber density range of the method (100-1300 f/mm²) have greater than optimal variability and are probably biased. Field blank results, when available, are used to blank correct results. NIOSH 7400 requires field blanks be submitted at a rate of 10%, with a minimum of 2 per set. Measurement of uncertainty available upon request. The results in this report meet all requirements of the NELAC standards unless otherwise noted. Intra-laboratory Sr values: 5-20 fibers = 0.33, 21-50 fibers = 0.21, 51-100 fibers = 0.12. Inter-laboratory Sr values (Average of EMSL round robin data) = 0.35.

Samples analyzed by EMSL Analytical, Inc San Leandro, CA AIHA LAP, LLC-IHLAP Accredited #101748

Initial report from: 08/17/2023 03:13 PM



EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Tel/Fax: (510) 895-3675 / (510) 895-3680

<http://www.EMSL.com> / sanleandrolab@emsl.com

EMSL Order: 092317868

Customer ID: SCAE50

Customer PO: B13885

Project ID:

Attention: Dan Leung
SCA Environmental, Inc.
320 Justin Drive
San Francisco, CA 94112

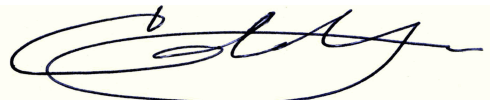
Phone: (415) 867-9544
Fax: (415) 962-0736
Received Date: 08/11/2023 12:00 PM
Analysis Date: 08/17/2023
Collected Date:

Project: B13885 - DL - BART M LINE - 8.10

Test Report: Fiber Count by Phase Contrast Microscopy (PCM), NIOSH 7400 Method - A Rules, Revision 3, Issue 3, 6/15/2019

Sample	Location	Sample Date	Volume (L)	Fibers	Fields	LOD (fib/cc)	Fibers/mm ²	Fibers/cc	Notes
--------	----------	-------------	------------	--------	--------	-----------------	------------------------	-----------	-------

Analyst(s):
Xeena Paul PCM 13



Cecilia Yu, Laboratory Manager
or other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. Limit of detection is 7 fibers/mm². Fiber counts outside the recommended fiber density range of the method (100-1300 f/mm²) have greater than optimal variability and are probably biased. Field blank results, when available, are used to blank correct results. NIOSH 7400 requires field blanks be submitted at a rate of 10%, with a minimum of 2 per set. Measurement of uncertainty available upon request. The results in this report meet all requirements of the NELAC standards unless otherwise noted. Intra-laboratory Sr values: 5-20 fibers = 0.33, 21-50 fibers = 0.21, 51-100 fibers = 0.12. Inter-laboratory Sr values (Average of EMSL round robin data) = 0.35.

Samples analyzed by EMSL Analytical, Inc San Leandro, CA AIHA LAP, LLC-IHLAP Accredited #101748

Initial report from: 08/17/2023 03:13 PM

Attachment 2

Respirable Dust (PM₁₀) Sampling Results – Embarcadero & Montgomery Street Stations

Location	Level	Sampled Date	DustTrak ID	DustTrak Data ID	Test Length (D:H:M)	Max Level (mg/m3)	Min Level (mg/m3)	Avg Level (mg/m3)	TWA (mg/m3)
Embarcadero Northeast Station Agent's Booth (near Clipper Service Station)	Concourse	8/9/23-8/10/23	9199	EMBAR N_021	0:22:00	0.12	<0.001	0.047	0.06
Embarcadero Southwest Station Agent's Booth	Concourse	8/9/23-8/10/23	8014	EMBAR S_021	0:22:20	0.123	0.001	0.046	0.054
Montgomery Station Train Control Rm 101C (Original Fan Rm 107 is under construction)	Concourse	8/8/23-8/9/23	8014	MONT 101C_017	0:20:20	0.007	<0.001	0.002	0.003
Montgomery South Station Agent's Booth	Concourse	8/8/23-8/9/23	9199	MONT S BOOTH_017	0:21:00	0.038	<0.001	0.005	0.004

Instrument DustTrak II
 Model Nur 8530
 Serial Num 8530100913
 Firmware \ 3.1
 Calibration 6/26/2023
 Test Name EMBAR S_021
 Test Start 10:32:20 AM
 Test Start I 8/9/2023
 Test Length 0:22:20
 Test Interv 10:00
 Mass Aver: 0.046
 Mass Minii 0.001
 Mass Maxi 0.123
 Mass TWA 0.054
 Photometr 1
 Flow User 0
 Errors
 Number of 134

Elapsed Time	Tir Mass [mg/m3]	Alarms	Errors
600	0.073		
1200	0.062		
1800	0.074		
2400	0.075		
3000	0.079		
3600	0.078		
4200	0.064		
4800	0.068		
5400	0.075		
6000	0.08		
6600	0.072		
7200	0.07		
7800	0.053		
8400	0.043		
9000	0.037		
9600	0.038		
10200	0.04		
10800	0.048		
11400	0.053		
12000	0.049		
12600	0.073		
13200	0.049		
13800	0.039		
14400	0.035		
15000	0.027		
15600	0.025		
16200	0.027		

16800	0.023
17400	0.028
18000	0.041
18600	0.037
19200	0.033
19800	0.034
20400	0.056
21000	0.05
21600	0.04
22200	0.05
22800	0.058
23400	0.066
24000	0.063
24600	0.064
25200	0.065
25800	0.053
26400	0.061
27000	0.082
27600	0.067
28200	0.059
28800	0.059
29400	0.059
30000	0.061
30600	0.066
31200	0.066
31800	0.06
32400	0.053
33000	0.049
33600	0.079
34200	0.07
34800	0.043
35400	0.031
36000	0.028
36600	0.026
37200	0.024
37800	0.027
38400	0.06
39000	0.05
39600	0.035
40200	0.026
40800	0.022
41400	0.029
42000	0.04
42600	0.033
43200	0.032
43800	0.028
44400	0.04

45000	0.035
45600	0.034
46200	0.038
46800	0.029
47400	0.049
48000	0.053
48600	0.034
49200	0.028
49800	0.024
50400	0.021
51000	0.038
51600	0.05
52200	0.037
52800	0.033
53400	0.042
54000	0.03
54600	0.026
55200	0.026
55800	0.017
56400	0.008
57000	0.006
57600	0.004
58200	0.003
58800	0.003
59400	0.002
60000	0.002
60600	0.002
61200	0.002
61800	0.001
62400	0.001
63000	0.009
63600	0.008
64200	0.005
64800	0.003
65400	0.003
66000	0.002
66600	0.001
67200	0.001
67800	0.001
68400	0.009
69000	0.05
69600	0.047
70200	0.108
70800	0.102
71400	0.123
72000	0.11
72600	0.095

73200	0.073
73800	0.104
74400	0.094
75000	0.089
75600	0.069
76200	0.087
76800	0.105
77400	0.086
78000	0.066
78600	0.082
79200	0.085
79800	0.07
80400	0.078

Instrument DustTrak II
 Model Nur 8530
 Serial Num 8530100930
 Firmware \ 3.1
 Calibration 6/27/2023
 Test Name EMBAR N_021
 Test Start 10:41:33 AM
 Test Start Date 8/9/2023
 Test Length 0:22:00
 Test Interval 10:00
 Mass Average 0.047
 Mass Minimum 0
 Mass Maximum 0.12
 Mass TWA 0.06
 Photometer 1
 Flow User 0
 Errors
 Number of 132

Elapsed Time	Mass [mg/m ³]	Alarms	Errors
600	0.052		
1200	0.043		
1800	0.057		
2400	0.069		
3000	0.056		
3600	0.048		
4200	0.043		
4800	0.058		
5400	0.077		
6000	0.066		
6600	0.061		
7200	0.052		
7800	0.062		
8400	0.077		
9000	0.077		
9600	0.073		
10200	0.066		
10800	0.069		
11400	0.063		
12000	0.079		
12600	0.077		
13200	0.067		
13800	0.053		
14400	0.057		
15000	0.049		
15600	0.046		
16200	0.039		

16800	0.043
17400	0.043
18000	0.045
18600	0.054
19200	0.053
19800	0.071
20400	0.062
21000	0.048
21600	0.04
22200	0.042
22800	0.049
23400	0.056
24000	0.051
24600	0.051
25200	0.05
25800	0.069
26400	0.085
27000	0.101
27600	0.079
28200	0.08
28800	0.072
29400	0.078
30000	0.101
30600	0.095
31200	0.081
31800	0.059
32400	0.054
33000	0.048
33600	0.049
34200	0.047
34800	0.043
35400	0.041
36000	0.039
36600	0.039
37200	0.035
37800	0.035
38400	0.037
39000	0.037
39600	0.047
40200	0.051
40800	0.05
41400	0.044
42000	0.039
42600	0.039
43200	0.036
43800	0.036
44400	0.036

45000	0.034
45600	0.033
46200	0.031
46800	0.029
47400	0.029
48000	0.027
48600	0.027
49200	0.033
49800	0.033
50400	0.039
51000	0.038
51600	0.033
52200	0.031
52800	0.042
53400	0.026
54000	0.019
54600	0.016
55200	0.014
55800	0.01
56400	0.007
57000	0.004
57600	0.002
58200	0.001
58800	0
59400	0
60000	0
60600	0
61200	0
61800	0
62400	0
63000	0.001
63600	0.002
64200	0.001
64800	0
65400	0.001
66000	0.001
66600	0.002
67200	0.003
67800	0.007
68400	0.027
69000	0.036
69600	0.04
70200	0.107
70800	0.113
71400	0.112
72000	0.11
72600	0.081

73200	0.061
73800	0.12
74400	0.099
75000	0.084
75600	0.075
76200	0.076
76800	0.057
77400	0.051
78000	0.054
78600	0.074
79200	0.09

Instrument: DustTrak II
 Model: Nur 8530
 Serial Num: 8530100913
 Firmware: 3.1
 Calibration: 6/26/2023
 Test Name: MONT 101C_017
 Test Start Time: 1:21:27 PM
 Test Start Date: 8/8/2023
 Test Length: 0:20:20
 Test Interval: 10:00
 Mass Average: 0.002
 Mass Minimum: 0
 Mass Maximum: 0.007
 Mass TWA: 0.003
 Photometer: 1
 Flow User: 0
 Errors:
 Number of: 123

Elapsed Time	Tir Mass [mg/m3]	Alarms	Errors
600	0.007		
960	0		
1200	0.004		
1800	0.005		
2400	0.004		
3000	0.004		
3600	0.004		
4200	0.003		
4800	0.003		
5400	0.003		
6000	0.006		
6600	0.003		
7200	0.003		
7800	0.003		
8400	0.003		
9000	0.004		
9600	0.003		
10200	0.003		
10800	0.003		
11400	0.002		
12000	0.003		
12600	0.004		
13200	0.003		
13800	0.002		
14400	0.002		
15000	0.003		
15600	0.005		

16200	0.005
16800	0.003
17400	0.002
18000	0.002
18600	0.002
19200	0.003
19800	0.003
20400	0.002
21000	0.003
21600	0.002
22200	0.002
22800	0.002
23400	0.002
24000	0.002
24600	0.002
25200	0.002
25800	0.002
26400	0.003
27000	0.003
27600	0.003
28200	0.002
28800	0.002
29400	0.002
30000	0.001
30600	0.001
31200	0.001
31800	0.001
32400	0
33000	0.001
33600	0.001
34200	0.001
34800	0
35400	0.001
36000	0.001
36600	0.001
37200	0
37800	0.001
38400	0
39000	0.001
39600	0.001
40200	0.001
40800	0.002
41400	0.001
42000	0.002
42600	0.002
43200	0.003
43800	0.004

44400	0.002
45000	0.002
45600	0.002
46200	0.001
46800	0.002
47400	0.001
48000	0.001
48600	0
49200	0
49800	0
50400	0
51000	0
51600	0
52200	0
52800	0
53400	0
54000	0
54600	0
55200	0
55800	0
56400	0
57000	0
57600	0
58200	0
58800	0.001
59400	0.002
60000	0.003
60600	0.003
61200	0.004
61800	0.005
62400	0.006
63000	0.006
63600	0.006
64200	0.005
64800	0.003
65400	0.004
66000	0.002
66600	0.001
67200	0.001
67800	0.004
68400	0.003
69000	0.002
69600	0.003
70200	0.003
70800	0.003
71400	0.003
72000	0.002

72600

0.002

73200

0.002

Instrument: DustTrak II
 Model: Nur 8530
 Serial Num: 8530100930
 Firmware: 3.1
 Calibration: 6/27/2023
 Test Name: MONT S BOOTH_017
 Test Start: 12:37:03 PM
 Test Start Date: 8/8/2023
 Test Length: 0:21:00
 Test Interval: 10:00
 Mass Average: 0.005
 Mass Minimum: 0
 Mass Maximum: 0.038
 Mass TWA: 0.004
 Photometer: 1
 Flow User: 0
 Errors:
 Number of: 126

Elapsed Time	Tir Mass [mg/m3]	Alarms	Errors
600	0.003		
1200	0.004		
1800	0.003		
2400	0.005		
3000	0.003		
3600	0.004		
4200	0.001		
4800	0.001		
5400	0.002		
6000	0.001		
6600	0		
7200	0.005		
7800	0.003		
8400	0		
9000	0.003		
9600	0.005		
10200	0.004		
10800	0.004		
11400	0.008		
12000	0.002		
12600	0.001		
13200	0.001		
13800	0		
14400	0.001		
15000	0.001		
15600	0.001		
16200	0.001		

16800	0
17400	0
18000	0.002
18600	0.002
19200	0.003
19800	0.006
20400	0.004
21000	0.005
21600	0.01
22200	0.031
22800	0.01
23400	0.008
24000	0.013
24600	0.007
25200	0.005
25800	0.006
26400	0.004
27000	0.004
27600	0.005
28200	0.006
28800	0.005
29400	0.006
30000	0.01
30600	0.007
31200	0.004
31800	0.006
32400	0.004
33000	0.002
33600	0.001
34200	0.001
34800	0.001
35400	0.002
36000	0.002
36600	0.001
37200	0.001
37800	0.001
38400	0.002
39000	0.001
39600	0.002
40200	0.001
40800	0
41400	0.001
42000	0.001
42600	0.001
43200	0.001
43800	0.001
44400	0

45000	0
45600	0
46200	0
46800	0
47400	0
48000	0
48600	0
49200	0
49800	0
50400	0
51000	0
51600	0
52200	0
52800	0
53400	0
54000	0
54600	0
55200	0
55800	0
56400	0
57000	0
57600	0
58200	0
58800	0
59400	0
60000	0.003
60600	0.011
61200	0.017
61800	0.022
62400	0.03
63000	0.028
63600	0.03
64200	0.034
64800	0.038
65400	0.037
66000	0.032
66600	0.022
67200	0.009
67800	0.009
68400	0.009
69000	0.007
69600	0.005
70200	0.005
70800	0.013
71400	0.009
72000	0.008
72600	0.006

73200	0.007
73800	0.006
74400	0.007
75000	0.005
75600	0.008

Attachment 3

San Francisco Line Spot Sampling Results for PM₁₀ and PM_{2.5}

Station	Location	Dustrak File ID	Date	Time	PM10 Concentrations (mg/m3)			PM2.5 Concentrations (mg/m3)		
					Max	Avg	Min	Max	Avg	Min
24th St. Mission	Agent Booth	2	8/8/2023	8:38	0.074	0.045	0.029	0.060	0.037	0.022
	Ticket Machines	3	8/8/2023	8:46	0.040	0.014	0.004	0.037	0.013	0.004
	Trackside	1	8/8/2023	8:29	0.146	0.137	0.119	0.114	0.103	0.086
16th St. Mission	Agent Booth	5	8/8/2023	9:48	0.082	0.072	0.063	0.068	0.059	0.049
	Ticket Machines	6	8/8/2023	9:53	0.075	0.031	0.012	0.061	0.025	0.010
	Trackside	4	8/8/2023	9:39	0.168	0.114	0.066	0.137	0.093	0.057
Civic Center	North Primary Agent Booth	8	8/8/2023	10:32	0.053	0.049	0.042	0.053	0.051	0.046
	North Ticket Machines	9	8/8/2023	10:38	0.074	0.064	0.053	0.060	0.055	0.046
	Trackside	7	8/8/2023	10:18	0.196	0.155	0.109	0.159	0.128	0.089
Powell	Police Break Rm/Squad Rm	12	8/8/2023	11:27	0.005	0.004	0.003	0.011	0.011	0.011
	South Agent Booth	13	8/8/2023	11:34	0.017	0.009	0.005	0.020	0.014	0.011
	North Ticket Machines	11	8/8/2023	11:09	0.055	0.047	0.043	0.046	0.038	0.034
Montgomery	North Agent Booth	16	8/8/2023	12:21	0.008	0.005	0.003	0.011	0.009	0.008
	North Ticket Machines	15	8/8/2023	12:16	0.008	0.003	0.001	0.010	0.007	0.006
	Trackside	14	8/8/2023	12:00	0.015	0.011	0.007	0.018	0.014	0.012
Embarcadero	Southwest Agent Booth	20	8/9/2023	10:23	0.076	0.070	0.065	0.059	0.055	0.050
	Southwest Ticket Machines	19	8/9/2023	10:17	0.080	0.072	0.058	0.062	0.054	0.044
	Trackside	18	8/9/2023	10:06	0.120	0.108	0.095	0.087	0.080	0.073
12th St. Oakland	Central Agent Booth	26	8/10/2023	11:27	0.025	0.014	0.008	0.010	0.009	0.009
	North Ticket Machines	25	8/10/2023	11:17	0.014	0.011	0.009	0.013	0.012	0.010
	Upper Platform Trackside	27	8/10/2023	11:33	0.012	0.010	0.006	0.012	0.010	0.008
19th St. Oakland	Northeast Ticket Machines	23	8/10/2023	10:55	0.014	0.011	0.009	0.011	0.010	0.009
	Central Agent Booth	24	8/10/2023	11:01	0.014	0.013	0.012	0.012	0.012	0.012
	Lower Platform Trackside	22	8/10/2023	10:49	0.015	0.013	0.011	0.010	0.010	0.010
				Max	0.196	0.155	0.119	0.159	0.128	0.089
				Min	0.005	0.003	0.001	0.010	0.007	0.004
				Avg	0.058	0.045	0.035	0.048	0.038	0.030

Attachment 4

CAM-17 Settled Dust Metals Analyses – Montgomery, Powell & Civic Center Stations



McC Campbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder: 2308878

Report Created for: SCA Environmental, Inc.

320 Justin Drive
San Francisco, CA 94112

Project Contact: Dan Leung

Project P.O.:

Project: B-13885; BART 2023 Ambient Ash Testing

Project Received: 08/10/2023

Analytical Report reviewed & approved for release on 08/17/2023 by:

Yen Cao
Project Manager

The report shall not be reproduced except in full, without the written approval of the laboratory. The analytical results relate only to the items tested. Results reported conform to the most current NELAP standards, where applicable, unless otherwise stated in a case narrative.





Glossary of Terms & Qualifier Definitions

Client: SCA Environmental, Inc.

WorkOrder: 2308878

Project: B-13885; BART 2023 Ambient Ash Testing

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit ¹
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit ²
RPD	Relative Percent Difference
RRT	Relative Retention Time
RSD	Relative Standard Deviation
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure

¹ MDL is the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. Definition and Procedure for the Determination of the Method Detection Limit, Revision 2, 40CFR, Part 136, Appendix B, EPA 821-R-16-006, December 2016. Values are based upon our default extraction volume/amount and are subject to change.

² RL is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. (The RL cannot be lower than the lowest calibration standard used in the initial calibration of the instrument and must be greater than the MDL.) Values are based upon our default extraction volume/amount and are subject to change.



Glossary of Terms & Qualifier Definitions

Client: SCA Environmental, Inc.

WorkOrder: 2308878

Project: B-13885; BART 2023 Ambient Ash Testing

TEQ Toxicity Equivalents

TZA TimeZone Net Adjustment for sample collected outside of MAI's UTC.

WET (STLC) Waste Extraction Test (Soluble Threshold Limit Concentration)



Analytical Report

Client: SCA Environmental, Inc.
Date Received: 08/10/2023 15:20
Date Prepared: 08/11/2023
Project: B-13885; BART 2023 Ambient Ash Testing

WorkOrder: 2308878
Extraction Method: SW3050B
Analytical Method: SW6020
Unit: mg/Kg

CAM / CCR 17 Metals

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
MONT-305	2308878-001A	Solid	08/08/2023 11:55	ICP-MS5 156SMPL.d	275678

Analytes	Result	RL	DF	Date Analyzed
Antimony	17	0.50	1	08/14/2023 13:20
Arsenic	16	0.50	1	08/14/2023 13:20
Barium	460	5.0	1	08/14/2023 13:20
Beryllium	ND	0.50	1	08/14/2023 13:20
Cadmium	18	0.50	1	08/14/2023 13:20
Chromium	79	0.50	1	08/14/2023 13:20
Cobalt	16	0.50	1	08/14/2023 13:20
Copper	740	5.0	10	08/11/2023 23:28
Lead	370	0.50	1	08/14/2023 13:20
Mercury	0.70	0.050	1	08/14/2023 13:20
Molybdenum	17	0.50	1	08/14/2023 13:20
Nickel	81	0.50	1	08/14/2023 13:20
Selenium	ND	0.50	1	08/14/2023 13:20
Silver	0.65	0.50	1	08/14/2023 13:20
Thallium	ND	0.50	1	08/14/2023 13:20
Vanadium	27	0.50	1	08/14/2023 13:20
Zinc	5400	50	10	08/11/2023 23:28

Surrogates	REC (%)	Limits	
Terbium	107	70-130	08/14/2023 13:20

Analyst(s): DB, MIG



Analytical Report

Client: SCA Environmental, Inc.
Date Received: 08/10/2023 15:20
Date Prepared: 08/11/2023
Project: B-13885; BART 2023 Ambient Ash Testing

WorkOrder: 2308878
Extraction Method: SW3050B
Analytical Method: SW6020
Unit: mg/Kg

CAM / CCR 17 Metals

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
POW-304	2308878-002A	Solid	08/08/2023 11:00	ICP-MS5 157SMPL.d	275678

Analytes	Result	RL	DF	Date Analyzed
Antimony	13	0.50	1	08/14/2023 13:24
Arsenic	8.6	0.50	1	08/14/2023 13:24
Barium	210	5.0	1	08/14/2023 13:24
Beryllium	ND	0.50	1	08/14/2023 13:24
Cadmium	9.2	0.50	1	08/14/2023 13:24
Chromium	99	0.50	1	08/14/2023 13:24
Cobalt	13	0.50	1	08/14/2023 13:24
Copper	790	5.0	10	08/11/2023 23:32
Lead	530	5.0	10	08/11/2023 23:32
Mercury	0.11	0.050	1	08/14/2023 13:24
Molybdenum	18	0.50	1	08/14/2023 13:24
Nickel	88	0.50	1	08/14/2023 13:24
Selenium	ND	0.50	1	08/14/2023 13:24
Silver	1.8	0.50	1	08/14/2023 13:24
Thallium	ND	0.50	1	08/14/2023 13:24
Vanadium	26	0.50	1	08/14/2023 13:24
Zinc	5400	50	10	08/11/2023 23:32

Surrogates	REC (%)	Limits	Date Analyzed
Terbium	115	70-130	08/14/2023 13:24

Analyst(s): DB, MIG



Analytical Report

Client: SCA Environmental, Inc.
Date Received: 08/10/2023 15:20
Date Prepared: 08/11/2023
Project: B-13885; BART 2023 Ambient Ash Testing

WorkOrder: 2308878
Extraction Method: SW3050B
Analytical Method: SW6020
Unit: mg/Kg

CAM / CCR 17 Metals

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
CIVIC-301A/B	2308878-003A	Solid	08/08/2023 10:15	ICP-MS5 158SMPL.d	275678

Analytes	Result	RL	DF	Date Analyzed
Antimony	17	0.50	1	08/14/2023 13:27
Arsenic	18	0.50	1	08/14/2023 13:27
Barium	290	5.0	1	08/14/2023 13:27
Beryllium	ND	0.50	1	08/14/2023 13:27
Cadmium	10	0.50	1	08/14/2023 13:27
Chromium	90	0.50	1	08/14/2023 13:27
Cobalt	13	0.50	1	08/14/2023 13:27
Copper	740	5.0	10	08/11/2023 23:36
Lead	390	0.50	1	08/14/2023 13:27
Mercury	0.30	0.050	1	08/14/2023 13:27
Molybdenum	13	0.50	1	08/14/2023 13:27
Nickel	69	0.50	1	08/14/2023 13:27
Selenium	ND	0.50	1	08/14/2023 13:27
Silver	0.58	0.50	1	08/14/2023 13:27
Thallium	ND	0.50	1	08/14/2023 13:27
Vanadium	47	0.50	1	08/14/2023 13:27
Zinc	3500	5.0	1	08/14/2023 13:27

Surrogates	REC (%)	Limits	Date Analyzed
Terbium	110	70-130	08/14/2023 13:27

Analyst(s): DB, MIG



Quality Control Report

Client:	SCA Environmental, Inc.	WorkOrder:	2308878
Date Prepared:	08/11/2023	BatchID:	275678
Date Analyzed:	08/11/2023	Extraction Method:	SW3050B
Instrument:	ICP-MS4	Analytical Method:	SW6020
Matrix:	Soil	Unit:	mg/kg
Project:	B-13885; BART 2023 Ambient Ash Testing	Sample ID:	MB/LCS/LCSD-275678

QC Summary Report for Metals

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Antimony	ND	0.12	0.50	-	-	-
Arsenic	ND	0.11	0.50	-	-	-
Barium	ND	0.71	5.0	-	-	-
Beryllium	ND	0.10	0.50	-	-	-
Cadmium	ND	0.092	0.50	-	-	-
Chromium	ND	0.13	0.50	-	-	-
Cobalt	ND	0.064	0.50	-	-	-
Copper	ND	0.13	0.50	-	-	-
Lead	ND	0.065	0.50	-	-	-
Mercury	ND	0.038	0.050	-	-	-
Molybdenum	ND	0.092	0.50	-	-	-
Nickel	ND	0.080	0.50	-	-	-
Selenium	ND	0.21	0.50	-	-	-
Silver	ND	0.057	0.50	-	-	-
Thallium	ND	0.072	0.50	-	-	-
Vanadium	ND	0.11	0.50	-	-	-
Zinc	ND	2.5	5.0	-	-	-
Surrogate Recovery						
Terbium	540			500	108	70-130



Quality Control Report

Client:	SCA Environmental, Inc.	WorkOrder:	2308878
Date Prepared:	08/11/2023	BatchID:	275678
Date Analyzed:	08/11/2023	Extraction Method:	SW3050B
Instrument:	ICP-MS4	Analytical Method:	SW6020
Matrix:	Soil	Unit:	mg/kg
Project:	B-13885; BART 2023 Ambient Ash Testing	Sample ID:	MB/LCS/LCSD-275678

QC Summary Report for Metals

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Antimony	49	49	50	98	99	75-125	0.731	20
Arsenic	50	51	50	99	102	75-125	2.64	20
Barium	490	500	500	98	99	75-125	1.53	20
Beryllium	47	48	50	94	96	75-125	2.13	20
Cadmium	50	51	50	99	102	75-125	2.50	20
Chromium	50	50	50	101	101	75-125	0.461	20
Cobalt	49	50	50	98	100	75-125	1.86	20
Copper	51	53	50	102	105	75-125	2.82	20
Lead	49	50	50	98	101	75-125	2.07	20
Mercury	1.3	1.3	1.25	100	103	75-125	3.15	20
Molybdenum	49	50	50	99	100	75-125	0.839	20
Nickel	51	53	50	103	106	75-125	3.44	20
Selenium	49	51	50	99	102	75-125	3.36	20
Silver	49	50	50	97	100	75-125	2.51	20
Thallium	48	50	50	96	99	75-125	3.54	20
Vanadium	50	51	50	100	101	75-125	1.17	20
Zinc	510	520	500	102	104	75-125	1.83	20
Surrogate Recovery								
Terbium	530	550	500	107	110	70-130	2.66	20



1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 2308878

ClientCode: SCAF

- WaterTrax
 CLIP
 EDF
 EQuIS
 Dry-Weight
 Email
 HardCopy
 ThirdParty
 J-flag
 Detection Summary
 Excel

Report to:

Dan Leung
SCA Environmental, Inc.
320 Justin Drive
San Francisco, CA 94112
415-882-1675 FAX: (415) 703-0701

Email: dleung@sca-enviro.com; labreports99@gm
cc/3rd Party: shuang@sca-enviro.com;
PO:
Project: B-13885; BART 2023 Ambient Ash Testing

Bill to:

Accounts Payable
SCA Environmental, Inc.
320 Justin Drive
San Francisco, CA 94112
labreports99@gmail.com

Requested TAT: 5 days;

Date Received: **08/10/2023**

Date Logged: **08/10/2023**

Lab ID	ClientSampID	Matrix	Collection Date	Hold	Requested Tests (See legend below)											
					1	2	3	4	5	6	7	8	9	10	11	12
2308878-001	MONT-305	Solid	8/8/2023 11:55	<input type="checkbox"/>	A	A										
2308878-002	POW-304	Solid	8/8/2023 11:00	<input type="checkbox"/>	A	A										
2308878-003	CIVIC-301A/B	Solid	8/8/2023 10:15	<input type="checkbox"/>	A	A										

Test Legend:

1	CAM17MS_TTLC_Solid	2	PRDisposal Fee	3		4	
5		6		7		8	
9		10		11		12	

Project Manager: Jennifer Lagerbom

Prepared by: Adrianna Cardoza

Comments:

NOTE: Soil samples are discarded 60 days after receipt unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.



WORK ORDER SUMMARY

Client Name: SCA ENVIRONMENTAL, INC.

Project: B-13885; BART 2023 Ambient Ash Testing

Work Order: 2308878

Client Contact: Dan Leung

QC Level: LEVEL 2

Contact's Email: dleung@sca-enviro.com; labreports99@gmail.com

Comments:

Date Logged: 8/10/2023

WaterTrax CLIP EDF Excel EQUIS Email HardCopy ThirdParty J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	U**	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	Sub Out
001A	MONT-305	Solid	SW6020 (CAM 17)	1	2OZ Container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8/8/2023 11:55	5 days	8/17/2023		<input type="checkbox"/>	<input type="checkbox"/>
002A	POW-304	Solid	SW6020 (CAM 17)	1	2OZ Container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8/8/2023 11:00	5 days	8/17/2023		<input type="checkbox"/>	<input type="checkbox"/>
003A	CIVIC-301A/B	Solid	SW6020 (CAM 17)	1	2OZ Container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8/8/2023 10:15	5 days	8/17/2023		<input type="checkbox"/>	<input type="checkbox"/>

NOTES: * STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- Organic extracts are held for 40 days before disposal; Inorganic extract are held for 30 days.

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

U** = An unpreserved container was received for a method that suggests a preservation in order to extend hold time for analysis.



Sample Receipt Checklist

Client Name: SCA Environmental, Inc.
 Project: B-13885; BART 2023 Ambient Ash Testing
 WorkOrder No: 2308878 Matrix: Solid
 Carrier: Laurie Moore (MAI Courier)

Date and Time Received: 8/10/2023 15:20
 Date Logged: 8/10/2023
 Received by: Adrianna Cardoza
 Logged by: Adrianna Cardoza

Chain of Custody (COC) Information

Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample IDs noted by Client on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Date and Time of collection noted by Client on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sampler's name noted on COC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
COC agrees with Quote?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper containers/bottles?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Samples Received on Ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

(Ice Type: WET ICE)

Sample/Temp Blank temperature		Temp: 5.7°C	NA <input type="checkbox"/>
ZHS conditional analyses: VOA meets zero headspace requirement (VOCs, TPHg/BTEX, RSK)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Sample labels checked for correct preservation?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

UCMR Samples:

pH tested and acceptable upon receipt (200.7: ≤2; 533: 6 - 8; 537.1: 6 - 8)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>
Free Chlorine tested and acceptable upon receipt (<0.1mg/L) [not applicable to 200.7]?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>

 Comments:

Attachment 5
SCA's Personnel Certifications

The Board for Global EHS Credentialing (BGC)

through its vested authority, hereby confirms that

Daniel M.K. Leung

has met all requirements of education, experience, and examination, and on-going maintenance set forth through the BGC's American Board of Industrial Hygiene® (ABIH®) credentialing division for re-certification in the Comprehensive Practice of Industrial Hygiene and is thereby conferred the credential of

Certified Industrial Hygienist® (CIH®)

The aforementioned individual is given all rights, privileges, and responsibilities as both a diplomate of the BGC and holder of the CIH credential, provided that the credential is not suspended or revoked, and it is renewed annually. Moreover, the holder must meet all recertification requirements, including the obligation to practice ethically as prescribed by the BGC.



Credential Number: 10893 CP

Award Date: November 21, 2015

Expiration Date: June 1, 2026

A handwritten signature in black ink, appearing to read "Alan Leibowitz", is written over a horizontal line.

Alan Leibowitz, CIH, CSP, FAIHA
Chair of the Board of Directors

A handwritten signature in black ink, appearing to read "Ulric K. Chung", is written over a horizontal line.

Ulric K. Chung, MCS, PhD
Chief Executive Officer and Secretary



State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Daniel Leung
Name

Certification No. **07-4175**

Expires on **04/19/24**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.





STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH



LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:



Daniel Leung

CERTIFICATE TYPE:

Lead Project Monitor

Lead Inspector/Assessor

NUMBER:

LRC-00002628

LRC-00002456

EXPIRATION DATE:

8/22/2024

10/14/2023

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

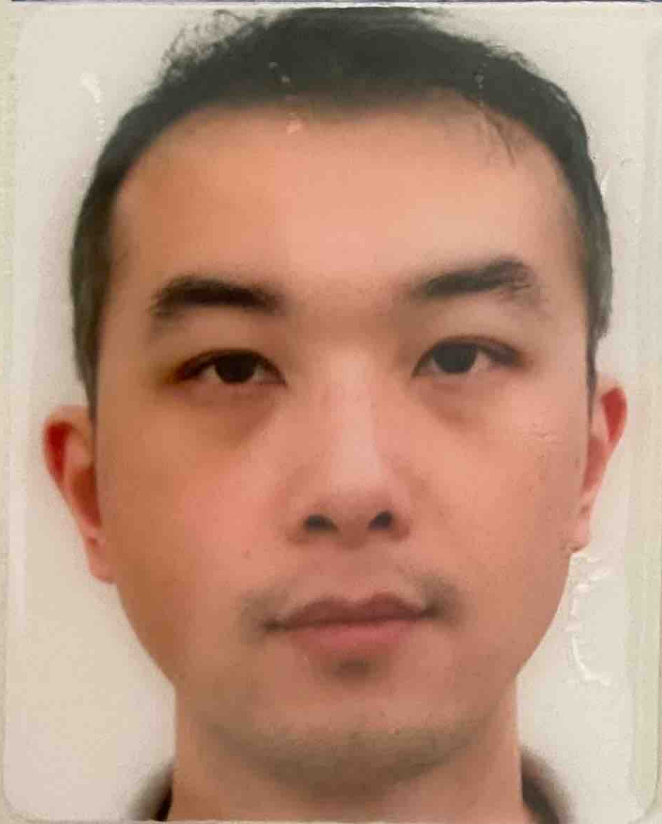
Chaowen Huang

Name

Certification No. 16-5737

Expires on 08/17/24

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.





STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH



LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:



Chaowen Huang

CERTIFICATE TYPE:

Lead Inspector/Assessor

Lead Sampling Technician

NUMBER:

LRC-00009179

LRC-00002865

EXPIRATION DATE:

9/18/2023

9/9/2023

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD