ENVIRONMENTAL PROTECTION AGENCY

ANALYSIS OF THE AIR POLLUTION CONTROL STRATEGY FOR THE SAN FRANCISCO BAY AREA INTRASTATE AIR QUALITY CONTROL REGION

July 1976

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TABLES AND FIGURES

I. INTRODUCTION

In 1971 the Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS) to safeguard the health and welfare of the people of the United States. Two levels of standards were developed: a) primary ambient air quality standards are those which allow an adequate margin of safety and are requisite to protect the public health, and b) secondary standards are those which are requisite to protect the public welfare from adverse effects associated with the presence of air pollutants in the ambient air. The National Ambient Air Quality Standards are listed in Table I.

Section 110(a)(2)(H) of the Clean Air Act, as amended, requires that State Implementation Plans - SIPs (enforcable State plans which provide for the attainment and maintenance of the national primary and secondary ambient air quality standards) - provide "for revision, after public hearings, of such plans (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of achieving such primary or secondary standards; or (ii) whenever the Administrator finds on the basis of information available to him that the plan is substantially inadequate to achieve the national ambient air quality primary or secondary standard which it implements".

The Regional Administrator has the responsibility to identify any SIP which is substantially inadequate to attain and maintain national standards, and to request a plan revision. While the Clean Air Act requires attainment of both primary and secondary standards, priority attention shall be addressed to attainment of primary standards. Any plan revision for attainment of national standards shall also consider maintenance of such standards.

Requests for SIP revisions are to be publicly announced through a letter to the Governor and a notice in the Federal Register. The requests must specify the schedule for submission of revisions by the State. An SIP revision which requires the application of all achievable emission limitations to the extent necessary to meet national primary standards must be submitted by the State to EPA on or before July 1, 1977. The term "achievable" is intended to mean "reasonably available control technology" (RACT).

TABLE I

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Primary Standard	Secondary Standard
Carbon Monoxide (CO):	10 mg/m^3 (9 ppm) 8 hour average concentration* and 40 mg/m^3 (35 ppm) 1 hour average concentration*	Same Same
Nitrogen Dioxide: (NO_2)	100 ug/m^3 (0.05 ppm) annual arithmetic mean	Same
Photochemical Oxidants (Ox), measured as ozone:	160 ug/m^3 (0.08 ppm) 1 hour average concentration*	Same
Hydrocarbons (HC), measured as non-methane organics:	160 ug/m^3 (0.24 ppm) 3 hour (6 to 9 AM) average concentration*,**	Same
Sulfur Oxides (SO_x), measured as Sulfur Dioxide (SO_2):	80 ug/m^3 (0.03 ppm) annual arithmetic mean; and 365 ug/m^3 (0.14 ppm) 24 hour average concentration*	1,300 ug/m^3 (0.5 ppm 3 hour average concentration*
Particulate Matter (PART), measured as Total Suspended Particulate (TSP):	75 ug/m^3 annual geometric mean; and 260 ug/m^3 24 hour average concentration*	 150 ug/m^3 24 hour average concentration*

*Maximum value not to be exceeded more than once per year
**To be used only as a guide in meeting the Ox standard

An SIP revision which includes all other control measures necessary to meet the national standards must be submitted by the State to EPA on or before July 1, 1978. These "other measures" should include items such as land use measures, transportation controls, transit improvements, zoning ordinances, building codes (such as to increase insulation), inspection/maintenance programs (for stationary and/or mobile sources), etc. These "other measures" are often incorrectly construed to be strictly "maintenance" measures; many are in fact effective for attainment also.

The SIP revisions must specify new primary standards attainment dates which are as expeditious as practicable. Although this term carries a presumption of no more than three years, in exceptional cases more than three years may be necessary. The SIP revisions must specify new secondary standards attainment dates which represent a "reasonable time". This term also carries a presumption of no more than three years, although additional flexibility is permitted in attainment of secondary standards.

The decision to request an SIP revision is based upon a summary of previous air quality analysis documents, an analysis of the present air quality, a projection of future air quality, a summary of the present control strategy, the status of enforcement activity, an analysis of the relative contribution of stationary point and non-point sources (i.e., major and minor sources) to the air pollution problem, and a comparison of the present control strategy with reasonably available control measures, for each air quality control region (AQCR).

II. ANALYSIS

A. SUMMARY OF AIR QUALITY ANALYSIS DOCUMENTS

Following are summaries of formal documents reviewed by EPA in assessing the air pollution problem in the San Francisco Bay Area Air Quality Control Region (AQCR):

1. Prediction of the Effects of Transportation Controls on Air Quality in Major Population Areas, prepared by TRW, Inc. for EPA, APTD-1363, November 1972:

This study was not directed at standard attainment.

The study estimated 1977 San Francisco Bay Area AQCR hydrocarbon emissions reductions from 1968 levels of 42 percent through internal automotive controls, an additional 12 percent through implementation of an Inspection/Maintenance program and less than 5 percent through traffic flow controls.

The study estimated 1977 San Francisco Bay Area AQCR carbon monoxide emission reductions from 1968 levels of 35 percent by additional internal automotive controls, an additional 10 percent reduction through implementation of an Inspection/Maintenance program, and a 20 percent reduction through implementation of vehicle miles traveled (VMT) reduction measures.

2. Air Quality Implementation Plan Development for Critical California Regions, San Francisco Bay Area Intrastate AQCR, prepared by TRW, Inc. for EPA, August 1973:

This study was directed at identifying measures which would allow attainment of the National Ambient Air Quality Standards. Particulate, reactive hydrocarbon, nitrogen oxides and carbon monoxide emissions are estimated for the base year of 1971, and projections are made for the years 1975, 1977 and 1980. The report concludes: "Presently planned stationary and mobile source controls are inadequate for achieving the ambient air quality goals; therefore, additional control measures are clearly indicated."

3. National Assessment of Particulate Problem, Volume XIII, San Francisco, California, Draft Final Report, prepared by GCA Corporation for EPA, February 1976:

This report is one of a series of similar studies done in other areas throughout the country to provide a nationwide assessment of the nature and reasons for the problem of non-attainment of the national ambient particulate standards. The report is structured so as to provide comparable data on air quality, emissions, regulations, compliance and other factors that may affect particulate levels so that an assessment can be made of the particulate problem, with recommendations for actions to be taken.

This report indicates that fugitive dust emissions make a major contribution to the violation of the secondary standard, and suggests that the control of fugitive dust could be improved by implementing source specific fugitive dust regulations. Fugitive dust is defined as particulate matter that becomes airborne due either to forces of wind or man's activity (e.g., windblown dust from deserts and tilled farmland, or traffic on unpaved roads).

B. SUMMARY OF AIR QUALITY DATA

The ambient air quality data summary analysis below is made in an effort to identify the magnitude and extent of the air pollution problem in the San Francisco Bay Area Intrastate Air Quality Control Region (AQCR). The National Ambient Air Quality Standards (see Section I-Introduction) are the standards against which the air quality is evaluated.

The majority of ambient monitoring in the AQCR is done by the Bay Area Air Pollution Control District (BAAPCD), but both the California Air Resources Board (ARB) and EPA operate air monitors in the region. The BAAPCD routinely submits air quality data to the ARB which in turn submits both the District and State data to EPA. The data are stored at the National level in the EPA National Aerometric Data Bank (NADB) in North Carolina. The data presented in this summary are for 1974, the most recent full year's data in NADB.

The second highest concentration over a standard, the ratio of the second highest concentration to the standard, and the number of days (or percent of values) over the standard, are presented in Table II for each station violating a standard. The second highest concentration is used since one excursion over the standard per year is allowed. Stations not violating a standard are not listed. Oxidant values are corrected where appropriate by the ARB recommended oxidant calibration correction factors. The correction factors are 0.85 for the San Diego County Air Pollution Control District stations, and 0.80 for all other stations in California except the Los Angeles County Air Pollution Control District stations, for which no correction factor is necessary.

A map has been prepared for each standard that has been violated in the AQCR illustrating the location of all monitoring stations for which there are data in the NADB, and indicating the stations where violations occurred and the station with the maximum concentration (See Figures I thru III).

Following are brief discussions of the monitoring and the air quality for each pollutant:

Carbon Monoxide (CO):

There were 15 continuous instruments monitoring CO in the AQCR in 1974. They were distributed throughout the metropolitan area. The 8-hour CO standard was violated at 4 of the stations. The maximum second highest concentration at any one station was 1.9 times the standard, and the maximum number of days the standard was exceeded at any one station was 21. No violations of the one-hour standard were reported.

Nitrogen Dioxide (NO_2):

There were 10 stations (8 BAAPCD, one ARB and one EPA) with continuous monitoring instruments in the AQCR. There were also 3 EPA National Air Sampling Network (NASN) 24-hour composite bubbler samplers in the metropolitan area. None of the stations reported violations of the NO_2 standard in 1974.

Photochemical Oxidants or Oxidants (Ox):

There were 22 continuous oxidant monitors (21 BAAPCD, one ARB) in the AQCR. The one-hour oxidant standard was violated at 20 stations in 1974. The maximum second highest concentration at any one station was 2.6 times the standard, and the maximum number of days the standard was exceeded at any one station was 65.

Sulfur Dioxide (SO_2):

The BAAPCD operated 10 continuous instruments monitoring SO_2 in the AQCR. Four instruments were located to monitor the major sources, and the remainder monitored population exposures in the general vicinity of the sources. Three EPA NASN 24-hour composite bubbler samplers were also located in the metropolitan area. None of the stations reported violations of the primary or secondary SO_2 standards in 1974.

Particulate Matter or Total Suspended Particulate (TSP):

There were 14 BAAPCD and 3 EPA NASN high volume samplers located throughout the AQCR. None of the stations recorded violations of the primary TSP standards in 1974. The secondary TSP standard was violated at two stations. The maximum second highest concentration at any one station was 1.2 times the standard, and the maximum percentage of values exceeding the standard at one station was 4.6 percent.

TABLE II

LIST OF MONITORING STATIONS
REPORTING VIOLATION OF NATIONAL AMBIENT
AIR QUALITY STANDARDS

LIST OF MONITORING STATIONS (1974)

CARBON MONOXIDE: 8-HOUR AVERAGE; STANDARD = 10 mg/m^3

Site	Second Highest Concentration (mg/m^3)	Ratio to Standard	Days Exceeding Standard
Burlingame	10.3	1.03	2
San Francisco	10.5	1.05	2
San Jose	19.3	1.93	21
Vallejo	13.7	1.37	22

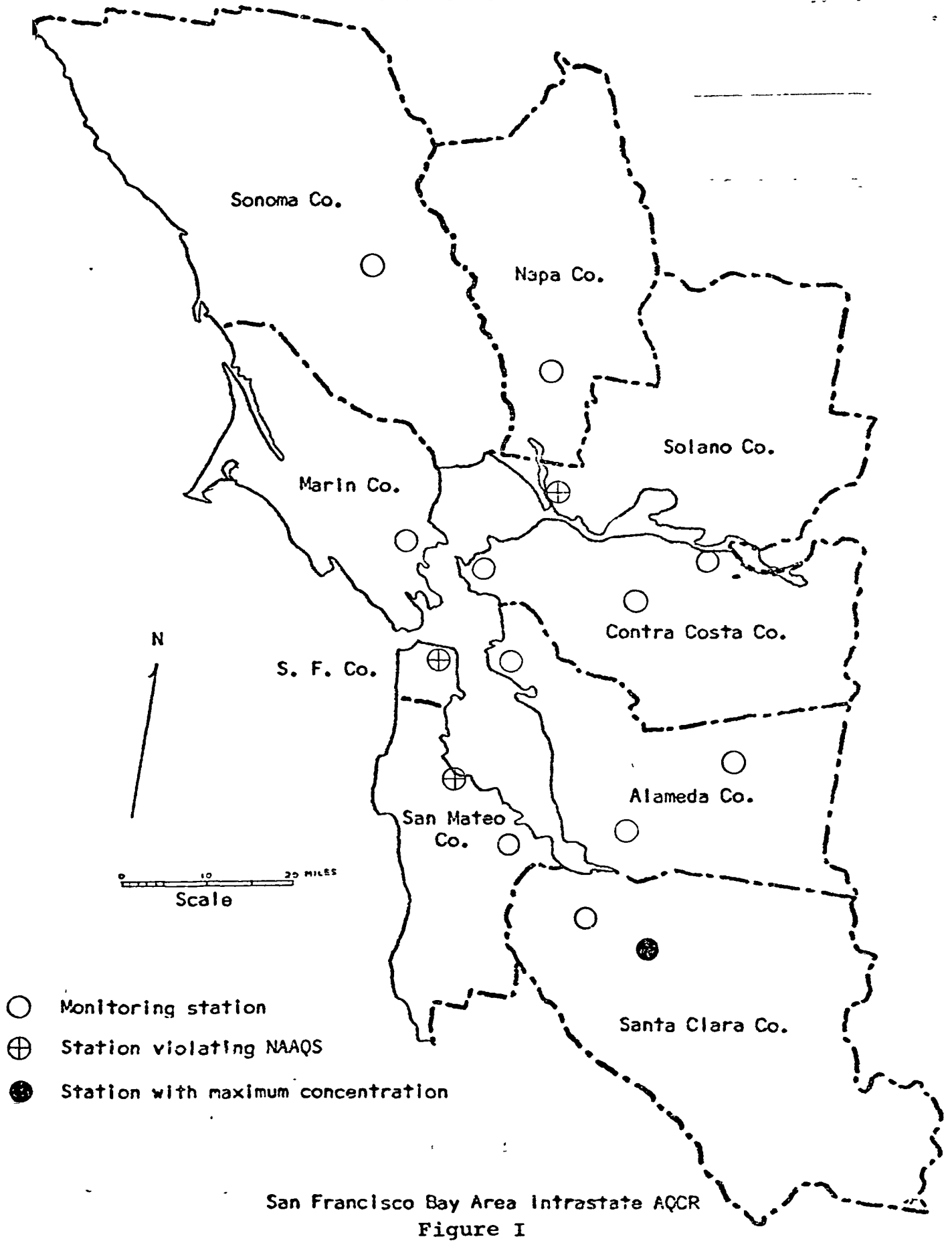
OXIDANTS: 1-HOUR AVERAGE; STANDARD = 160 ug/m^3

Site	Second Highest Concentration (ug/m^3)	Ratio to Standard	Days Exceeding Standard
Burlingame	234	1.46	6
Concord	234	1.46	14
Fairfield	203	1.27	16
Fremont	329	2.06	26
Hayward	329	2.06	29
Livermore	391	2.44	65
Los Gatos	360	2.25	44
Mountain View	219	1.37	12
Napa	203	1.27	16
Oakland	203	1.27	3
Petaluma	219	1.37	7
Pittsburg	172	1.08	2
Pleasant Hill	234	1.46	13
Redwood City	266	1.66	9
Richmond	172	1.08	1
San Francisco	203	1.27	1
San Jose	423	2.64	60
San Leandro	266	1.66	11
Sunnyvale	266	1.66	22
Vallejo	234	1.46	15

PARTICULATE MATTER: 24-HOUR AVERAGE; SECONDARY STANDARD = 150 ug/m

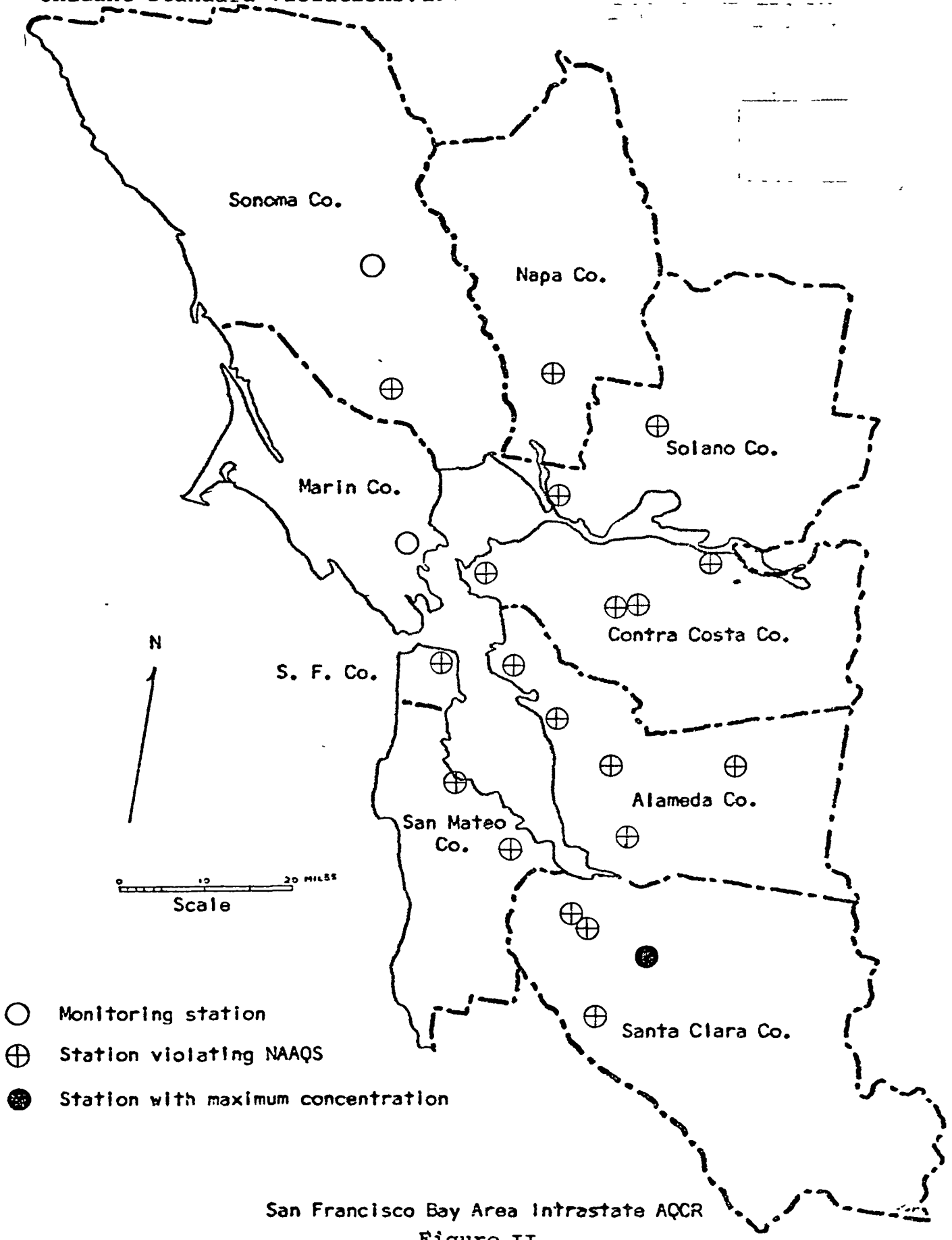
Site	Second Highest Concentration (ug/m^3)	Ratio to Standard	Days Exceeded Standard
Livermore	173	1.15	4.6%
Vallejo	183	1.22	3.4%

Location of Carbon Monoxide Monitoring Stations and Distribution of 8-hour CO Standard Violations. 1974



San Francisco Bay Area Intrastate AQCR
Figure I

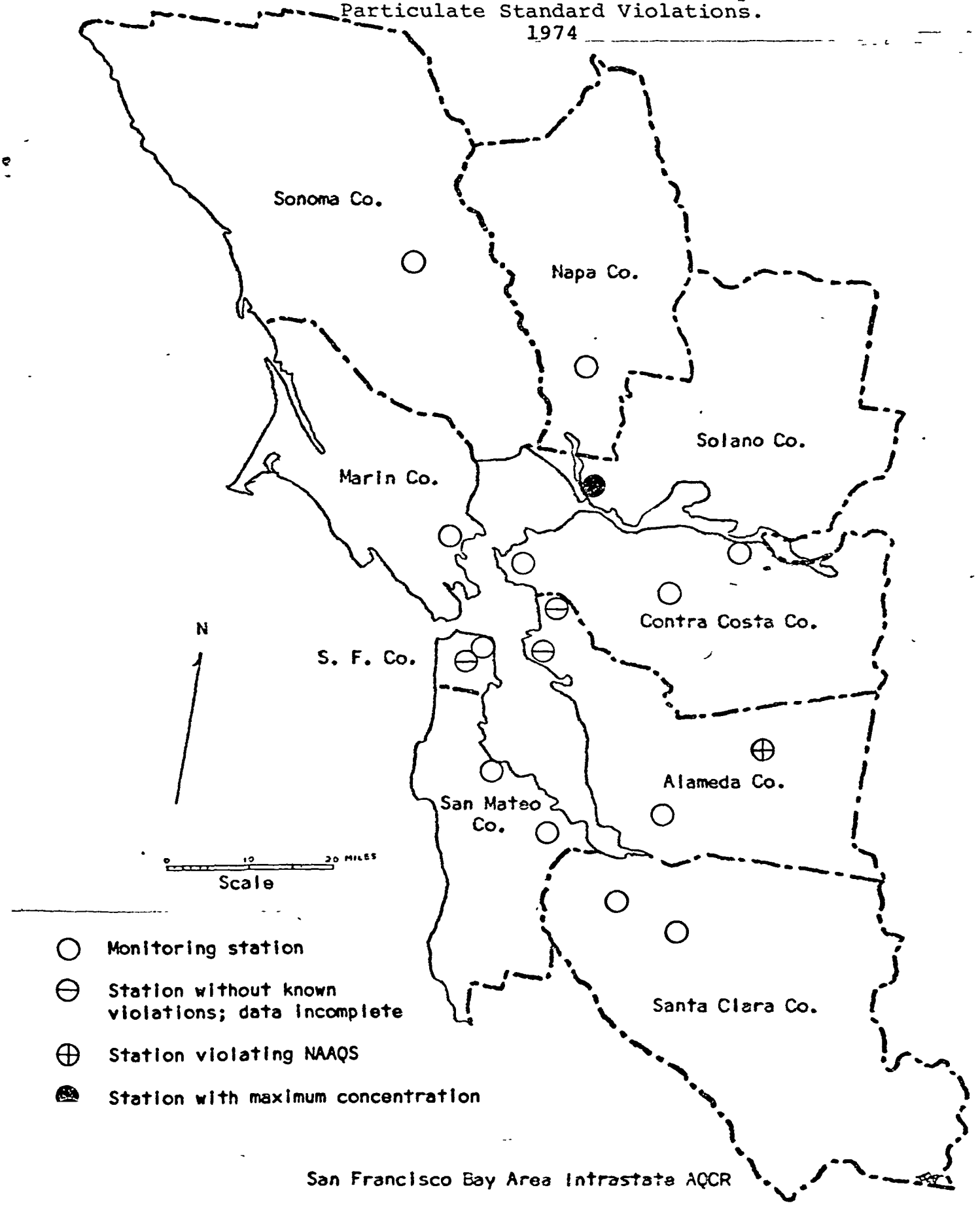
Location of Oxidant Monitoring Stations and Distribution of 1-hour Oxidant Standard Violations. 1974



San Francisco Bay Area Intrastate AQCR

Figure II

Location of Total Suspended Particulate Monitoring Stations and Distribution of Secondary 24-hour Particulate Standard Violations.
1974



San Francisco Bay Area Intrastate AQCR

Figure III

C. AIR QUALITY PROJECTIONS

The relationship between pollutant emissions and ambient pollutant concentrations must be determined from a known point or base year, for which air pollutant concentrations and the quantity of air pollutant emissions are known. A base year then, is a year for which: 1) the amount of emissions and the air quality concentrations are known, and 2) a specific relationship is determined to exist between emissions and air quality. Air quality is assumed to have the same relationship to emissions in future years as that determined for the base year.

The base year (i.e., 1973) emission inventory used for this analysis is from a draft emission inventory developed by the California Air Resources Board for the San Francisco Bay Area Air Basin, and was obtained from the ARB in February, 1976 (see Table III). The San Francisco Bay Area Air Basin boundaries and emissions closely approximate those for the San Francisco Bay Area AQCR. Emission inventory growth factors for this AQCR, and therefore air quality projections, are developed by using growth factors which are derived from a Bay Area Air Pollution Control District (BAAPCD) Emission Trends Report dated February 6, 1976. The California ARB was able to supply emission inventory growth projections for two years, 1980 and 1985. With the exception of nitrogen oxides (NO_x) emissions, the ARB estimates project larger emissions growth factors than do those of the BAAPCD. The BAAPCD and ARB emission growth factors are found in Table IV. The ARB projections are used for worst case analysis purposes. The growth factors reflect the implementation of only the presently adopted emission control measures.

The 1973 base year emission inventory for the San Francisco Bay Area AQCR is shown in Table III, and the emission inventory growth factors are shown in Table IV. A list of the 1973 highest and second highest ambient concentrations for various pollutants, as reported by the EPA-NADB, is shown in Table V.

A direct proportional relationship is assumed to exist between sulfur oxides (SO_x) emissions and resulting SO_2 ambient concentrations, nitrogen oxides (NO_x) emissions and resulting NO_2 ambient concentrations, particulate emissions and resulting TSP ambient concentrations, CO

Table III

Summary of the 1973
Emission Inventory for the
San Francicso Bay Area Air Basin

Emissions (Tons/Day)

Emission Sources	CO	NO_x	TOG*	SO_x	Part
Stationary	209	253	611	223	140
LDV & HDV	3080	433	420	16	43
Other Mobile	260	119	75	42	20
Totals	3544	805	1106	281	203

*Refers to "Total Organic Gas" emissions, which are a close approximation of non-methane organic gas emissions.

Table IV
Emission Inventory Growth Factors
Projected from Base Year 1973

CO

Year	1976	1980	1985	1990
Growth Factor				
BAAPCD	.84	.53	.30	.26
ARB		.60	.49	

NO_x

Year	1976	1980	1985	1990
Growth Factor				
BAAPCD	.93	.96	1.00	1.10
ARB		.92	.84	

TOG

Year	1976	1980	1985	1990
Growth Factor				
BAAPCD	.85	.71	.66	.70
ARB		.85	.89	

SO_x

Year	1976	1980	1983	1985	1990
Growth Factor					
BAAPCD	1.18	1.60	1.78	1.65	1.51
ARB		2.07		2.2	

PART

Year	1976	1980	1985	1990
Growth Factor				
BAAPCD	.95	1.05	1.1	1.15
ARB		1.23	1.31	

Table V
Summary of the 1973 Ambient Concentrations

Pollutant	Concentration	Units	High	2nd High
CO	8-hour average	mg/m^3	21	15
	1-hour average	mg/m^3	26	26
NO_2	annual arithmetic mean	ug/m^3	70	-
Ox	1-hour average	ug/m^3	438*	406*
SO_2	annual arithmetic mean	ug/m^3	21	-
	24-hour average	ug/m^3	106	99
	3-hour average	ug/m^3	No data	No data
TSP	annual geometric mean	ug/m^3	66	-
	24-hour average	ug/m^3	225	188

*These values are corrected by the California ARB recommended oxidant calibration correction factor of 0.8.

emissions and resulting CO ambient concentrations and total organic gas (TOG) emissions and resulting photochemical oxidant ambient concentrations. For instance, if in some future year, a pollutant emission rate is projected to double from that estimated for the base year, then the air quality in the future year is projected to deteriorate, or worsen, by a factor of 2 from that measured in the base year. Conversely, if in some future year a pollutant emission rate is projected to be only one half of that estimated for the base year, then the air quality in this future year is projected to improve and the air pollutant concentrations are estimated to be only one half as high as that measured in the base year. For all national air quality standard concentration reporting periods (e.g., 1-hour, 8-hour and 24-hour average concentrations), the maximum yearly air pollutant concentrations are used for air quality projection purposes.

Using the assumptions and data discussed previously, air quality projections are estimated by using the following technique or equation:

(1973 Base Year Worst Case Air Quality) x (Year X Emission Inventory Growth Factor) = Projected Air Quality in Year X

Background pollutant emissions and concentrations (i.e., those emissions and concentrations not related to man-made activities) are difficult to quantify and are not considered in this technique. If the projected air quality in a future year X is greater than the NAAQS listed in Section I - Introduction, then an air quality violation is predicted.

Using the technique just discussed, the following air quality projections and analyses are presented for those pollutants for which standards have been violated in the base year, or are projected to be violated in future years:

OXIDANT AIR QUALITY PROJECTIONS

The oxidant standard was violated in 1973 with a maximum 1-hour concentration of 438 ug/m^3, which is 2.7 times the standard. The emission inventory growth

factors show a reduction in TOG emissions and therefore oxidant concentrations from 1973 to 1985. Starting in 1985, TOG emissions are expected to increase. The 1-hour oxidant concentration, projected from 1973 to 1985 by the air quality projection technique and the APCD growth factor, is as follows for this pivotal year:

* 438 ug/m^3 x .66 = 289 ug/m^3

* This value is corrected by the California ARB recommended oxidant calibration correction factor of 0.8.

The standard is thus projected to be exceeded in 1985 with the occurrence of a maximum 1-hour oxidant concentration which is 1.8 times the standard. A worsening trend is expected to follow. Use of the more pessimistic California ARB growth projections indicates that even larger standard violations will occur.

CO AIR QUALITY PROJECTIONS

The 8-hour carbon monoxide standard (as opposed to the 1-hour standard) is the most seriously violated CO standard. This standard was violated in 1973, with a maximum 8-hour average concentration recorded of 21 mg/m^3, which is 2.1 times the standard. CO emissions are projected to steadily and significantly decline from 1973 to 1990. 1980 air quality estimated by the air quality projection technique and using the APCD growth factor is as follows:

21 mg/m^3 x .53 = 11 mg/m^3

This concentration is 1.1 times the standard. The standard is thus projected to be only slightly exceeded in 1980, and standard attainment is expected prior to 1985. Use of the more pessimistic California ARB growth projections suggests that standard attainment will occur soon after 1985.

TSP AIR QUALITY PROJECTIONS

The primary annual TSP standard (as opposed to the 24-hour standard) was the closest to being violated in the 1973 base year. The question of continued attainment of the standard is evaluated as follows, using the 1973 annual concentrations, the air quality projection technique and the APCD growth factor for the year 1990:

$$66 \text{ ug/m}^3 \times 1.15 = 76 \text{ ug/m}^3$$

The national annual primary standard of 75 ug/m^3 is thus projected to be slightly exceeded in 1990. Particulate emissions began increasing in 1975 and are expected to continue to increase through the year 1990, primarily as a result of the decreased use of natural gas and the substitution of fuel oil for combustion processes. Use of the more pessimistic California ARB growth projections suggests that the annual standard will be violated by 1980. The national secondary ambient particulate standard was exceeded in 1973 and in 1974, and violations are expected to continue as a result of the projected increase in particulate emissions, unless additional emission control measures are implemented.

D. SUMMARY OF PRESENT CONTROL STRATEGIES

Following are general descriptions of the present air pollutant emission control strategies:

NO_x Control

NO_x emission control for stationary combustion sources is accomplished primarily by lowering peak combustion flame temperature, by reducing the oxygen and nitrogen concentrations during the combustion processes, and by reducing the gas residence time at high temperatures. These concepts are applied by the use of such techniques as exhaust gas recirculation, two-stage combustion, and low excess air. The techniques are primarily applied to the larger stationary source combustion processes. Reducing NO_x emissions from new and in-use vehicle engines is primarily accomplished by lowering peak combustion flame temperatures through the use of ignition retard, and exhaust gas recirculation techniques. The BAAPCD has adopted regulations controlling NO_x emissions. In summary, these regulations limit NO_x emissions from certain new and modified equipment to 125 PPM for gaseous fuel use and 225 PPM for oil fuel use; and for certain in-use equipment, NO_x emissions are limited to 175 PPM for gaseous fuel use, and 300 PPM for oil fuel use.

SO_x Control

SO_x emission control is accomplished for mobile and stationary emission sources primarily by limiting the sulfur content of fuels. In addition, sulfur recovery and sulfuric acid plant emissions are controlled by requiring the improved efficiency, sizing, and operation of plant equipment; and, in some cases, stack scrubbing is employed. Stack gas scrubbing for SO_x removal is not widely used at this time in this AQCR. The BAAPCD has adopted an SO_x emission control regulation that either requires a specific SO_x exhaust gas concentration limitation; or requires the employment of a ground level monitoring system. In summary, the SO_x emissions regulation requires that sources either limit their SO_x stack emissions to 300 PPM or install a ground level ambient SO_2 monitoring system and be subject to certain SO_2 ambient concentration requirements.

CO Control:

Mobile source CO exhaust emission control is accomplished by using the following techniques: lowering CO emissions by converting them to harmless CO_2 gas as a result of improved engine combustion efficiency; oxidizing exhaust CO to CO_2 by the use of a catalyst device in the exhaust system; promoting the use of more volatile fuels (e.g., liquified petroleum gas and compressed natural gas) and thereby improving combustion efficiency; and implementing various transportation control measures such as bus and car pool lanes and transit service improvements, which reduce the amount of CO-producing activities.

There are no BAAPCD regulations which require the control of CO emissions from stationary sources.

Ox Control:

Ambient concentrations of photochemical oxidants (Ox) are reduced by controlling the emissions of the primary oxidant precursor, reactive hydrocarbons (HC) (i.e., non-methane organics). Mobile source HC emissions result from fuel evaporation as well as engine exhaust. Fuel evaporation is controlled by enclosing the vehicle fuel tank and carburetor systems, and venting them through an HC collection system into the engine. Exhaust HC emissions control is accomplished by using the following techniques: venting crankcase HC emissions back into the engine for combustion; lowering engine HC emissions by improved combustion efficiency, thus converting the HC to harmless CO_2 and water; oxidizing exhaust HC to CO_2 and water by the use of a catalyst device in the exhaust system; promoting the use of more volatile fuels (e.g., liquified petroleum gas and compressed natural gas) and thereby improving combustion efficiency; and implementing various transportation control measures such as bus and car pool lanes and transit improvements, which reduce the amount of HC-producing activities.

The control of HC emissions from stationary sources is accomplished through operational or process changes, substitution of non HC materials for HC materials, and the installation of emission control equipment. The techniques used in control devices include incineration (after-burners to complete the oxidation of organic

emissions), adsorption (collection of a gas on a special material or surface), absorption (transfer of a soluble gas to a non-volatile liquid absorbant), and condensation (collecting organic emissions by lowering the gas stream temperature to the appropriate condensation point). The BAAPCD has adopted a regulation (i.e., Regulation 3) which controls HC emissions from a range of stationary HC emissions sources.

Particulate Control

Visible emissions - Presently, Ringleman One (20% opacity) is the allowable density for smoke, used for evaluation of smoke plumes in the field. Any plume which obscures an inspector's view by more than 20% for longer than three minutes in any hour is in violation.

Open burning - Regulation One bans dump fires and back yard trash burning. It also subjects agricultural burning to meteorological controls. Farmers are allowed to burn their crop waste during specified seasons on district-approved "burn" days. Exempted from Regulation One's control are barbecues, recreational fires, and fires approved for the purpose of disposing of diseased trees and brush, hazardous materials, fire training, range, forest and wildlife management, flood control, and the clearing of undergrowth in irrigation ditches.

Incineration - Emissions from an incinerator with a capacity greater than 100 tons per day are limited to 0.05 grains per standard dry cubic foot (scf). For an incinerator with a capacity of less than, or equal, to, 100 tons per day, the emission limit is 0.15 grains per standard cubic foot. The new source performance standard is 0.08 range per standard cubic foot for incinerators with a capacity greater than 50 tons per day. The incinerators must also meet SO_2, H_2S, hydrocarbon and carbonyl emission limitations.

Fuel burning - Particulate emissions from a combustion operation are limited to 0.15 grains per standard cubic foot (0.25 pounds per 10^6 BTU) regardless of the size of the facility. The new source performance standard for fossil fueled steam generators is 0.10 pounds of particulate matter per million BTU heat input.

General processes - The allowable particulate emissions for manufacturing processes are on a process weight

rate basis. Exemptions from this weight rate can be granted if the source can demonstrate that it does not exceed a grain loading weight, ranging from 0.10 gr/scf to 0.02 gr/scf depending on the gas volume.

Fugitive Dust - San Francisco does not have a specific fugitive dust regulation, relying instead on control of such sources under a nuisance provision of Regulation Two and Article 10 of the Bay Area Air Pollution Control Law. These controls prohibit a person from allowing particulates of sufficient number and of a size large enough to be identified as individual particulates at the source, to fall on the property of another, thereby constituting an nuisance.

E. ENFORCEMENT STATUS AND ANALYSIS

Approximately 109 point sources (stationary sources which have potential emissions - emissions which would occur if no controls were applied - of greater than 100 tons/year) have been identified by the Bay Area APCD for EPA's Compliance Data System (CDS) network in the AQCR. Additional point sources may exist in the AQCR, but have not yet been identified. Data submitted by the ARB for the third quarter of Fiscal Year 1976 indicate that 87 percent of the identified point sources are in compliance with all applicable portions of the State Implementation Plan. Of the remaining point sources, 3 percent are on compliance schedules and 10 percent are either of unknown status or are in violation of an emission regulation and not yet on a compliance schedule.

The available EPA-CDS data would indicate that air quality violations are not due to lack of enforcement.

Table VI contains a list of point sources in violation of emission regulations and an explanation of their compliance status.

Table VI

LIST AND COMPLIANCE STATUS OF POINT SOURCES IN VIOLATION OF EMISSION REGULATIONS

Sources	Status
Alameda County	
General Motors, Fremont	V
Costra Costa County	
Monsanto Chemical (Avon Plant) Martinez	VS
Phillips Petroleum (Avon Refinery) Martinez	VS
Fibreboard, Antioch	U
C&H Sugar, Crocket	U
San Francisco County	
Feedstuffs Processing, San Francisco	V
Santa Clara County	
Ford, Milpitas	V
Solano County	
Newhall Land Farming, Dixon	
Travis AFB, Fairfield	V
Sonoma County (Northern)	
Boise Cascade, Healdsburg	U
G&R Lumber Co., Cloverdale	V
Annapolis Milling, Annapolis	V
Chenoweth Lumber, Bodega	S
Harris Pine Mills, Healdsburg	U
M.G.M. Brake, Cloverdale	U
Masonite Corp., Cloverdale	U
Rolando Lumber Co., Cloverdale	U

Key

S = Not in compliance--on compliance schedule--not in violation of compliance schedule
V = Not in compliance--violation of emission regulation
VS = Violation of compliance schedule
U = Unknown

F. POINT/NON-POINT (I.E., MAJOR/MINOR) STATIONARY SOURCE ANALYSIS

EPA is concerned about the cumulative contribution that relatively small stationary sources make to total emissions, and therefore, the emphasis that should be placed on controlling such sources. EPA has called such relatively small sources "non-point sources", and has defined such a source as any stationary source that does not have the potential for emitting more than 100 tons/year. Table VII contains the 1974 emissions data for point and non-point sources, as well as total emissions, as supplied to EPA by the California ARB.

Non-point SO_x emission sources are apparently insignificant, and at any rate, there appears to be no SO_2 air quality problem in the AQCR, based on the SO_2 analysis in Sections II.B. and C. Therefore, no additional emphasis on non-point SO_x emissions control is called for at this time.

Non-point particulate sources emit approximately 59% of all particulate emissions. Of these non-point emission sources, fugitive emissions, which include emissions from agricultural operations, construction and demolition, and unpaved road travel, contribute 33 tons/day or approximately 15% of total emissions; mineral processing and manufacturing operations emit 27 tons/day or approximately 13% of total emissions; and food and agricultural processing operations emit 21 tons/day or approximately 10% of total emissions.

The secondary particulate standard is violated at two stations. Continual violation of the secondary standard is projected based on the present control stategy, and violation of the primary standard is projected to occur as early, perhaps, as 1980 (see Sections II.B. and C.).

Analysis referenced in Section II.A.3. suggests that more stringent control of fugitive emissions may be justified and that such control could be accomplished if source specific fugitive dust regulations were introduced. These regulations would be in addition to the nuisance regulation which is presently being enforced to control fugitive dust emissions.

The contribution of non-point mineral processing and manufacturing operations, and food and agricultural processing operations to total particulate emissions is significant, and accounts for 23% of total emissions. EPA has no analysis to show that more stringent regulations based on RACT, or more vigorous enforcement of the present regulations, would reduce the emissions from these two categories.

Table VII

Point/Non-Point Emission Data

Emissions (Tons/Day)

Pollutant	Non-Point Sources	Point Sources	Total Stationary Sources	Total Stationary and Mobile Sources
CO		Data Not Available		
NO_x		Data Not Available		
TOG		Data Not Available		
SO_x	4	223	227	282
Particulate	128	25	153	218

G. COMPARISON OF PRESENT CONTROL STRATEGY WITH MEASURES CONSIDERED RACT

Table VIII is a list of emission control measures that are considered by EPA to meet the definition of reasonably available control technolocy (RACT) (see discussion of RACT in Section I).

A comparison of the present control strategy with the list of RACT measures will be made in this Section for those pollutants for which national standards are violated in the base year, or are projected to be violated in some future year. Consequently no such comparison will be made for NO_x and SO_x emission control, because the NO_2 and SO_x air quality standards have not been violated in the base year and no violations are projected.

The primary oxidant standard, the primary carbon monoxide standard, and the secondary particulate standard were violated in the base year and future violations of the primary particulate standard are projected. Following are camparisons of the present CO, oxidant, and particulate control strategies with the RACT control measures listed for these pollutants.

CO:

RACT measures have been promulgated by EPA (November 12, 1973, California Transportation Control Plan), and by the State for the control of mobile source CO emissions through the application of transportation control measures and an Inspection/Maintenance program. There are, however, no controls on CO emissions from petroleum refineries, chemical plants, and other industrial sources; therefore RACT measures are not being employed for these stationary emission sources. Stationary source CO controls should be required.

Ox:

The implementation plan submitted by the State and the EPA-promulgated plan employ the RACT measures listed in this section for the control of non-methane organic emissions and therefore oxidants. There may be specific source categories for which stationary source regulations can be strengthened or expanded. This possibility is being actively investigated by the State and EPA. However, it is determined for now that RACT measures are either being implemented or have been

promulgated. This determination could, of course, be changed based on the results of the EPA and State studies.

Particulate:

The implementation plan submitted by the State contains with one exception, the RACT measures listed in this section. This one exception results from the lack of an adequate fugitive dust regulation in effect for this area. At present, fugutive dust emissions are controlled by the local enforcement of an nuisance regulation. It is EPA's opinion that certain source specific fugitive dust regulations are RACT measures, and should be adopted.

Table VIII

LIST OF MEASURES CONSIDERED REASONABLY

AVAILABLE CONTROL TECHNOLOGY

CO Emissions Control

Source Control Measures:

* Inspection/Maintenance for vehicle emissions control

* Petroleum refinery, chemical plant and other industry controls

Transportation Measures:

* Transit improvement

* Employer incentives

* Parking management/restrictions

* Traffic management/restraint

NO_x Emissions Control

Combustion Modifications:

* Lower excess air

* Staged combustion

* Burner modification or replacement

* Flue gas recirculation (for gas or oil-fired boilers with recirculation provisions)

Control of NO_x emissions from nitric acid plants:

* Catalytic decomposition

Oxidants Control (Non-Methane organic gas emission control)

Source Control Measures:

* Inspection/Maintenance for vehicle emissions control

* Vapor controls for organic solvents

* Petroleum refinery, chemical plant and other industry controls

* Vapor controls for gasoline marketing

Transportation Control Measures:

* Transit improvement

* Employer incentives

* Parking management/restrictions

* Traffic management/restraint

SO_x Emissions Control

* Combustion of natural low sulfur fuels

* Combustion of fuels with sulfur content lowered by technological removal processes

* Control of SO_x emissions from sulfur recovery and sulfuric acid plants

* Control of SO_x stack emissions from industrial processes by gas cleaning devices

Particulate Emissions Control

Section 2 of Appendix B, 40 CFR Part 51 (see below), lists measures considered by EPA to be RACT for particulates.

APPENDIX B—EXAMPLES OF EMISSION LIMITATIONS ATTAINABLE WITH REASONABLY AVAILABLE TECHNOLOGY

2.0 CONTROL OF PARTICULATE EMISSIONS

2.1 *Visible emissions.* The emission of visible air pollutants can be limited to a shade or density equal to but not darker than that designated as No 1 on the Ringelmann chart or 20 percent opacity except for brief periods during such operations as soot blowing and startup. This limitation would generally eliminate visible pollutant emissions from stationary sources.

The emission of visible air pollutants from gasoline-powered motor vehicles can be eliminated except for periods not exceeding 5 consecutive seconds. The emission of visible air pollutants from diesel-powered motor vehicles can be limited to a shade or density equal to but not darker than that designated as No. 1 on the Ringelmann chart or 20 percent opacity except for periods not exceeding 5 consecutive seconds.

2.2 *Fugitive dust.* Reasonable precautions can be taken to prevent particulate matter from becoming airborne. Some of these reasonable precautions include the following:

(a) Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

(b) Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dusts;

(c) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods can be employed during sandblasting or other similar operations;

(d) Covering, at all times when in motion, open bodied trucks, transporting materials likely to give rise to airborne dusts;

(e) Conduct of agricultural practices such as tilling of land, application of fertilizers, etc., in such manner as to prevent dust from becoming airborne;

(f) The paving of roadways and their maintenance in a clean condition;

(g) The prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

2.3 *Incineration.* The emission of particulate matter from any incinerator can be limited to 0 20 pound per 100 pounds (2 gm/kg) of refuse charged. This emission limitation is based on the source test method for stationary sources of particulate emissions which will be published by the Administrator. This method includes both a dry filter and wet impingers and represents particulate matter of 70° F. and 1.0 atmosphere pressure.

2.4 *Fuel burning equipment.* The emission of particulate matter from fuel burning equipment burning solid fuel can be limited to 0.30 pound per million B t.u. (0 54 gm/10⁶ gm-cal) of heat input This emission limitation is based on the source test method for stationary sources of particulate emissions which will be published by the Administrator. This method includes both a dry filter and wet impingers and represents particulate matter of 70° F. and 1 0 atmosphere pressure.

2 5 *Process industries—general.* The emission of particulate matter for any process source can be limited in a manner such as in table I. Process weight per hour means the total weight of all materials introduced into any specific process that may cause any emission of particulate matter. Solid fuels charged are considered as part of the process weight, but liquid and gaseous fuels and combustion air are not. For a cyclical or batch operation, the process weight per hour is derived by dividing the total process weight by the number of hours in one complete operation from the beginning of any given process to the completion thereof, excluding any time during which the equipment is idle. For a continuous operation, the process weight per hour is derived by dividing the process weight for a typical period of time.

TABLE I

Process weight rate (lbs./hr.)	*Emission rate (lbs./hr.)*
50	0.36
100	0.55
500	1.53
1,000	2.25
5,000	6.34
10,000	9.73
20,000	14.99
60,000	29.69
80,000	31.19
120,000	33.28
160,000	34.85
200,000	36.11
400,000	40.35
1,000,000	46.72

Interpolation of the data in table I for the process weight rates up to 60,000 lbs./hr. shall be accomplished by the use of the equation:

$$E=3.59\,P^{0.62} \quad P\leq 30 \text{ tons/hr.}$$

and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lbs./hr. shall be accomplished by use of the equation:

$$E=17.31\,P^{0.16} \quad P>30 \text{ tons/hr.}$$

Where: E=Emissions in pounds per hour.
P=Process weight rate in tons per hour.

Application of mass emission limitations on the basis of all similar units at a plant is recommended in order to avoid unequal application of this type of limitation to plants with the same total emission potential but different size units.

III. SUMMARY AND CONCLUSION

For some pollutants, air quality standard violations occurred during the base year and for other pollutants there were no base year violations, but future violations are projected. For both of these situations, a summary of the control strategy deficiencies is presented, and a conclusion reached concerning the need to call for an SIP revision. Generally EPA should request an SIP revision from the State in cases where air quality violations are indicated and where RACT is not required either as a result of State or EPA regulations. The summary and conclusion is as follows:

Carbon Monoxide

The carbon monoxide standard is being slightly violated, and standard attainment is projected as early as 1985 or perhaps shortly thereafter.

EPA's California Transportation Control Plan, promulgated on November 12, 1973, requires implementation of vehicle Inspection/Maintenance and various transportation related measures in order to control CO emissions from mobile sources. Certain elements of the Transportation Control Plan were challenged by the Air Resources Board and others in Federal court, and this issue is currently being reviewed by the Supreme Court.

While the State has implemented some transportation related RACT measures (e.g., various bus and carpools lanes) for CO control in the San Francisco Bay Area AQCR, a major deficiency exists in the present State submitted CO control strategy because of the lack of a vehicle emission Inspection/Maintenance program. EPA, though, is not requesting a revision to the State Implementation Plan on this basis at this time because an Inspection/Maintenance program as well as other RACT measures are contained in the EPA Transportation Control Plan that is presently under Supreme Court review.

There is, however, no regulation for the control of stationary source emissions of CO; and because of this EPA has determined that RACT measures are not being applied. Therefore, EPA is requesting an SIP revision to correct this deficiency through the adoption of regulations that will better control stationary CO emission sources such as petroleum refinery CO boilers and foundry combustion sources.

Oxidants/Non-methane Organics

The oxidant standard is being violated, and standard attainment is not anticipated. EPA's California Transportation Control Plan requires implementation of RACT and other control measures (e.g., gasoline rationing) for reducing non-methane organic emissions in order to meet the oxidant standard by 1977. Certain elements of the Transportation Control Plan were challenged by the Air Resources Board and others in Federal court, and this issue is currently being reviewed by the Supreme Court. Implementation of many of the measures required by the Transportation Control Plan will depend upon the Supreme Court decision.

Among the measures required under the EPA Transportation Control Plan for the San Francisco Bay Area AQCR, and not under court challenge and review, are various stationary source organic vapor control programs. The Bay Area Air Pollution Control District subsequently adopted or modified its regulations to implement such vapor control programs (Regulation 3). Upon review of the District's Regulation 3, EPA has noted that some deficiencies still exist. Therefore, EPA will continue to enforce its organic emissions control regulations, especially 40 CFR 52.254.

While EPA has determined that a major deficiency in the State submitted oxidant control strategy exists at this time (i.e., lack of Inspection/Maintenance), EPA is not requesting a revision to the State Implementation Plan, because an Inspection/Maintenance program as well as other RACT measures are contained in the EPA Transportation Control Plan that is presently under Supreme Court review. There may be specific source categories for which stationary source regulations can be strengthened or expanded. This possibility is being actively investigated by the State and EPA. However, as previously stated, it is determined for now that RACT measures are either being implemented or have been promulgated. This determination could be changed based on findings from the EPA and State studies.

Since the EPA oxidant control plan is under court review and oxidant standard attainment is not being projected, the Air Quality Maintenance Area (AQMA) planning process should address the problem of standard attainment, as well as maintenance. EPA has designated areas nationwide which are not expected to attain, or once attained would not maintain, certain of the National Ambient Air Quality Standards during the 1975-1985 time frame. In such

instances, the California ARB and EPA have been encouraging local governments with assistance from the State to develop locally acceptable plans for the attainment and maintenance of the standards for the specified pollutants, including but not limited to land use and transportation controls. Such plans are expected to be submitted as formal revisions to the State Implementation Plans. In the San Francisco Bay Area the planning effort has been integrated into a larger scale Environmental Management Plan development process of which air quality is a discrete element. Designated pollutants in the San Francisco Bay Area are oxidants, sulfur oxides and particulate matter.

Particulate Matter

The primary particulate standards have not been violated in this AQCR. However, the secondary particulate standards has been violated. Estimates of future emissions and air quality indicate that the primary standards will be violated, perhaps before 1980, and the continued violation of secondary standards appears certain.

The Bay Area APCD presently controls fugitive dust emissions through the provisions of a nuisance regulation. Adoption of a source specific, and therefore more effective, fugitive dust regulation appears needed; and the adoption of more stringent particulate controls for industrial fuel burning equipment may also be needed in the future. The issue of particulate emissions control for industrial fuel burning equipment is to be dealt with through the AQMA planning process. Since the AQCR has been designated an AQMA for particulate matter, a plan will be developed through this process for maintaining the standards through 1985. Therefore, EPA at this time is not requesting an SIP revision for the control of particulate matter from industrial fuel burning equipment.

However, since the secondary standard violation appears to be significantly affected by fugitive dust emissions which are not controlled by RACT, EPA is requesting an SIP revision to correct this deficiency through the adoption of source specific fugitive dust regulations that could better control emissions from such activities as earth moving, construction and demolition.