

State of California
AIR RESOURCES BOARD

Resolution 85-64

August 22, 1985

Agenda Item No: 85-13-1

WHEREAS, Health and Safety Code Sections 39600 and 39601 require the Air Resources Board (the "Board") to adopt rules and regulations and take all actions necessary for the proper execution of the powers and duties granted to and imposed upon the state board;

WHEREAS, Health and Safety Code Section 39606(b) requires the Board to adopt standards of ambient air quality for the protection of the public health, safety and welfare, including but not limited to health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy;

WHEREAS, Health and Safety Code Section 39607 requires the state board to secure data on air quality in each air basin established by the state board and to monitor air pollutants in cooperation with other agencies;

WHEREAS, the current statewide ambient air quality standards for suspended particulate matter (PM₁₀) of 50 $\mu\text{g}/\text{m}^3$ (24-hour average) and 30 $\mu\text{g}/\text{m}^3$ (annual geometric mean), set forth in Title 17, California Administrative Code, Section 70200, specify measurement by a PM₁₀ sampler "which collects 50 percent of all particles of 10 micrometers aerodynamic diameter and collects a declining fraction of particles as their diameter increases, reflecting the characteristic lung deposition";

WHEREAS, compliance with the state PM₁₀ standard can best be determined by establishing a PM₁₀ sampling method;

WHEREAS, the method by which suspended particulate matter (PM₁₀) is measured is an integral part of the standard, as the use of different types of PM₁₀ samplers can produce different results;

WHEREAS, for purposes of the state 24-hour sulfur dioxide (SO₂) standard, the referenced suspended particulate matter standard is not the PM₁₀ standard but rather the 100 $\mu\text{g}/\text{m}^3$ total suspended particulate matter standard adopted by the Board in 1969, measured by a high volume sampler;

WHEREAS, the California Environmental Quality Act and Board regulations require that no project having significant adverse environmental impacts be adopted as originally proposed if feasible alternatives or mitigation measures are available;

WHEREAS, the Board finds that:

Currently available, size selective inlet, high volume (SSI) PM₁₀ samplers meet the criteria set forth in the comments to the PM₁₀ standard in Title 17, California Administrative Code, Section 70200;

A sampling method should be adopted which sets forth performance specifications, operating and calibration procedures, and calibration methods for PM₁₀ samplers;

Other samplers and sampling methods may be used for monitoring purposes if shown to give results equivalent to the specified method at or near the level of the standards;

The definitions for total suspended particulate matter as measured by a high volume sampler and suspended particulate matter (PM₁₀) should be in separate subsections of the regulations in order to differentiate and distinguish between the two definitions; and

The comment in Title 17, California Administrative Code, Section 70200 should be clarified to describe more accurately the PM₁₀ particle size distribution by specifying that the PM₁₀ sampler collects 50 percent of all particles of 10 microns aerodynamic diameter, a declining fraction of particles as their diameter increases, and an increasing fraction of particles as their diameter decreases;

WHEREAS, the Board finds that the proposed action will be beneficial to the environment by facilitating implementation of the state PM₁₀ standard adopted in 1983 and will have no adverse environmental impacts; and

WHEREAS, a public hearing has been held in accordance with the provisions of the Administrative Procedure Act (Government Code Section 11340 et seq.).

NOW, THEREFORE, BE IT RESOLVED that the Board hereby amends the regulations contained in Title 17, California Administrative Code, Sections 70100 and 70200, as set forth in Attachment A, and adopts Method P to be incorporated by reference in Title 17, California Administrative Code, Section 70100(j), as set forth in Attachment B, for determining ambient atmospheric concentrations of suspended particulate matter (PM₁₀).

I hereby certify that the above is a true and correct copy of Resolution 85-64, as adopted by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Public Hearing to Consider Amendments to Regulations Regarding
Measurement Methods for Determining Ambient Concentrations of
Suspended Particulate Matter (PM₁₀) and Related Matters

Agenda Item No.: 85-13-11

Public Hearing Date: July 5, 1985

Response Date: August 22, 1985

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant environmental
issues pertaining to this item. The staff report identified no
adverse environmental effects.

Response: N/A

Certified:

Harold Holmes
Board Secretary

Date:

8/30/86

Text of Proposed Amendments to Title 17,
California Administrative Code, Sections 70100 and 70200

NOTE: On April 30, 1985, the Board adopted amendments to Title 17, California Administrative Code, Sections 70100 and 70200 as a result of the regulatory review processes required by Assembly Bill 1111 (Stats 1979, ch 567) and by the Governor in 1983. The April 30, 1985 amendments are presently being reviewed by the Office of Administrative Law (OAL) and have not yet become effective.

The attached text of proposed amendments indicates changes from the presently effective language in underline and strikeout form. Copies of the April 30, 1985 amendments are available from the Air Resources Board's Public Information Office, 1102 Q Street, Sacramento, California 95814. The April 30, 1985 amendments did not change either Section 70100(j) or the portion of the table in Section 70200 regarding the sulfur dioxide (SO₂) standard, and amendments to the portion of the table in Section 70200 regarding the suspended particulate matter (PM₁₀) standard only corrected a typographical error contained in the published version of the California Administrative Code. The amendments did change the language in Section 70100(k) through (m), and added new subsections (n), (o) and (p). If the attached amendments are adopted by the Board, the staff will request to OAL that the new subsections added in the April 30, 1985 amendments be lettered (o), (p) and (q), respectively.

Amend Title 17, California Administrative Code, Section 70100, subsections (j) and following, to read as follows:

(j) Suspended Particulate Matter (PM₁₀). Suspended particulate matter (PM₁₀) refers to atmospheric particles, solid or liquid, except uncombined water. ~~Atmospheric-suspended-particulate-matter-is-to-be as measured by the high-volume-sampler-method-or-by-an-equivalent-method-for purposes-of-determining-total-suspended-particulate-and-by a PM₁₀ sampler which collects 50 percent of all particles of 10 μm aerodynamic diameter and which collects a declining fraction of particles as their diameter increases and an increasing fraction of particles as their diameter decreases,~~ reflecting the characteristic of lung deposition. Suspended particulate matter (PM₁₀) is to be measured by the size selective inlet high volume (SSI) PM₁₀ sampler method in accordance with ARB Method P, as adopted on August 22, 1985, or by an equivalent PM₁₀ sampler method, for purposes of monitoring for compliance with the Suspended Particulate Matter (PM₁₀) standards (PM₁₀).

(k) Total Suspended Particulate Matter. Total suspended particulate matter refers to suspended atmospheric particles of any size, solid and liquid, except uncombined water. Total suspended particulate matter is to be measured by the high volume sampler method or by an equivalent method for purposes of monitoring for compliance with the 24-hour Sulfur Dioxide (SO₂) standard.

(k) (1) Visibility Reducing Particles. Visibility reducing particles are atmospheric particles in the light scattering size range. The effect of these particles on prevailing visibility is to be determined by direct observation, or by an equivalent method.

{1} (m) Hydrogen Sulfide (H₂S). Hydrogen sulfide is a colorless gas having the molecular form H₂S. Atmospheric hydrogen sulfide concentrations are to be measured by the cadmium hydroxide-STRactan method.

{m} (n) Nitrogen Dioxide (NO₂). Nitrogen dioxide is a red-brown gas, odorless under atmospheric conditions, having the molecular form NO₂. Atmospheric nitrogen dioxide concentrations are to be measured by the Saltzman Reagent method, or by an equivalent method.

NOTE: Authority cited: Sections 39600 and 39601, Health and Safety Code.
Reference: Sections ~~39600~~, 39602, and ~~39607~~ 39606(b), Health and Safety Code.

Amend portion of table in Section 70200, Title 17, California Administrative Code,

to read as follows:

70200. Table of Standards, Applicable Statewide.

Substance	Concentration and Methods*	Duration of Averaging Periods	Most Relevant Effects	Comments
* * * * *				
Sulfur Dioxide (SO ₂)	0.25 ppm** fluorescence method	1 hour	a. Bronchoconstriction accompanied by symptoms, which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma.	The standard is designed to protect against adverse effects from short-term (5-10 min.) peak exposures
	0.05 ppm fluorescence method, with oxidant, (ozone) equal to or greater than the state standard, or with total suspended particulate matter equal to or greater than the state 24-hour suspended particulate matter standard.****	24 hours	a. Will help prevent respiratory disease in children. b. Higher concentrations associated with excess mortality.	a. Further studies on co-carcinogenic role are necessary. b. Does not include effects on vegetation, ecosystems and materials. c. May not include a margin of safety

* * * * *

Suspended Particulate Matter (PM ₁₀)	50 μ g/m ³ PM ₁₀ **	24-hour sample	Prevention of excess deaths from short-term exposures and of exacerbation of symptoms in sensitive patients with respiratory disease. Prevention of excess seasonal declines in pulmonary function, especially in children.	This standard applies to suspended matter as measured by PM ₁₀ sampler, which collects 50% of all particles of 10 μ m aerodynamic diameter and collects a declining fraction of particles as their diameter increases and an increasing fraction of particles as their diameter decreases, reflecting the characteristic of lung deposition.
	30 μ g/m ³ PM ₁₀ ** <u>SSI Method in accordance with ARB Method P</u>	24-hour samples, annual geometric mean		

* * * * *

* Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

** These standards are violated when concentrations exceed those set forth in the body of the regulation.

* * * * *

**** The 24-hour suspended particulate matter standard referred to is that adopted by the Board in 1969, of 100 μ g/m³ as measured by high volume sampler.

NOTE: Authority cited: Sections 39600, 39601(a) and 39606(b), Health and Safety Code.
Reference: Sections 39014, 39606(b), 39701 and 39703(g), Health and Safety Code.

METHOD P

AMBIENT AIR ANALYSIS METHOD FOR DETERMINING AMBIENT ATMOSPHERIC CONCENTRATIONS OF SUSPENDED PARTICULATE MATTER NOMINALLY 10 MICROMETERS OR LESS IN AERODYNAMIC DIAMETER (PM₁₀)

1. Principle and Applicability

1.1 Principle

A sampler draws a known quantity of ambient air through an inlet which is designed to admit specified proportions of particles as a function of their aerodynamic diameter. The inlet is designed to mimic the deposition of particulate matter in the human lung.

The particle collection characteristics of an ideal sampler, one which matches the human lung particle deposition characteristics, are outlined in 5.1.j. The particulate matter collected with such a sampler is referred to as suspended particulate matter nominally 10 micrometers or less in aerodynamic diameter, or abbreviated as PM₁₀.

As does the human lung, the ideal sampler collects a declining fraction of particles as their diameter increases and an increasing fraction of particles as their diameter decreases. For example, as can be seen in 5.1.j, all particles less than 1.0 μm in diameter are collected and no particles of 16 or more μm in diameter are collected.

In the ideal sampler, the PM₁₀ passes through the inlet and is collected on a filter. The net weight (mass) of particulate matter deposited on the filter is determined as the difference in filter weight before and after sampling. The concentration of PM₁₀ is reported as mass of particulate collected per cubic meter of air sampled (micrograms per cubic meter) at normal sea level temperature and pressure (760 torr., 25°C).

1.2 Applicability

This method provides for the measurement in ambient air of the concentration of PM₁₀ over a 24-hour period. The measurement process is nondestructive and the sample can be subjected to subsequent physical and chemical analyses.

2. Range

The lower limit of the mass concentration range is limited by the repeatability of filter tare weights, assuming the nominal air sample volume for the sampler. The upper range limit is determined by the point at which the sampler can no longer maintain the required flow. This limit is a complex function of particle type and size distribution which is not readily quantifiable.

3. Interferences

3.1 Loss of Volatile Particles

Volatile particles collected on filter material can be lost during shipment and/or storage of the filters. Filters should therefore be reweighed as soon as possible.

3.2 Artifact Particulate Matter

Filters that meet the alkalinity specifications (Section 6, paragraph 6.4) show little or no artifact sulfate. Loss of true nitrate is dependent on location and temperature but for most locations the errors are expected to be small.

4. Precision and Accuracy

4.1 Precision

The reproducibility of PM_{10} samplers must be within ± 15 percent of true value at the 95 percent confidence level, as assessed by collocation of samplers.

4.2 Accuracy

Sample accuracy is dependent on sampling effectiveness, flow measurement and calibration. Sampling effectiveness is expressed as the ratio of the mass concentration of particles of a given size reaching the sample filter to the mass concentration of particles of the same size approaching the sampler. The particle size for 50 percent effectiveness is required to be 10 ± 1 micrometers.

5. Apparatus and Specifications

5.1 PM_{10} Sampler

The sampler shall be designed to:

- a. draw the air sample, via reduced internal pressure, into the sampler inlet and through the filter at a uniform face velocity.
- b. hold and seal the filter in a horizontal position so that sample air is drawn downward through the filter.
- c. allow the filter to be installed and removed conveniently.
- d. protect the filter and sampler from precipitation and prevent insects and other debris from being sampled.

- e. minimize leaks that would cause error in the measurement of the air volume passing through the filter.
- f. discharge exhaust air at a sufficient distance from the sampler inlet to minimize the sampling of exhaust air.
- g. minimize the collection of dust from the supporting surface.
- h. provide uniform distribution of particulate matter on the filter media such that the deposition on the four quadrants shall agree within 5 percent.

The PM₁₀ sampler shall meet the following criteria for sampling effectiveness at windspeeds from 2 to 24 kilometers per hour:

<u>Parameter</u>	<u>Criteria</u>
Liquid Particles	Expected mass concentration is within + 10 percent of that predicted by the ideal sampler.
Solid Particles	Expected mass concentration no more than 5 percent above that obtained for liquid particles of the same size.
50 Percent Cutpoint	10 ± 1 μm aerodynamic diameter
Reproducibility	15 percent coefficient of variation for three collocated samplers.

The sampling effectiveness of the ideal sampler is:

<u>Particle Size (μm)</u>	<u>Sampling Effectiveness</u>
< 1.0	1.000
2.0	0.942
3.0	0.922
4.0	0.893
5.0	0.857
6.0	0.812
7.0	0.759
8.0	0.697
9.0	0.628
10.0	0.551
11.0	0.465
12.0	0.371
13.0	0.269
14.0	0.159
15.0	0.041
≥ 16.0	0.000

The sampler shall operate at a controlled flow rate specified by its designer or manufacturer, and it shall have an inlet system that provides particle size discrimination characteristics meeting all of the specifications in this document. The sampler inlet shall show no significant wind direction dependence. This requirement can generally be satisfied by an inlet shape that is circularly symmetrical about a vertical axis.

The sampler shall provide a means to measure the total flow rate during the sampling period. A continuous flow recorder is recommended. The sampler may be equipped with additional flow measurement devices if it is designed to collect more than one particle size fraction.

The sampler shall have an automatic flow control device capable of adjusting and maintaining the sample flow rate within ± 10 percent for the sampler inlet over normal variations in line voltage and filter pressure drop. A convenient means must be provided to temporarily disable the automatic flow control device to allow calibration of the sampler's flow measurement device.

A timing/control device capable of starting and stopping the sampler shall be used to obtain an elapsed run time of 24 ± 1 hour (1440 ± 60 minutes). An elapsed time meter, accurate to within 15 minutes, shall be used to measure sampling time. This meter is optional for samplers with continuous flow recorders if the sampling time measurement obtained by means of the recorder meets the ± 15 minute accuracy specifications.

The sampler shall have an associated operation or instruction manual.

Since proper service and maintenance is critical to obtaining valid data, the user should adopt adequate and documented standard operating procedures.

6. Filters

6.1 Filter Medium

No commercially available filter medium is ideal in all respects for all samplers. The user's goals in sampling determine the relative importance of various filter evaluation criteria (e.g. cost, ease of handling, physical and chemical characteristics, etc.) and consequently determine the choice among acceptable filters. Furthermore, certain types of filters may not be suitable for use with some samplers, particularly under heavy loading conditions (high mass concentrations), because of high or rapid increase in the filter flow resistance that would exceed the capability of the sampler's automatic flow controller. The specifications given below are minimum requirements to insure acceptability of the filter medium for measurement of PM_{10} mass concentrations.

6.2 Collection Efficiency

Greater than 99 percent as measured by DOP test (ASTM-2986) with 0.3 μm particles at the sampler's operating face velocity.

6.3 Integrity

$\pm 5 \mu\text{g}/\text{m}^3$ (assuming sampler's nominal 24-hour air sample volume), measured as the concentration equivalent corresponding to the difference between the initial and final weights of the filter when weighed and handled under simulated sampling conditions (equilibration, initial weighing, placement on inoperative sampler, removal from sampler, re-equilibration, and final weighing).

6.4 Alkalinity

< 0.005 milliequivalents/gram of filter as measured by ASTM-D202 following at least two months storage at ambient temperature and relative humidity.

7. Procedure

7.1 The sampler shall be operated in accordance with the general instructions given here and with the specific instructions provided in the sampler manufacturer's instruction manual.

Note: This procedure assumes that the sampler's flow rate calibration was performed using flow rates at ambient conditions (Q_a).

7.2 Inspect each filter for pinholes, particles, and other imperfections; establish a filter information record and assign an identification number to each filter. Careful handling of filters between preweighing and post-sampling is necessary to avoid errors due to damaged filters or loss of particulate.

7.3 Equilibrate each filter in the conditioning environment for at least 24 hours.

Filter Conditioning Environment

a. Temperature range: 15 to 30°C

b. Temperature control: $\pm 3^\circ\text{C}$

c. Humidity: Less than 50 percent relative humidity

7.4 Following equilibration, weigh each filter and record the presampling weight with the filter identification number.

7.5 Analytical Balance

The analytical balance must be suitable for weighing the type and size of filters required by the sampler. The range and sensitivity required will depend on the filter tare weight and mass loading. Typically, an analytical balance with a sensitivity of 0.1 mg is required for high volume SSI samplers (flow rates > 0.5 m³/min).

7.6 Pre-Run Procedure

- a. Air Sample Report - Prior to each run, record on the Air Sample Report: the reporting agency, station address, station name, instrument number and county, site, agency and project codes. Figure P-1 shows an example of the Air Sample Report form.
- b. Clean Filter Installation - The clean particulate filter is placed on the sampler and secured in place.
- c. Flow Setting - The actual flow rate must be maintained as specified by the manufacturer in order to maintain the 10 µm cut-point of the inlet. This will require special care at elevations greater than 1000 feet above sea level in order to prevent errors due to reduced atmospheric density.
- d. Elapsed Time Meter - Record the initial elapsed time meter reading on the Monthly Check Sheet.

7.7 Post-Run Procedure

- a. Final Flow Meter Reading - Before removing the filter and flow chart, make sure that the recorder trace shows the final flow. If not, the sampler must be started to determine the final flow.

Remove the flow chart from the recorder and examine the trace for abnormalities. Note and investigate any abrupt changes in air flow. If the start and finish air flows are not representative of your geographic area, note this on the Air Sample Report under "Remarks."

- b. Exposed Filter Removal - Grasp the exposed filter without touching the darkened area. Fold it in half width-wise with the darkened side in. A satisfactory filter is one which has a uniform white border. Dark streaks into the border may indicate an air leak which invalidates the sample. If there are insects on the filter, remove them carefully. Note on the Air Sample Report if the filter is torn or ruptured, if pieces of filter are left sticking to the gasket, if the start or finish times are not known, or if the flows are outside the specified range.

Note: A removable filter cartridge may be loaded and unloaded at the station operator's headquarters to avoid contamination and damage to the filter media.

- c. Timer and Elapsed Time Meter Check - After each run, check how long the sampler ran by reading the elapsed time meter. Record the final elapsed time meter (ETM) reading. These ETM readings are used in calculating the concentration of collected particulates as they are more accurate than the timer or flow chart times. Adjust the timers to meet the timer acceptance limits of 24 hours + 15 minutes.

7.8 Equilibration

Equilibrate the exposed filter(s) in the conditioning environment for 24 hours and immediately after equilibration reweigh the filter(s) and record the weight(s) with the filter identification number(s).

8. Calibration

The Size Selective Inlet High Volume Sampler (SSI) is calibrated by establishing that the air sample velocity is as designed to meet the particle deposition specifications given in Section 5 of this method. The SSI PM₁₀ sampler is calibrated using an orifice transfer standard that has been standardized against a primary standard Roots meter. The orifice transfer standard is referenced to 25°C and 760 mm Hg. Two different types of orifice calibrators are available. One type uses multihole adapter plates to vary the flow. The second type has an adjustable flow restrictor. In either case, the calibrator is connected to a differential pressure gauge or slack tube manometer. Pressure drops and indicated flow meter readings are recorded and corrected for elevation, as necessary. Using the pressure drops, the standard (true) flowrates are calculated using the certification equation for the transfer standard. Finally, a working sampler calibration curve of standard flowrate vs. indicated flowrate is plotted. The field calibration procedure assumes that:

- elevations below 1,000 feet are equivalent to standard conditions.
- the effect of temperature on the indicated flowrate is negligible and therefore is not used in the determination of the standard flowrate.

8.1 Apparatus

- a. Orifice Calibrator Transfer Standard with certification equation.
- (1) A flow rate transfer standard, suitable for the flow rate of the sampler and calibrated against a primary standard that is traceable to NBS, must be used to calibrate the sampler's flow measurement device.
 - (2) The reproducibility and resolution of the transfer standard must be 2 percent or less of the sampler's operating flow rate.
 - (3) The flow rate transfer standard must include a means to vary the sampler flow rate during calibration of the sampler's flow measurement device.

- b. 0-20" differential pressure gauge or slack tube manometer.
- c. Tygon tubing for static pressure connections.
- d. Faceplate adapter with "C" clamps.
- e. Flow charts for continuous recorder.
- f. Calibration report forms.
- g. Plastic cap for constant volume sampler sensor.

8.2 "As Is" Calibration

Other than routine daily checks, sampler repairs or adjustments (brush changes, motor replacement, flow recorder changes, etc.) should not be made prior to the "as is" calibration. The sampler should be calibrated after each 800 hours of operation, if the sampler is moved to a different site, or if the initial flow meter reading falls outside of specified tolerance limits.

Note: Some samplers use a closed loop control system to provide constant blower speed and sample flow. The flow sensor is located in the throat of the filter holder assembly. Before calibrating this type of sampler, first cover the flow sensor with a plastic cap. After calibrating, remove the cap.

- a. Open the PM₁₀ sampler shelter and remove the filter holder. Secure the faceplate adaptor and orifice calibrator; then, tighten down the orifice calibrator. If using a variable resistance calibrator, simply secure the calibrator to the faceplate adaptor and turn the restrictor control fully counterclockwise so that the maximum flow will be obtained. Connect a section of tygon tubing from the orifice tap on the calibrator to one leg of the manometer. Open the other leg so that it is open to the atmosphere. A schematic diagram of a typical sampler flow calibration is shown in Figure P-2.
- b. After the sampler has warmed up, turn the motor off and then on and allow the static pressure (ΔP) and indicated flow reading (Q_{ind}) to stabilize. Then, read the static pressure (ΔP) and indicated flow readings (Q_{ind}). The static pressure is read as the total displacement, in inches, of the manometer water column. Record the static pressure and the indicated flow readings on the PM₁₀ Sampler Calibration Data Sheet (see Figure P-4 as an example). Repeat this step twice so that a total of three test runs are performed.
- c. Repeat Step b for each of the remaining four load plates. When using the variable resistance calibrator, select four additional points equally spaced around the setpoint determined in Section 7.6 (two points above and two points below; see example in Figure P-4).

- d. Remove the orifice calibrator from the sampler. Measure the indicated flow with a clean filter installed in the PM₁₀ sampler and record this value on the bottom of the Calibration Data Sheet.
- e. On the left side of the Calibration Data Sheet, sum the ΔP readings for each line (Runs 1-3) and record the sum under "SUM ΔP "; then calculate and record the average ΔP for each line (Points 1-5). On the right side of the data sheet, sum the Q_{ind} readings for each line (Runs 1-3) and record the sum under "SUM Q_{ind}"; then calculate and record the average Q_{ind} for each line (Points 1-5).
- f. Record the elevation of the sampler on the Calibration Data Sheet. If the elevation is less than 1,000 feet, no altitude correction is required. If the elevation is 1,000 feet or greater, apply an altitude correction factor.
- g. Referring to the certification equation and using the corrected ΔP values calculated in f. above (or average ΔP values for locations less than 1,000 feet elevation), determine and record Q_{std} (transfer standard) for each point, where

$$Q_{std} = \text{factor Corr } \Delta P$$

- h. Using the data from the Calibration Data Sheet, plot a Calibration Graph Q_{std} (transfer standard) vs. Q_{ind}. Draw a straight line through the plotted points, or, if facilities are available, obtain a linear regression computer plot.

This line represents the working sampler calibration graph for the particular sampler elevation. A sample plot is shown in Figure P-5.

- i. Using the tabulated values of average Q_{ind}, determine Q_{prev} (PM₁₀ Sampler) by referring to the previous sampler calibration curve (Q_{std} vs. Q_{ind}). Find the appropriate value of Q_{prev} from the y-axis corresponding to Q_{ind} on the x-axis. Record Q_{prev} on the Calibration Data Sheet for each line (points 1-5).
- j. Sum the column Q_{std} (transfer standard), tabulated on the left side of the Calibration Data Sheet. Record this sum as "S₁".
- k. Sum the column Q_{prev} (PM₁₀ Sampler), determined in Step i; record this sum as "S₂".
- l. Calculate the percent deviation from previous calibration using the equation listed on the bottom of the Calibration Data Sheet. Record the result.
- m. Using the sampler calibration graph, convert the clean filter indicated air flow rate to standard air flow rate and record the result on the bottom of the Calibration Data Sheet.

n. Complete a Calibration Report (see Figure P-3). A copy should be kept at the sampling site and in the operating organization's headquarters file.

8.3 "Final" Calibration - A final calibration is required after specified maintenance is performed (brush changes, motor replacement, flow recorder changes, including maintenance to correct the average initial flow meter reading being out of tolerance, or to repeat a sampler calibration graph which is non-linear.

8.4 Blank Forms and Assistance - A sample copy of forms such as blank Calibration Data Sheets, as well as assistance in calibration procedures, can be obtained by contacting:

STATE OF CALIFORNIA
Air Resources Board
Aerometric Data Division
Quality Assurance Section
P. O. Box 2815
Sacramento, CA 95812

9. Calculations

9.1 Determine the average flow rate over the sampling period corrected to reference conditions as Q_{std} .

9.2 Calculate the total volume of air sampled as:

$$V = Q_{std} \times t$$

Where:

V = total air sampled in standard volume units, std m^3 ;

t = sampling time, min.

9.3 Calculate the PM_{10} concentration as:

$$PM_{10} = \frac{(W_f - W_i) \times 10^6}{V}$$

Where:

PM_{10} = mass concentration of PM_{10} , $\mu g/std\ m^3$;

W_f W_i = final and initial weights of filter(s)
collecting PM_{10} particles, g;

10^6 = conversion of g to μg .

Memorandum

To : Gordon Van Vleck
Secretary
Resources Agency

Date : January 27, 1986

Subject : Filing of Notice of
Decisions of the Air
Resources Board

Harold Holmes
Harold Holmes
Board Secretary

From : Air Resources Board

Pursuant to Title 17, Section 60007 (b), and in compliance with Air Resources Board certification under Section 21080.5 of the Public Resources Code, the Air Resources Board hereby forwards for posting the attached notice of decisions and response to environmental comments raised during the comment period.

ATTACHMENTS

85-64
85-65
85-70 and SEI
85-79

FILED AND POSTED BY
OFFICE OF THE SECRETARY

JAN 27 1986

Resources Agency of California