SUMMARY OF BOARD ITEM

ITEM # 01-3-3: PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE ASSESSMENT OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA

STAFF RECOMMENDATION: The staff recommends that the Air Resources Board adopt-the proposed amendments to the assessment of the impacts of transported pollutants on ozone concentrations in California.

DISCUSSION: Health and Safety Code (H&SC) section 39610 directs the Air Resources Board (Board) to identify upwind air basins that cause or contribute to violations of the State ozone standard in downwind areas and to assess the relative contributions of upwind emissions. This report proposes to amend the transport identification regulation (California Code of Regulations, title 17, section 70500(c)) and to make conforming notational changes to the transport mitigation regulation (California Code of Regulations, title 17, section 70600).

The-identification regulation lists the upwind and downwind areas that are the origin and destination of transported air contaminants referred to as “transport couples.” The transport mitigation regulation requires air basins which are identified as upwind areas in the transport identification regulation to adopt best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions. In addition, air basins that are classified as causing “overwhelming” transport must adopt sufficient control measures to attain the State ozone standard in the downwind areas when conditions are conducive to “overwhelming” transport.

Based on the available data, the ARB staff recommends that two new transport couples be added to the transport identification regulation: the San Francisco Bay Area/North Coast couple; and the San Francisco Bay Area/South Central Coast couple.

The ARB staff also recommends the following classifications for these ozone transport assessments: “overwhelming” transport from the San Francisco Bay Area Air Basin to the northern Sonoma County portion of the North Coast Air Basin; “significant” transport from the San Francisco Bay Area Air Basin to the San Luis Obispo County portion of the South Central Coast Air Basin. Additionally, the staff recommends that on a few days there is “inconsequential” transport from the Broader Sacramento Area to the Upper Sacramento Valley.

Based on the recommendation of “overwhelming” transport from the San Francisco Bay Area Air Basin to the northern Sonoma County portion of North Coast Air Basin, staff recommends that conforming notational changes be made to the mitigation regulation to reflect this transport classification.

In addition to the regulatory proposals, ARB staff will present a review of what we have learned about transport impacts over the last decade, region by region.

SUMMARY AND IMPACTS: The proposed transport assessments are not expected to affect any existing upwind mitigation requirements since the staff is not identifying any new upwind areas. For . instance, the San Francisco Bay Area Air Basin has already been identified as overwhelming a few adjacent air basins- As a result, there are no new mitigation requirements for the San Francisco Bay Area Air Basin due to the overwhelming transport

impact on the North Coast Air Basin. Therefore, the adoption of the proposed amendments is not expected to result in any adverse impacts on public health and welfare. In addition, the proposed amendments do not change any of the requirements of the existing regulations for mitigation. Therefore, these amendments have no direct economic impact.

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE ASSESSMENT OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA

The Air Resources Board (Board or ARB) will conduct a public hearing at the time and place noted below to consider amendments to the regulations identifying downwind areas affected by the transport of ozone and/or ozone precursors and the upwind areas which are the sources of the pollution.

DATE: April 26, 2001

TIME: **9:00** a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Auditorium, Second Floor
1001 I Street
Sacramento, CA 958 14

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., April 26, 2001, and may continue at 8:30 a.m., April 27, 2001. This item may not be considered until April 27, 2001. Please consult the agenda for this meeting, which will be available at least 10 days before April 26, 2001, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact the ARB's Clerk of the Board at (916) 322-5594, or TDD (916) 324-9531 or (800) 700-8326 for TDD calls from outside the Sacramento area, by April 12, 2001 to ensure accommodation.

INFORMATIVE DIGEST OF PROPOSED ACTION/POLICY STATEMENT OVERVIEW

Sections Affected; Proposed amendments to title 17, California Code of Regulations (CCR), sections 70500 and 70600, pursuant to section 39610(b) of the Health and Safety Code.

Background: The California Clean Air Act of 1988 (the Act), in Health and Safety Code section 39610(b), directs the Board to identify downwind areas affected by transported pollutants and the upwind air basins or regions which are the sources of the pollutants. The Act also requires the Board to assess the relative contributions of the upwind emissions to downwind exceedances of the State ambient air quality standard for ozone as "overwhelming," "significant," "inconsequential," or some combination thereof, to the extent permitted by available data. Section 40912 of the Health and

Safety Code requires air districts responsible for transport to provide for attainment and maintenance of state and federal ambient air quality standards in both the upwind and downwind districts to the extent of the pollution contribution-

The assessments establish ozone transport couples, which are air basins or air pollution control districts from which transported pollution originates and in which transported ozone and ozone precursors affect air quality. The assessments are a preliminary step in determining appropriate mitigation requirements. The Board approved the first assessment in August 1990, with updates in August 1993 and November 1996. This report is the third update to the original assessments of August 1990.

This update includes assessments of established transport couples where new information **is** available and updates are warranted. It also establishes new transport couples based upon new data.

Staff Proposal: There are severai areas where the Board's staff recommends changes to the assessments. First, the staff proposes to reinstate the "inconsequential" transport classification-from the Broader Sacramento Area to the Upper Sacramento Valley. This means that on some days, local emissions from the Upper Sacramento Valley are responsible for exceedances in the Upper Sacramento Valley.

Second, the staff proposes to identify the San Francisco Bay Area Air Basin as "overwhelming" the northern Sonoma County portion of the North Coast Air Basin. This assessment was done because in November of 1999 the Board redesignated the Northern Sonoma district from attainment to nonattainment of the State ambient air quality standard for ozone. All violations of the State standards for 1996 through 1998 were determined to be caused by transport from the San Francisco Bay Area Air Basin. Based on available data, the staff does not believe that the emissions **in** northern Sonoma County are sufficient to cause ozone violations.

Third, the staff proposes to identify the San Francisco Bay Area Air Basin as an upwind contributor to ozone violations in San Luis Obispo County in the South Central Coast Air Basin. The staff has determined that emissions from the San Francisco Bay Area Air Basin, in combination with the emissions from the San Joaquin Valley Air Basin, collectively can overwhelm San Luis Obispo County. The data are not sufficient to quantify the contribution from the two upwind areas. Therefore, the staff recommends that the San Francisco Bay Area Air Basin and the San Joaquin Valley Air Basin are individually responsible for significant transport impacts to San Luis Obispo County.

In the Staff Report, the staff references the Board's 1990, 1993, and 1996 transport documents for historical perspective on transport couple identification, assessment, and mitigation developments. The staff does not recommend amending the transport mitigation requirements at this public hearing.

COMPARABLE FEDERAL REGULATIONS

There are no comparable federal regulations.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the potential environmental and economic impacts of the proposal, if any. The Staff Report is entitled, "Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California."

Copies of the Staff Report and the full text of the proposed regulatory language, in underline and strike-out format to allow for comparison with the existing regulations, may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, 1st Floor, Sacramento, CA 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing (April 26, 2001).

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the web site listed below.

Inquiries concerning the proposed administrative action or substance of the proposed regulations may be directed to the designated agency contact persons, Debora Popejoy, Manager of the Air Quality Analysis Section, Air Quality Data Branch, Planning and Technical Support Division at (916) 323-5123, or Steve Gouze at (916) 323-6627.

Further, the agency representative and designated back-up contact persons to whom inquiries concerning the proposed administration action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

if you are a person with a disability and desire to obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 3234916, or TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at http://www.arb.ca.gov/regact/trans01/trans01____ .htm.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred in reasonable compliance with the proposed amendment are presented below.

The proposed amendments to the transport assessments by themselves do not contain requirements for action. Subsequent requirements for action may result after additional steps, such as plan preparation by the air districts and review by the ARB, are undertaken. Because these regulations by themselves contain no requirements for action, they have no direct economic impact, and the following general determinations are appropriate.

The Executive Officer has determined that adoption of the proposed amendments will not create costs or savings, as defined in Government Code section 113465(a)(6), to any state agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary costs or savings imposed upon local agencies.

The classification of "overwhelming" transport impact from the San Francisco Bay Area Air Basin to the northern Sonoma County portion of the North Coast Air Basin could result in costs to, and impose a mandate upon, the San Francisco Bay Area Air Basin, as an upwind area, but only after additional regulatory actions are taken. The Bay Area Air Quality Management District (Bay Area District), which is responsible for the San Francisco Bay Area Air Basin, may need to adopt additional control measures to mitigate the impact of their emissions within the Bay Area District and on downwind areas. The Bay Area District is already responsible for contributing to attainment in several downwind areas pursuant to section 40912 of the Health and Safety Code. As part of the attainment demonstrations anticipated in 2003, the Bay Area District plan will need to quantify the emission reductions needed to achieve attainment in the Bay Area itself and for all of the downwind areas for which it is responsible. Resulting control measures will be proposed as part of the Bay Area District air quality attainment plan for ozone under the California Clean Air Act, and will be adopted by the district pursuant to normal regulatory notice, hearing, and adoption procedures (see Health and Safety Code sections 4072546728.5).

Additionally, the San Francisco Bay Area Air Basin and the San Joaquin Valley Air Basin are already required to mandate best available retrofit control technology for existing sources of air pollution in their districts pursuant to existing transport mitigation requirements because they are already identified as upwind areas.

Even if the amendments will impose a mandate upon, and create costs to, the air districts responsible for transport, reimbursements from the State to the districts are not required pursuant to Government Code sections 17500 et. seq., and section 6 of

article XIIIB of the California Constitution because the districts have the authority to levy fees sufficient to pay for the mandated program upon permitted stationary sources which emit the pollutants (see Health and Safety Code section 4231 I).

The Executive Officer also has initially determined, in accordance With Government Code section 11346.5(a)(8), that adoption of the proposed amendments will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states..

Furthermore, pursuant to Government Code section 113465(a)(9), the Executive Officer is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action._

In accordance with Government Code section 11346.5(a)(10), the Executive Officer has determined that adoption of the proposed amendments will not affect the creation or elimination of jobs within the State of California, the creation. of new businesses or the elimination of existing businesses within California, or the expansion of businesses currently doing business within California.

Finally, the Executive Officer has also determined that the proposed regulatory action will not affect small business because the mitigation requirements have not changed, and there are no additional requirements as a result of the proposed amendments to the assessment.

Before taking final action on the proposed amendments to the regulations, the Board must determine that no reasonable alternative considered by the Board, or that has otherwise been identified and brought to the attention of the Board would be more effective in carrying out the purpose for which the action is proposed, or would be as effective and less burdensome to affected private persons than the proposed action. Since this action is based on scientific data and does not affect private persons or businesses, the staff will recommend that the Board make this determination.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions must be received **no later than 12:00 noon, April 25,** 2001, and addressed to the following:

Clerk of the Board
Air Resources Board
1001 I Street, 23"' Floor
Sacramento, California 95814

To be considered by the ARB, e-mail submissions must be addressed to' trans01@listserv.arb.ca.gov and received at the ARB **no later than 12:00 noon, April 25, 2001**.

To be considered by the ARB, facsimile submissions must be sent to (916) 322-3928 and **received at** the **ARB no later than 12:00 noon, April 25, 2001**.

The Board requests but does not require 30 copies of any written submission- Also the ARB requests that written and e-mail statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action-

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under that authority granted to the Board in sections 39600, 39601, and 39610 of the Health and Safety Code. The amendments to the regulations are proposed to implement, interpret, and make specific sections 39610, 40912, 40913, 40921, **and** 41503 of the Health and Safety Code.

HEARING PROCEDURES AND AVAILABILITY OF MODIFIED TEXT

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code. Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text, as modified, is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language, as modified, could result from the proposed regulatory action. In the event such modifications are made, the full regulatory text, with the modifications clearly indicated, **will** be made available to the public for written comment at least 15 days before it is adopted. The public may request a copy of the modified regulatory text from the Public Information Office, Air Resources Board, 1001 I Street, 2nd Floor, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

Michael P. Kenny
Executive Officer

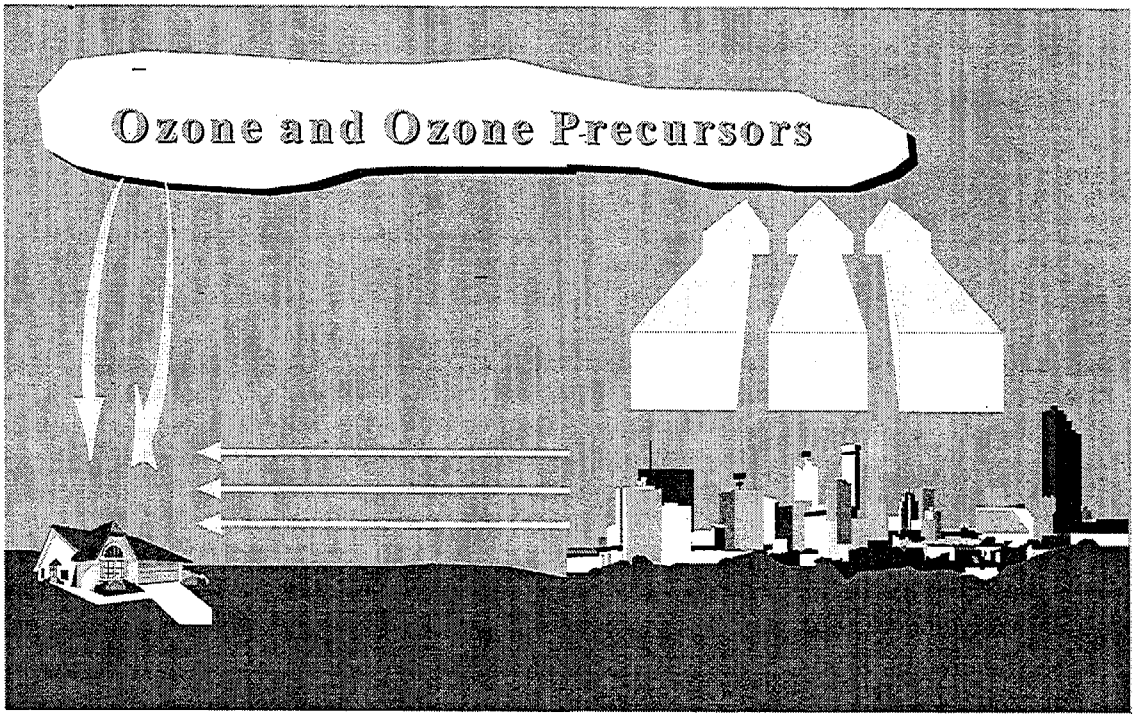
Date: February 27, 2001

California Environmental Protection Agency

Air Resources Board

ASSESSMENT OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA

March 2001



State of California
California Environmental Protection Agency
Air Resources Board

ASSESSMENT OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA

March 2001

Staff Report: Initial-Statement of Reasons

For consideration on
April 26, 2001

Prepared by

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This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the California Environmental Protection Agency or the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

TABLE OF CONTENTS

Chapter

Summary and Overview.. i
I. Background 1
A. Introduction 1
B. Previous Transport Assessment.. 1
C. Transport Impact Mitigation 2
D. Public Consultation Process 3
E. Definitions and Terminology 3
II. Proposed Regulatory Changes 5
A. Transport Couples Identification Changes.. 5
B. Transport Assessment Changes.. 5
III. Transport Couple Assessments 7
A. Broader Sacramento Area to Upper Sacramento Valley.. 7
B. San Francisco Bay Area Air Basin to North Coast Air Basin.. 14
C. San Francisco Bay Area and San Joaquin Valley Air Basins to South Central Coast Air Basin (San Luis Obispo County) 18
IV. Impact Analysis 25
A. Public Health, Welfare, and Environmental Impacts 25
B. Economic Impacts.. 25
C. Alternatives to the Staffs Proposed Amendments.. 26
V. Recommendations for Further Research.. 27
References 29

Appendix *Page*

A. Text of Health and Safety Code ..... A-I
B. Public Workshop Notice.. ..... B-I
C. Transport Workshop Participants ..... C-I
D. Glossary.. ..... D-I
E. Proposed Text of Regulation Identifying Areas Which Are Impacted by Transported Air Pollutants.. ..... E-I
F. Technical Support for Assessments ..... F-I
1. Broader Sacramento Area to Upper Sacramento Valley.. ..... F-2
2. San Francisco Bay Area Air Basin to North Coast Air Basin. ..... F-I 0
3. San Francisco Bay Area and San Joaquin Valley Air Basins to South Central Coast Air Basin (San Luis Obispo County) ..... F-I 5

ASSESSMENT AND MITIGATION OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA

SUMMARY AND OVERVIEW

The Air Resources Board (ARB or Board) is required' to 1) identify upwind air basins or subregions which cause or contribute to violations of the State ozone standard in downwind air basins or subregions, 2) assess the relative contributions of upwind emissions to downwind ozone concentrations, and 3) update this assessment at least every three years. The Board approved the first assessment in August 1990 (ARB 1990). Subsequent updates occurred in August 1993 (ARB 1993) and November 1996 (ARB 1996). This report, which is the third update of the ozone transport couples, reviews and updates the 1996 assessment.-

The ARB staff reviews all the available data in order to determine if there are impacts in a downwind region from the transport of pollutants from an upwind region. If transport exists, the staff recommends to the Board that they amend the transport identification regulation to identify upwind and downwind regions as a transport couple. As a non-regulatory action, the staff also recommends to the Board that the relative contribution of the transport be assigned as the classification of “overwhelmed”, “significant”, or “inconsequential”.

This report proposes to amend two separate regulations: the transport identification regulation (California Code of Regulations, Title 17, section 70500(c)) and the transport mitigation regulation (California Code of Regulations, Title 17, section 70600). The identification regulation lists the upwind and downwind areas, referred to as transport couples. The transport mitigation regulation requires air basins, which are identified as upwind areas in the transport identification regulation to adopt best available retrofit control technology for some existing stationary sources of ozone precursor emissions. In addition, air basins, which are classified as causing “overwhelming” transport, must adopt suffkient control measures to attain the State ozone standard in the downwind areas when conditions are conducive to “overwhelming” transport.

Based on the available data, the ARB staff recommends that two new transport couples be added to the transport identification regulation:

- The San Francisco Bay Area/North Coast couple; and
- The San Francisco Bay Area/South Central Coast couple.

The ARB staff also recommends the following non-regulatory changes to the ozone transport assessments:

- A classification of “overwhelming” transport from the San Francisco Bay Area Air Basin to the northern Sonoma County portion of the North Coast Air Basin;

[1] Section 39610 of the Health and Safety Code

- A classification of “significant” transport from the San Francisco Bay Area Air Basin to the San Luis Obispo County portion of the South Central Coast Air Basin; and
- A classification of “inconsequential” transport from the Broader Sacramento Area to the Upper Sacramento Valley.

Table 1 lists all the air basins, which have been identified as transport couples and the assigned transport classifications. Figure 1 shows where these air basins are located.

The new assessments, associated with the classification of the transport couples, requires that the transport mitigation regulation also be amended to reflect the classification of “overwhelming” transport from the San Francisco Bay Area Air Basin to the northern Sonoma County portion of the North Coast Air Basin. The other two assessments do not require amendments to the mitigation regulation, because the San Joaquin Valley Air Basin and the Broader Sacramento Area were previously identified as upwind areas and are already subject to the mitigation regulation requirements.

The staff also recommends that future transport analyses take advantage of two regional field studies which in the aggregate cover many of the ozone non-attainment areas of the State: the 1997 Southern California Ozone Study and the 2000 Central California Ozone Study. It is anticipated that the data from these studies will allow for better three-dimensional characterization of transport and will provide data to examine transport from a regional, rather than transport couple, perspective.

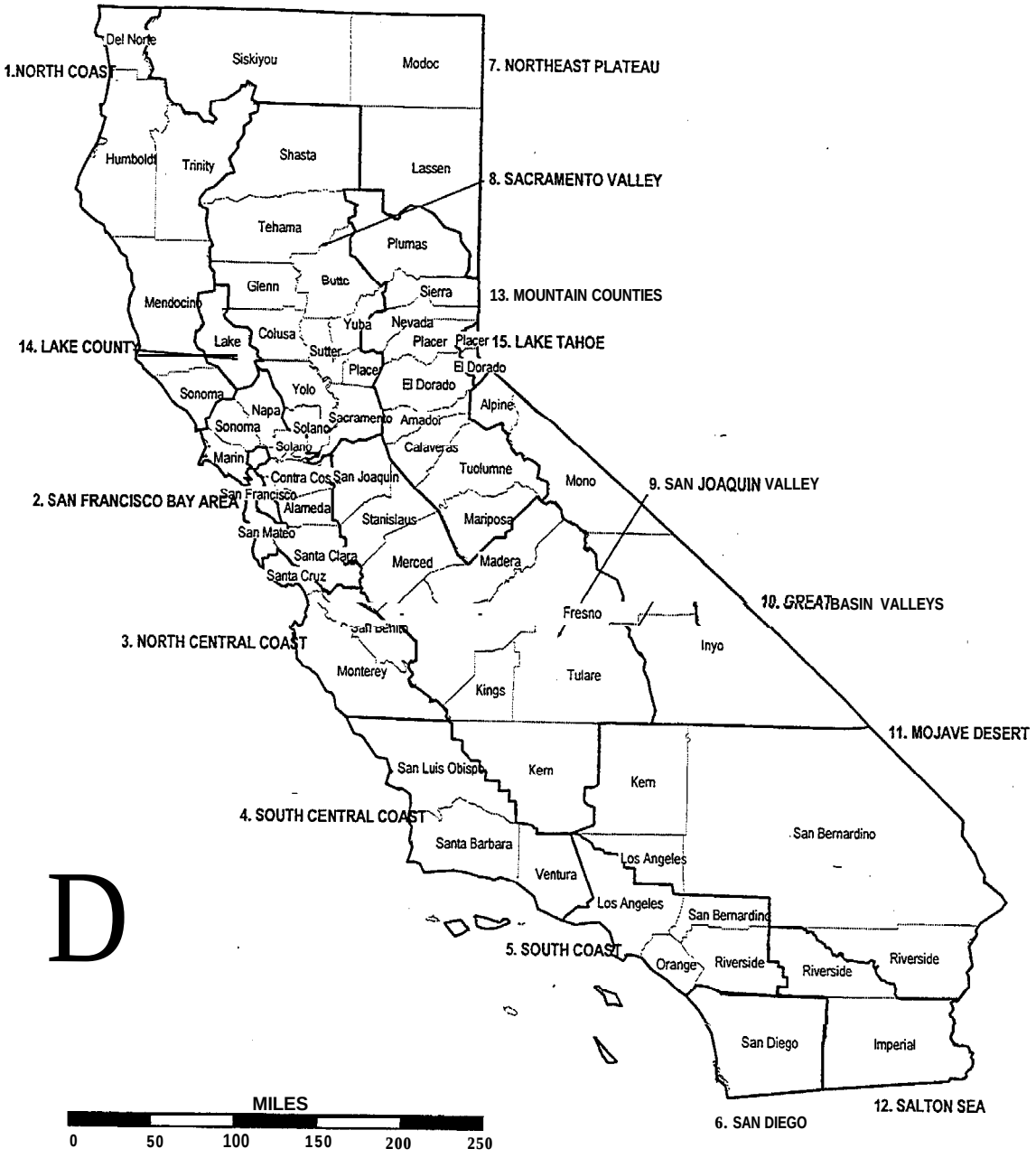
The ARB 1989, 1990, 1993, and 1996 transport documents on transport couple identification, assessment, and mitigation are included as part of this report by reference. (See References)

Table 1
Summary of Transport Couple Characterizations*

Transport Couples	Transport Characterization**	
	Previous	Proposed
Broader Sacramento Area *to* Mountain Counties	O	O
Broader Sacramento Area *to* San Joaquin Valley	S, I	S, I
Broader Sacramento Area *to* San Francisco Bay Area	S, I	S, I
Broader Sacramento Area *to* Upper Sacramento Valley	O, S	O, S, I
California Coastal Waters *to* South Central Coast	S	S
Mexico *to* Salton Sea	O, S	O, S
Mexico *to* San Diego	O, S, I	O, S, I
San Francisco Bay Area *to* Broader Sacramento Area	O, S, I	O, S, I
San Francisco Bay Area *to* Mountain Counties	S	S
San Francisco Bay Area *to* North Central Coast	O, S	O, S
San Francisco Bay Area *to* North Coast	—	**O**
San Francisco Bay Area *to* San Joaquin Valley	O, S, I	O, S, I
San Francisco Bay Area *to* South Central Coast	—	**S**
San Joaquin Valley *to* Broader Sacramento Area	S, I	S, I
San Joaquin Valley *to* Great Basin Valleys	O	O
San Joaquin Valley *to* Mountain Counties	- 0	0
San Joaquin Valley *to* Mojave Desert	0	0
San Joaquin Valley to North Central Coast	S	S
San Joaquin Valley *to* South Central Coast	S, I	S, I
South Coast *to* Mojave Desert	O, S	O s
South Coast *to* Salton Sea	0. s	0: s
South Coast to San Diego	0, 's, I	0, S, I
South Coast *to* South Central Coast	S, I	S, I
South Central Coast to South Coast	S, I	S, I

* Staff recommended changes shown in **bold**
** 0 = Overwhelming, S = Significant, I = Inconsequential

Figure 1
California Counties and Air Basins



D

CHAPTER I

Background

A. Introduction

The California Clean Air Act of 1988 (the "Act," Stats. 1988, Chapter 1568; as amended by AB 2783, Stats. 1992, Chapter 945) requires each air pollution control and air quality management district (district) in which a State ambient air quality standard for ozone, carbon dioxide, sulfur dioxide, or nitrogen dioxide is exceeded to develop a plan and an emission control program to attain the standard(s). The Act recognizes that ozone and ozone precursors can be carried by winds over long distances and thereby contribute to air quality problems outside the district or air basin where they originated. To address this, the Act requires upwind districts to mitigate the impacts on downwind areas of pollutants emitted in the upwind districts (see section 39610 of the Health and Safety Code). The Act directs the Air Resources Board (ARB or Board) to assess the impacts of such transport and to establish mitigation requirements for upwind districts. This chapter provides background information related to the assessment of transport impacts and describes the public consultation process.

5. Previous Transport Assessments

The Act directs the ARB to:

1) Identify downwind areas affected by transported air pollutants and the upwind air basins or regions that are the sources of the pollutants;
2) Assess the relative contribution of upwind emissions to downwind ozone concentrations as "overwhelming", "significant", "inconsequential", or some combination thereof, to the extent permitted by available data (Health and Safety Code, section 39610(a) and (b)); and
3) Update this analysis at least once every three years (Health and Safety Code, section 3961 O(d)).

The assessment of transport couples depends upon the exceedance values at any given site. All values that exceed the State standard are considered exceedances. However, the assessment process also considers the expected peak day concentration (EPDC) threshold. This ozone concentration **is** a statistically calculated value, which is not expected to occur more than one time per year. Thus, ozone concentrations greater than the EPDC are, theoretically, expected to occur less than one time per year on the average. Those ozone concentrations, which are greater than the State standard, and less than or equal to the EPDC, are considered violations of the State standard. Those values which are greater than the EPDC are considered extreme concentrations, because of the nature of their occurrence. Given that they are extreme concentrations,

the staff considers them beyond reasonable regulatory control. Thus, they are not used in the transport assessment process.

More than one assessment may apply to a transport couple. The assessments rely on, but are not limited to, meteorological data such as wind speed and direction. As these parameters vary from day to day., the assessments also vary. Therefore, while there may be a finding of “inconsequential” transport impacts on one or more violation days, other days may be assessed as “overwhelming” and/or “significant”. Likewise, an area that is the upwind air basin on one day may be the downwind air basin on another day.

In December 1989 (ARB 1989), the ARB adopted a regulation identifying 14 transport couples, each consisting of an upwind area that is the source of transported ozone or ozone precursors and a downwind receptor area impacted by those pollutants (Title 17, California Code of Regulations, section 70500). In May 1992, the ARB approved changes to the transport identification regulation, which redefined the boundaries of the Upper Sacramento Valley and the Broader Sacramento Area.

In August 1990 (ARB 1990), the ARB approved a qualitative assessment of the relative contributions of upwind emissions to downwind concentrations. In that assessment, the relative contribution was qualitatively classified as “overwhelming”, “significant”, or “inconsequential”. In August 1993 (ARB 1993a), the ARB approved the first update to the 1990 assessments. In that update, new transport couples were identified and assessed, the number of areas with mitigation responsibility was increased, and some previous assessments were updated. In November 1996 (ARB 1996), the ARB approved the second update to the transport assessments. Only a few minor changes to the assessments took place.

This report represents the third update to the 1990 assessments. The staff recommends identifying-two new couples and modifying the transport characterizations for one existing couple.

C. Transport Impact Mitigation

Health and Safety Code section 39610(b) directs the ARB to establish mitigation requirements for upwind districts commensurate with their contributions to the air quality problems in downwind areas. This was first done with the August 1990 transport assessment. Three parts to the mitigation requirements applicable to upwind districts were established:

I) Adopt a “no-net-increase” permitting program for all new or modified stationary sources;
2) Commit to adopt best available retrofit control technology (BARCT) for some existing stationary sources of reactive organic gas (ROG) and oxides of nitrogen (NO,) emissions; and

3) Where “overwhelming” transport exists, include sufficient measures in the air quality plans to ensure expeditious attainment of the State ozone standard in the downwind district(s).

In March 1993 (ARB 1993b), the ARB approved the deletion of the “no-net-increase” requirement from the mitigation regulation (section 70600). The effect of this deletion is that permitting requirements for all districts are those specified in the Act based on the districts’ nonattainment classification, whether or nor the district is a source of transported pollutants. (See Health and Safety Code section 40918 et. seq. found in Appendix A) The remaining two mitigation requirements were not changed. The staff is not proposing to change the mitigation requirements of upwind areas at this time. The staff only recommends amendments that redefine which areas are subject to the mitigation requirements.

D. Public Consultation Process

ARB staff participated in several transport working groups to share data, analyses, and recommendations for the proposed assessments. In addition, the staff conducted a public consultation workshop on November 4, 1999. A copy of the workshop notice is provided in Appendix B, and the list of workshop participants is shown in Appendix C.

E. Definitions and Terminology

Below are some terms used frequently in this report. See Appendix D for a glossary of many other commonly used terms:

Inconsequential – ozone transport classification describing a condition when upwind emissions were not transported or did not appear to contribute significantly to a violation of the State ozone standard in the downwind area. A violation not impacted by transported emissions is considered local and results when the wind flow patterns and atmospheric conditions do not strongly suggest responsibility-from an upwind area. The responsibility of “inconsequential” transport lies with the downwind area.

Overwhelmed – ozone transport classification describing a condition when the emissions from the upwind area independently result in a violation of the State ozone standard in the downwind area on any given day. Significant emission sources in the downwind area were not in the pathway of the air parcel that was transported from the upwind area. The responsibility for a violation caused by “overwhelming” transport lies with the upwind area.

Significant – ozone transport classification describing a condition in which the emissions from the upwind area contributed measurably to a violation of the State ozone standard in the downwind area on any given day, but did not “overwhelm” the area. A violation is considered caused by “significant” transport if the emissions from sources within the downwind area combine with the transported parcel carrying ozone or ozone precursors from the upwind area. A violation classified as

“significant” is considered shared, with responsibility lying with both the upwind and downwind areas.

CHAPTER II

Proposed Regulatory Changes*

A. Transport Couples Identification Changes

The staff proposes to identify two new transport couples. One new couple **is** the San Francisco Bay Area Air Basin to the North Coast Air Basin, based on assessment of impacts to the Sonoma County portion of the North Coast Air Basin. The staff recommends this couple be incorporated into the transport identification regulation (California Code of Regulations, Tile 17, Subchapter 1.5, Article 5, section 70500(c)). See Appendix E for the text of the proposed regulation.

The other new couple is the San Francisco Bay Area Air Basin to the South Central Coast Air Basin, based on the assessment of impacts to San Luis Obispo County. The staff recommends that this couple be incorporated into the transport identification regulation (California Code of Regulations, Title 17, Subchapter 1.5, Article 5, section 70500(c)). See Appendix E for the text of the proposed regulation.

B. Transport Assessment Changes

The staff recommends the assessment of transport impacts from the San Francisco Bay Area Air Basin to the North Coast Air Basin be classified as “overwhelming”. The new assessment associated with this “overwhelming” classification, requires the transport mitigation regulation (California Code of Regulations, Title 17, Subchapter 1.5, Article 6, section 70600(b)) to be amended to reflect the classification of “overwhelming” transport from the San Francisco Bay Air Basin to the Sonoma County portion of the North Coast Air Basin. See Appendix E for text of the regulation.

The transport mitigation regulation requires air basins, which are identified as upwind areas in the transport identification regulation, to adopt best available retrofit control technology for some existing stationary sources of ozone precursor emissions. In addition, air basins, which are classified as causing “overwhelming” transport, must adopt sufficient control measures to attain the State ozone standard in the downwind areas when conditions are conducive to “overwhelming” transport.

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* In addition to the changes identified, the staff also assessed transport for two exisitng transport couples. The staff found that on some days, there is “inconsequential” transport from the Broader Sacramento Area to the Upper Sacramento Valley, and that on some days threre is “significant” transport from the SanJoaquin Valley Air Basin to San Luis Obispo County in the South Central Coast Air Basin. However, thes findings will not result in any amendments to the transport regulations, because the Broader Sacramento Area/Upper Sacramento Valley and the San Joaquin Valley Air Basin/South Central Coast Air Basin were previously identified as transport couples.

Chapter III provides the details of the staffs analyses to support the proposed changes to both the transport couple identifications and assessments.

CHAPTER III

Transport Couple Assessments

A. Broader Sacramento Area to Upper Sacramento Valley

1. Recommendation

The Air Resources Board (the Board or ARB) staff recommends, based on the recent analyses, to re-instate the classification of "inconsequential" to the Upper Sacramento Valley (USV). In addition to the 1996 transport assessment of "significant" and "overwhelmed", the transport of pollutants from the Broader Sacramento Area (BSA) was found to be "inconsequential" as measured at the monitoring site at Redding in Shasta County. "Inconsequential" transport means that little or no transport impacted the monitor and that the exceedance was due to local emissions. This assessment does not require a regulatory change because this transport-couple has been identified previously, and this work illustrates that emissions in the Upper Sacramento Valley can, on occasion, cause exceedances of the State ozone standard without a transport component.

2. Background

a. Previous Assessments

Based on previous assessments, the ARB concluded that historically, the Upper Sacramento Valley (USV) was impacted by "overwhelming", "significant", and "inconsequential" transport from the Broader Sacramento Area (BSA). Based on the 1993 and 1996 assessments, transport from the BSA was found to be "overwhelming" at the following air monitoring sites:

Chico (Butte County)	Arbuckle (Colusa County)
Willows (Glenn County)	Redding (Shasta County)
Yuba City (Sutter County)	Red Bluff (Tehama County)

Based on the 1990 and 1996 assessments, transport was found to be "significant" at the following air monitoring sites:

Chico (Butte County)	Colusa and Arbuckle (Colusa County)
Willows (Glenn County)	Redding and Anderson (Shasta County)
Yuba City (Sutter County)	Red Bluff (Tehama County).

Based on the 1990 assessment, transport was found to be "inconsequential" at:

Redding and Anderson (Shasta County).

In the 1996 assessment, it was found that none of the sites had “inconsequential” transport during the period 1994 through 1996 and therefore, the “inconsequential” transport assessment was removed.

b. Transport Working Group

The ARB staff and the Shasta County district staff formed the Shasta County Transport Working Group. This group shared data, analyses, suggestions, and pertinent recommendations. Group members met once in June 1999 and also discussed the analyses during several phone calls. Since the number of State ozone exceedance days in Shasta County increased significantly during 1996-98 compared to the previous three year period and because both “significant” and “overwhelming” transport episodes have already been well documented, the Working Group focused on analyzing for an “inconsequential” transport episode.

3. Geographical Features

A detailed description of the geography of the Sacramento Valley can be found on page VII.7 of the 19% transport “Assessment and Mitigation of the Impacts of Transported’ Pollutants on Ozone Concentrations in California.” The important features related to this analysis are that Shasta County is located at the northern end of the Sacramento Valley. Shasta County is surrounded by mountains on three sides, providing a bowl, which allows, under some meteorological conditions, for emissions and pollutants to accumulate and/or recirculate. Figure 2 is a map of the Sacramento Valley, which shows the major geographic features.

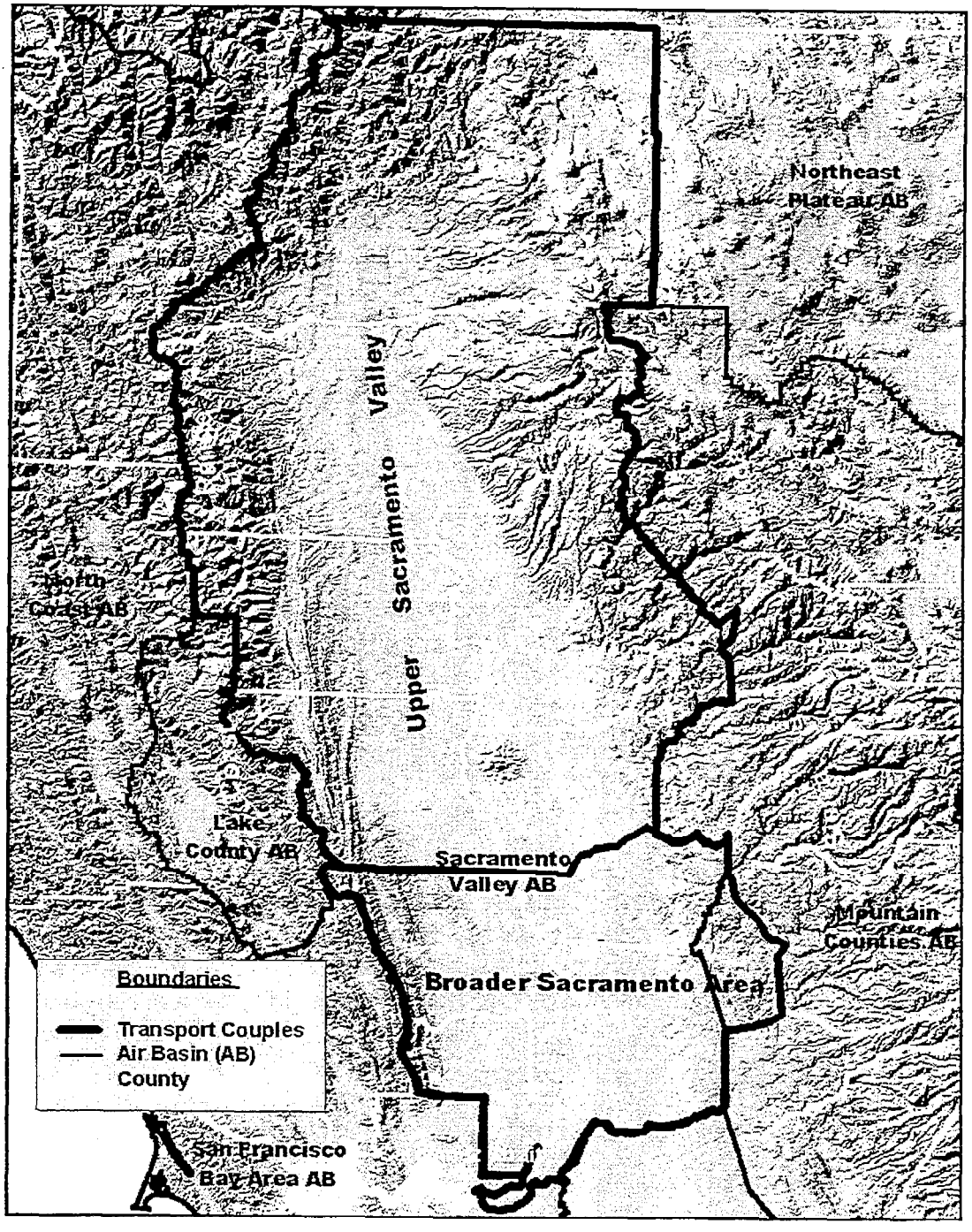
4. Emissions

Shasta County is the second highest emitter of NO, and ROG within the Sacramento Valley Air Basin (SVAB), with Sacramento County being.the highest.- The highest emitting facilities of NO, in the SVAB are located in Shasta County. The highest emitter of NO, within the SVAB is Calaveras Cement Company with 559 tons/year located in the city of Redding. Three other high emitting facilities of NO, within the SVAB are located in the city of Anderson: Simpson Paper Company with 377 tons/year, Wheelabrator Energy with 364 tons/year, and Wheelabrator Lassen with 227 tons/year. In addition, the city of Burney has a high emitting facility for NO,, the PG&E plant producing 220 tons/year..

5. Population

Shasta County has the second highest population in the USV, second to Butte County. Shasta County’s immediate neighboring counties to the south are Tehama and Butte County. Together these three counties constitute approximately 70 percent of the USV population with a total 1998 population of 418,100. The average growth for these three counties between 1990-I 998 was 10 percent.

Figure 2
Geographic Features of the Sacramento Valley



6. Analysis

Shasta County had its worst year on record in 1998 with 40 State ozone exceedances. In addition, the ozone trend for Shasta County has remained flat between 1980 through 1998, whereas the ozone trend for this same period in Sacramento County shows a downward trend. This prompted the ARB staff to re-evaluate transport to determine if Shasta County was affected by “inconsequential” transport resulting in local exceedance days.

The ARB staff screened 1997 and 1998 ozone exceedances (1996 data have been independently evaluated by Sonoma Technology Inc.) and identified three possible local days. These proposed local exceedances occurred on August 4, 1997, August 19, 1998, and September 24, 1998.

Air quality and meteorological data were evaluated for evidence of transport impacts. Both spatial and temporal analyses were done to establish the extent of the exceedances and the time of day that they occurred. Diurnal profiles, which are the ozone concentrations that occurred throughout the day, were used to understand the behavior of the ozone concentrations. Maximum concentrations which occur in the early morning may indicate the possibility of ozone trapped aloft which fumigates to the surface as the surface temperatures increase. The assessment of transport impacts requires a three dimensional analysis. Therefore, air quality and meteorological data for different altitudes is helpful in understanding the possibility of transport of air pollutants aloft. The monitors located on top of the Sutter Buttes and Tuscan Buttes in the Sacramento Valley area represent the air quality aloft. Sutter Buttes is located at 2,132 feet in Sutter County and Tuscan Buttes is at 1,868 feet in Tehama County. (See Appendix F for more detailed technical description of the analyses.)

a. Analysis of the August 4, 1997 Exceedance

Summary

The staff found that the exceedance on this day was caused by local emissions and not transported pollutants from the Broader Sacramento Area (BSA). Both surface and aloft wind directions and speeds were not conducive for transport from the BSA to Shasta County. In addition, the temporal and spatial characteristics of the exceedance are consistent with a locally generated ozone exceedance.

Air Quality

Shasta County exceeded the State ozone standard on August 4, 1997, with a daily maximum concentration of 0.097 ppm. The analysis included data for the period of August 2, 1997, through August 4, 1997. The air quality for the entire Sacramento Valley Air Basin (SVAB) was reviewed for spatial and temporal relationships.

The exceedance in Shasta County occurred near the noon hour, indicating contribution from locally generated emissions. Only one monitor in the BSA had an exceedance during this period, which occurred at noon on the same day as in Shasta County. In addition, the concentrations at Tuscan and Sutter Buttes were low which indicate no significant contribution to Shasta County exceedance from BSA transport aloft.

Meteorology

The surface winds were affected by a high pressure system located at the most northern extent of the Sacramento Valley (Shasta County), and a low pressure system located over most of the remainder of the Sacramento Valley. (High-pressure systems are conducive for ozone formation, whereas, low-pressure systems are conducive for the dispersion, and dilution of emissions and pollutant concentrations-) For most of this period, there were weak northerly surface winds in the northern portion of the USV. Moreover, an early morning calm was observed for each of these three days, allowing local emissions to build. These meteorological conditions are not conducive for surface transport from the BSA to Shasta County.

The aloft winds were also affected by these two pressure systems. The day prior to the exceedance, the wind direction at Sutter Buttes for the evening was from the south and the wind speed was very low (1 mile per hour). In addition, the wind direction at the Tuscan Butte site for the morning hours was from the north and the wind speed was 4 miles per hour. The aloft wind directions and speeds are not conducive for the transport of significant pollutants from the BSA to Shasta County.

b. Analysis of the August 19, 1998 Exceedance

Summary

The staff found that the exceedance on this day was caused by local emissions, and not by transported pollutants from the BSA. Both surface and aloft wind directions and speeds were not conducive for transport from the BSA to Shasta County: In addition, the temporal and spatial characteristics of the exceedance are consistent with a locally generated ozone exceedance.

Air Quality

Shasta County exceeded the State ozone standard on August 19, 1998 with a daily maximum concentration of 0.100 ppm. The analysis included data for the period of August 17, 1998 through August 19, 1998. Air quality for the entire SVAB was reviewed for spatial and temporal relationships.

For the duration of this period, Shasta County was the only area within the SVAB that exceeded the State ozone standard. The exceedance occurred near the noon hour indicating contribution from locally generated emissions. In addition, the aloft

concentrations at Tuscan and Sutter Buttes were low, indicating that transport aloft from the BSA did not contribute to the Shasta County exceedance.

Meteorology

The surface winds for this three day period were affected by a shifting surface high pressure system located near or around the most northern extent of the Sacramento Valley (Shasta County), and a surface low pressure system located over most of the remainder of the Sacramento Valley. On each of the three days, an early morning calm or northerly wind was observed, allowing local emissions to build or potentially to recirculate.

The aloft winds were also affected by these two pressure systems. The day prior to the exceedance, the wind direction at Sutter Buttes was from the south and the wind speed was very low (3 miles per hour). The wind direction at the Tuscan Buttes site was from the north and the wind speed was 5 miles per hour. These aloft wind directions and speeds are not conducive for the transport of pollutants from the BSA to Shasta County.

c. Analysis of the September 24, 1998 Exceedance

Summary

The staff found that the exceedance on this day was caused by local emissions, and not by transported pollutants from the BSA. Both surface and aloft wind directions and speeds were not conducive for transport from the BSA to Shasta County. In addition, the temporal and spatial characteristics of the exceedance are consistent with a locally generated-ozone exceedance.

Air Quality

Shasta County exceeded the State ozone standard on September 24, 1998, with a daily maximum concentration of 0.100 ppm. The analysis included data for the period of September 21, 1998, through September 24, 1998. The air quality for the entire SVAB was reviewed for spatial and temporal relationships.

For the duration of this period, Shasta County was the only area within the SVAB that exceeded the State ozone standard. The exceedance occurred mid-afternoon, indicating contribution from locally ‘generated emissions from within Shasta County, where some emissions from adjacent counties within the USV could have contributed. The aloft concentrations at Tuscan and Sutter Buttes were low. The maximum concentrations at the monitors on the Tuscan and Sutter Buttes occurred at the same time as the maximum concentration at Redding. On the evening prior to the exceedance day, the ozone concentrations at the Sutter Buttes site were also low. During the early morning of the exceedance day, the ozone concentrations at the

Tuscan Buttes site were also low. This indicates that the ozone aloft did not appear to contribute significantly to the exceedance.

Meteorology

During this period, Shasta County had higher ambient temperatures than in Sacramento County. This indicates that Shasta County's temperature was more conducive for ozone formation-

On September 21, 1998, a northerly wind was prevalent for most of the day, which allowed for the clean day in the SVAB. The period from September 22-24 had very similar meteorological conditions. During all three days, an evening and early morning calm was observed, allowing local emissions to build.

During the last three days of this period, the highest ozone concentration occurred about the same time as the daily temperature peaked. The temperature peaked at 27°C in Redding, and peaked at 24.9°C in Folsom. The wind trajectory model runs were consistent with the above analysis, indicating that the emissions, which impacted the Redding monitor most likely, originated in Tehama and Shasta Counties.

7. Conclusions

The ARB staff determined that the ozone exceedances on August 4, 1997, August 19, 1998, and September 24, 1998, at Redding in Shasta County had little or no impact from transport of upwind emissions from the Broader Sacramento Area. Based on these recent analyses, the staff recommends that the USV transport classification include that of "inconsequential" transport in addition to that of the 1996 assessment of "significant" and "overwhelming" impacts. The staffs findings indicate that Shasta County, as well as the neighboring counties, has a responsibility to reduce emissions to attain the State ozone standard in the USV.

B. San Francisco Bay Area Air Basin to North Coast Air Basin

1. Recommendation

The staffs analysis indicates that transport from the San Francisco Bay Area Air Basin (SFBAAB) caused exceedances of the State ozone standard in the Sonoma County portion of the North Coast Air Basin (NCAB). This conclusion is based on screening all nine exceedance days in Healdsburg (the only ozone monitoring site located in the Sonoma County portion of the NCAB) during 1996-98 and analyzing all five exceedance days that were not excluded as extreme concentrations. There are no indications that the Sonoma County portion of the NCAB (northern Sonoma County) is capable of exceeding the State ambient air quality standard for ozone without transport from an upwind area. The September 24, 1997 exceedance is presented as an example of an exceedance due to “overwhelming” transport.

The staff recommends that the Board classify the transport of ozone (and its precursors) from the SFBAAB to the NCAB as “overwhelming”. The staff also recommends that the air quality attainment plan of the Bay Area Air Quality Management District include sufficient measures to attain the State ozone standard within northern Sonoma County.

2. Background

In 1999, the Sonoma County portion of the NCAB (northern Sonoma County) was designated nonattainment for the State ozone standard for the first time. As a newly designated nonattainment area with few stationary sources and low vehicle volumes, the staff believed that a transport assessment was necessary.

3. Geographical Features

Figure 3 shows the geographic setting of this transport couple. The SFBAAB comprises all or parts of nine counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, the western portion of Solano, and the southern portion of Sonoma County. However, due to their spatial relationship with northern Sonoma County and the predominant windflow pattern throughout the SFBAAB, Marin, Napa, and the southern portion of Sonoma County have the greatest potential to impact air quality in northern Sonoma County. The NCAB is comprised of all or parts of five counties: Del Norte, Humboldt, Mendocino, Trinity, and northern Sonoma County. However, due to the rugged topography of much of the NCAB, the only emissions in the NCAB that are likely to contribute to exceedances in Healdsburg are those occurring in northern Sonoma County.

Healdsburg is located at the north end of the Santa Rosa Plain where it narrows from approximately 15 miles wide near Santa Rosa to about five miles wide at Healdsburg. The Santa Rosa Plain extends roughly in a north-south direction.

Therefore, the predominant onshore flow observed during the summer and fall months result in the frequent southerly winds observed throughout the Santa Rosa Plain.

4. Emissions

The staff used the 1996 emission inventory data for statewide, air basin, and county totals. While such emission totals provide only general information, they are useful for determining the relative difference in emissions between various areas. Emissions in the SFBAAB for both NO, and ROG are roughly ten times greater than that of the NCAB. Emissions in the Sonoma County portion of the SFBAAB are about 3-4 times greater than the Sonoma County portion of the NCAB. Emissions from the northern counties of the SFBAAB (southern Sonoma, Marin, and Napa Counties) are about 7 times greater than in northern Sonoma County. Additionally, there are no major stationary sources of ROG or NO, between the basin boundary and the Healdsburg monitor.

5. Population

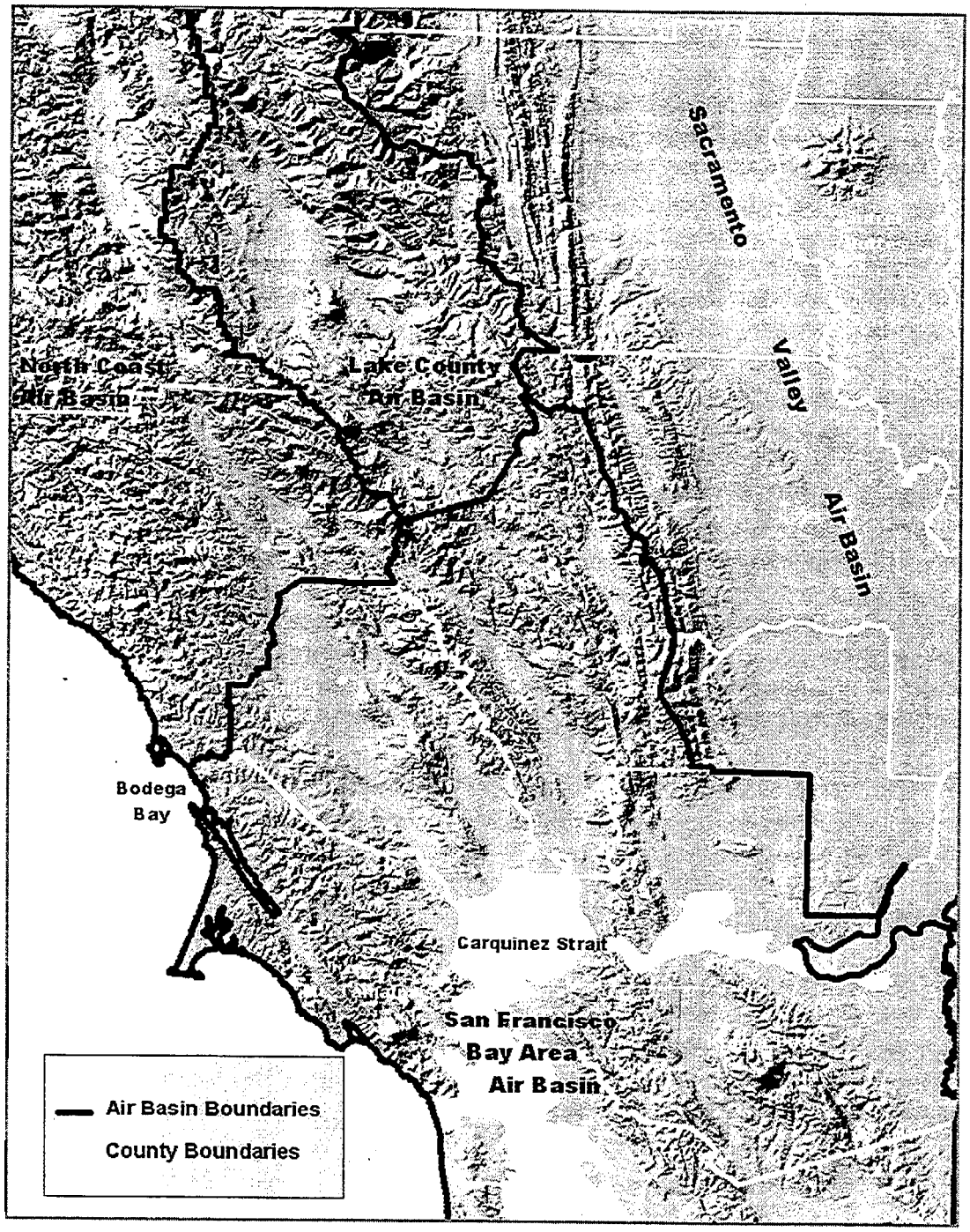
Healdsburg, with a mere population of 10,000, is located-just five miles north of the basin boundary separating the SFBAAB and the NCAB. In addition, Healdsburg is only approximately 15 miles north of Santa Rosa, a fast growing metropolitan area with an estimated population of 140,000. Windsor, an area of new development, is a town 10 miles north of Santa Rosa and only two miles south of the basin boundary. Windsor's population is estimated to be 20,000. The population of Sonoma County south of the basin boundary (the SFBAAB portion) is approximately seven times greater than its northern counterpart (the NCAB portion). In addition, the combined population of the SFBAAB portion of Sonoma County, Marin County, and Napa County is more than 13 times greater than the population of northern Sonoma County. Finally, the population of the entire SFBAAB is approximately 20 times greater than the NCAB.

6. Analysis of the September 24, 1997 Exceedance

Summary

There were nine exceedance days measured in Healdsburg during 1996-98. Four of these days can be excluded as extreme concentrations. (An extreme concentration is a concentration that is statistically expected to recur less frequently than once every year.) Exceedances identified as extreme concentrations are not considered violations and were not included in this transport assessment because attainment designations are based only on violations. Those days not considered extreme concentration events are violations days. The staff analyzed all five violation days and found all five violation days to be "overwhelmed" by transport of ozone and/or ozone precursor emissions from the SFBAAB. The September 24, 1997 exceedance is presented as an example of an exceedance due to "overwhelming" transport. (See Appendix F for more detailed technical description of the analyses.)

Figure 3
Geographic features of Sonoma County and Surroundings



Air Quality

The analysis included data for the period of September 22, 1997 through September 24, 1997. Ozone maximums on September 22 were very low (near background levels) except at Healdsburg which recorded 0.07 parts per million (ppm). Ozone concentrations in Healdsburg and southward increased on September 23. The upward trend continued on September 24, 1997, when Healdsburg exceeded the State ozone standard with a 0.10 ppm for four consecutive hours.

On September 24, high ozone values were observed from San Rafael to Healdsburg. The exceedance at Healdsburg lasted until early evening, which is an indication that the ozone concentrations may be impacted by transport.

Meteorology

Surface wind observations along the transport route from the SFBAAB to Healdsburg predominantly measured wind coming from a southerly direction from September 22 up until the mid-afternoon exceedance on September 24. Sites recording south winds include Petaluma, Santa Rosa, Windsor, and Healdsburg.

Surface wind trajectories were simulated for this episode. The trajectories consistently point toward the Santa Rosa area as the upwind area contributing to Healdsburg's ozone concentrations. It is also possible that carry-over emissions from areas south of Santa Rosa may have contributed to Healdsburg's ozone exceedances.

The staff also examined upper-level winds for indications of transport. The upper air meteorological sites that were analyzed include Oakland, Reno, Bodega Bay, and Sacramento. In addition, data from surface sites located on mountain peaks were used to approximate upper level winds at their corresponding elevations.

For the hours leading up the exceedance in Healdsburg on September 24, 1997, winds aloft were generally southeasterly and easterly. Therefore, the immediate upwind region is the SFBAAB.

7. Conclusion

The ARB staff concluded that all five violation days in northern Sonoma County were caused by "overwhelming" transport from the SFBAAB based on the evaluation of the topography, airflows, temporal and spatial extent of the ozone concentrations, and a comparison of the emissions and populations. The staffs findings indicate that the San Francisco Bay Area Air Basin is responsible for the attainment of the State ozone standard in the Sonoma County portion of the North Coast Air Basin. Since local emissions in northern Sonoma County do not contribute significantly to the exceedances, the Northern Sonoma County Air Pollution Control District will not need to comply with the planning requirements of the California Clean Air Act.

C. San Francisco Bay Area and San Joaquin Valley *Air Basins to South Central Coast Air Basin (San Luis Obispo County)*

1. Recommendations

The staff recommends that the Board continue to classify the transport from the San Joaquin Valley Air Basin to the South Central Coast as "significant" and "inconsequential" as was found in the 1993 transport assessment report. The staff also recommends that "significant" transport from the San Francisco Bay Area Air Basin and the San Joaquin Valley Air Basin, collectively, can "overwhelm" the South Central Coast Air Basin (San Luis Obispo County portion only). In addition, the staff found that emissions from the San Francisco Bay and San Joaquin Valley Air Basins combine with local emissions to cause exceedances in San Luis Obispo County. Therefore, the staff recommends that the Board identify the-San Francisco Bay Area Air Basin to South Central Coast Air Basin as a new transport couple.

2. Background .

A transport assessmentwas conducted for San Luis Obispo County (the County) at the request of the San Luis Obispo County Air Pollution Control District (the District). This request was due to an unusually high number of State l-hour ozone exceedances in 1998. 1998 was the worst year on record, with 25 ozone exceedance days.

a. Previous: Assessments

In 1993, the Board concluded that the County was impacted by "significant" and "inconsequential" ozone transport from the San Joaquin Valley Air Basin (SJVAB). The staff found that ozone exceedances in the County could be the result of combined emissions from within the County and emissions transported from the SJVAB via winds aloft. An analysis performed by the District for an exceedance in 1989 indicated that there was no "significant" transport from regions outside the County for that exceedance. Thus, the analysis indicates "inconsequential" transport from SJVAB.

b. Transport Working Group

In 1993, the Board directed the ARB staff to work more directly with the districts' staffs to assess transport. A result of this direction was the formation of the San Luis Obispo County Transport Working Group. This group comprised the staff from the Bay Area Air Quality Management District, Monterey Bay Unified Air Pollution Control District, San Joaquin Valley Unified Air Pollution Control District, the District, and the ARB. The purpose of the working group was to assess the impact of transport on days exceeding the State ozone standard in the County during 1996-1998. The working group met three times during 1999 and once in 2000.

3. Geographical Features

Figure 4 shows the locations of important geographical features referenced in this discussion. The County is located in the northern section of the South Central Coast Air Basin. Monterey County borders it to the north, Santa Barbara County to the south, the Pacific Ocean to the west, and the San Joaquin Valley to the east.

4. Emissions

Comparisons of the 1996 emission inventories for ozone precursors were conducted for the County, neighboring counties, and air basins- While such emission totals provide only general information, they are useful for determining the relative difference in emissions between various areas. There is a wide disparity between emission inventories in the County and other areas. The NOx emissions in North Central Coast Air Basin (NCCAB), southern San Francisco Bay Area Air Basin (SFBAAB), San Joaquin Valley Air Basin, and Monterey plus San Benito Counties are nearly 2 to 15 times the emissions generated in the County. The ROG emissions in North Central Coast Air Basin, southern San Francisco Bay Area Air Basin, San Joaquin Valley Air Basin, and Monterey plus San Benito Counties are nearly 2 to 17 times the emissions generated in the County.

The combined emissions of central and southern San Joaquin Valley Air Basin are 4-6 times the NO, and 4-7 times the ROG inventories of the County. These emission inventory relationships indicate that emissions in adjacent areas, under appropriate meteorological conditions, have the potential to significantly and overwhelmingly impact the County.

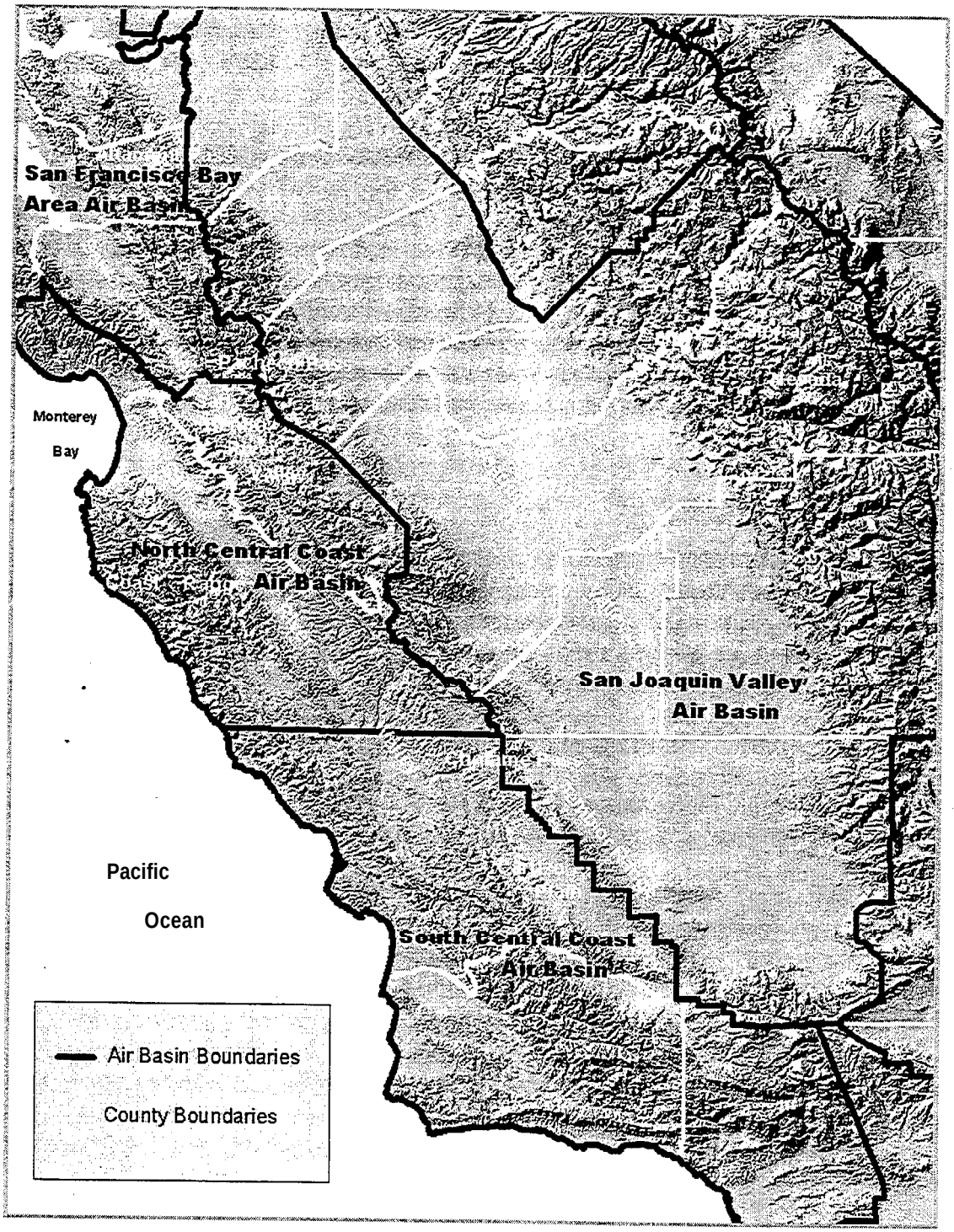
5. Population

Population growth for the entire county was 4.6% between 1990 and 1995. The population rose from 217,162 to 227,225 during this period. The greatest increase in population occurred in the upper Salinas Valley area. However, this growth represents less than 4,000 residents. Population growth in the surrounding air basins has increased from 1990 to 1995. The greatest population growth was within the San Joaquin Valley Air Basin.

6. Analysis

All 1996 through 1998 ozone exceedance days were first screened to determine which were violations of the State Ambient Air Quality Standard using the criteria for extreme concentrations. The working group looked at all the violation days with the focus on analyzing examples of “overwhelming”, “significant”, and “inconsequential” ozone transport. The working group identified an ozone episode that represented each of the

Figure 4
Geographic Features of Central California



three kinds of transport impacts. The working group determined that ozone from both the SJVAB and SFBAAB "overwhelmingly" impacted Paso Robles and "significantly" impacted Atascadero on August 28, 1998. Paso Robles and Atascadero were "significantly" impacted by transported ozone from the SJVAB on May 1 I, 1996. In addition, the working group determined that emissions solely from within the County caused the ozone exceedance at Atascadero on September 1, 1996. (See Appendix F for more detailed technical description of the analyses.)

a. "Overwhelming" and "Significant" Transport Impact – August 28, 1998

Summary

This analysis suggests that significant emissions from the SFBAAB joined significant emissions from the SJVAB to collectively "overwhelm" Paso Robles on August 28. In addition, this analysis suggests that these emissions impacting Paso Robles continued southward to impact Atascadero. However, the combination of these transported emissions along with sufficient local emissions resulted in a "significant" impact at Atascadero.

Air Quality

The analysis included data for the period of August 26 through August 28, 1998. The ozone air quality on August 26 was good except in the isolated areas in central and southern SJVAB. On August 27, ozone maximum concentrations increased at Paso Robles and Atascadero, as well as aloft at Black Mountain (the District's special study air monitoring site at'3600 feet) and the adjacent air basins. The ozone concentrations continued to increase on August 28, when both Paso Robles and Atascadero exceeded the State ozone standard. The State ozone standard was also exceeded in the adjacent air basins including SFBAAB at Livermore, and throughout central and southern SJVAB. The NCCAB ozone concentrations remained low except for the inland site at Hollister and the higher elevation site at Pinnacles National Monument (1100 feet).

The time of peak ozone concentrations on August 28 occurred in the early evening in the County, mid to late afternoon at Hollister and Pinnacles National Monument, and late afternoon in the Santa Clara Valley. These late peak times indicate impacts from transported emissions. The progression of the hour of peak ozone concentration extends southward from the southern SFBAAB to Pinnacles then Paso Robles and Atascadero. This progression suggests that transported emissions from the SFBAAB impacted the northern County.

Meteorology

On August 27, strong high pressure aloft covered the southwestern United States and was highest over central California. As the high pressure increased from August 27 to 28, ozone exceedances became more widespread across central California.

Central California surface winds during August 27 and 28 were generally northwest to north. Surface back trajectories indicated that the San Jose area was the upwind area contributing to the ozone concentrations in the County. Data from Fort Ord show winds aloft were from the north to northeast. Winds at Black Mountain were east-northeast.

Surface temperatures in southern Monterey County to central San Luis Obispo County were the highest throughout central California on August 28. Peak temperatures at Paso Robles reached 104 degrees Fahrenheit on August 28. Peak temperatures in the SJVAB reached 99 and 97 degrees on August 28 at Fresno and Bakersfield, respectively. The high surface temperatures on August 28 resulted in deep vertical mixing. This deep vertical mixing could have served as a mechanism to further draw air into the area where the exceedances occurred in the County, thus enhancing transport and vertical interchange.

b. "Significant" Transport Impact – May 11, 1996

Summary

This analysis suggests that significant surface emissions from within the San Luis Obispo County joined significant aloft emissions from the SJVAB to cause ozone exceedances in the County on May 11, 1996.

Air Quality

The analysis included data for the period of May 9 through May 11, 1996. Maximum ozone concentrations on May 9 were low throughout central California. Ozone concentrations increased at Paso Robles and Atascadero, as well as in the adjacent air basins on May IO. Concentrations continued to increase on May 11, when both Paso Robles and Atascadero exceeded the State ozone standard with 0.097 ppm. In addition, ozone concentrations exceeding the State ozone standard occurred in all the adjacent air basins. The time of peak ozone concentrations on May 11 occurred in the early afternoon in the northern County, mid to late afternoon at Hollister and Pinnacles National Monument, and late afternoon in the Santa Clara Valley. The lack of a progression of the hours of the peak ozone concentrations from the SFBAAB to Paso Robles, does not suggest a transport connection.

The timing and distribution of the daily maximum ozone concentration on May 10 suggests that the Hanford exceedance was primarily the result of surface emissions from the Fresno urban plume and not the SFBAAB. The elevated daily maximum ozone concentrations at Tracy and Crows Landing on May 1 1 indicate that some SFBAAB emissions impacted northern SJVAB, although, these concentrations are below the State 1-hour ozone standard. In addition, the timing of the daily maximum ozone concentration at these two northern SJVAB sites is similar to Paso Robles and Atascadero, not considerably prior. Therefore, it's doubtful that significant SFBAAB

emissions via the San Joaquin Valley contributed to the May 11 ozone exceedances at Paso Robles and Atascadero.

Meteorology

On May 10 high pressure aloft was centered along the western U'. S. coast. The center of this high pressure moved eastward into the Great Basin by the late afternoon of May 11, becoming stronger as it moved over California. As the high pressure over California increased from May IO to 1 1, ozone exceedances became more widespread across central California.

This increase in high pressure over California brought light to moderate winds from the north to northeast in the northern County on May 10-l I-. Surface back trajectories indicated that the surface northerly flow was very weak, and therefore, not consistent with transport from the SFBAAB. The winds aloft on May 11 were generally offshore at Vandenberg AFB, Fort Ord, Oakland, and Fresno.

Surface temperatures in Paso Robles, Atascadero, and the San Joaquin Valley were high on May 11. Peak temperatures at Paso Robles and Atascadero reached 95 and 91 degrees Fahrenheit. Peak temperatures at Fresno and Bakersfield were 90 and 88 degrees Fahrenheit, respectively. The high surface temperatures resulted in deep vertical mixing on May 11 over the County and central and southern SJVAB. This deep vertical mixing could have served as a mechanism to further draw air into the area where the exceedances occurred in the northern County, thus enhancing transport and vertical interchange.

C. **"Inconsequential" Transport Impact – September 1, 1996**

Summary

This analysis suggests that emissions predominantly within the County resulted in a l-hour exceedance of the State ozone standard at Atascadero on September 1. As a result, Atascadero was impacted by "inconsequential" transport on September 1, 1996. This indicates San Luis Obispo County will need to reduce the emissions within the County to reach attainment of the State ozone standard.

Air Quality

The analysis included data for the period of August 31 through September 1, 1996. Maximum ozone concentrations on August 31 were low in the County, moderate in the NCCAB, and exceeded the state ozone standard in the southern SFBAAB and in the SJVAB. By September 1 ozone concentrations increased in the northern County, but decreased in the adjacent air basins-

Elevated concentrations of oxides of nitrogen were measured at Atascadero during the morning and evening hours of August 31. The local emissions of oxides of nitrogen

were magnified by the increased Labor Day traffic on U. S. Highway 101. Elevated concentrations of oxides of nitrogen continued overnight and into the morning hours of September 1.

Meteorology

On August 31 high pressure was centered over the California's central coast and desert interior, causing the buildup of ozone concentrations in the central and southern portions of California. However, by September 1 lower pressure aloft resulted in decreased ozone concentrations over portions of central and southern California except for the northern County.

The nighttime and morning surface winds at Atascadero were calm on August 31 and September 1. Afternoon west-southwest seabreeze winds were light on August 31 and September 1. The winds aloft at Vandenberg AFB, Oakland, and Fresno were generally onshore both on August 31 and September 1. The surface backward trajectory from Atascadero indicated that air arriving in Atascadero at the time of the peak ozone concentration had originated off the coast earlier in the day.

7. Conclusions

The staff concluded that on at least one day during 1996-1998, emissions within San Luis Obispo County were solely the cause of an exceedance of the State ozone standard in the County. On at least one other day, significant emissions from within the County combined with transported emissions from the SJVAB to cause an exceedance. On another day, the staff found that an exceedance was due to significant emissions from the SFBAAB and the SJVAB that collectively "overwhelmed" Paso Robles. In addition, on this day, significant emissions from the SFBAAB, SJVAB, and from within the County were the cause of an exceedance.

The staffs findings indicate that San Luis Obispo County will need emission reductions from both the San Francisco Bay Area and the San Joaquin Valley to reach attainment of the State ozone standard. In addition, the findings indicate that there is a shared responsibility of San Francisco Bay Area, San Luis Obispo, and San Joaquin Valley to reduce emissions. Finally, the findings indicate San Luis Obispo will need to reduce the emissions within the county to reach attainment of the State ozone standard.

CHAPTER IV

Impact Analysis

A. Public Health, Welfare, and Environmental impacts

The proposed amendments are not expected to affect any existing upwind mitigation requirements since the staff is not identifying any new upwind areas. Therefore, the adoption of the proposed amendments is not expected to result in any adverse impacts on public health and welfare.

5. Economic Impacts

The proposed amendments do not change any of the requirements in place pursuant to the current version of the regulation. Therefore, these regulations have no direct economic impact, and the following general determinations are appropriate:

The Executive Officer has determined that adoption of the proposed amendment will not create costs or savings, as defined in Government Code section 113465(a)(6), to any State agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other nondiscretionary savings to local agencies-

The Executive Officer also has determined, in accordance with Government Code section 113465(a)(8), that adoption of the proposed amendment will not have a significant adverse economic impact on businesses, including the ability of California businesses to compete with businesses in other States. The Executive Officer has determined that there will be no, or an insignificant, potential cost impact, as defined in Government Code section 11346.5(a)(9), on private persons or businesses directly affected as a result of adopting the proposed amendment.

In accordance with Government Code section 11346.3, the Executive Officer has determined that adoption of the proposed amendment will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or the elimination of existing businesses within California, or the expansion of businesses currently doing business within California.

In accordance with Government Code section 11346.5(a)(1 I), the Executive Officer has determined that adoption of the proposed amendment will not have a significant effect on housing costs.

Finally, the Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the proposed regulatory action will not affect small business, because by itself, the amendment contains no requirements for action and, therefore, has no direct economic impact.

Before taking final action on the proposed amendment to the regulations, the Board must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

C. Alternatives to the Staff's Proposed Amendments

State law explicitly requires the ARB to assess the contribution of upwind emissions to downwind ozone concentrations based on the preponderance of evidence, and to establish transport couples and transport mitigation requirements that are commensurate with those contributions (Health and Safety Code, section 3961 O(b)). This mandate precludes consideration of the "no action" alternative with regard to the proposal for new transport couples, since measured data and not policy determines the outcome. The identification process leaves little room for alternatives. Each transport couple is accompanied by discussion of the basis for the identification. Implicit in these discussions is the consideration of possible alternatives to the transport assessment classifications, but the available data does not support these alternatives. The staff considered various alternatives to the mitigation requirements when the regulation was revised in March 1993. This proposal does not change the requirements; it only amends the regulation to assign additional responsibilities to previously identified upwind areas based on new findings of "overwhelming" and "significant" transport.

CHAPTER V

Recommendations for Further Research

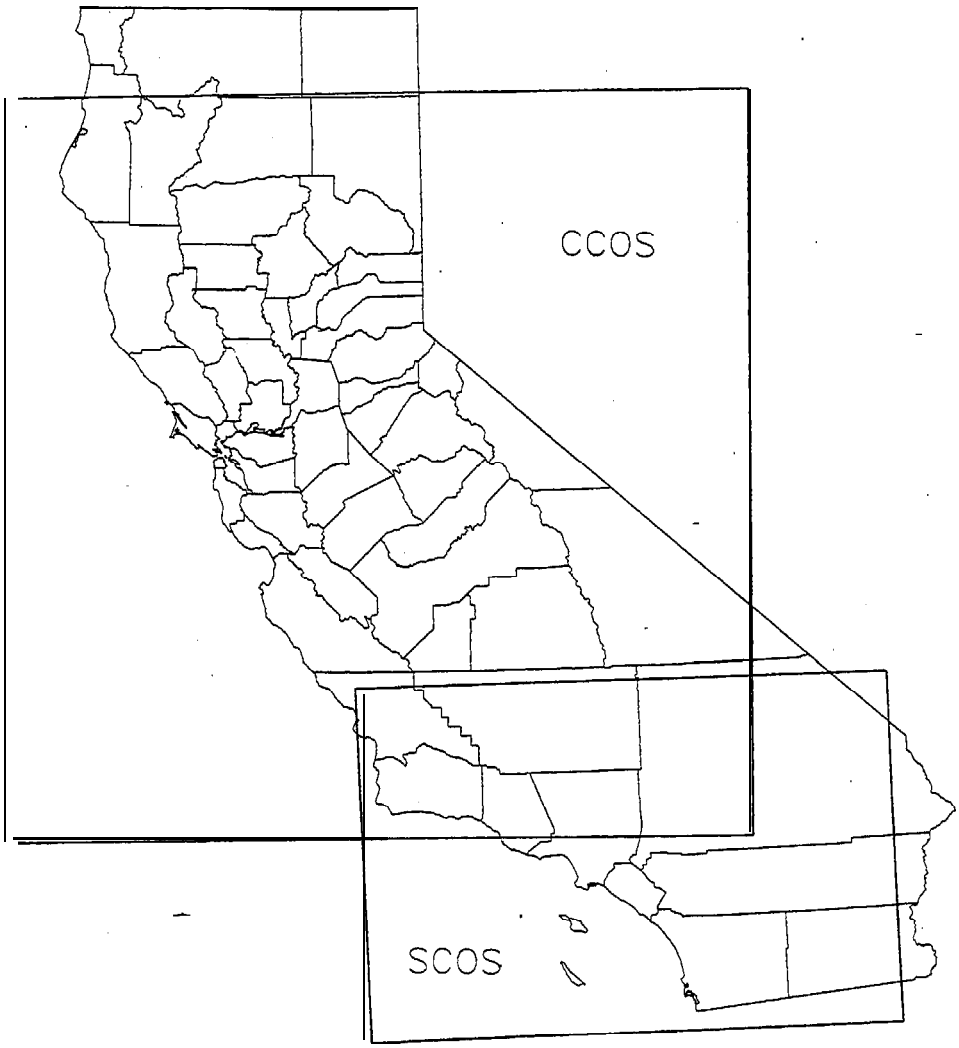
Transport of ozone and precursors is a three-dimensional phenomenon. Surface transport is only the most obvious process. Mixing of ozone and precursors aloft and subsequent transport also affects ozone concentrations in downwind and elevated areas. The routine monitoring networks which supply the data used to assess transport are primarily surface based. Therefore it has been difficult to understand the full nature and extent of transport.

Fortunately, two major ozone field studies should provide the three-dimensional data necessary to fully investigate transport in most of the ozone non-attainment areas of the State. These studies are the 1997 Southern California Ozone Study (SCOS) (Fujita et al. 1999a) and the 2000 Central California Ozone Study (CCOS) (Fujita et al. 1999b). Figure 5 shows the area covered by the two field study domains.

Both studies included enhanced monitoring of meteorology and air quality, both at the surface and aloft. Data were collected over a large region for several months during the ozone season, with additional measurements taken during ozone episodes.

These studies were designed to provide the necessary data to support regional modeling and data analysis efforts, for both attainment planning and transport assessment. Thus it is anticipated that the resulting data sets and resulting modeling analyses will allow a unique opportunity to both study and characterize three-dimensional transport on a regional basis.

Figure 5
CCOS and SCOS Domains



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APPENDIX A

TEXT OF HEALTH AND SAFETY CODE

APPENDIX A

TEXT OF HEALTH AND SAFETY CODE

Section 39610

(a) Not later than December 31, 1989, the state board shall identify each air basin, or subregion thereof, in which transported air pollutants from upwind areas outside the air basin, or subregion thereof, cause or contribute to a violation of the state ambient air quality standard for ozone, and shall identify thedistrict of origin of the transported air pollutants based upon the'preponderance of available evidence. The state board shall identify and determine the priorities of information and studies needed to make a more accurate determination, including, but not limited to, emission inventories, pollutant characterization, ambient air monitoring, and air quality models.

(b) The state board shall, in cooperation with the districts, assess the relative contribution of upwind emissions to downwind ozone ambient air pollutant levels to the extent permitted by available data, and shall establish mitigation requirements commensurate with the level of contribution. In assessing the relative contribution of upwind emissions to downwind ozone ambient air pollutant levels, the state board shall determine if the contribution level of transported air pollutants is "overwhelming", "significant", "Inconsequential", or some combination thereof. Any determination by the state board shall be based upon a preponderance of available evidence.

(c) The state board shall make every reasonable effort to supply air pollutant transport information to heavily impacted districts prior to the development of plans to attain the state ambient air quality standards, shall consult with affected upwind and downwind districts, and shall adopt its findings at a public hearing.

(d) The state board shall review and update its transport analysis at least once every three years.

(e) The state board shall conduct appropriate studies to carry out its responsibilities under this section.

Section 40918

(a) Each district with moderate air pollution shall, to the extent necessary to meet the requirements of the plan developed pursuant to Section 40913, include the following measures in its attainment plan:

(1) A stationary source control program designed to achieve no net increase in emissions of nonattainment pollutants or their precursors from new or modified stationary sources which emit or have the potential to emit 25 tons per year or more of nonattainment pollutants or their precursors. The program shall require the use of best available control technology for any new or modified stationary source which has the

potential to emit 25 pounds per day or more of any nonattainment pollutant or its precursors.

(2) The use of reasonably available control technology for all existing stationary sources, except that stationary sources permitted to emit five tons or more per day or 250 tons or more per year shall be equipped with the best available retrofit control technology.

(3) Reasonably available transportation control measures sufficient to substantially reduce the rate of increase in passenger vehicle trips and miles traveled per trip if the district contains an urbanized area.with a population of 50,000 or more.

(4) Provisions to develop areawide source and indirect source control programs-

(5) Provisions to develop and maintain an emissions inventory'system to enable analysis and progress reporting and a commitment to develop other analytical techniques to carry out its responsibilities pursuant to subdivision (b) of Section 40924.

(6) Provisions for public education programs to promote actions to reduce emissions from transportation and areawide sources-

(b) Any district with moderate air pollution that is not below the pollutant concentrations for a moderate classification pursuant to Sections 40921 and 40921.5 by December 31, 1997, shall comply with Section 40919 if the state board demonstrates that the additional requirements of Section 40919 will substantially expedite the district's attainment of the state ambient air quality standards. Any actions taken by the state board pursuant to this subdivision are subject to Section 41503.4.

Section 40918.5

(a) Notwithstanding Sections 40918, 40919, and 40920, a district that does not have extreme air pollution may elect to not include a no-net-increase permitting program in its attainment plan if all of the following actions are taken:

(1) The governing board of the district finds, at a public hearing, that the no-net-increase permitting program is not necessary to achieve and maintain the state ambient air quality standards by the earliest practicable date.

(2) Prior to making the finding specified in paragraph (I), the governing board does both of the following:

(A) Reviews an estimate of the growth in emissions, if any, that is likely to occur as a result of the elimination of a no-net-increase permitting program.

(B) Complies with Section 40914 either by having adopted, or having scheduled for adoption, all feasible measures to achieve and maintain state ambient air quality standards, or by the use of an alternative emission reduction strategy.

(3) The governing board of the district submits its finding to the state board, and, within 60 days from the date of the submittal of the finding, the state board makes a determination based on quantifiable and substantial evidence that a no-net-increase permitting program is not necessary to comply with the mitigation requirements established pursuant to Section 39610 and that the no-net-increase permitting program is not necessary to achieve and maintain the state ambient air quality standards by the earliest practicable date. If the state board does not make any determination within that

60-day period, and the district does not agree to an extension of that time period, the district may make the election authorized by this subdivision.

(b) Nothing in this section shall relieve a district from the obligation to require the use of the best available control technology pursuant to Section 40918, 40919, or 40920.

Section 4094 8.6.

Following the implementation of Section 40918.5, both of the following shall occur:

(1) The district governing board's finding pursuant to paragraph (1) of subdivision (a) of Section 40918.5 shall, by operation of law, become part of the district's attainment plan.

(2) The state board shall, during any subsequent review of the district's attainment plan pursuant to subdivision (a) of Section 41500, determine based on quantifiable and substantial evidence whether or not a no-net-increase permitting program is necessary to comply with mitigation requirements established pursuant to Section 39610 or to achieve and maintain state ambient air quality standards by the earliest practicable date. If the state board determines that a-no-net-increase permitting program is necessary to comply with those requirements, the district shall then adopt and implement a no-net-increase permitting program pursuantto Section 40918, 40919, or 40920.

APPENDIX B

PUBLIC WORKSHOP NOTICE

Winston H. Hickox
Secretary for Environmental Protection

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95814 • www.arb.ca.gov

Gray Davis
Governor

October 4, 1999

Dear Sir/Madam:

Public Workshop to Discuss the Third Triennial Update to ARB's Assessment of the Impacts of Transborted Pollutants on Ozone Concentrations in California

The Air Resources Board (ARB) staff has scheduled a public workshop on November 4, 1999, to discuss staffs identification and assessment of pollutant transport between the San Francisco Bay Area Air Basin and the North Coast Air Basin. The impact of transported pollutants on ambient ozone concentrations within Shasta County and San Luis Obispo County will also be discussed.

The California Clean Air Act (Act) of 1988 directed ARB to assess the impacts of pollutants transported from upwind regions to downwind areas. A detailed analysis was performed in 1990 and published in a report, Assessment and Mitiaation of the Impacts of Transported Pollutants on Ozone Concentrations within California, which identified 14 transport couples (areas where pollutants were found to be transported from one area to another). The report analyzed wind flow patterns, reviewed state ozone standard exceedance data, and used atmospheric information to determine if pollutants from one area were contributing to the exceedances in a downwind area. Based on the available information, staff labeled the transport impacts as either "inconsequential," "significant", or "overwhelming." The assessment included the emissions inventories, which helped determine the level of impact of transported pollutants. Downwind areas that exceeded the State ozone with little or no local contribution were considered to be "overwhelmed" by transported pollutants from the upwind area. Areas where the exceedanceg resulted from both local and transported pollutants in a shared fashion were labeled "significant" and if transported pollutants contributed insignificantly to an area's exceedances the impact was called "inconsequential." By 1996 subsequent updates to the initial assessment have brought the number of transport couples to 26. The Act also called for mitigation commensurate with the degree of contribution and as a result, transport mitigation requirements were developed.

The transport mitigation requirements primarily apply to upwind areas which are sources of "overwhelming" or "significant" transport. These areas are required to mitigate the impact of the transported pollutants on downwind areas. The mitigation regulation requires upwind areas to mitigate the impact of its pollution on downwind areas and specifically requires the five air basins having the largest impact on

downwind areas to adopt, at a minimum, rules that represent best available retrofit control technology (BARCT) for stationary sources of ozone precursor emissions. Districts have complied with this mitigation requirement. In addition, ongoing reductions of pollutants from upwind areas will continue to be accomplished through the adoption of "all feasible measures" as required by the Act.

The purpose of the workshop is to discuss the results of the most recent assessment. No changes to existing transport assessments, other than for San Luis Obispo County and Shasta County, or to the mitigation requirements are proposed. The workshop will be held at the time and location identified below:

DATE: **November 4, 1999**

TIME: **10:00 a.m. – 3:00 p.m.**

PLACE: **Air Resources Board**
Second Floor Conference Room
2020 L Street
Sacramento, California

Should you have any questions, please contact Debora Popejoy, Air Quality Analysis Section Manager, at (916) 323-5123, or Steve Goure, of her staff, at (916) 323-6627.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact Janine Hiles at (916) 322-5350 by November 2, 1999. Persons with hearing or speech impairments can contact us by using our Telephone Device for the Deaf (TDD) at (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area.

Sincerely,

Bart Croes for

Lynn Terry
Deputy Executive Officer

APPENDIX C

TRANSPORT WORKSHOP PARTICIPANTS

APPENDIX C

TRANSPORT WORKSHOP PARTICIPANTS
(November 4, 1999)

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ARB Attendees
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John DaMassa
Cynthia Garcia
Steve Gouze
Richard Hackney
Nehzat Motallebi
Debbie Popejoy
Peggy Taricco
Dennis Wade
Jeff Wright

APPENDIX D

GLOSSARY

APPENDIX D

GLOSSARY

The following definitions are provided as an aid to the reader.

Adiabat/Adiabatic – see Lapse rate.

APOB – acronym for Airplane observation.

air basin – an area wherein there are similar meteorological and geographic conditions; also defined by political boundaries; an area in which the air mass is homogeneous; an area usually bounded by topographical features.

aircraft soundings – temperature and/or pollutant measurements aloft obtained by aircraft either at multiple levels over one location (referred to as a spiral), at one level over several locations (referred to as a traverse), or at multiple levels over several locations (referred to as a dolphin).

airflow charts – the Air Resources Board's Meteorology Section prepares charts that include wind speed and wind direction for many sites. The winds are analyzed with lines showing airflow patterns; a modified streamline chart produced by the Air Resources Board's Meteorology Section.

airflow type/pattern – the Air Resources Board's Meteorology Section first plots wind speed and direction at various locations statewide, they then analyze the plots using a modified streamline method, then they categorize, or type, airflow patterns in the larger, predominant regions of the state.

aloft – above the earth's surface, generally 50 feet elevation and higher; as opposed to the surface, is not exactly at the surface but usually anywhere from 2 to 30 feet above the ground.

ambient – surrounding, on all sides; in situ; for use in air pollution, ambient refers to free moving air as opposed to, possibly, in a laboratory setting.

anti-cyclonic – clockwise; wind flow around an area of high pressure.

AUSPEX – San Joaquin Valley Air Quality Study/Atmospheric Utility Signatures, Predictions, and Experiments (SJVAQS/AUSPEX); a field program conducted in 1990.

background -for ozone studies, background refers to an area's normal minimum ozone concentration, or that concentration normally experienced by an area without influence or transport from an upwind area. For instance, clean air, such as the air mass over the Pacific Ocean has a normal background concentration of 4 pphm. Areas in the mountains may have background concentrations of.5 or 6 pphm because there is not a presence of NOx for ozone scavenging as there is in the urban areas. Urban areas often have background ozone concentration levels of 0 or 1 pphm.

backward trajectory – a pictorial technique that estimates the path an air parcel took over a specified period of time. This path is estimated using wind speed and wind direction at various sites in the domain, which have been analyzed into successive hours of wind fields. Terrain and meteorology are also considered in this-analysis. In the case of backward trajectory, the site of the ozone concentration in question is used as the start point and then a figurative air parcel is "backed up" to determine the approximate source area of the polluted air mass.

bimodal – an analysis in which there are two areas where a-certain value, number, or concentration occurs with high frequency.

biogenic emissions – hydrocarbon emissions from plant species including alcohols, acetates, aldehydes, ketones, ethers, esters, alkanes, alkenes, aromatics, and, most prevalently, isoprene and alpha pinene (a monoterpene).

boundary conditions – for use in photochemical modeling, a boundary condition refers to those pollutant concentrations in air at the boundaries of the domain being modeled.

boundary sites -for use in transport assessments, a boundary site is a site close to an air basin boundary line.

break (inversion) – The temperature at the top of the inversion is an indicator of when the inversion might cease to exist, or break. This break temperature is the temperature at which the top of the inversion would be if lowered dry adiabatically. In other words, as a parcel of air changes altitude, it will warm if lowered or cool if raised approximately 5F per 1000 feet. When the surface temperature equals or exceeds that of the inversion top temperature lowered adiabatically, vertical mixing is possible and the inversion is said to have broken or eroded. Vertical mixing is contained only in layers of the atmosphere where the temperature decreases with height.

Clean Air Act – The California Clean Air Act was AB 2595, Sher (Chapter 1568, Statutes of 1988). Referring only to transport, this Act established time frames by which districts should improve air quality or meet attainment of the ambient air quality standard for ozone. This Act also established requirements for transport assessments to be made as well as updates of these assessments. The Federal

Clean Air Act was passed in 1977 and amendments were made in 1990. The state's transport research is primarily aligned with the California Clean Air Act.

corridor – a common path of airflow, usually unobstructed and long and usually transects two air basins,

convection/convective (heating) – upward vertical motion in the atmosphere; free convection is a result of surface heating or vertical motion caused by density differences within the airmass; forced convection is a mechanical lifting caused by such things as weather fronts or terrain.

couple – a pair of geographic areas, one considered upwind and one considered downwind.

decoupled – occurs when the air mass be-low the inversion is distinctly-different than the air mass above the inversion.

CDEC – acronym for California Data Exchange Center.

character of exceedance – an ozone concentration trend will indicate whether the ozone exceedance occurred abruptly or if the ozone concentrations gradually built up to exceed the state standard. The ozone concentration trend-also indicates whether the exceedance was brief or if it spanned many hours. The ozone concentration trend for the downwind site, compared with trends for upwind sites, will help support an assessment of transport or no transport.

CIMIS – acronym for California Irrigation Management information System.

contours – on constant pressure charts, i.e. 500 millibar chart, a contour is a line of uniform pressure heights.

confluence -the rate at which adjacent flow is converging, or coming together, along an axis oriented normal to the flow at the point in question; the opposite of diffluence; referring to direction.

convergence – flowing or running together to form one mass.

conversions –

From this:	To this:		
	m/sec	mph	knots
m/sec		x 2.2369	x 1.9425
mph	x 0.44707		x 0.86839
knots	x 0.51479	***x 1.1516***	–

From this:	To this:	
	lbs/day	tons/day
lbs/day	–	x 0.0005
tons/day	x 2000	–

From this:	To this:	
	°F	°C
°F	–	0.5555 x (“F-32)
°C	32 + (1.8 x °C)	

cyclonic – counter-clockwise; wind flow around an area of low pressure.

differential heating/cooling – when the rate of heating/cooling differs spatially.

difiuence -the rate at which adjacent flow is diverging, or moving apart, along an axis oriented normal to the flow at the point in question; opposite of confluence; referring to direction.

disperse -to break up and scatter in all directions; in transport, this term refers to the scattering of air pollutants by wind or by convection.

diurnal – daily; especially pertaining to actions which are completed within twenty-four hours and which recur every twenty-four hours.

divergence – flowing or moving apart from one common mass; opposite of convergence; referring to the velocity field.

domain – a field or sphere of activity or influence; in transport, the domain is the area of which data is input for modeling purposes.

downwind – The direction toward which the wind is blowing; with the wind.

drainage flow – general term for gravity-induced, down slope flow of relatively cold air.

duration – normally referring to the duration of the ozone exceedance at a particular site; the number of hours of ozone exceedance can be determined by reviewing the ozone concentration trend.

eddy – current of air moving against the main current and with a circular motion; limited in importance or effect.

emission inventory – usually expressed in tons per day; the emission inventory is used in photochemical modeling and in area comparisons.

exceedance – any ozone concentration greater than the ambient air quality standard for ozone.

extreme concentration – a concentration that is statistically expected to occur less frequently than once every year.

forward trajectory – a pictorial technique which estimates the path an air parcel took over a specified period of time. This path is estimated using wind speed and wind direction at various sites in the domain, which have been analyzed into successive hours of wind fields. Terrain and meteorology are also considered in this analysis. In the case of forward trajectory, an upwind area or site is used at the start point and then a figurative "air parcel" is then moved forward to determine the possible impacted area.

fumigate – this occurs when an air mass carrying pollutants becomes unstable, causing the airmass to mix vertically and the pollutants to come in contact with the earth's surface.

GMT – acronym for Greenwich Mean Time, the time in Greenwich, England which is eight hours later than Pacific Standard Time; also referred to as Zulu or Z time.

gradient – usually refers to temperature or pressure change over a given distance (usually horizontal); the ratio of change to distance. A "tight" or "strong" gradient refers to a high ratio or a lot of change per given distance. A "loose" or "weak" gradient, therefore, is less change over the same given distance.

high pressure – a dominating atmospheric feature; a large area where surface pressures are higher than the surrounding area; an area of anticyclonic circulation.

hydrocarbons – compounds containing various combinations of hydrogen and carbon atoms and which contribute to ozone formation.

inconsequential – ozone transport classification describing a condition when upwind emissions were not transported or did not appear to contribute significantly to a violation of the ozone standard in the downwind area. A violation not impacted by transported emissions is considered local and results when the wind flow patterns and atmospheric conditions do not strongly suggest responsibility from an upwind area. The responsibility of "inconsequential" transport lies-with the downwind area.

intrusion – see Stratospheric Intrusion.

inversion -that portion of the vertically measured atmosphere in which the temperature increases, rather than decreases, with height.

inverted (thermal) trough – a low pressure area induced by surface heating in which the general flow is from east to west instead of west to east; a meteorological feature commonly found in California from the imperial Valley northward through the Sacramento Valley.

isopleth – a line of equal or constant value of a given quantity with respect to either space or-time.

isotherm – a line connecting points of equal temperature.

isobar – a line connecting points of equal pressure.

jet stream – a channel of increased wind speeds. Some low level jets are mechanically induced such as jets near the inversion-or jets funneled by terrain; upper level jet streams (25,000 to 50,000 feet) are induced by the temperature differences between two air masses. Jet streams are usually considered as such when they are a relatively narrow band of-greater wind speeds than the surrounding winds and are greater than 50 knots.

knot – a rate of speed equal to one nautical mile per hour (therefore, no such term as knots per hour); equal to 1 .1508 statute miles per hour or .5144 meters per second.

lapse rate -this is the rate at which a particular column of air cools. A negative lapse rate indicates warming with height rather than cooling (see inversion). A lapse rate that equals the standard atmospheric lapse rate is referred to as the adiabatic lapse rate. A super-adiabatic lapse rate occurs as a layer of air cools with height quicker than the adiabatic lapse.

latitude – angular distance, measured in degrees (0-90), north or south from the equator.

lidar – a system which uses laser technology to measure atmospheric parameters.

local – a transport assessment also referred to as “inconsequential”; a transport assessment given to an exceedance day in which the emission impact from an upwind district was either non-existent or so little as to have “inconsequential” impact on the exceedance; a transport assessment in which it has been determined that nearly all the emissions causing the exceedance were locally generated.

longitude – distance east or west, measured in degrees (O-l 80), from the prime meridian (or longitude) which passes through Greenwich, England.

low pressure/heights – on the surface, an area of low pressure is surrounded by an higher pressures; aloft, an area of low heights is an area where a constant pressure is lower than the same pressure is in surrounding areas.

magnitude – one dimensional; a number given to a quantity for purposes of comparison with other quantities of the same class.

marine air – air whose characteristics are developed over an extensive water surface and which, therefore, has the basic maritime quality of high moisture content in at least its lower levels; below the inversion, moist, thermally modified air intrudes as far inland as 100 miles or more into most of California.

marine layer - a layer of marine air from the surface to the base of the inversion.

Marta – a system for retrieving and managing various types of meteorological data including hourly observations and satellite imagery.

microclimate -the fine climatic structure of the air space which extends from the very surface of the earth to a height where the effects of the immediate character of the underlying surface no longer can be distinguished from the general local climate; generally, four times the height of surface growth or structures defines the level where micro climatic tones disappear.

millibar (MB) – a unit measure of atmospheric pressure. The worldwide average sea level pressure is 1013.2 MB; 850 MB is approximately 5000 ft; 700 MB is approximately 10,000 ft; 500 MB is approximately 18,000 ft.

mitigation – in air pollution control, mitigation refers to those measures that are taken to prevent or reduce emissions in the atmosphere.

mixing depth -the layer of atmosphere, usually surface-based, where vertical mixing can occur; this depth is usually defined by the inversion.

model – a computer based representation of atmospheric processes.

moderate – regarding the California Clean Air Act, an area classified as moderate for ozone I) is expected to reach attainment by December 31, 1997, and 2) has a once in one year recurrence rate of 12 pphm or less.

nautical mile – 1852 meters, 6076.103 feet, or 1 .1508 statute miles; the length of one minute of arc along any great circle on the earth's surface. This distance varies slightly with latitude and therefore the distance of a nautical mile has been reached by international agreement.

nephanalysis -the analysis of a synoptic chart in terms of the types and amount of clouds and precipitation.

nitric oxides (NO) – a colorless, poisonous gas found in variable trace quantities in the atmosphere, especially near industrial areas.

nocturnal jet – a low-level jet that exists at night due to the strength of the inversion at that time.

nocturnal – of, done, or happening during the night.

NO, – oxides of nitrogen (NO and/or NO_2).

NO, scavenging – a method by which ozone is removed from the ambient air.. When ozone reacts with nitric oxide, the resulting concentration of ozone is lower.

ozone – a secondary ambient air pollutant generated by photochemical reactions primarily involving hydrocarbons and nitric oxides.

ozone concentrations – produced by the chemical reaction of nitrogen oxides and hydrocarbons in the presence of sunlight.

overwhelmed – ozone transport classification describing a condition when the emissions from the upwind area independently result in a violation of the State ozone standard in the downwind area on any given day. Significant emission sources in the downwind area were not in the pathway of the air parcel that was transported from the upwind area. The responsibility for a violation caused by "overwhelming"-transport lies with the upwind area.

Pacific High – a semi-permanent synoptic condition dominating the eastern Pacific.

parcel – a theoretical "box" of air that may be physically tracked to show movement from an upwind area to a downwind area; a theoretical "box" of air that contains certain masses of atmospheric gases.

PGM – Photochemical Grid Model; mathematical representation of the three-dimensional atmosphere used to simulate the dispersion and chemical transformation of pollutant emissions that produce ozone.

photochemical -the effect of light or other radiant energy in producing chemical action; a chemical reaction which involves either the absorption or emission of radiation.

pibal – contraction for pilot-balloon observation; this type of observation measures winds aloft by tracking a balloon with a theodolite.

plume – on a point-source scale, a plume is the airborne discharge from an industrial stack, an agricultural burn location, or any other single source; on a regional scale, a plume is considered to be the polluted air mass which may travel away from the source region-

ppb – parts per billion; pphm x 10.

pphm – parts per hundred million; ppm x 100.

ppm – parts per million.

precursors – primary air pollutants which contribute to ozone formation; air pollutants which haven't undergone chemical processes in the ambient air.

preponderance -term used in California Clean Air Act to describe the types and amount of data used to make transport assessments; greater in amount, weight, power, influence, importance; predominant.

profiler – equipment that provides continuous winds aloft measurements using the Doppler shift principle and radar waves.

PST – Pacific Standard Time.

qualification – making a transport assessment using general, relative terms.

quantification – making a transport assessment using specific numbers.

radiosonde – a balloon-borne instrument for the simultaneous measurement and transmission of meteorological data - specifically pressure, temperature, and humidity.

RAOB – contraction for radiosonde observation.

rawinsonde – a radiosonde observation combined with a rawin (winds-aloft) observation; rawin is a method of winds-aloft observation; use of radiosonde to determine pressure, temperature, dewpoint, wind speed, and wind direction aloft.

reactive hydrocarbons – photochemically reactive compounds that contain only hydrogen and carbon atoms.

reactive organic gases – photochemically reactive compounds containing carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding other compounds identified by the Air Resources Board.

receptor – a downwind area; downwind from the emission source area.

ridge – as a terrain feature, a ridge is the crest line, or the line which joins the highest peaks of a mountain range, often the air basin boundary; as a meteorological feature, a ridge is most commonly referred to as a large area of high pressure such as the "ridging" over the California coastline or a "ridge" of high pressure.

Schultz Eddy – counter-clockwise circulation found in the southwestern portion of the Sacramento Valley. This phenomena is dependent upon wind speed and direction from the delta area. Very strong southwest windflow will erode the eddy, while very light windflow will not support the eddy.

sea breeze - air flowing from the ocean to land; usually occurs in late afternoon through mid evening and the land has become hotter causing air to rise, cooler marine air will flow landward to replace the air which has risen; see also marine air.

serious – an area that has a once per year recurrence rate greater than or equal to 12 pphm but less than 16 pphm.

severe – an area which has a once in one year recurrence rate greater than or equal to 16 pphm.

significant – ozone transport classification describing a condition in which the emissions from the upwind area contributed measurably to a violation of the State ozone standard in the downwind area on any given day, but did not "overwhelm" the area. A violation is considered caused by "significant" transport if the emissions from sources within the downwind area combine with the transported parcel carrying ozone or ozone precursors from the upwind area. A violation classified as "significant" is considered shared, with responsibility lying with both the upwind and downwind areas.

sloshing – a theory that polluted air flows up a mountain with the valley breeze in the afternoon and down the mountain with drainage flow in the late night and early morning hours leaving behind some of the polluted air near the inversion. The theory is that this phenomenon may, over several days, contribute to ozone exceedances.

sounding -this term is used for any type of vertical atmospheric measurement. These measurement methods include pibals, APOBs, lidar, rawinsonde, and profilers

source area – upwind area; the area from where emissions originate.

spatial – horizontal, geographic relationship.

spirals – vertical aircraft patterns whereby air&aft can measure air pollutants aloft.

stable -when a warm strata of air overlies a cooler strata of air, the condition is considered stable. Stability is determined by the lapse rate. When a lapse rate is less than the adiabatic lapse rate (slower cooling with height), the air mass tends to be more stable. When a lapse rate is more than the adiabatic lapse rate (more cooling with height), or super-adiabatic, the air mass tends to be less stable. A stable air mass will have little vertical motion associated with it and will therefore be

absent of vertically developed clouds and weather. An unstable air mass will have greater vertical motion and may have many vertically developed clouds, depending on the availability of moisture in the air mass.

Stability is very important in assessing air pollution transport and in real-time air pollution matters such as agricultural burning. Even if there is not enough moisture for clouds, vertical motion still occurs and will assist in dispersing and diluting the air pollutants into the atmosphere.

statute mile -the “common” mile; 5,280 feet.

stratosphere – the atmosphere immediately above the tropopause usually-beginning somewhere between 35,000 and 65,000 feet, depending on the latitude and the season.

stratospheric intrusion – air which is downward vertically mixed from the stratosphere into the troposphere. This is usually caused by a synoptic disturbance.

streamline analysis – normally, an analysis produced for areas with nearly laminar flow such as the ocean surface and constant pressure charts (layers aloft); in this type of analysis, wind vectors are plotted and lines drawn parallel to the vectors; airflow charts used in transport analyses are sometimes referred to as streamline charts but are not true streamline charts as such.

subsidence – descending air, usually associated with a high pressure area.

surface -the boundary between the earth and the atmosphere.

surface deposition – method by which ozone and other compounds are removed from the ambient air. Deposition occurs on vegetation or other surfaces.

synoptic – presenting or involving data on weather and atmospheric conditions over a wide area at a given time.

theodolite – a piece of survey-type equipment used for tracking weather balloons; equipment with azimuth (direction) and elevation readings.

thermal low – an area of low atmospheric pressure due to high temperatures caused by intensive heating at the earth’s surface; non-frontal.

thermal trough – see thermal low.

time-series – a graph with hour on the x-axis, ozone concentration on the y-axis; graph indicates ozone trend for a given period of time.

trajectory -the path an air parcel takes in movement from one area to another dependent upon wind speed, wind direction, terrain, and meteorology; a pictorial analysis technique which estimates the path an air parcel took over a specified period of time. This path is estimated using wind speed and wind direction at various sites in the domain, which have been analyzed into successive hours of wind fields. Terrain and meteorology are also considered in this analysis. See also forward and backward trajectory.

transport – horizontal movement of air pollution or air pollution precursors at the earth's surface or aloft. Vertical movement of air pollution is referred to as mixing.

traverses – horizontal aircraft patterns whereby aircraft can measure air pollutants spatially.

tropopause -the boundary between the troposphere and the stratosphere.

troposphere – the atmosphere beginning at the earth's surface and extending to the tropopause.

trough – an area of low pressure (surface) or low heights (aloft); wind flow around a trough is cyclonic or counter-clockwise.

trof – same as trough.

turbulence -vertical air motion; random motion in layers of a fluid (atmosphere)

UAM – Urban Airshed Model.

upwind – in the direction from which the wind is blowing; against the wind.

UV intensity – solar radiation.

valley breeze – wind flow up a mountain from valley during the day.

vector-wind speed and wind direction combined.

violation -An exceedance that is not excluded as a highly irregular or infrequent event, such as an exceptional, unusual, or extreme concentration event, and is considered beyond reasonable regulatory control.

Winds2D – a two-dimensional airflow model used for generating parcel trajectories.

wind -Air in motion relative to surface of the earth; horizontal movement of air generated and modified by pressure differences, earth's rotation, terrain, synoptic conditions, latitude; measured or named as direction from which the wind is blowing such as northerly, southeasterly, valley breeze, sea breeze.

wind run – analysis method of algebraically adding wind velocity at a given location; unreliable analysis method due to inherent assumption of regionally uniform, unobstructed windflow patterns.

WNI -Weather Network, Inc., a Butte County company providing weather data, historic and real-time, to contracted users. (Company name recently changed).

Z -Zulu time.

Zulu -see GMT.

APPENDIX E

PROPOSED TEXT OF REGULATION IDENTIFYING AREAS WHICH ARE IMPACTED BY TRANSPORTED AIR POLLUTANTS

APPENDIX E

PROPOSED TEXT OF REGULATION IDENTIFYING AREAS WHICH ARE IMPACTED BY TRANSPORTED AIR POLLUTANTS

Amend Subchapter 1.5, Article 5, section 70500, Title 17, California Code of Regulations-to read as follows ~~(items which have been added in previous rulemaking procedures but subsequently omitted from the California Code of Regulations are in italics)~~ (proposed additions are underlined and in italics, proposed deletions are struck out)[1]:

Article5 Transported-Air Pollutants

70500 Transport Identification

(a) Purpose: This regulation identifies the areas in which transported air pollutants from upwind areas cause or contribute to a violation-of the state ambient air quality standard for ozone and the areas of origin of the transported pollutants. All areas identified in the table are the air basins except as otherwise specifically described and defined.

(b) Definitions:

(1) "California Coastal Waters" includes the area between the California coastline and a line starting at the California-Oregon border at the Pacific Ocean; thence to 42.0 degrees North, 125.5 degrees West; thence to 41 .O degrees North, 125.5 degrees West; thence to 40.0 degrees North, 125.5 degrees West; thence 39.0 degrees North, 125.0 degrees West; thence to 38.0 degrees North, 124.5 degrees West; thence to 37.0 degrees North, 123.5 degrees West; thence to 36.0 degrees North, 122.5 degrees West; thence to 35.0 degrees North, 121.5 degrees West; thence to 34.0 degrees North, 120.5 degrees West; thence to 33.0 degrees North, 119.5 degrees West; thence to 32.5 degrees North, 118.5 degrees West; and ending at the California-Mexican border at the Pacific Ocean.

(2) "Upper Sacramento Valley" includes the Colusa, Butte, Glenn, Tehama, and Shasta County Air Pollution Control Districts, and that area of the Feather River Air Quality Management District which is north of a line connecting the northern border of Yolo County to the southwestern tip of Yuba County and continuing along the southern Yuba County border to Placer County.

(3) "Broader Sacramento Area" includes the Sacramento Metropolitan Air Quality Management District; Yolo-Solano Air Pollution Control District; the portions of the El Dorado County Air Pollution Control District included in 1990 U.S. Census Tracts 306.01, 307, 308.01, 308.02, 308.03, 308.04,

309.01, 309.02, 310, 311, 312, 315.01, and 315.02; and the portions of the Placer County Air Pollution Control District included in 1990 U.S. Census Tracts 203, 204, 205, 206.01, 206.02, 206.03, 207.01, 207.02, 207.03, 208, 209, *210.01, 210.02, 211.01, 211.02,* 212, 213.01, *213.02, 214, 215.01, 215.02,* 216, 218.01, and 218.02; and that area of the Feather River Air Quality Management District which is south of a line connecting the northern border of Yolo County to the southwestern tip of Yuba County, and continuing along the southern Yuba County border to Placer County.

(c) Transport Identification Table

OZONE IMPACTED BY TRANSPORT:	AREAS OF ORIGIN OF TRANSPORT:
1. North Central Coast	San Francisco Bay Area San Joaquin Valley
2. South Central Coast	South Coast California Coastal Waters San Joaquin Valley *San Francisco Bay Area*
3. South Coast	South Central Coast
4. San Diego	South Coast Mexico
5. Upper Sacramento Valley	Broader Sacramento Area
6. Broader Sacramento Area	San Francisco Bay Area San Joaquin Valley
7. San Joaquin Valley	San Francisco Bay Area Broader Sacramento Area
8. Great Basin Valleys	San Joaquin Valley
9. Mojave Desert	South Coast San Joaquin Valley Mexico
10. San Francisco Bay Area	Broader Sacramento Area
11. Mountain Counties	Broader Sacramento Area San Joaquin Valley San Francisco Bay Area
12. Salton Sea	South Coast Mexico
13. North Coast	*San Francisco Bay Area*

Note: Authority cited: Sections 39600,39601,39610(a), Health and Safety Code. Reference: Section 39610(a), Health and Safety Code.

~~1. At the May 30, 1996 public hearing, the Air Resources Board approved amendments to sections 60104 and 60109, and added a new section 60114, Title 17, California Code of Regulations, which divided the Southeast Desert Air Basin into two new air basins:~~

~~the Mojave Desert Air Basin and the Salton Sea Air Basin. These amendments have not yet been formally approved by the Office of Administrative Law. However, the transport identification regulation above has been amended to reflect the changes in the Southeast Desert Air Basin.~~

PROPOSED TEXT OF REGULATION FOR MITIGATING THE UPWIND EMISSIONS ON DOWNWIND OZONE CONCENTRATIONS

Amend Subchapter 1.5, Article 6, section 70600, Title 17, California Code of Regulations, to read as follows (proposed additions are underlined and in italics, proposed deletions are struck out)':

ARTICLE 6. 'Transport Mitigation

70600. Emission Control Requirements

Districts within the areas of origin of transported air pollutants, as identified in section 70500(c), shall include sufficient emission control measures in their attainment plans for ozone adopted pursuant to Chapter 10 of the Health and Safety Code, Part 3, Division 26, beginning with section 40910, to mitigate the impact of pollution sources within their jurisdictions on ozone concentrations in downwind areas. At a minimum, the attainment plans for districts within the air basins or areas specified below shall conform to the following requirements:

(a) Broader Sacramento Area (as defined in section 70500(b)(3)) shall:

(1) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable. At a minimum, the plan shall provide for the adoption of rules that represent best available retrofit control technology for source categories that collectivelyamount to 75 percent of the 1987 actual reactive hydrocarbon emissions inventory for permitted stationary sources, and 75 percent of the 1987 actual nitrogen oxides emissions inventory for permitted stationary sources, no later than January 1, 1994.

(2) include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the Upper Sacramento Valley and that portion of the Mountain Counties Air Basin north of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border, except as provided in Health and Safety Code section 41503(d), during air pollution episodes which the state board has determined meet the following conditions:

(A) are likely to produce a violation of the state ozone standard in the Upper Sacramento Valley or that portion of the Mountain Counties Air Basin north of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border; and

(B) are dominated by overwhelming pollutant transport from the Broader Sacramento Area; and

(C) are not measurably affected by emissions of ozone precursors from sources located within the Upper Sacramento Valley or that portion of the Mountain Counties Air Basin north. of the Calaveras-Tuolumne County border and south of the Sierra-Plumas County border.

(b) San Francisco Bay Air Basin shall:

(1) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable. At a minimum, the plan shall provide for the adoption of rules that represent best available retrofit control technology for source categories that collectively amount to 75 percent of the 1987 actual reactive hydrocarbon emissions inventory for permitted stationary sources, and 75 percent of the 1987 actual nitrogen oxides emissions inventory for permitted stationary sources, no later than January 1, 1994.

(2) include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the North Central Coast Air Basin, that portion of Solano County within the Broader Sacramento Area, *that portion of Sonoma County within the North Coast Air Basin,* and that portion of Stanislaus County west of Highway 33, except as provided in the Health and Safety Code section 41503(d), during air pollution episodes which the state board has determined meet the following conditions:

(A) are likely to produce a violation of the state ozone standard in the North Central Coast Air Basin, or that portion of Solano County within the Broader Sacramento Area, *or that portion of Sonoma County within the North Coast Air Basin,* or that portion of Stanislaus County west of Highway 33; and

(B) are dominated by overwhelming pollutant transport from the San Francisco Bay Air Basin; and

(C) are not measurably affected by emissions of ozone precursors from sources located within the North Central Coast Air Basin, or that portion of Solano County within the Broader Sacramento Area, *or that portion of Sonoma County within the North Coast Air Basin,* or that portion of Stanislaus County west of Highway 33.

(c) San Joaquin Valley Air Basin shall:

(1) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable. At a minimum, the plan shall provide for the adoption of

rules that represent best available retrofit control technology for source categories that collectively amount to 75 percent of the 1987 actual reactive hydrocarbon emissions inventory for permitted stationary sources, and 75 percent of the 1987 actual nitrogen oxides emissions inventory for permitted stationary sources, no later than January 1, 1994.

(2) include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the Mojave Desert Air Basin, the Great Basin Valleys Air Basin, and that portion of the Mountain Counties Air Basin south of the Amador-El Dorado County border, except as provided in Health and Safety Code section 41503(d), during air pollution episodes which the state board has determined meet the following conditions:

(A) are likely to produce a violation of the state ozone standard in the Mojave Desert Air Basin, or the Great Basin Valleys Air Basin, or that portion of the Mountain Counties Air Basin south of the Amador-El Dorado County border; and

(B) are dominated by overwhelming pollutant transport from the San Joaquin Valley Air Basin; and

(C) are not measurably affected by emissions of ozone precursors from sources located within the Mojave Desert Air Basin or the Great Basin Valleys Air Basin, or that portion of the Mountain Counties Air Basin south of the Amador-El Dorado County border.

(d) South Central Coast Air Basin south of the Santa Barbara-San Luis Obispo County border shall, for sources located in that portion of the Basin:

(1) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable. At a minimum, the plan shall provide for the adoption of rules that represent best available retrofit control technology for source categories that collectively amount to 75 percent of the 1987 actual reactive hydrocarbon emissions inventory for permitted stationary sources, and 75 percent of the 1987 actual nitrogen oxides emissions inventory for permitted stationary sources, no later than January 1, 1994.

(e) South Coast Air Basin shall:

(1) require the adoption and implementation of best available retrofit control technology, as defined in Health and Safety Code section 40406, on all existing stationary sources of ozone precursor emissions as expeditiously as practicable. At a minimum, the plan shall provide for the adoption of

rules that represent best available retrofit control technology for source categories that collectively amount to 75 percent of the 1987 actual reactive hydrocarbon emission inventory of permitted stationary sources, and 75 percent of the 1987 actual nitrogen oxides emissions inventory for permitted stationary sources, no later than January 1, 1994.

(2) Include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the South Central Coast Air Basin south of the Santa Barbara-San Luis Obispo County border, the San Diego Air Basin, the Mojave Desert Air Basin, and the Salton Sea Air Basin, except as provided in Health and Safety Code section 41503(d), during air pollution episodes which the state board has determined meet the following conditions:

(A) are likely to produce a violation of the state ozone standard in the South Central Coast Air Basin south of the Santa Barbara-San Luis Obispo County border, or in the San Diego Air Basin, or in the Mojave Desert Air Basin, or in the Salton Sea Air Basin; and

(B) are dominated by overwhelming pollutant transport from the South Coast Air Basin; and

(C) are not measurably affected by emissions of ozone precursors from sources located within the South Central Coast Air Basin south of the Santa Barbara-San Luis Obispo County border, or the San Diego Air Basin, or the Mojave Desert Air Basin, or the Salton Sea Air Basin.

Note: Authority cited: Sections 39601 and 39610(b), Health and Safety Code. Reference: Sections 39610, 40912, 40913, 40921 and 41503, Health and Safety Code.

~~1. At the May 30, 1996 public hearing, the Air Resources Board approved amendments to sections 60104 and 60109, and added a new section 60114, Title 17, California Code of Regulations, which divided the Southeast Desert Air Basin into two new air basins: the Mojave Desert Air Basin and the Salton Sea Air Basin. These amendments have not yet been formally approved by the Office of Administrative Law. However, the transport identification regulation above has been amended to reflect the changes in the Southeast Desert Air Basin.~~

APPENDIX F

TECHNICAL SUPPORT FOR ASSESSMENTS

1. Broader Sacramento Area to Upper Sacramento Valley

The ARB staff screened 1997 and 1998 ozone exceedances (1996 data have been independently evaluated by Sonoma Technology Inc.) and identified three possible local days. These proposed local exceedances occurred on August 4, 1997, August 19, 1998, and, September 24, 1998. The analysis of each of the three exceedance days began with the first "clean" day (maximum ozone concentration between 0.004 parts per million (ppm) and 0.085 ppm) prior to the exceedance.

Air quality and meteorological data were evaluated for evidence of transport impacts. (See Figure F-1 for the location of the monitoring sites, pertinent cites, and counties.) Both spatial and temporal analyses were done to establish the extent of the' exceedances and the time of day that they occurred. Diurnal profiles represent the ozone concentrations that occurred throughout the day and were used to understand the behavior of the ozone concentrations. Maximum concentrations occuring in the early morning may indicate the possibility of ozone trapped aloft which fumigates to the surface as the surface temperatures increase. Maximum concentrations occuring in the evening may indicate ozone transported from upwind sources. In general, exceedances caused by locally generated emissions usually peak around late morning or early afternoon in the middle of summer, between the hours of 1100 and 1400 PST. During late summer and the beginning of fall, locally generated ozone usually peaks later, between the hours 1200 and 1500 PST.

The assessment of transport impacts requires a three dimensional analysis. Therefore, air quality and meteorological data for different altitudes is helpful in understanding the possibility of transport of air pollutants aloft. The monitors located on top of the Sutter Buttes and Tuscan Buttes in the Sacramento Valley area represent the air quality aloft. Sutter Buttes is located at 2,132 feet in Sutter County and Tuscan Buttes is at 1,868 feet in Tehama County.

a. Emissions

Shasta County is the second highest emitter of NO, and ROG within the Sacramento Valley Air Basin (SVAB), with Sacramento County being the highest (see Table F-l). The highest emitting facilities of NO_x in the SVAB are located in Shasta County (see Table F-2). The highest emitter of NO, within the SVAB is Calaveras Cement Company with 559 tons/year located in the city of Redding. Three other high emitting facilities of NO, within the SVAB are located in the city of Anderson: Simpson Paper Company with 377 tons/year, Wheelabrator Energy with 364 tons/year, and Wheelabrator Lassen with 227 tons/year. In addition, the city of Burney has one of the highest emitting facilities for NO,, the PG&E plant producing 220 tons/year.

Figure F-I
Counties, Monitoring Sites, and Cities

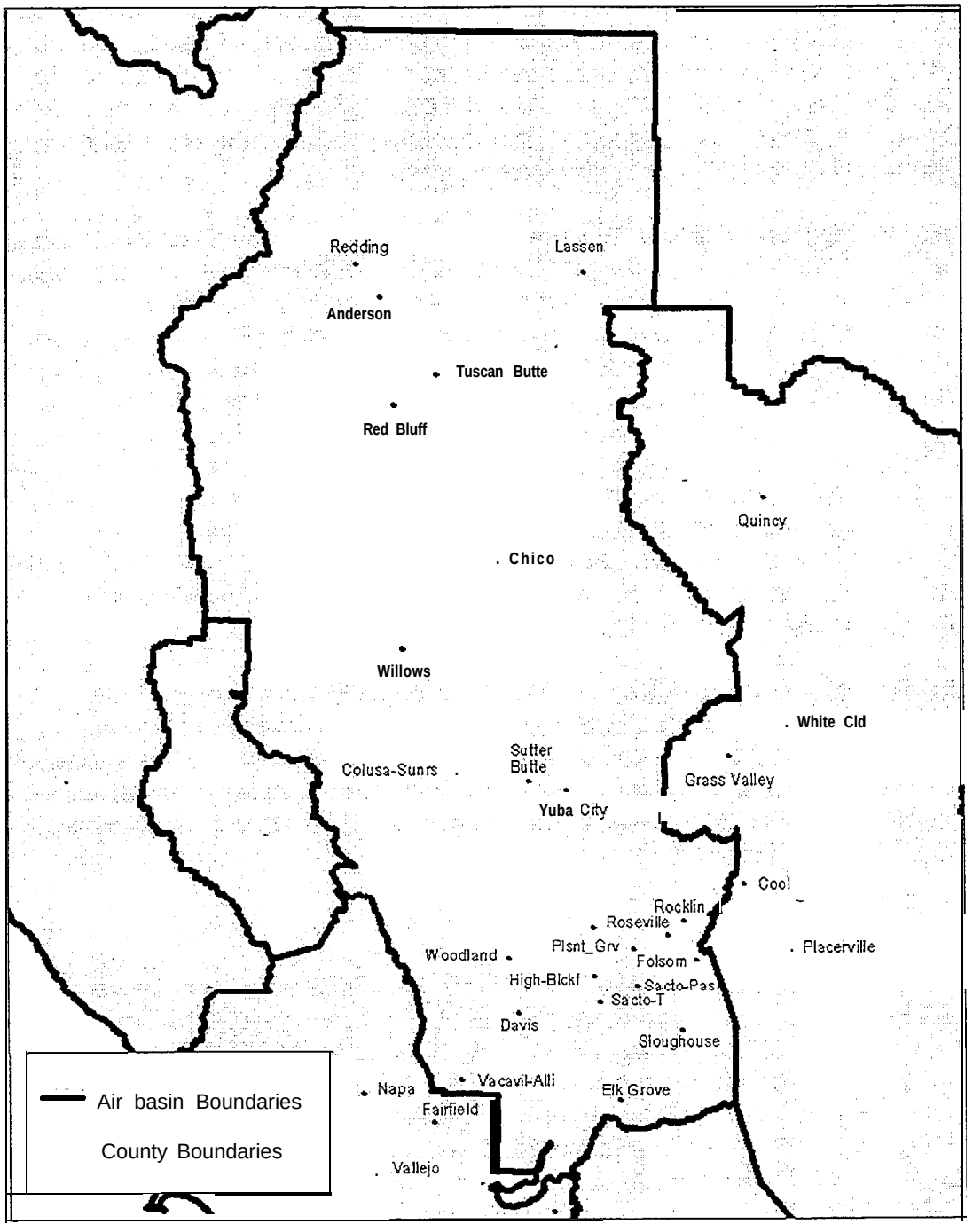


Table F-l
1996 Emissions of the Upper Sacramento Valley and Broader Sacramento Area

Area	NO_x (tons/day)	ROG (tons/day)
Upper Sacramento Valley (USV)		
Butte County	20	26
Colusa County	12	9.3
Glenn County	11	9.6
Shasta County	31	28
Sutter County (USV portion)	9.9*	13*
Tehama County	17	10
Yuba County	8.5	9.2
Broader Sacramento Area (BSA)		
El Dorado County (BSA portion)	13*	18*
Placer County (BSA portion)	24	25
Sacramento County	86	100
Solano County (BSA portion)	13	16
Sutter County (BSA portion)	-	-
Yolo County	18	20

* Sutter County and El Dorado County are divided for transport and planning proposes. The emission inventory does not calculate these as separate portions. Most of the anthropogenic emissions in Sutter County are produced in the portion within the USV. Therefore, Sutter County's total emissions are allocated to the USV. In El Dorado County most of the anthropogenic emissions are produced in ffie portion within the BSA. Therefore, El Dorado County's total emissions are allocated to the BSA portion.

Table F-2
The Eight Highest Emitting Facilities of NO, Emissions in the Sacramento Valley Air Basin (Based on 1995 Emissions)

County	City	Facility	Emissions (tons/year)
Shasta	Redding	Calaveras Cement	559
Shasta	Anderson	Simpson Paper Company	377
Shasta	Anderson	Wheelabrator Energy	364
Yolo	Woodland	Spreckels Sugar Company	275
Yolo	Woodland	Contadina Foods Inc.	269
Butte	Oroville	Louisiana Pacific Corp.	236
Shasta	Anderson	Wheelabrator Lassen	227
Shasta	Burney	PG&E	220

b. Population

Shasta County has the second highest population in the USV, second to Butte County. Shasta County's immediate neighboring counties to the south are Tehama and Butte County. Together these three counties constitute approximately 70 percent of the USV population with a total 1998 population of 418,100. The average growth for these three counties between 1990-I 998 was 10 percent. Table F-3 shows the population growth in the USV.

Table F-3
Population of Upper Sacramento Valley

Area	1990	1995	1998	% Growth 1990 - 1998
Butte County	183,100	194,700	199,100	8.7%
Colusa County	160,400	17,700	18,600	13.4%
Glenn County	24,900	26,350	26,850	7.8%
Shasta County	148,600	160,300	164,100	10.4%
Sutter County (USV portion)	65,000*	73,000*	76,400*	17.5%
Tehama County	49,900	53,800	54,900	10.0%
Yuba County	58,800	62,100	60,800	3.4%

* The Department of Finance does not calculate a population number for the USV portion of Sutter County. Since the majority of the population is located in the USV portion all of Sutter County's population is allocated to the USV.

c. Analysis of the August 4, 1997 Exceedance

Air Quality

Shasta County exceeded the State ozone standard on August 4; 1997, with a daily maximum concentration of 0.097 ppm. The analysis included data for the period of August 2, 1997, through August 4, 1997. The air quality for the entire Sacramento Valley Air Basin (SVAB) was reviewed for spatial and temporal relationships. Table F-4 shows the daily maximum l-hour ozone concentration and the time the maximum ozone concentration occurred for the significant sites in the SVAB.

Table F-4
Air Quality for August 2-4, 1997

Monitoring Site	August 2 --		August 3		August 4	
	Max I-Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST
Shasta County						
Redding	0.082	1200	0.077	1300	**0.097**	1200
Anderson	0.052	1200	0.053	1100	0.075	1200
Tehama County						
Tuscan Buttes	0.063	1100	0.069	1500	0.065	2100
Red Bluff	0.060	1000	0.060	1000	0.070	1300
Butte County						
Chico-Manzanita	0.056	1200	0.058	1500	0.059	1300
Glenn County						
Willows	0.057	1100	0.056	1100	0.066	1200
Sutter County						
Sutter Buttes	0.054	1200	0.076	1900	0.071	1400
Colusa County						
Colusa	0.056	1100	0.064	1500	0.076	1700
Placer County						
Rocklin	0.067	1400	0.077	1200	0.050	0900
Sacramento County						
Sloughhouse	0.057	1400	0.067	1500	**0.098**	1200
Earhart	0.079	1600	0.092	1500	0.085	1100

* Ozone Concentrations exceeding the State standard are shaded and bold faced

The exceedance in Shasta County occurred at 1200 PST, indicating contribution from locally generated emissions. In addition, the concentrations at Tuscan and Sutter Buttes were low and did not appear to contribute significantly to the exceedance. The ozone concentration range was 0.062 ppm - 0.070 ppm for the Sutter Buttes site the

evening prior to the exceedance day between the hours of 1400 and 2000 PST., The ozone concentration range was 0.057 ppm - 0.064 ppm for the Tuscan Buttes site the morning of the exceedance day between the hours 300 and 1000 PST. These concentrations indicate no significant contribution to Shasta County exceedance from BSA transport aloft.

Meteorology

The surface winds were affected by a high pressure system located at the most northern extent of the Sacramento Valley (Shasta County), and a low pressure system located over most of the remainder of the Sacramento Valley. (High-pressure systems are conducive for ozone formation, whereas, low-pressure systems are conducive for the dispersion, and dilution of emissions and pollutant concentrations.) The presence and location of these two pressure systems caused a weak marine layer throughout the period, with a weak surface southerly flow in the Sacramento Valley. For most of this period, there were weak northerly surface winds in the northern portion of the USV. During the afternoon of August 3, 1998, there were lighter southeast winds. On August 4, 1998, the northerly winds remained all day. Moreover, an early morning calm was observed for each of these three days, allowing local emissions to build. These meteorological conditions, i.e.-week southerly flow, northerly winds, and morning calm, are not conducive for surface transport from the BSA to Shasta County.

The aloft winds were also affected by these two pressure systems. The day prior to the exceedance, the wind direction at Sutter Buttes for the evening hours between 1400 and 2000 PST was from the south and the wind speed was very low (1 mile per hour). In addition, the wind direction at the Tuscan Butte site for the morning hours between 300 and 1000 PST was from the north and the wind speed was 4 miles per hour. The aloft wind directions and speeds are not conducive for the transport of significant pollutants from the BSA to Shasta County.

d. Analysis of the August 19, 1998 Exceedance

Air Quality

This ozone exceedance was similar to the August 4, 1997 exceedance. Shasta County exceeded the State ozone standard on August 19, 1998 with a daily maximum concentration of 0.100 ppm. The analysis included data for the period of August 17, 1998 through August 19, 1998. Air quality for the entire SVAB was reviewed for spatial and temporal relationships. Table F-5 shows the daily maximum l-hour ozone concentration and the time the maximum occurred at significant sites in the SVAB.

For the duration of this period, Shasta County was the only area within the SVAB that exceeded the State ozone standard. The exceedance occurred at 1300 PST, indicating contribution from. locally generated emissions. In addition, the aloft concentrations at Tuscan and Sutter Buttes were low and did not appear to contribute significantly to the exceedance. Between the hours of 1400 and 2000 PST on the

evening prior to the exceedance day, the ozone concentration range was 0.059-0.065 ppm at the Sutter Buttes site. Between the hours of 300-I 000 PST of the exceedance day, the ozone concentration range was 0.048-0.059 ppm for the Tuscan Buttes site. These concentrations indicate no significant contribution to the Shasta County exceedance from BSA transport aloft.

Table F-5
Air Quality for August 17-19, 1998

Monitoring Site	August 17		August 18		August 19	
	Ma.x Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST	'Max Ozone (ppm)	Hour of Max PST
Shasta County						
Redding	0.080	**1100**	**0.090**	1200	**0.100**	1300
Anderson	0.070	1200	0.080	1600	0.080	1100
Tehama County						
Tuscan Buttes	0.074	1700	0.079	1600	0.073	1400
Red Bluff	0.080	1700	0.080	1600	0.070	1200
Butte County						
Chico-Manzanita	0.065	1700	0.063	1500	0.073	1700
Glenn County						
Willows	0.069	1400	0.064	1500	0.075	1500
Sutter Count-v						
Sutter Buttes	0.072	1400	0.065	1600	0.079	1700
Colusa County						
Colusa	0.069	1600	0.063	1600	0.074	1600
Placer County						
Rocklin	0.061	1600	0.053	1500	0.072	1400
Sacramento Coutnty						
Folsom	0.062	1600	0.063	1700	0.070	1400
Sloughhouse	0.062	1500	0.062	1700	0.080	1600

* Ozone Concentrations exceeding the State standard are shaded and bold faced

Meteorology

The surface winds for this three day period were affected by a shifting surface high pressure system located near or around the most northern extent of the Sacramento Valley (Shasta County), and a surface low pressure system located over most of the remainder of the Sacramento Valley. (High-pressure systems are conducive for ozone formation, whereas, low-pressure systems are conducive for the dispersion and dilution of emissions and pollutant concentrations.) This high and low system persisted throughout the period. The presence and location of these two pressure systems

seemed to have weakened and decoupled the winds, Thus, a southerly flow was not as conducive for surface transport from the BSA. In addition, an early morning calm or northerly wind was observed for each of the three days, allowing local emissions to build or potentially to recirculate.

The aloft winds were also affected by these two pressure systems. For the evening hours between 1400 and 2000 PST on the day prior to the exceedance, the wind direction at Sutter Buttes was from the south and the wind speed was very low (3 miles per hour). For the morning hours between 300 and 1000 PST, the wind direction at the Tuscan Buttes site was from the north and the wind speed was 5 miles per hour. These aloft wind directions and speeds are not conducive for the transport of pollutants from the BSA to Shasta County.

e. Analysis of the September 24, 1998 Exceedance

Air Quality

Shasta County exceeded-the State ozone standard on September 24, 1998, with a daily maximum-concentration of 0.100 ppm. The analysis included data for the period of September 21, 1998, through September 24, 1998. The air quality for the entire SVAB was reviewed for spatial and temporal relationships. Table F-6 shows the daily maximum l-hour ozone concentration and the time the maximum occurred at significant sites in the SVAB.

For the duration of this period, Shasta County was the only area within the SVAB that exceeded the State ozone standard. The exceedance occurred at 1500 PST, indicating contribution from locally generated emissions from within Shasta County, where some emissions from adjacent counties within the USV could have contributed. The aloft concentrations at Tuscan and Sutter Buttes were low. The maximum concentrations at the monitors on the Tuscan and Sutter Buttes occurred at the same time as the maximum concentration at Redding. Between the hours 1400 and 2000 PST of the evening prior to the exceedance day, the ozone concentration range for the Sutter Buttes site was 0.052-0.064 ppm. Between the hours 300 and. 1000 PST during the early morning of the exceedance day, the ozone concentration range for the Tuscan Buttes site was 0.046-0.055 ppm. This indicates that the ozone aloft did not appear to contribute significantly to the exceedance.

Meteorology

During this period, Shasta County had higher ambient temperatures than in Sacramento County. This indicates that Shasta County's temperature was more conducive for ozone formation- In addition, the lower temperatures observed in Sacramento County may help, in part, explain the low ozone concentrations during this period in the Sacramento County area.

Table F-6
Air Quality for September 24, 1998

Monitoring Site	September 21		September 22		September 23		September 24	
	Max Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST	Max Ozone (ppm)	Hour of Max PST
Shasta County								
Redding	0.060	1200	0.090	1600	0.090	1200	**0.100**	1500
Anderson	0.050	1200	0.080	*1500*	*0.080*	'1400	0.070	1700
Tehama County								
Tuscan Buttes	0.060	2000	0.080	1800	0.075	1400	0.074	1500
Red Bluff	0.060	1400	0.070	1300	0.080	1500	0.070	1200
Butte County								
Chico-Manzanita	0.056	1500	0.075	1500	0.053	1400	0.071	1500
Glenn County								
Willows	0.063	1500	0.069	1500	0.055	12:00	0.069	1500
Sutter County								
Sutter Buttes	0.078	1500	0.072	1500	0.064	1700	0.077	1500
Colusa County								
Colusa	0.055	1300	0.067	1600	0.056	1600	0.070	1500
Placer County								
Rocklin	0.064	1500	0.063	1600	0.046	1300	0.061	1500
Sacramento County								
Sloughhouse	0.060	1600	0.067	1600	0.057	1400	0.065	1500
Folsom	0.073	1500	0.070	1600	0.053	1700	0.064	1400

* Ozone Concentrati ns exceeding the State standard are shaded and bold faced

On September 21, 1998, a northerly wind was prevalent for most of the day, which allowed for the clean day in the SVAB. The period from September 22-24 had very similar meteorological conditions. During all three days, a weak marine layer created a weak southerly flow throughout the Valley. As the day reached the highest ambient temperature in Shasta County, the weak southerly flow reached the Redding area and some contribution from the Upper Sacramento Valley (USV) was observed. An evening and early morning calm was observed for each of the last three days, allowing local emissions to build.

During the last three days of this period, the highest ozone concentration occurred abput the same time as the daily temperature peaked. The temperature peaked at 27% in Redding, and peaked at 24.9°C in Folsom. The wind trajectory model runs were consistent with the above analysis, indicating that the emissions which impacted the Redding monitor most likely originated in Tehama and Shasta Counties.

2. San Francisco Bay Area Air Basin to North Coast Air Basin

In 1999, the Sonoma County portion of the NCAB (northern Sonoma County) was designated nonattainment for the State ozone standard for the first time. As a newly designated nonattainment area with few stationary sources and low vehicle volumes, the staff believed that a transport assessment was necessary.

There were nine exceedance days measured in Healdsburg during 1996-98. (See Figure F-2 for the locations of monitoring sites, pertinent cities, and counties-) Four of these days can be excluded as extreme concentrations and are depicted in Table F-7. (An extreme concentration is a concentration that is statistically expected to recur less frequently than once every year.) Exceedances identified as extreme concentrations are not considered violations and were not included in this transport assessment because attainment designations are based only on violations Those days not considered extreme concentration events are violations days. The staff analyzed all five violation days and found all five violation days to be "overwhelmed" by transport of ozone and/or ozone precursor emissions from the SFBAAB. The September 24, 1997, exceedance is presented as an example of an exceedance due to "overwhelming" transport.

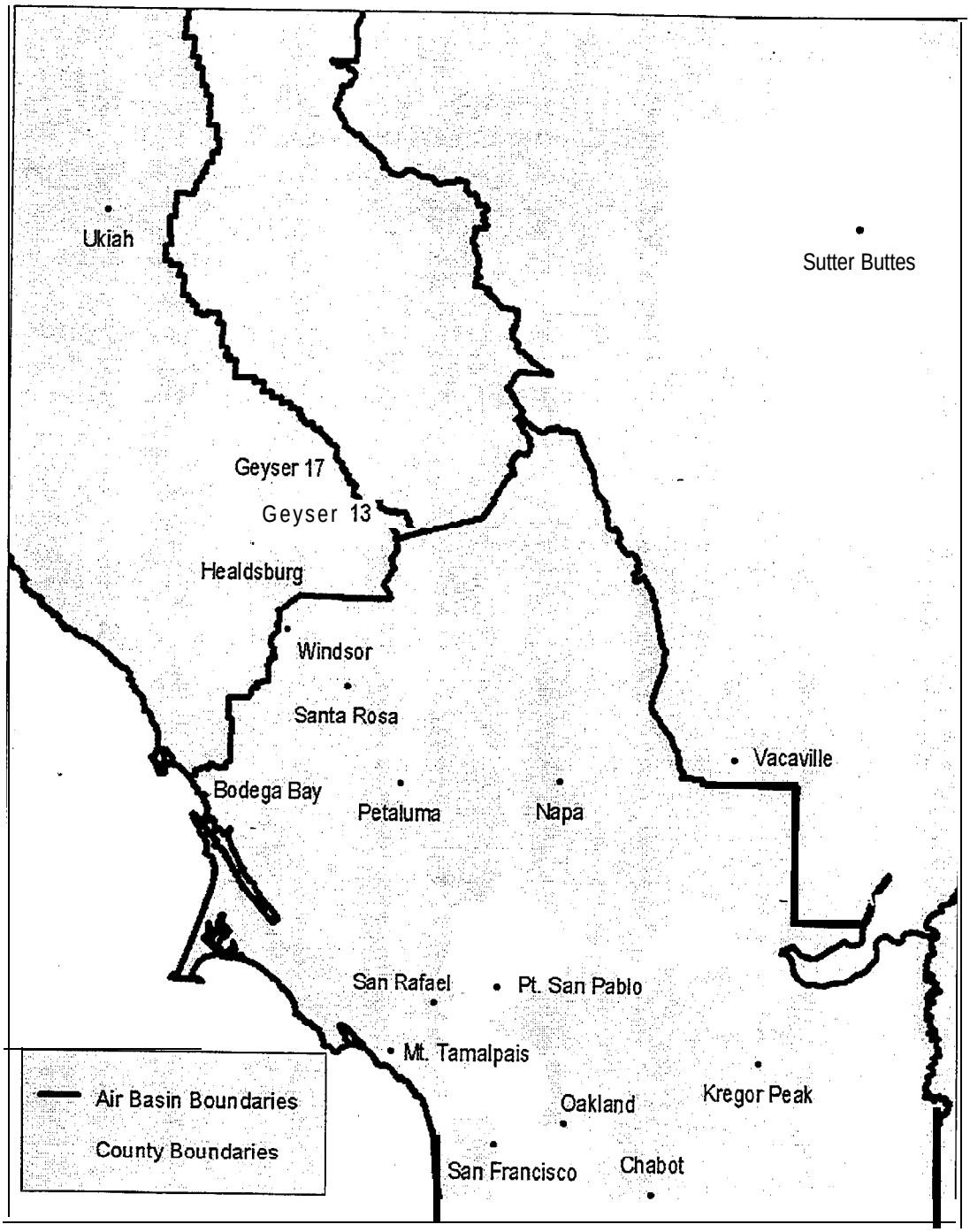
Table F-7
Healdsburg Ozone Exceedances (1996-98)

Date	Maximum Ozone Concentration (ppm)	Hour(s) of Maximum Ozone Concentration (PST)	Extreme Concentration?
9/24/97	**0.10**	I-400-1700	No
9/29/97	0.10	1200	No
8/3/98	0.10	1200	No
9/1/98	0.10	1300	No
9/2/98	0.12	1400	Yes
9/3/98	0.13	1300,1500	Yes
9/7/98	0.11	1200,1400,1500	Yes
9/11/98	0.10	1300-1500	No
9/12/98	0.11	1300	Yes

a. Emissions

The staff used the 1996 emission inventory data for statewide, air basin, and county totals. While such emission totals provide only general information, they are useful for determining the relative difference in emissions between various areas. Table F-8 illustrates the wide disparity between emission inventories in the SFBAAB and the NCAB. Emissions in the SFBAAB for both NO, and ROG are roughly ten times greater than that of the NCAB. Emissions in the Sonoma County portion of the SFBAAB are about 3-4 times greater than the Sonoma County portion of the NCAB. Emissions from

Figure F-2
Counties, Monitoring Sites, and Cities



the northern counties of the SFBAAB (southern Sonoma, Marin, and Napa Counties) are about 7 times greater than in northern Sonoma County. Additionally, there are no major stationary sources of ROG or NO, between the basin boundary and the Healdsburg monitor.

Table F-8
1996 Basin and County Emissions (Tons/Day)

North Coast Air Basin		
County	**NO_x**	**ROG**
Del Norte	3.6	6
Humboldt	23	23
Mendocino	15	16
Sonoma'	5.8	9.9
Trinity	2.9	6.1
Total[2]	50	61
San Francisco Bay Area Air Basin		
County	**NO_x**	**ROG**
Alameda	110	100
Contra Costa	120	91
Marin	17	21
Napa	8.3	11
San Francisco	38	42
San Mateo	62	52
Santa Clara	120	110
Solano[1]	36	32
Sonoma[1]	26	29
Total[2]	540	490

1 That portion of the county within the air basin.
2 Air basin emission total may not equal the sum of the county emission totals because of rounding.

b. Population

Healdsburg, with a mere population of 10,000, is located just five miles north of the basin boundary separating the SFBAAB and the NCAB. In addition, Healdsburg is only approximately 15 miles north of Santa Rosa, a fast growing metropolitan area with an estimated population of 140,000. Windsor, an area of new development, is a town 10 miles north of Santa Rosa and only two miles south of the basin boundary. Windsor's

population is estimated to be 20,000. The population of Sonoma County'sbuth of the basin boundary (the SFBAAB portion) is approximately seven times greater than its northern counterpart (the NCAB portion). In addition, the combined population of the SFBAAB portion of Sonoma County, Marin County, and Napa County is more than 13 times greater than the population of northern Sonoma County. Finally, the population of the entire SFBAAB is approximately 20 times greater than the NCAB.

c. Analysis. of the September 24, 1997 Exceedance

Air Quality

The maximum ozone concentrations for the days leading up to the exceedance at Healdsburg on September 24, 1997 are shown in Table F-9. Ozone maximums on September 22 were very low (near background levels) except at Healdsburg which recorded 0.07 parts per million (ppm). Ozone concentrations in Healdsburg and southward increased about 0.02 – 0.04 ppm on September 23. The upward trend continued on September 24, 1997, when Healdsburg exceeded the State ozone standard with a 0.10 ppm for four consecutive hours. On this day, high ozone values were observed from San Rafael to Healdsburg. The exceedance at Healdsburg lasted until 1700 Pacific Standard Time (PST) which is an indication that the ozone concentrations may be impacted by transport. Maximum ozone concentrations in an area resulting from 'local emissions' typically occur between 1100 and 1400 local standard time (LST). Although, as seen in Table F-7, the timing of most of Healdsburg's exceedances might appear to indicate that their exceedances are caused by local emissions. However, as already mentioned, the emissions in Healdsburg are minimal. The fact that Healdsburg is only 15 miles downwind of Santa Rosa is the primary reason for their early exceedance hours. Only a small amount of time is typically needed for'ozone and ozone precursors to be transported from Santa Rosa to Healdsburg.

Meteorology

Surface wind observations along the transport route from the SFBAAB to Healdsburg predominantly measured wind coming from a southerly direction from September 22 up until the exceedance at 1400 PST on September 24. Sites recording south winds include Petaluma, Santa Rosa, Windsor, and Healdsburg. These sites are shown in Figure F-2.

Surface wind trajectories were simulated for this episode. One-day forward and backward trajectories were calculated for both September 23 and September 24. Both the forward and backward trajectories consistently point toward the Santa Rosa area as the upwind area contributing to Healdsburg's ozone concentrations. Two-day trajectories indicate that the Santa Rosa area and possibly areas to the south contributed to Healdsburg's 'ozone concentrations. Therefore, it is possible that carry-over emissions from areas sputh of Santa Rosa may have also contributed to Healdsburg's ozone exceedances.

Tablè F-9
Maximum Ozone Concentrations (September 22-24, 1997)

Site	September 22		September 23		September 24	
	Max Ozone (ppm)	Hour(s) of Max	Max Ozone (ppm)	Hour(s) of Max	Max Ozone (ppm)	Hour(s) of Max
Marin County						
San Rafael	0.036	1400	0.077	1300	**0.106**	1400
Sonoma County						
Santa Rosa	0.047	1400	0.077	1500	0.093	1400
Heal&burg	0.070	1400-I 500	0.090	1400-I 500	0.1'00	1400-I 700
Napa County						
Napa	0.039	1500	0.075	1300	0.084	1300
Mendocino County						
Ukiah	0.051	1300	0.051	1300	0.067	1600

* Ozone Concentrations exceeding the State standard are shaded and bold faced

The staff also examined upper-level winds for indications of transport- The upper air meteorological sites that were analyzed include the Oakland (and Reno) rawinsonde (available twice a day), profiler data located at Bodega Bay (hourly), and pibal data from Sacramento (once a day). In addition, hourly wind data from surface sites located on mountain peaks were used to approximate upper level winds at their corresponding elevations. These sites include PG&E Geyser sites 13 (3300 feet) and 17 (3040 feet), Mt. Tamalpais (2500 feet), Kregor Peak (1895 feet), Chabot (560 feet), Pt. San Pablo (230 feet), and Sutter Buttes (2130 feet) and are shown in Figure F-2. The Sutter Buttes site also measures ozone and can be used to estimate ozone aloft.

For the hours leading up the exceedance in Healdsburg on September 24, 1997, winds aloft were generally southeasterly and easterly. Therefore, the immediate upwind region is the SFBAAB. Additional upper air meteorological and air quality data would be needed to implicate further upwind areas such as the Broader Sacramento Area or the San Joaquin Valley Air Basin.

3. San Francisco Bay Area and San Joaquin Valley Air Basins to South Central Coast Air Basin (San Luis Obispo County)

A transport assessment was conducted for San Luis Obispo County (the County) at the request of the San Luis Obispo County Air Pollution Control District (the District). This request was due to an unusually high number of State l-hour ozone exceedances in 1998. 1998 was the worst year on record with 25 ozone exceedance days.

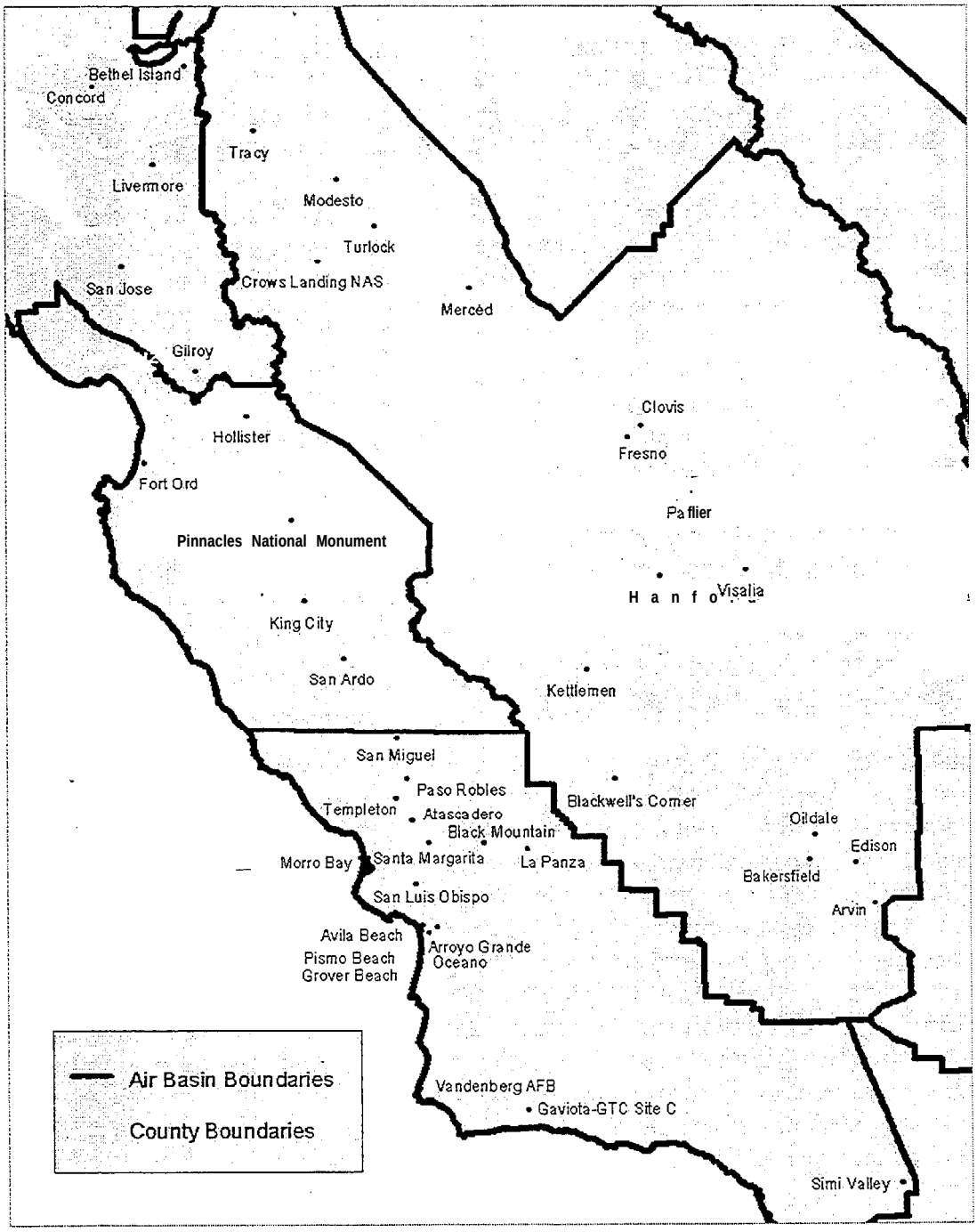
The County is located in the northern section of the South Central Coast Air Basin (SCCAB). (See Figure F-3 for a map of the area.) Monterey County borders it to the north, Santa Barbara County to the south, the Pacific Ocean to the west, and the San Joaquin Valley to the east. The County consists of three geographic regions:

(1) The coastal plateau along the Pacific Ocean having 75% of the population and producing the highest emissions in the county;
(2) The upper Salinas River valley in the northern section of the county having 23% of the population and historically measuring the highest ozone levels in the county; and
(3) The east county plain has only 2% of the county's population and the largest land area, which consists mostly of the Carrizo Plain, a large drainage basin. The Carrizo Plain borders the Temblor Mountain range to the east, which lies in a northwestsoutheast direction along the western side of the SJVAB. The only major break in the range occurs at the Cholame Pass (elevation 1155 feet) in the northern end of the mountain range.

The meteorology of the County, San Francisco Bay Area Air Basin (SFBAAB), North Central Coast Air Basin (NCCAB), and the San Joaquin Valley Air Basin (SJVAB) is highly influenced by the-existence of a persistent high pressure area residing over the Pacific Ocean. Seasonal variations in the strength and location of the high pressure system along with circulations driven by land and sea temperature differences affect the local winds. The typical summer wind circulation pattern in the County consists of the daily sea breeze meeting the wind flow coming out of the San Joaquin Valley and coming southward up the Salinas River Valley, which peaks in the late afternoon. When the high pressure area moves inland, it causes air to sink and heat as it descends in the atmosphere. This heating aloft causes an elevated layer of air to be warmer than the air underneath and subsequently prevents any vertical mixing of air. The normal sea breeze pattern is shut down and stagnant conditions persist. Under stronger offshore flow SLOC can be impacted by airflow from the north and east.

All 1996 through 1998 ozone exceedance days were first screened to determine which were violations of the State Ambient Air Quality Standard using the criteria for extreme concentrations. All the violation days were examined with the focus on analyzing examples of "overwhelming", "significant", and "inconsequential" ozone transport. Ozone episodes were identified, that represented each of the three kinds of transport impacts.

Figure F-3
Counties, Monitoring Sites, and Cities



a. Emissions

Comparisons of the 1996 emission inventories for ozone precursors were conducted for San Luis Obispo County, neighboring counties, and air basins and are presented in Table F-l 0. While such emission totals provide only general information, they are useful for determining the relative difference in emissions between various areas. Table F-IO illustrates the wide disparity between emission inventories in the County and other areas. -The NOx.emissions in NCCAB, southern SFBAAB, SJVAB, and Monterey plus San Benito Counties are nearly 2 to 15 times the emissions generated in the County. The ROG emissions in NCCAB, southern SFBAAB, SJVAB, and Monterey plus San Benito Counties are nearly 2 to 17 times the emissions generated in the County. The combined emissions of central and southern SJVAB are 4-6 times the NO, and 4-7 times the ROG inventories of the County. These emission inventory relationships indicate that emissions in adjacent areas, under appropriate meteorological conditions, have the potential to significantly and overwhelmingly impact the County.

Table F-IO
1996 Emission Inventories of Ozone Precursors

Area	Emissions (tons/day)		Ratio to SLOC	
	ROG	NO_x	ROG	NO_x
North Central Coast	73	73	2.5	2.2
Monterey + San Benito Counties	49	56	1.7	1.7
Southern San Francisco Bay Area	395	450	13.6	13.6
San Joaquin Valley	490	500	16.9	15.2
Southern San Joaquin Valley	130	150	4.5	4.5
Central San Joaquin Valley	203	195	7	5.9
San Luis Obispo County	29	33	1	1

b. Population

The population distribution of San Luis Obispo County follows closely the three geographic regions as explained in Section 3 and is found in Table F-l 1. Population growth for the entire county was 4.6% between 1990 and 1995. The population rose from 217,162 to 227,225 during this period. The greatest increase in population occurred in the upper Salinas Valley area. However, this growth represents less than 4,000 residents.

Population growth in the surrounding air basins has increased from 1990 to 1995. The greatest population growth was within the SJVAB.

Table F-II
Population Growth

Area	1990	1995	Population Difference	% Growth
San Luis Obispo County	217,162	227,225	10,063	4.6
Coastal Plateau	114,874	116,802	1,928	1.7
San Luis Obispo Area	43,478	43,252	-226	-0.5
Morro Bay Area (Estero)	27,515	27,764	249	0.9
San Luis Bay Area	43,881	45,786	1,905	4.3
Upper Salinas Valley Area	52,177	56,010	3,833	7.4
Atascadero	22,876	23,962	1,086	4.8
Paso Robles	18,529	20,020	1,491	8.1
San Miguel	1,123	1,200	77	6.9
Santa Margarita	1,066	1,208	142	13.3
Templeton	2,795	3,173	378	13.5
Rural Area	5,788	5,961	173	3.0
Shandon-Carrizo	1,902	2,407	505	26.6
San Joaquin Valley	2,660,000	2,960,000	300,000	11.3
San Francisco Bay Area	5,900,000	6,240,000	340,000	5.8
North Central Coast	624,800	645,950	21,150	3.4

C. **"Overwhelming" and "Significant" Transport Impact – August 28, 1998**

Air Quality

The maximum ozone concentrations for the days leading up to the exceedances at Paso Robles and Atascadero on August 28 are shown in Table F-12. The ozone air quality on August 26 was good except in the isolated areas in central and southern SJVAB. On August 27 ozone maximum concentrations increased at Paso Robles and Atascadero, as well as aloft at Black Mountain (the District's special study air monitoring site at 3600 feet) and the adjacent air basins. The ozone concentrations continued to increase on August 28, when both Paso Robles and Atascadero exceeded the State ozone standard. The August 28 State ozone exceedances at Paso Robles occurred during two periods, 1200-I 500 and 1800-2000 PST with the daily maximum occurring during the second period's rapid rise in ozone. The Atascadero ozone exceedance occurred only for one hour at 1900 PST. In addition, exceedances of the ozone standard occurred in the adjacent air basins including SFBAAB at Livermore, and throughout central and southern SJVAB. NCCAB ozone concentrations remained low except for the inland site at Hollister and the higher elevation site at Pinnacles National Monument (1 100 feet).

An examination of the time of peak ozone concentration throughout central California on August 28 shows an early evening peak in the northern County, mid to late afternoon peaks at Hollister and Pinnacles National Monument, and late afternoon peaks in the Santa Clara Valley. These late peak times indicate impacts from

transported emissions. The progression of the hour of peak ozone concentration extends southward from the southern SFBAAB to Pinnacles then Paso Robles and Atascadero. This progression suggests that transported emissions from the SFBAAB impacted the northern County. Within the SJVAB, the early afternoon hour peaks within the Fresno and Bakersfield urban areas indicate primary impacts from local emissions. However, the late afternoon peaks to the east and southeast of these urban areas indicate downwind impacts.

Table F-12
Air Quality Data*

Site	August 26, 1998		August 27, 1998		August 28, 1998	
	Max Ozone ppm	Hour of Max	Max Ozone ppm	Hour of Max	Max Ozone ppm	Hour of Max
San Luis Obispo County						
Paso Robles	**0.074**	**1200**	**0.095**	**1200**	**0.114**	1900
Atascadero	**0.056**	1100	**0.072**	1100	**0.097**	1900
Black Mountain	**0.063**	**2300**	**0.085**	2300	**0.096**	**1200**
San Francisco Bay Area						
Livermore	**0.054**	1600	**0.092**	1500	**0.101**	**1500**
San Jose-4th	**0.048**	1500	**0.070**	**1400**	**0.060**	**1400**
San Martin	**0.061**	1500	**0.092**	**1400**	**0.082**	**1600**
North Central Coast						
Hollister	**0.045**	**1300**	**0.072**	**1300**	**0.086**	**1500**
Pinnacles	**0.063**	**1300**	**0.077**	**1700**	**0.109**	**1600**
San Joaquin Valley						
Turlock	**0.081**	**1700**	**0.095**	1600	0.086	1300
Fresno-1st	**0.084**	1400	**0.101**	1400	**0.110**	1300
Clovis	0.092	1400	**0.113**	1400	**0.128**	1300
Sequoia NP-Lookout	**0.111**	1700	**0.107**	1600	**0.119**	1600
Sequoia NP-Kaweah	**0.098**	1700	**0.103**	1700	**0.100**	1700
Parlier	**0.095**	1500	**0.120**	1600	**0.116**	1500
Visalia	0.086	1300	**0.103**	1700	**0.109**	1600
Hanford	**0.076**	**1600**	**0.091**	1600	**0.103**	1300
Bakersfield-Golden	0.084	1300	**0.096**	1300	**0.106**	1200
Edison	**0.113**	1400	**0.128**	1400	**0.150**	1300
Maricopa	0.089	1600	**0.104**	1600	**0.108**	1400

* Ozone Concentrations exceeding the State standard are shaded and bold faced

Meteorology

On August 27, 1998, strong high pressure aloft covered the southwestern United States and was highest over central California. As the high pressure increased from August 27 to 28, ozone exceedances became more widespread across central California.

This buildup in high pressure over the central California coastal area brought about a change in wind patterns from August 27 to August 28. At Paso Robles, surface sea breeze (west-southwest) winds on August 27 switched to generally northerly on August 28. The northerly winds persisted through August 28, increasing by the hour of the daily maximum ozone concentration (1900 PST). Atascadero exhibited a similar wind pattern change from August 27 to 28. Northerly surface winds extended from the Santa Clara Valley and Pinnacles area, as well as the Salinas River Valley throughout August 28. In addition, the high pressure kept the seabreeze confined to the coastal area of the northern County. During the late morning and afternoon hours of August 28, northeast to east flow was evident in the far western side of the southwestern San Joaquin Valley at Kettleman and Btackwells Corner. However, there was no evidence of these easterly winds reaching Paso Robles on August 28.

Surface back trajectories were simulated for this episode. Two-day backward trajectories from Paso Robtes and one-day back trajectories from Pinnacles were calculated for August 28. The August 28 back trajectory's path from Paso Robles at 1900 PST originated in the San Jose area during the previous morning, via the mountainous corridor between the NCCAB and SJVAB. Due to the lack of wind measurements and the complex elevated terrain along this mountainous corridor, there is some uncertainty in the back trajectory. However, the back trajectory from Paso Robles to east of King City (reached early afternoon) is reasonable because of the existence of wind measurements and flatter terrain. The back trajectory from Pinnacles indicated that emissions had originated from the SFBAAB earlier in the day via the Santa Clara Valley. These combined findings suggest that SFBAAB emissions had at least transported into the Pinnacles area by mid to late afternoon and could have continued southward to impact the northern County during the early evening.

Central California winds during August 27 and 28 were generally northwest to north from the surface to approximately 3500 feet and offshore above 3500 feet. Fort Ord offshore winds (north to northeast) extended to 5,000 feet above a shallow coastal marine layer on August 28. Black Mountain (3600 feet) in the central County had persistent and strong offshore east-northeast winds, reaching 22 mph during the morning hours of August 28. Offshore winds (east to southeast) at Vandenberg AFB extended approximately to 18,000 feet above a shallow marine layer. Moderate offshore winds (5 to 15 mph) at Visalia were found between 3900-5100 feet in the morning hours, but strengthened and extended from 2600 feet through 5100 feet during the afternoon hours on August 27 and 28.

Surface temperatures in southern Monterey County to the central County were the highest throughout central California on August 28. Peak temperatures at Paso Robles reached 104 degrees Fahrenheit on August 28. Peak temperatures in the SJVAB reached 99 and 97 degrees on August 28 at Fresno and Bakersfield, respectively. The high surface temperatures on August 28 resulted in deep vertical mixing in some areas of southern Monterey County to the central County. This deep vertical mixing could have served as a mechanism to further draw air into the area where the exceedances occurred in the northern County, thus enhancing transport and vertical interchange.

The major findings supporting the staffs conclusion that the northern County was impacted by significant emissions from the SFBAAB are listed below:

- high ozone concentrations in the southern SFBAAB;
- low ozone concentrations at the surface in the NCCAB;
- high ozone concentrations in the elevated portions of NCCAB at Pinnacles;
- surface and aloft northwest to north winds within the first few thousand feet;
- mid-afternoon SFBAAB emissions impact on Pinnacles;
- the progression of the time of the southern SFBAAB to the northern County peak ozone concentration;
- the Paso Robles early evening (1900 PST) ozone concentration peak occurring with increasing northerly winds; and
- light surface northerly winds at Atascadero.

In addition, the following findings suggest that the northern County was impacted by significant emissions from the SJVAB:

- high ozone concentrations in the SJVAB;
- offshore flow aloft throughout central California;
- State l-hour ozone exceedances at Black Mountain; and
- deep vertical mixing over the County and southern NCCAB.

d. "Significant" Transport Impact – May 11, 1996

Air Quality

The maximum ozone concentrations for the days leading up to the exceedances at Paso Robles and Atascadero on May II, 1996 are shown in Table F-l 3. Maximum ozone concentrations on May 9 were low throughout central California. Paso Robles and Atascadero maximum ozone concentrations were 0.065 and 0.066 ppm, respectively. Maximum ozone concentrations increased at Paso Robles and Atascadero, as well-as in the adjacent air basins on May 10. Ozone concentrations continued to increase on May 11, 1996 when both Paso Robles and Atascadero exceeded the State ozone standard with 0.097 ppm. The May 11 Paso Robles exceedances occurred over a three hour period beginning 1200 PST, while Atascadero exceedances also occurred over a three hour period beginning at 1300 PST. In

addition, ozone concentrations exceeding the State ozone standard occurred in all the adjacent air basins.

An examination of the time of peak ozone concentration throughout central California on May 11 shows an early afternoon peak in the northern SLOC, mid to late afternoon peaks at Hollister and Pinnacles National Monument, and late afternoon peaks in the Santa Clara Valley. These late peak times indicate impacts from transported emissions.

Table F-13
Air Quality Data*

Site	May 9, 1996		May 10, 1996		May 11, 1996	
	Max Ozone ppm	Hour of Max	Max Ozone ppm	Hour of Max	Max Ozone ppm	Hour of Max
San Luis Obisoo County						
Paso Roblks	0.065	1100	0.081	1500	0.097	1300
Atascadero	0.066	1100	0.083	1500	**0.097**	1400
Morro Bay	0.041	1200	0.044	1300	0.061	0200
San Luis Obispo	0.040	1300	0.050	1000	0.081	1300
San Francisco Bay Area						
San Jose-4th	0.046	1400	0.062	1600	**0.110**	1500
Gilroy	0.061	1600	0.076	1400	**0.115**	1700
North Central Coast						
King City	0.049	1400	0.065	1200	0.094	1600
San Joaquin Valley	0.064	1500	0.088	1700	**0.107**	1900
Tracy	0.063	1400	0.075	1500	0.085	1500
Crows Landing	0.068	1500	0.073	1500	0.080	1400
Turlock	0.072	1600	0.080	1700	**0.106**	1500
Fresno - First	0.066	1300	0.081	1500	0.089	1500
Clovis	0.070	1300	0.077	1400	**0.096**	1200
Parlier	0.077	1300	0.093	1500	**0.117**	1400
Hanford	0.081	1400	**0.101**	1600	**0.108**	1300
Visalia	0.065	1700	0.080	1600	**0.105**	1600
Bakersfield-Golden	0.067	1200	0.082	1300	**0.116**	1700
Arvin	0.075	1500	**0.106**	1600	**0.120**	1700
Maricopa	0.070	1000	0.076	1100	**0.104**	1400
Santa Barbara County						
Gaviota-GTC Site C	0.073	1500	0.082	1400	**0.130**	1400
Ventura County						
Simi Valley	0.067	1300	**0.100**	1200	**0.134**	1400

* Ozone Concentrations exceeding the State standard are shaded and bold faced

Timing of the l-hour peak daily ozone concentration from the SFBAAB to Paso Robles does not suggest a connection (see Table F-13). Moreover, while there were no ozone exceedances on May 10, on May 11 Gilroy began exceeding the State l-hour standard at 1300 PST, Pinnacles National Monument at 1500 PST, Paso Robles at 1200 PST, and Atascadero at 1300 PST. Though not quite reaching a State exceedance, King City's daily l-hour peak ozone concentration reached 0.094 ppm at 1600 PST. Clearly, there is a progressive timing in the first hour of a State exceedance from Giiroy to Pinnacles National Monument, and subsequently to King City. However, that progression is not evident beyond King City. The occurrence of the first hour (1200 PST) and peak hour (13-1400 PST) of the ozone exceedances at Paso Robles occurs earlier to a progression beyond King City, tet alone at Pinnacles National Monument. Therefore, ozone from the SFBAAB via the Salinas Valley and Pinnacles National Monument routes did not contribute to the ozone exceedances at Paso Robles and Atascadero on May 11.

The timing and distribution of the daily maximum ozone concentration on May 10 suggests that the Hanford exceedance was primarily the result of surface emissions from the Fresno urban plume and not the SFBAAB. The elevated daily maximum ozone concentrations at Tracy (0.085 ppm) and Crows Landing (0.080 ppm) on May 1 1 indicate that some SFBAAB emissions impacted northern SJVAB. However, these concentrations are below the State l-hour ozone standard. In addition, the timing of the daily maximum ozone concentration at these two northern SJVAB sites is similar to Paso Robles and Atascadero, not considerably prior. Therefore, it's doubtful that significant SFBAAB emissions via the San Joaquin Valley contributed to the May 11 ozone exceedances at Paso Robles and Atascadero.

Meteorology

On May 10 high pressure aloft was centered along the western U. S. coast. The center of this high pressure moved eastward into the Great Basin by the late afternoon of May 11, becoming stronger as it moved over California. As the high pressure over California increased from May 10 to 11, ozone exceedances became more widespread across central California.

This increase in high pressure over California brought light to moderate northerly winds to the northern County on May 1 O-l 1. Paso Robles wind speeds were light throughout May 11. Atascadero winds were light and from the south-southwest during the nighttime hours of May 10-I 1, otherwise winds were generally from the north through northeast.

Surface back trajectories were simulated for this episode. Two-day backward trajectories from Paso Robles and Atascadero at the hour of the daily maximum ozone concentration were calculated for May 11. In general, the back trajectories indicated that the surface northerly flow was very weak. Specifically, the back trajectories indicated that the path of airflow had spent most of May II between the Monterey

County line and the Paso Robles and Atascadero areas, while spending the late afternoon and evening of May 10 in the southeastern portion of Monterey County.

The winds aloft on May 11 were generally offshore at Vandenberg AFB, Fort Ord, Oakland, and Fresno. The offshore flow was as deep as 5800 feet at Fresno and 5000 feet at Oakland, Fort Ord, and Vandenberg AFB.'

Surface temperatures in Paso Robles, Atascadero, and the San Joaquin Valley were high on May 11. Peak temperatures at Paso Robles and Atascadero reached 95 and 91 degrees Fahrenheit. 'Peak temperatures at Fresno and Bakersfield were 90 and 88 degrees Fahrenheit, respectively. The high surface temperatures resulted in deep vertical mixing on May 11 over the County and central and southern SJVAB. This deep vertical mixing could have served as a mechanism to further draw air into the area where the exceedances occurred in the northern County, thus enhancing transport and vertical interchange.

The major findings, supporting the ARB staffs conclusion that the northern County was impacted from significant surface emissions from within the County and by significant aloft emissions from the SJVAB are:

- buildup of northern County emissions under light northerly surface winds;
- high ozone concentrations in the Hanford area the day prior, and high ozone concentrations in the SJVAB on May 11;
- deep vertical mixing in the SJVAB;
- deep layer of offshore winds above 1500-2000 feet at Fresno, Oakland, Fort Ord, and Vandenberg AFB; and
- deep vertical mixing in the northern County.

e. "Inconsequential" Transport Impact – September 1, 1996

Air Quality

The maximum ozone concentrations for the day leading up to the exceedance at Atascadero on September 1, 1996 are shown in Table F-14. Maximum ozone concentrations on August 31 were low in the County, moderate in the NCCAB, and exceeding the state ozone standard in the southern SFBAAB and in the SJVAB. By September 1 ozone concentrations increased in the northern County, but decreased in the air basins adjacent to the County. The Atascadero air monitoring station exceeded the state l-hour ozone standard with 0.095 ppm for one hour on September 1. In the adjacent air basins, l-hour ozone exceedances were confined to the SJVAB at Turlock, the Fresno urban area, and the southern San Joaquin Valley south of Oildale. Daily maximum l-hour ozone concentrations were less than 0.064 ppm in the NCCAB to the north and were less than 0.074 ppm in the Santa Barbara County to the south. Exceedances of the l-hour national ozone standard were confined to Edison in the SJVAB on September 1.

Table F-14
Air Quality Data*

Site	August 31, 1996		September 1, 1996	
	Max Ozone ppm	Hour of Max	Max Ozone ppm	Hour of Max
San Luis Obispo County				
Paso Robles	0.066	1200	0.084	1700
Atascadero	0.070	1200	**0.095**	1700
Morro Bay	0.030	1400	0.033	1900
San Luis Obispo	0.053	1500	0.052	1100
North Central Coast				
Pinnacles	0.081	1800	0.063	1200
San Francisco Bay Area				
King City	0.059	1300	0.056	1200
Gilroy	0.093	1500	0.066	1500
San Joaquin Valley				
Tracy	0.077	1400	0.088	1600
Turlock	0.074	1600	**0.096**	1400
Fresno-1st	**0.138**	1400	**0.107**	1200
Clovis	**0.130**	1400	**0.123**	1200
Parlier	**0.151**	1600	0.093	1300
Hanford	**0.144**	1400	0.083	1100
Visalia	**0.128**	1400	0.082	1300
Oildale	**0.121**	1200	0.087	1100
Bakersfield-Golden	**0.124**	1200	**0.096**	1100
Arvin	**0.120**	1300	**0.101**	1500
Edison	**0.142**	1400	**0.129**	1300
Maricopa	**0.095**	1200	**0.096**	1500
Santa Barbara County				
Santa Maria-Broadway	0.034	1500	0.034	1200
Los Flores Canyon #1	**0.106**	1500	0.069	1300
Paradise Road	**0.097**	1400	0.075	1500

* Ozone Concentrations exceeding the State standard are shaded and bold faced

Elevated concentrations of oxides of nitrogen were measured at Atascadero during the morning and evening hours of August 31. The local emissions of oxides of nitrogen were magnified by the addition Labor Day traffic on U. S. Highway 101. Elevated concentrations of oxides of nitrogen continued overnight and into the morning hours of September 1.

Meteorology

On August 31 high pressure was centered over the California's central coast and desert interior, causing the buildup of ozone concentrations in the central and southern portions of California. However, by September 1 lower pressure aloft resulted in decreased ozone concentrations over portions of central and southern California except for the northern County.

The nighttime and morning surface winds at Atascadero were calm on August 31 and September 1. Afternoon west-southwest seabreeze winds were light on August 31 and September 1. A one-day surface backward trajectory from Atascadero was calculated for September 1, 1996. The back trajectory indicated that air arriving in Atascadero at the time of the peak ozone concentration (1700 PST) had originated off the coast earlier in the day. The winds aloft at Vandenberg AFB, Oakland, and Fresno were generally onshore both on August 31 and September 1.

The major findings, supporting the ARB staffs conclusion that SLOC was predominately impacted by emissions from within the SLOC are:

- weak onshore surface airflow in the northern SLOC;
- onshore flow aloft at Oakland, Vandenberg AFB, and Fresno;
- abundant SLOC Labor Day ozone precursor emissions;
- geographically isolated Atascadero ozone exceedance; and
- westward back trajectory.