California Environmental Protection Agency
AIR RESOURCES BOARD

Monitoring and Laboratory Division
Air Quality Surveillance Branch

Protocol for the Ambient Air Monitoring of PM2.5 State Route 15 in San Diego, California

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The following protocol has been reviewed and approved by staff of the Air Resources Board (ARB). Approval of this protocol does not necessarily reflect the views and policies of the ARB, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

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1.0 Background

The potential of increased commercial trucking on State Route 15 (SR-15) has created some public concern. In response to these concerns, the Office of Supervisor Ron Roberts, County of San Diego, has requested the Air Resources Board (ARB) and the San Diego County Air Pollution Control District (SDAPCD) to assess the air quality near SR-15 in the City Heights neighborhood of San Diego. On January 15th, representatives of the ARB and SDAPCD met with representatives of Supervisor Ron Roberts, San Diego Unified School District and the California Department of Transportation and agreed to conduct a short term air quality study to measure levels of particulate matter with a diameter of 2.5 micrograms and less (PM2.5) at two (2) schools near SR-15 and to compare those levels to PM2.5 levels elsewhere in the county.

The study will utilize two roof-top mounted PM2.5 monitors manufactured by Met One Instruments. These monitors are known as E-BAMs and they measure and record hourly particulate mass concentrations in ambient air.

This protocol is intended to clarify how this study will be conducted and to specify various "products" which the study participants are expected to deliver.

2.0 Project Goals and Objectives

The goal of this project is to measure the levels of PM2.5 at two schools near SR-15, and compare these levels to levels measured at nearby air monitoring network stations.

To achieve this goal, the following objectives should be met:

1. Monitor PM2.5 concentrations at Central Elementary School and Wilson Middle School,

2. Conduct concurrent PM2.5 monitoring at nearby air monitoring network stations, and,

3. Prepare a written report focusing on the analysis of data collected near SR-15 with that collected at nearby air monitoring network stations (concurrent and historical data).

3.0 Contacts

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4.0 Study Location and Design

Sampling will be conducted with the Met One E-BAM. The E-BAM is a roof top mounted PM2.5 device which provides hourly PM2.5 concentrations coupled with hourly wind speed and direction. Two E-BAMs will be placed near Interstate 15 at Central Elementary and Wilson Middle School. See Figures 1 and 2 (Met One E-BAM with 034B Wind Sensor) and Figure 3 (Map of Site Locations).

The duration of this study is approximately four (4) weeks.

The San Diego County Air Pollution Control District presently operates four (4) continuous PM2.5 Met One BAM 1020 Monitors and five (5) PM2.5 filter samplers. Filters are collected from midnight to midnight on a daily or a 1-in-3 day schedule.

Location	PM2.5 BAM	PM2.5 Filter Sampler	Filter Schedule
Alpine-Victoria Drive	**X**		
El Cajon-Redwood Avenue	**X**	**X**	**1 and 3**
Escondido-E Valley Parkway	**X**	**X**	**1 and 3**
San Diego-1110 Beardsley Street	**X**	**X**	**Daily**
Chula Vista		**X**	**1 and 3**
San Diego – Overland		**X**	**1 and 3**

TABLE 1: PM2.5 FRM and BAM-1020 Locations

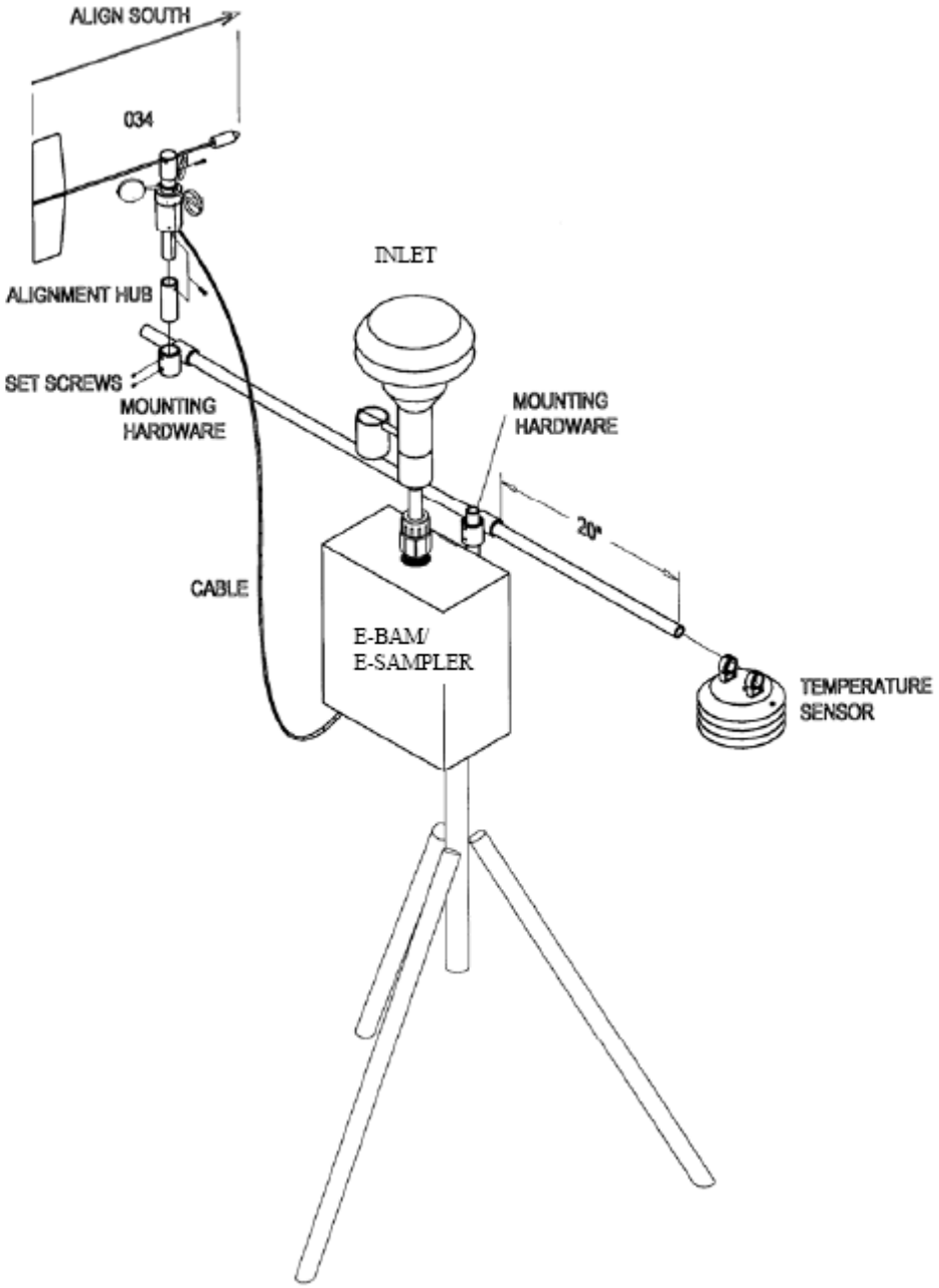

FIGURE 1: Met One E-BAM with 034B Wind Sensor.

FIGURE 2: Met One E-BAM with 034B Wind Sensor

Locations

Working in conjunction with Gary Rotto, Deputy Chief of Staff for Supervisor Ron Roberts, County of San Diego and James Watt, Director, Architecture and Planning, San Diego Unified School District, two locations have been identified as ambient air monitoring sites. They are:

Central Elementary School
4063 Polk Ave.
San Diego 92105 619-281-0644

Wilson Middle School
3838 Orange Ave.
San Diego 92105 619-280-1661

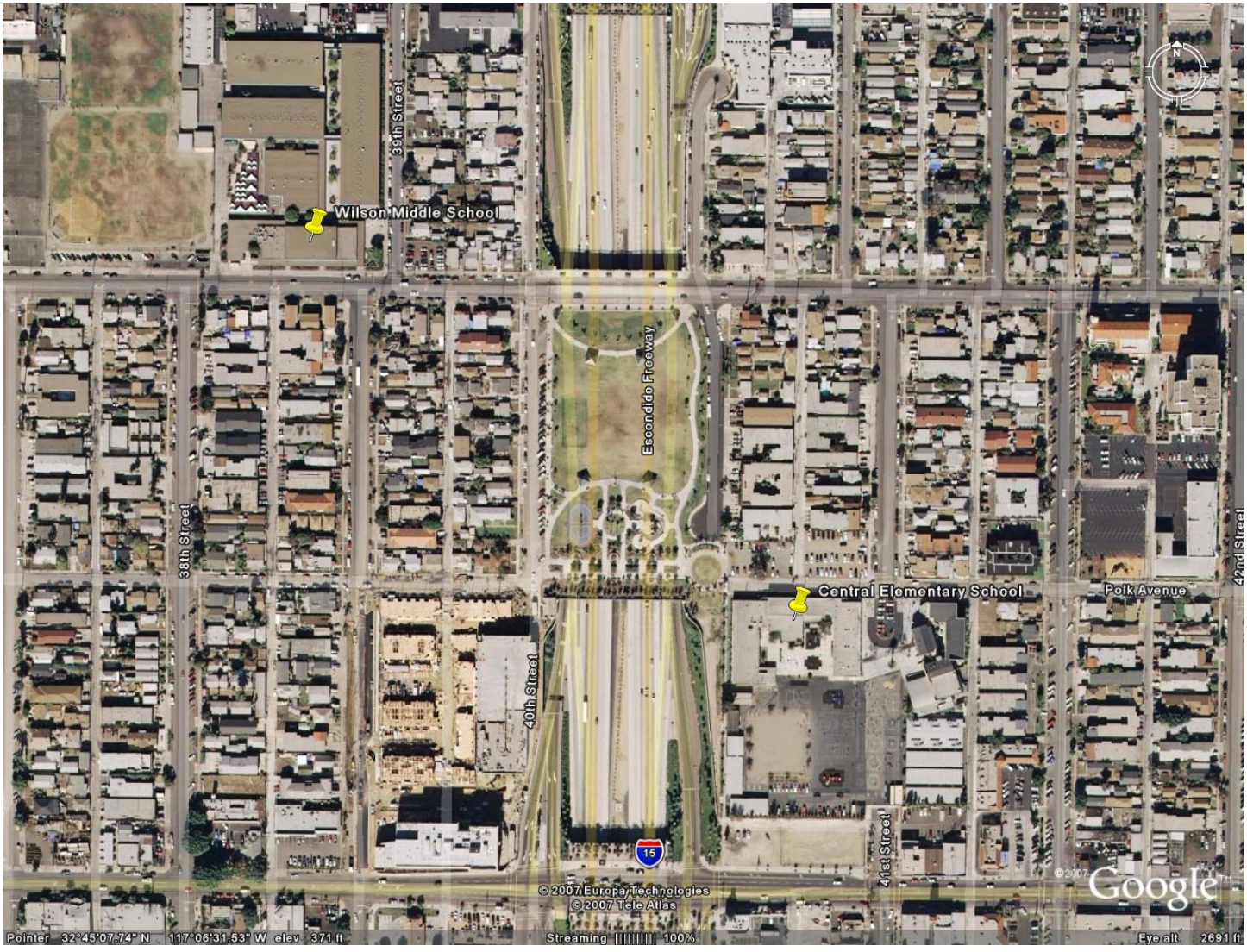

FIGURE 3: Map of Site Locations

5.0 Sampling and Data Collection Procedures

Special Purpose Monitoring Section (SPM) personnel will transport, assemble, calibrate and disassemble the Met One E-BAMS. Data will be validated and delivered to San Diego County APCD.

The E-BAM consists of a tripod, power supply, cabinet, PM2.5 inlet, cross arm, temperature sensor, wind speed sensor and wind direction sensor.

After start up, review operating settings and perform the field calibration. Calibration of the E-BAM is performed using a NIST-traceable transfer standard. The field calibration is completed by performing a flow, temperature and pressure calibration. **NOTE: Before a flow calibration is completed, a temperature and pressure calibration/check must first be conducted.** A field calibration will also be performed prior to shutdown.

Refer to AQSB SOP 411 (Draft) for additional information. (See Appendix A)

6.0 List of Field Equipment

Quantity	Item Description
(1)	Global Positioning System (GPS) with backup batteries and carrying case.
(1)	Digital Camera with backup batteries and carrying case.
(1)	BGI DeltaCal.
(1)	Ladder.
(2)	Met One E-BAM with 034B Wind Sensor (Figure 1).
(1)	Laptop.
(2)	Rolls of Filter Tape.
(1)	Toolbox.
(2)	50 foot Extension cords with multiple outlets.

7.0 Quality Control

Quality control procedures will be observed to ensure the integrity of data collected in the field. National Institute of Standards and Technology (NIST)-traceable transfer standards will be used to calibrate sample flow rates and meteorological sensors.

The sample flow rate and meteorological sensors of the Met One E-BAM sampler will be measured using a BGI DeltaCal having a current certification. Wind Direction will be aligned with geographic north.

The ARB Calibration Report and the Quality Control Maintenance Checksheet will be used to document operation of the E-BAM.

8.0 Deliverables

Air Resources Board Deliverables

Within 30 days from the completion of field sampling, the AQSB will provide the San Diego Air Pollution Control District with a report containing the following:

1) Sampling Protocol,
2) A map of the monitoring site locations,
3) Site Photographs,
4) Site Descriptions and Measurements, GPS coordinates,
5) Sampler Calibration Reports,
6) Transfer Standard Certification Reports, and,
7) A disk containing electronic files of hourly PM2.5 data and hourly wind speed/direction data in EXCEL format.

In addition, the Special Purpose Monitoring Section (SPM) will prepare a project binder containing the above information. This binder will remain with SPM though available for viewing and review as requested.

San Diego Unified School District Deliverables

Prior to the start of the project San Diego Unified School District will:

1) Identify secure locations of where the E-BAMs will operate,
2) Provide a reliable source of 110 Volt AC power, and,
3) Provide access to the locations where the E-BAMs will operate.

San Diego Air Pollution Control District Deliverables

Within 30 days from receiving the AQSB deliverables, the San Diego Air Pollution Control District will:

1) Assemble historic ambient PM2.5 data from nearby network monitoring stations,
2) Collect current PM2.5 from the same stations as mentioned above,
3) Compare the PM2.5 data collected at the two schools with historic/current data from the local network monitoring stations, and,
4) Submit results in a report to the Office of Supervisor Ron Roberts, County of San Diego.

   This report will contain:

   - Central tendency analysis statistical (e.g., means, maximums and modes of PM2.5 values),
   - Pollutant time-series analysis,
   - Wind rose plots (plots displaying percentage of time wind blows from different directions), and,
   - Pollutant rose plots for PM2.5 (displaying wind direction for various pollutant concentrations).

APPENDIX A: STANDARD OPERATING PROCEDURE
MET ONE INSTRUMENTS
E-BAM MASS MONITOR (DRAFT)

The purpose of this Standard Operating Procedure (SOP) is to document the Met One E-BAM (E-BAM) procedures used by the Air Quality Surveillance Branch of the California Air Resources Board (ARB). The goal of this SOP is two fold; to formalize E-BAM installation, configuration and operation procedures in order to ensure comparability among all E-BAM data, and to describe supplemental information and modifications to the E-BAM Operation Manual necessary to successfully integrate the E-BAM into California's ambient air monitoring network. The E-BAM Operation Manual contains a significant source of information pertinent to the operation, maintenance and understanding of this instrument, and therefore the ARB highly recommends a thorough review of the E-BAM Operation Manual.

APPENDIX B: Calibration Certificates/Documentation