



San Joaquin Valley  
Unified Air Pollution Control District

To: <i>Sylvia Oey</i>	From: <i>Mark R. Boase</i>
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(1)

August 9, 1993

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*8/12/93*

STATE OF CALIFORNIA  
AIR RESOURCES BOARD  
RECEIVED *8/9/93*  
BY BOARD SECRETARY

*cc: Bd members*  
*JS MHS*  
*JD TSD*  
*JB Regal*

Board Secretary  
California Air Resources Board  
P.O. Box 2815  
Sacramento, CA 95812

RE: Triennial Report of Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations in California (June, 1993)

Dear Air Resources Board:

The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) staff has completed a review of the report referenced above and offers the following comments for your consideration:

We agree with, and recommend approval of, the ARB staff recommendation to classify the San Francisco Bay Area transport impact on the San Joaquin Valley as "overwhelming." Based on the clear evidence presented, we are also convinced that the "overwhelming" impact of Bay Area emissions covers a much larger geographic area than specified in the staff report and should extend to the Stockton-Modesto areas.

In addition, we have noted several apparent inconsistencies in evaluation methodologies in the ARB Staff Report with respect to how various transport couples were analyzed. The SJVUAPCD recommends that classifications be established on the basis of consistent analytic review. Specifically, in cases where information is known to be lacking to support classification assignments, air basins should be classified according to the same rules applied to other air basins, or classification should be postponed. For example, in several cases where information did not support a clear decision, adjacent basins were given contrasting designations. In one case involving the Mountain Counties Air Basin where data was said to be insufficient, the San Joaquin Valley was assigned an unsupported "overwhelming" classification while the Bay Area was not assigned comparable responsibility despite tracer gas evidence of transport from the Bay Area. Our concerns are further detailed below:

David L. Crow

Executive Director/Air Pollution Control Officer

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**San Francisco Bay Area to San Joaquin Valley Transport Clearly "Overwhelming."**

We strongly concur with and support the finding that the Bay Area is responsible for ozone exceedances in the San Joaquin Valley during transport conditions, and we urge the Air Resources Board to adopt the recommendation to reclassify the Bay Area as having an "overwhelming" ozone transport impact on the San Joaquin Valley. As stated in your Staff Report:

"[T]racer gas released from Pittsburg on August 3, 1990, between 6 and 10 a.m. was detected at Stockton between 4 and 8 p.m. and at Modesto between 6 and 8 p.m. of the same day. The tracer gas released from San Jose on August 3, 1990, between 6 and 10 a.m. was observed at Crow's Landing and Modesto around 8 p.m. This is conclusive evidence that pollutants emitted near Pittsburg and San Jose are transported to portions of the SJVAB."

We strongly agree with this statement and would add that if tracer gas traveled into the San Joaquin Valley interior in just 10-12 hours, then the ozone precursor emissions and the ozone resulting from them must ultimately be transported much farther downwind and in sufficient concentrations to have an "overwhelming" impact on more of the San Joaquin Valley than just the narrow band of land west of Highway 33 in Stanislaus County. In fact, as reported on page IV.24 of the Staff Report, this same tracer gas was detected in the Mountain County Air Basin just a few hours later. This provides clear evidence that the Bay Area impact is much more widespread than the area designated in the ARB Staff Report.

**Bay Area to San Joaquin Valley Downwind Impact Distance.**

Due to the speed of movement of the tracer gas during the August 3, 1990, tests, it can be fairly argued that a portion of the ozone precursors emitted in the Bay Area may not react chemically by the time they reach the Crow's Landing monitoring station. Thus, some pollutants may pass by Crow's Landing, react to form ozone at some distance downwind, and contribute to ozone exceedances throughout the San Joaquin Valley. This position is supported on page VI.9 of the ARB Staff Report in the discussion of ozone exceedances in Stockton and Turlock on August 6, 1990, wherein "The staff believes that combined emissions of ozone precursors from

both the SFBAAB and the SJVAB contributed to these exceedances." Therefore, the Bay Area should be responsible for attainment of the ozone standard in a much larger geographic area than proposed in the ARB Staff Report. As we have stated in past correspondence and presentations before the ARB, determinations should be based on actual data and sound air quality modeling methodologies. The area of impact should not be cut off where other emissions enter the picture, but rather where the emissions are no longer "overwhelming." This distance has not yet been established, but we believe there is sufficient data present to extend the overwhelming designation to the Modesto-Stockton areas.

**Bay Area to San Joaquin Valley Is Not A "Transport Couple Where Emissions Are Similar."**

The emissions inventory analysis (page VI.12) describes the impact of Bay Area emissions on the San Joaquin Valley as "transport couples where emissions are similar" by comparing the emission inventory totals for the air basins. The impact of Bay Area emissions is actually much more severe than an equal contribution during transport episodes. When meteorological events cause transport from the Bay Area into the San Joaquin Valley, most of the San Joaquin Valley emissions occur downwind of the counties affected by the transport. The northern three counties of the SJVUAPCD emit only 285 tons per day of ROG and NOx while being inundated with the transport from an air basin releasing 1,370 tons per day. This disparity in allowed emissions is the reason that an "overwhelming" impact was observed under transport conditions.

Air Basin	ROG	NOx	TOTAL	Ratio of BAY transport to SJV emissions
San Francisco Bay Area	790	580	1370	
San Joaquin Valley emissions from counties impacted by Bay Area transport: San Joaquin, Stanislaus, Merced	148	137	285	4.80

The meteorological conditions which cause the transport keep emissions from the southern half of the valley from playing any significant role. Under other than transport meteorological conditions, during severe stagnant inversions, San Joaquin Valley emissions to the south are believed to contribute to the exceedances observed. During transport episodes from the Bay Area, such emissions cannot be expected to have found a way to flow upwind. During a multi-day episode, part of which involves stagnant inversions or nighttime jet currents carrying emissions northward, emissions occurring in the southern five counties may play a role in the buildup of ozone levels. The SJVAQS/AUSPEX Regional Modeling Adaptation Project (SARMAP) modeling effort may be able to provide further analysis of multi-day episodes and the transport of emissions during such episodes.

Furthermore, the source of the majority of ozone precursor emissions within the San Joaquin Valley is over 100 miles downwind of the northern portion of the San Joaquin Valley and, therefore, cannot conceivably be thought to play a role in the ozone exceedances during transport conditions.

**The "Overwhelming" Designation Concerning the Mountain Counties Air Basin is not Supported by Evidence.**

We do not argue with the finding that the San Joaquin Valley is a source of transported pollutants in the Mountain Counties Air Basin. However, we do take exception with the conclusion that the San Joaquin Valley is responsible for an "overwhelming" impact while the Bay Area is only responsible for a significant impact.

There is no quantitative data to support a finding of "overwhelming" impact from the San Joaquin Valley. In fact, the only real evidence cited in the staff report is that tracer gas released from Pittsburg in the Bay Area on August 3, 1990, was detected in the Mountain Counties Air Basin within 12-16 hours after its release (page IV.24 of ARB Staff Report). Absent any quantitative data, it would appear that neither the San Joaquin Valley nor the Bay Area should be assessed a more restrictive transport mitigation classification than the other until better information is available.

If there is to be an assignment of transport responsibility, it appears that the contribution of the Bay Area emissions of 1,370 tons per day may have a more significant impact on the Mountain Counties ozone exceedances than the 285-ton-per-day emissions from the northern portion of the San Joaquin Valley during meteorological conditions that prevail during transport episodes.

In view of the information presented above, the SJVUAPCD strongly urges the ARB to classify the impact of the San Joaquin Valley on the Mountain Counties as "significant" until more accurate data is available for a realistic evaluation of Bay Area, Sacramento, and San Joaquin Valley contributions to the Mountain County air quality violations and the correct "overwhelming" emissions source can be identified.

Air Basin	ROG	NOx	TOTAL	RATIO of BAY TRANSPORT	RATIO of SJV TRANSPORT
San Francisco Bay Area	790	580	1370		
Mountain Counties Amador, Mariposa, Calaveras, Tuolumne	27.9	24.8	52.7	25.99	5.40
San Joaquin Valley transport counties to MCAB from tracer gas path: San Joaquin, Stanislaus, Merced	148	137	285	4.80	

**Different Rules Used for the San Joaquin Valley Air Basin to the San Luis Obispo County Transport Analysis.**

The SJVUAPCD agrees with the ARB Staff Report identification of the San Joaquin Valley Air Basin and South Central Coast Air Basin transport couple. We further agree that emissions are transported in both directions from time to time, depending upon meteorological conditions. We are concerned, however, and do object to the conclusion that the San Joaquin Valley should be classified as having a "significant" and "inconsequential" impact while the ARB Staff Report also recommends that the South Central Coast to San Joaquin Valley transport couple not be identified at this time.

The staff report loses all consistency with other evaluations by considering "previously transported SJVAB air from the day before" plus the shared contribution from the "populated coastal region" (p. IV.35) and also uses shared responsibility "strong evidence that ozone exceedances at Santa Margarita on August 6 at midday were partly the result of transported air from the SJVAB" (p. IV.36) in making the finding of significant impact from the San Joaquin Valley. In analyses of

other transport couples which impacted areas within the San Joaquin Valley, the shared contribution events were thrown out, and the Staff Report refused to make any findings of significance for the basins affecting the San Joaquin Valley. The Staff Report includes no analysis of impact from the South Central Coast Air Basin to the San Joaquin Valley. In view of the paucity of data, the SJVUAPCD recommends that the identification of both of these couples be deferred until sufficient valid, quantitative information is available to reach an informed determination.

**Staff has Used Inconsistent Methodologies in Determining Transport Impacts.**

As stated above, the ARB staff analysis of San Joaquin Valley impact on San Luis Obispo County holds us responsible for emissions from the day before and for areas of shared contribution. However, in evaluations of other transport couples, protection for the San Joaquin Valley is extended only to areas where no shared contribution exists (re. the cutoff of transport responsibility at Crows Landing), and the impact distances of upwind basins are limited to a matter of hours, with no multi-day protection or analysis. While a transport corridor was identified from San Luis Obispo to the San Joaquin Valley, no effort was made to examine the impact on the San Joaquin Valley. We ask that the protection and assignment of responsibility be established on a consistent basis for all transport situations.

**CARB Should Reconsider Its March 11, 1993, Action Amending Regulation § 70600.**

At the hearing on March 11, 1993, concerning Regulation § 70600, the Board approved deletion of the "no net increase" requirement from the mitigation regulation. As part of that action, the Board directed its executive officer to present the regulation back to the Board, if warranted, after consideration of additional data.

The proposal made by staff at that time was to increase the emissions threshold at which sources would be included in a no net increase permitting program from zero tons per year to a uniform threshold of 10 tons per year. The Board modified this recommendation and simply deleted the permitting requirement from the regulation. This resulted in the inequitable situation of allowing upwind districts (such as the Bay Area) to provide a greater relaxation of permitting rules than downwind districts (such as the San Joaquin Valley).

In the discussion concerning said action, staff admitted that the technical data needed to quantify the impact of transported pollution was not yet available but that it was being developed. The clear import of the hearing was that when more data became available, the threshold issue would be reconsidered.

The staff report for the August 12, 1993, hearing recommends classifying the Bay Area as an "overwhelming" contributor to pollution in the San Joaquin Valley. The report indicates that the recommendation is based on new data available from the San Joaquin Valley Air Quality Study. (Staff Report II.3) This is the appropriate time to "revisit" the issue of transport of pollutants from upwind areas to those areas downwind. The Board should begin steps to rescind its action taken in March 1993 and rectify the situation created that potentially allows upwind areas, such as the Bay Area, to relax their permitting to a threshold of 15 tons per year, while keeping downwind areas, such as the San Joaquin Valley, to a 10-ton-per-year threshold. It would appear appropriate at this time to take actions necessary to establish a uniform requirement for upwind and downwind districts as was originally recommended by staff. We urge the Board to do so.

**Health and Safety Code Requirements Mandate That CARB Develop Specific Mitigation Measures.**

Health and Safety Code § 39610(b) requires the Board to assess the relative contribution of upwind emissions to downwind ambient pollution levels and further mandates that it "...shall establish mitigation requirements commensurate with the level of contribution."

Prior to March 11, 1993, the Board complied with its duty under § 39610 by implementing specific minimum mitigation measures. For example, the previous version of Regulation 70600 imposed the "no net increase" permitting program for all areas and required implementation of a best available retrofit technology on at least 75% of the 1987 NOx emissions inventory for upwind districts. This stringent mitigation measure was relaxed in March 1993 when the no net increase provision was removed.

On the subject of mitigation measures, the current staff report proposes a general requirement to the effect that upwind basins causing overwhelming pollution to downwind areas should be required to adopt unspecified control measures sufficient to attain the ozone standard in the impacted downwind area.

As such, the staff recommendation does not comply with the legal requirements of Health & Safety Code § 39610, which requires that the Board establish mitigation requirements. The duty is placed on the Board to adopt specific mitigation measures, just as it had in past actions.

We request the Board direct staff to return with more specific mitigation requirements for Regulation 70600. Examples of specific measures that could be considered include:

1. A requirement that permitting programs for offsets and BACT in upwind areas found to be overwhelming contributors be at least as stringent as those in downwind areas impacted by overwhelming transport.
2. Reconsider the March 1993 action removing the "no net increase" requirement. It is suggested that this regulation could be amended to specify, as was recommended by CARB staff, that the offset mitigation threshold requirement be set at 10 tons per year. A uniform 10-ton-per-year threshold for all districts would remove inequity and would be a beneficial measure for mitigation of transported pollutants.

We urge the Board to not adopt the currently proposed amendment to the transport impact mitigation portion of § 70600. The Board should direct its staff to draft an amendment with specific mitigation measures and return for a future hearing.

**Requested Action:**

In conclusion, the SJVUAPCD respectfully requests the Board take the following actions:

1. Declare that the impact of the San Francisco Bay Area to San Joaquin Valley transport couple is overwhelming as far inland as the Stockton and Modesto areas.



2. Direct staff to draft specific mitigation measures to be imposed on overwhelming upwind transporters and return at a future meeting for consideration of said measures.
3. Begin procedures to rescind the action taken by the Board on March 11, 1993, which allows upwind overwhelming contributors to establish a 15-ton-per-year threshold while downwind areas are limited to a 10-ton-per-year threshold.
4. Require the use of consistent methodologies in determining transport couples and severities.
5. Amend the current findings to either state that the San Joaquin Valley is only a significant contributor to the mountain counties or that the Bay Area is an overwhelming contributor to those areas.
6. Take no action declaring a transport couple between the San Joaquin Valley and the south central coast.

Representatives of the San Joaquin Valley Unified Air Pollution Control District will be in attendance at the August 12, 1993, Public Hearing on this important issue. We urge the Board to ensure that final actions are established on a consistent basis which provides equal protection to the citizens of all air basins.

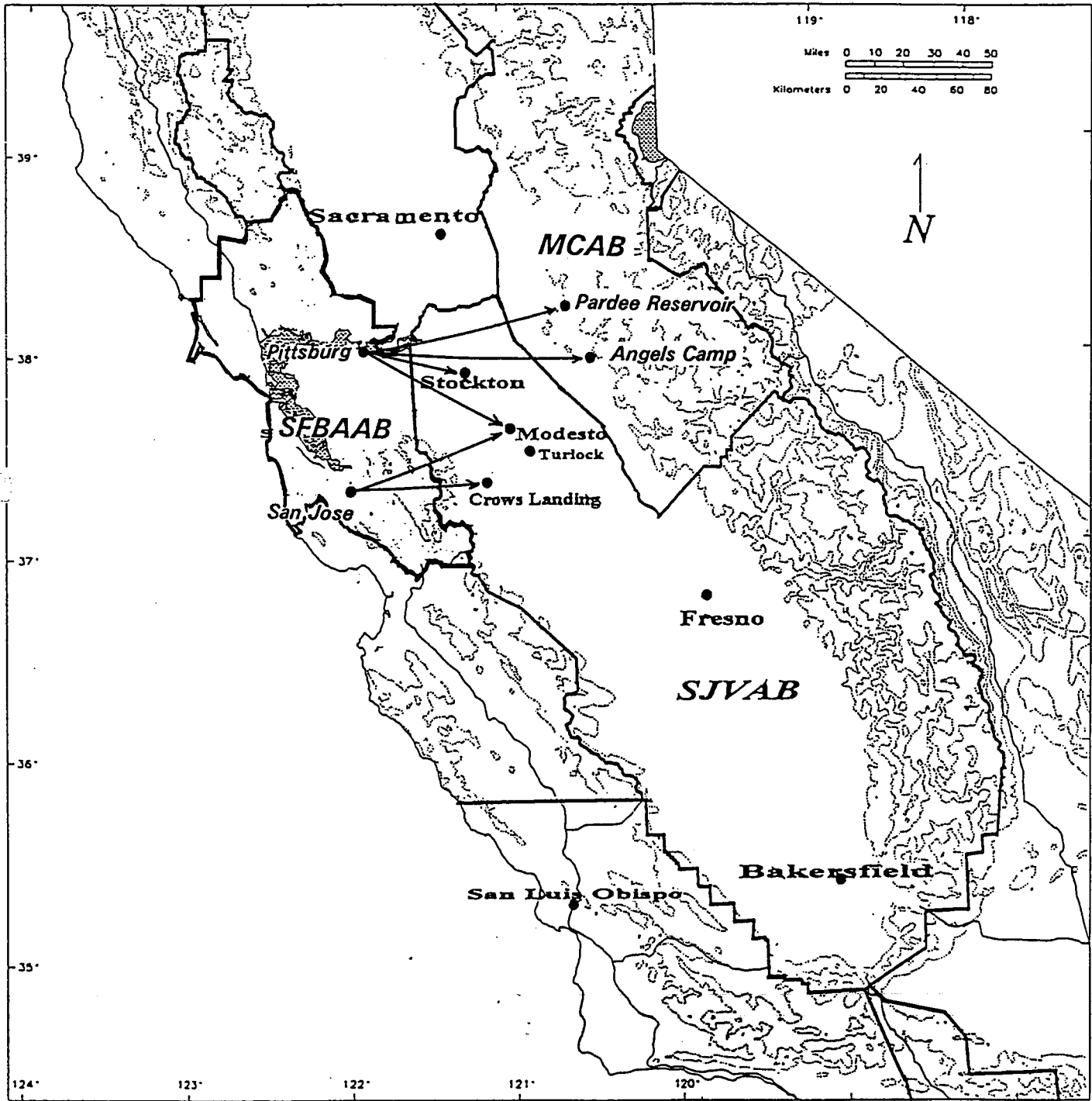
Sincerely,

DAVID L. CROW  
Executive Director/APCO



Mark Boese, Deputy APCO

# FATE OF TRACER GAS RELEASED FROM SFBBAB ON AUGUST 3, 1990



## COMPARISON OF EMISSIONS INVENTORIES

### BAY AREA AND SAN JOAQUIN VALLEY

Air Basin	ROG	NOx	TOTAL	Ratio of BAY transport to SJV emissions
San Francisco Bay Area	790	580	1370	
San Joaquin Valley emissions from counties impacted by Bay Area transport: San Joaquin, Stanislaus, Merced	148	137	285	4.80

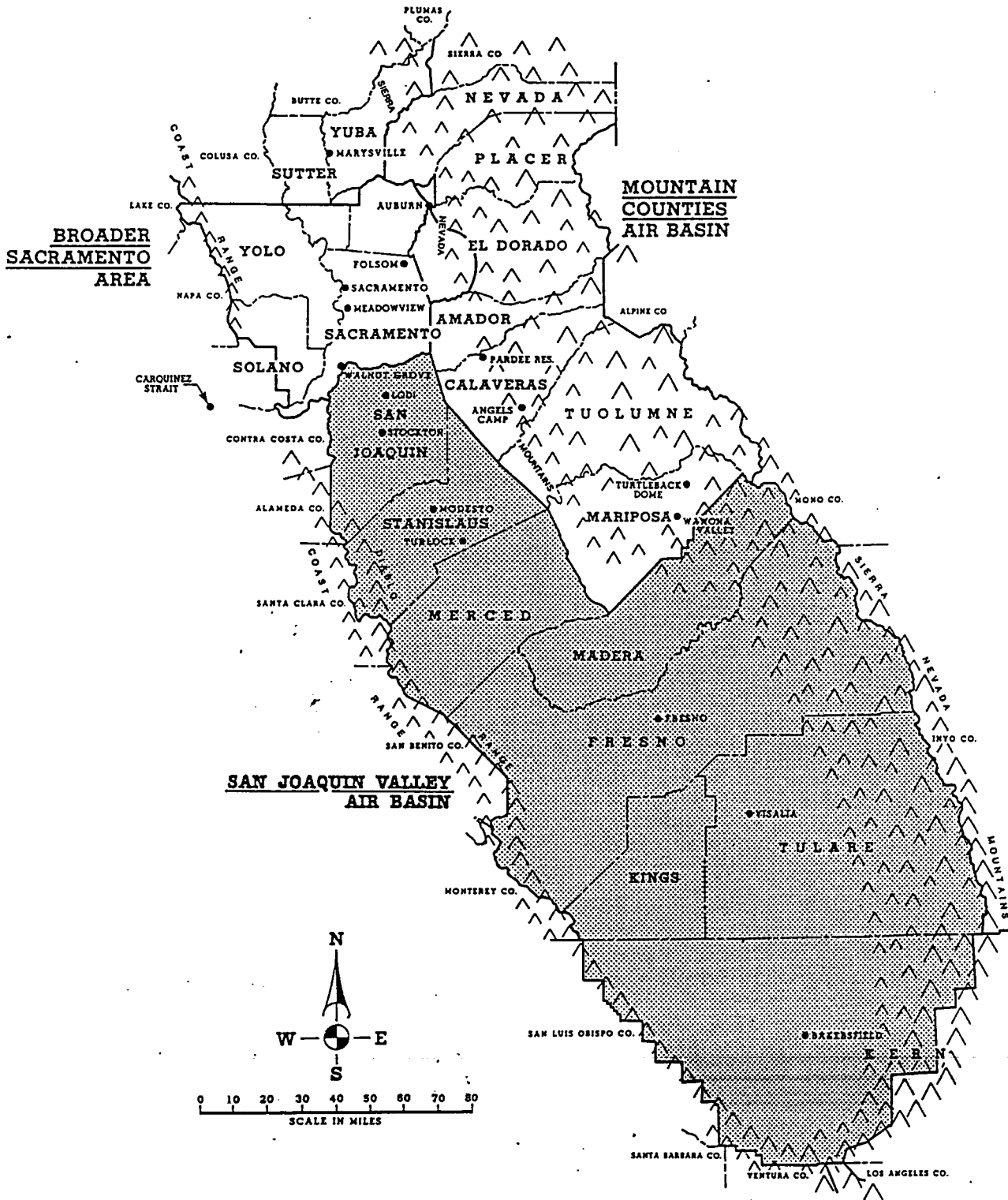
# COMPARISON OF EMISSIONS INVENTORIES

## BAY AREA, SAN JOAQUIN VALLEY, AND MOUNTAIN COUNTIES

Air Basin	ROG	NOx	TOTAL	RATIO of BAY TRANSPORT	RATIO of SJV TRANSPORT
San Fransisco Bay Area	790	580	1370		
Mountain Counties Amador, Mariposa, Calaveras, Tuolumne	27.9	24.8	52.7	25.99	5.40
San Joaquin Valley transport counties to MCAB from tracer gas path: San Joaquin, Stanislaus, Merced	148	137	285	4.80	

FIGURE IV.2

TRANSPORT COUPLE  
SAN JOAQUIN VALLEY TO SOUTHERN MOUNTAIN COUNTIES



(2)

# BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 Ellis Street  
San Francisco, CA 94109

TESTIMONY PRESENTED BEFORE THE AIR RESOURCES BOARD  
by Jan Bush, Deputy Air Pollution Control Officer  
on August 12, 1993

Chairperson Sharpless and Members of the Board,

My name is Jan Bush. I am a Deputy Air Pollution Control Officer with the Bay Area Air Quality Management District and wish to address your staff's proposal to designate the Bay Area as an "overwhelming" contributor to exceedances of the State ambient air quality standard for ozone at the Vacaville and Crows Landing sites in the Sacramento and San Joaquin Valley Air Basins, respectively.

Our staff has evaluated your staff's work in coming to those conclusions. We have also looked at additional information which your staff may not have considered. Our conclusion from reviewing this information is different from that of your staff. We do not believe that the Bay Area is an "overwhelming" contributor to either of these sites on the days designated by your staff. We have submitted our analysis to your staff for their review. We agree that reasonable people can disagree regarding the conclusions one could draw from the available data. I believe that neither your staff's analysis nor our staff's analysis is conclusive. A joint review of the information may lead to a consensus conclusion and I believe that such an effort would be appropriate, not only for the existing study but for such studies in the future.

However, we believe that there is a more pressing concern. That is our ability to document that we are no longer an "overwhelming" contributor, assuming we are in the first place, since the monitors at these two locations are no longer in place. We assert that we should not be designated an "overwhelming" contributor unless the stations are continued in operation and we have the ability to evaluate the data collected at them to determine if any future event occurs which may lead your staff to conclude that transport to either of these sites is "overwhelming."

Finally, we believe that even if we have been an overwhelming contributor for these low level violations of the state ozone standard, the control strategies included in our recently adopted Clean Air Plan will certainly reduce emissions so that these stations will no longer

be adversely affected by Bay Area emissions sufficient to be the recipient of "overwhelming" transport.

We request that you change the date in the proposed revisions to Subchapter 1.5, Article 6, Section 70600 (b)(1) of the California Code of Regulations from January 1, 1994 to June 1, 1994. We will have noticed all hearings and begun the workshop process by the earlier date but do not expect to have completed adoption until the latter date.

**TECHNICAL STAFF REPORT  
IN RESPONSE TO THE  
1993 ARB TRANSPORT ASSESSMENT  
FOR THE  
SCAB-SEDAB TRANSPORT COUPLE**



Prepared by:

*Mojave Desert Air Quality Management District*

August 9, 1993



## **I. BACKGROUND**

The California Clean Air Act of 1988 (the Act) required the Air Resources Board (ARB) to identify each air basin or subregion thereof, in which transported air pollutants from upwind areas outside the air basin (or subregion), cause or contribute to a violation of the state standard for ozone (Section 39610 (a)). This section further requires the ARB to 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. The ARB adopted a resolution in December 1989 which initially identified 14 transport couples.

The Health and Safety Code (Section 39610(b)), mandates the ARB to assess the relative contributions of upwind emissions to downwind state ozone exceedances. The first assessment was approved by the ARB in August 1990. At that time, the ARB made a finding that ozone transport from the South Coast Air Basin (SCAB) to the Southeast Desert Air Basin (SEDAB) was "overwhelming" on some days and "inconsequential" on some days. The Act requires the ARB to update this assessment at least every three years (Health and Safety Code 39610(d)).

In June 1993, ARB published a draft staff report entitled "Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations in California". The June 1993 ARB staff report provides an update to the transport assessment for selected transport couples, including SCAB and SEDAB. The document explains that transport evaluations are based on available data and new information or research regarding ozone transport couples. The report indicates that ARB staff reevaluated the San Joaquin Valley Air Basin transport to SEDAB and reaffirmed its 1990 finding of both "overwhelming" and "inconsequential" transport. In addition, the report explains that since SCAB transport to San Bernardino County was already documented and presented to ARB to be "overwhelming" in the 1990 assessment, no further examples were selected in the current study period (1989-1991). However, the ARB did undertake additional analysis for the SCAB-SEDAB transport couple for an evaluation on "inconsequential" and "significant" transport, which is included in the ARB staff report. The remainder of this report discusses the new analysis performed by ARB staff for the SCAB-SEDAB transport couple. District staff found no analysis contained in the ARB document to reaffirm its 1990 finding of the "overwhelming" and "inconsequential" transport from the San Joaquin Valley Air Basin to SEDAB.

## **II. SCOPE OF ANALYSIS**

The ARB is required to assess the relative contribution of upwind emissions to downwind ozone concentrations which exceed the state standard. The 1993 ARB staff report states that the transport assessment studies were intended to define the "relative contribution" to the fullest extent possible. However, the report also states that limitations of the data and inherent difficulties in understanding and characterizing mechanisms that result in ozone formation and transport, allows for a qualitative assessment under the law.

Therefore, the ARB is mandated to conduct appropriate studies to carry out its responsibilities under this section. The 1993 report states that ARB utilized available data and different analytical methods to study selected transport couples subject to the review. The report asserts that "two or more of the analytical approaches can be used to infer whether transport occurs or not".

The 1993 report provided information on the SCAB-SEDAB transport couple, based on the staff evaluation of "inconsequential" and "significant" transport. The report declares the resulting analysis is based on a review of 474 days wherein the state ozone standard was exceeded in SEDAB during 1989-1991. ARB staff indicate two days were chosen for a more detailed analysis based on the recommendations contained the report "A Study to Determine the Nature and Extent of Ozone and Ozone Precursor Transport in Selected Areas of California" prepared by Sonoma Technology Inc.

#### A. Significance of Geographical Setting

##### Extent of Study Area

The ARB staff report has included a rather brief description of the geographical setting which describes the SCAB and SEDAB boundaries. Barstow was chosen as the focus "because it is close enough to data sources to allow reliable analyses and far enough away from basin boundaries to be subject to inconsequential transport". However there is no details as to the distances between the exceedance location and other areas which may have contributed emissions during this episode.

While the ARB staff report acknowledges the SEDAB boundary on the northeast with Nevada state line and on the east with Arizona (including the Colorado River), there is no geographical information given about these areas potential role in regional episodes.

*Ozone formation and transport can occur on a localized, regional or global scale. Studies have shown that upwind urban areas can cause higher ozone exceedances in rural areas in a large scale over the course of days. The ARB evaluates transport episodes and categorizes them on a jurisdictional concept of air basins. In the case study, ARB was investigating the SCAB-SEDAB transport couple and may have limited its scope of analysis to those areas alone. The staff report does not clearly show that other adjacent regions were considered for any potential impact on the ozone episode.*

*From a direct route, Barstow is approximately 52 miles north by northeast of the Cajon Pass (see Attachment 1) a major route of transport into the desert. Barstow is located more or less east and northeast of the San Joaquin Valley and approximately 70 miles from the Tehachapi mountains. In addition, Barstow is situated more or less due west from Needles and the state border with Arizona and the lower end of Nevada. Across the state line, in close proximity to*

*Needles is the town of Laughlin, Nevada and Bullhead City, Arizona. Las Vegas, a very large metropolitan area, is approximately 131 miles northeast from Barstow (see attachment 1).*

### Geographical Features

The report lists the major mountain ranges and passes in SCAB. Other than the mountain which the SEDAB shares in common with SCAB and SJVAB, there is no other geographical features noted. Although ARB staff does state that many small mountain ranges dot the SEDAB, the map included in their 1993 report (Attachment 2) does not show any of the hills and mountains in the SEDAB interior. While ARB in 1979 recognized the importance of the topography by including a better map in the Nonattainment Plan for SEDAB (Attachment 3). Attachment 4 illustrates some of the numerous geographical features in the SEDAB study area and adjacent surroundings. Another important SEDAB geographical feature is the vast desert expanse which contributes to the heating and cooling of the ambient temperature. There is no information disclosed about either Arizona or Nevada's geographical features which lie in close proximity to SEDAB and the exceedance area. Lastly, the report does not describe the role various geographical features such as mountains, hills and valleys may play as an orographic influence on the meteorological conditions.

*Much has been written describing the topography of the SCAB and its acknowledged role in the aid of air pollutant transport into SEDAB through the mountain passes. An ozone evaluation for SEDAB, should adequately acknowledge the complex terrain that exists. Certainly, the SEDAB is not as flat as it appears in Attachment 2 and the region around Barstow is marked by many sizable hills and valleys extending northward and eastward. Nevada has hills and mountains along with valleys; therefore it could be considered a complex terrain and have an influence on the wind flow. The topography of Arizona, especially that area in close proximity to Needles should also be considered. Since air flows may travel along the course of a river and the Colorado River is very close to where ARB staff theorized the air parcel originated, this geographical feature may have played a role. In addition, air flows can be affected by bodies of water and there are several lakes in the Nevada and Arizona area not too far from the Needles area.*

*The ARB staff evaluation draws conclusions on ozone transport based on the case study day of September 15, 1989. The study area and the potential upwind transport region covers a large area of complex terrain. Geographical features which cause orographic effects in the surface layer can potentially be felt up higher in the troposphere. This arises when the turbulence in the Atmospheric Boundary Layer (ABL) is generated by friction of the atmospheric flow with the earth's surface. In a region such as SCAB-SEDAB, appropriate consideration should be given to investigate whether geographical features aided as a mechanism for transport.*

In view of the fact that ARB needs to consider all available data and information and research for transport evaluations, the following areas are being suggested for further consideration before conclusions are drawn:

- Adequate documentation of the geographical features of SEDAB and their associated orographic effects.
- Consideration of the geographical features located in SCAB and their orographic impact on conditions in SEDAB.
- Documentation and consideration of geographical features in Nevada and their associated orographic effects.
- Documentation and consideration of geographical features in Arizona and their associated orographic influence.
- Analysis of the ozone episode over a 5-7 day period with due consideration given to conditions occurring in Nevada and Arizona.
- Reevaluation of the case study day incorporating all available data, information and results from revised analyses.

#### **B. Analysis of Surface Winds**

The ARB report states that staff used hourly surface wind speed and direction and data to establish whether the surface air flow could transport pollutants from upwind to downwind areas. Information received during a phone conversation with ARB staff on August 3, 1993 indicated that surface wind information was obtained from air monitoring stations in the MDAQMD, part of the SCAB, and possibly the southern area of the San Joaquin Valley. Limited upper air information was obtained from only Edwards Air Force Base.

*In practice, mean wind data can be obtained either from routine synoptic observations, or from a dynamic model. The former data is generally available but the disadvantage is that it is inherently ground based and should rely on sufficient density of the measurements. In the case at hand, there appears to be no data used for a large sector of the area from the northeast to the east (approximately a missing gap of 135° or about 37 % of the data sets required).*

*Such recorded observations of surface winds are often affected by local conditions, thus requiring considerable effort to derive a representative wind field. A number of models have been devised to address the problematic issue of accurately portraying wind fields. These can be used in conjunction with other models in order to collectively assess transport mechanisms.*

## ARB Wind Trajectory Construction

The ARB report states that wind trajectory analysis is used as a "pictorial technique" to estimate the path an air parcel traveled over a specified period of time. It was explained that the method uses hourly surface streamline charts to estimate the average speed and direction of the air parcel for a one-hour or two-hour increment. Then segments were drawn for each one-hour increment for a predetermined period to simulate the path of an air parcel. The report states that backward trajectories need to show that an air parcel at the exceedance site in the downwind area, originated in the upwind area in order for transport to occur.

For the Barstow case study, the report states that wind speed and direction were plotted for each hour for 48 hours prior to the exceedance time. The plotted hourly data was analyzed using streamline techniques. ARB staff manually constructed a backward trajectory from Barstow from the 11:00 a.m.--12:00 noon hour on September 15, 1989. The resultant trajectory indicates that approximately 24 hours prior to the exceedance, the air parcel was about 40-50 miles northeast of Barstow. While 48 hours prior to the exceedance the trajectory infers that the air was near the California-Nevada border about 20-30 miles northwest of Needles. Therefore, the ARB report relies very heavily on surface data and asserts that the drawn trajectory "does not indicate transported air from any area outside of the SEDAB".

The ARB report states that the analysis undertaken by the staff utilized just the surface winds from neighboring monitoring sites in and around SEDAB and only the limited upper air data from one site. Based on information received from ARB staff, the trajectory constructed as part of their analysis relied on observations of the surface winds and streamlines rather than a process of using math equations to numerically calculate the air parcel path over successive points. The resulting trajectory places the parcel of air 24 hours before the exceedance at 40-50 miles away from Barstow, which is almost directly over Interstate Highway 15. It should be noted that this is the major transportation corridor between California and Las Vegas, Nevada and points east. In addition, the backwards trajectory 48 hours before the exceedance, indicates that the air originated near the California-Nevada Border about 20-30 miles northwest of Needles (see Attachment 4). As the map illustrates, this is just above Interstate Highway 40 in very close proximity to Laughlin-Bullhead City area. The staff report asserts that the trajectory does not indicate transported air from any area outside of the SEDAB.

### Methods to Construct Trajectories

*For decades, there has been a meteorological technique of mathematically calculating trajectories using differential equations and approximations. This can be a complex process as it may involve a series of mathematical computations using scalar values for wind speed and direction with recognition of additional forces which may act on the parcel. Note that this method, is more comprehensive than merely relying on visual approximation of the wind fields. In addition, there are now a number of different sophisticated computer programs which can*

*model the path of air parcels. These can be used to support or affirm a numerically computed wind trajectories and can be a valuable tool in air quality analysis.*

*Error in the plotted trajectory can arise in a myriad of ways. The most basic error that could occur is the inaccuracy of the data recorded. There may be variations among the instruments used and quality assurance procedures. In addition, this process in large measure, relies on a steady state of wind flow which may or may not be the case. Indeed near the ground, stability is principally a result of radiative and advective processes in the surface layer. Localized processes tend to prevent such stability.*

*The inaccuracy of a trajectory can result due to misleading wind field data if local conditions or factors are overlooked. This is why meteorological analysis, such as this, be thoroughly investigated and all available data be evaluated. In this case, local conditions which may especially apply to the Barstow region, could include (1) orographic disturbances (2) Localized convection cells (3) modifications of stability, vertical wind shears, and surface wind and pressure gradient (4) transport by a small scale air mass over a lake or river (5) gradients in surface roughness and turbulence (6) effects of differences in soil characteristics, and soil cover and (7) containment of colder shallow air masses by mountain barriers.*

*Analysis errors can also be introduced in evaluating such scalar amounts like surface winds by a lack of adequate data points. This possibility will continue to be a weakness of the analysis undertaken for the Barstow vicinity in SEDAB. Since wind data measurements were not closely available north and west of Barstow, there is a lack of continuity in space of the data. The resultant wind trajectory must have depended on some form of interpolation of the wind values. A general rule is the greater the distance between points the more the straight-line approximation is subject to error. Assuming the ARB utilized data from the stations listed on the standard meteorology analysis chart (attachment 5) there is considerable distances between the probable stations which were used for obtaining wind data.*

*Associated with this method, is the special error that can be introduced when dealing with boundary conditions. Since Barstow was probably the most northern location having surface wind data, the interpolation for that area in the quadrant north of Barstow, could be very different from the known points. This unknown "interpolated" region coincidentally, is where the polluted air parcel supposedly originated 24 and 48 hours earlier.*

A transport evaluation for SEDAB could benefit from further investigation, documentation, analysis and research concerning these items:

- Additional data on surface winds recorded in northwest sector to the area due east during the ozone episode.
- Additional reliable data on both the vertical and horizontal components of the wind flow.
- Construct a forward trajectory for the state boundary area between California, Nevada and Arizona.
- Construct a numerically devised trajectory based on a series of mathematical equations.
- Adapt a model for the exceedance region in order to construct a trajectory for comparison with the previously devised trajectory

### C. Analysis of Winds Aloft

The ARB document reports that the upper air winds at Edwards air Force Base were calm or very light (2-4 knots) and variable. However, the ARB report states that "it is unlikely the September 15, 1993 exceedance at Barstow was caused by transport aloft" based on this data alone. The staff report does not cite any other upper wind information utilized for this analysis. There is no information in the ARB or Sonoma Technology report which indicates what may have been occurring in the vertical dimension or in layers aloft.

#### Atmospheric Processes

*The atmosphere is affected by a large spectrum of motions from planetary waves, synoptic scale disturbances, mesoscale circulations, to turbulent fluctuations. Which of these scales are important will depend on the atmospheric residence time of the gas particle in question. For ozone, the residence time is in 'days'. Thus, the atmospheric circulation of this pollutant would be influenced by advection with synoptic disturbances and larger scale tropospheric flow. This allows an ozone transport mechanism to occur on both a regional and global scale.*

*In the lower troposphere, a few layers may be distinguished: the surface layer, the atmospheric boundary layer (ABL) which includes the surface layer and the free troposphere. The dynamic air circulation occurring in these layers is vital to understanding the different mechanisms of ozone transport. In the ABL, transport in the horizontal direction, parallel to the surface is dominated by the mean windfield. While transport in the vertical direction is mainly the resultant of turbulent atmospheric motions. The intensity of these motions is closely related to*

*the mean wind shear and the stability of the atmosphere.*

*The formation of various currents in the atmosphere leads to the mixing of large masses of air and transport of compounds emitted by various sources on earth's surface over considerable distances. The different processes of turbulent diffusion also plays a large role in the dissipation of air in the surface layers. The existence of air currents moving at different velocities and the inhomogeneity of heat transfer at the earth's surface is the main reasons for the generation of turbulent chaotic air motion. The intensity of the mixing is, in turn, mainly dependent on the wind velocity and the thermal state of the atmosphere. When thermal stratification of the air is stable, convection currents are prevented from forming thus turbulent diffusion proceeds very slowly. Conversely, if convection is considerable then turbulent diffusion increases.*

*Thermal conditions such as a temperature inversion, an increase in temperature with altitude, can cause a decrease in the turbulence diffusion by preventing the formation of convective currents. Temperature inversions can occur both in the upper atmosphere and at the earth's surface. Such inversions near the ground usually appear on windless nights when the earth's surface and the adjoining air is greatly cooled. The development of temperature inversions can prevent the vertical air motion and dispersion of pollutants thereby causing an area to be impacted by a lingering parcel of contaminated air. Simply stated, high winds tend to distribute ozone evenly, and any distinction between levels in the more and in the less polluted areas of the region is lost. While calm or low wind days can lead to atmospheric conditions which exacerbate the differences in pollutant concentrations in different locales.*

*In the upper layers of the troposphere and in the stratosphere, jet flows are generated in which the maximum wind velocities attain 100 to 150 ms<sup>-1</sup>. The width of these currents could be several hundred kilometers and are capable of transporting great masses of air. In the summer, east winds predominate in the layers above 25 km and in the winter, west winds prevail in the stratosphere. Meteorological events which sporadically occur around the jetstream can transport ozone from the stratosphere across the troposphere into the boundary layer. Another atmospheric mechanism contributing to the ABL pollution arises because of ozone influx from the free troposphere. The input of ozone in this manner would depend on the concentration of ozone in the background (free) tropospheric air. Historically, ozone values in the Northern Hemisphere have been rising over the years which is thought to be due to the increasing anthropogenic production of ozone.*



**A transport evaluation for SEDAB could benefit from further investigation, documentation, analysis and research in the following areas:**

- **Obtaining adequate information on all necessary meteorological parameters for the entire episode (at least 5-7 days time period).**
- **Evaluation of a three dimensional analysis of the meteorology during the ozone episode.**
- **Information and data on stratified layers of pollutants during the ozone episode**
- **Determine the likelihood of stratospheric injection of ozone into the troposphere during the episode period.**
- **Systematically classify the types of weather systems which lead to ozone exceedances in SEDAB.**

#### **IV. ATMOSPHERIC CHEMISTRY**

##### **A. Ozone Production and Disassociation**

###### Routine Ozone Production

For the purposes of this paper, it is enough to say that the presence of ozone in the atmosphere occurs because of its transport from the stratosphere to the troposphere and ozone formation as a result of a series of photochemical reactions involving oxides of nitrogen and organic substances. It is generally accepted by the scientific community that the production of ozone is NO<sub>x</sub> limited throughout most of the troposphere. Therefore, the relative presence and transport of NO<sub>x</sub> is as important as the presence and transport of ozone.

Such formation of ozone in the boundary layer during photochemical pollution episodes can give rise to ozone concentrations ranging from .10 to .40 ppm. Aircraft measurements reveal ozone plumes and troughs can occur in the atmosphere. Due to meteorological conditions the atmosphere can contain stratified layers of air containing different ozone concentrations. At times, the upper layers may have higher readings than the ground layer, thus forming a potential reservoir of ozone which could be transported downward.

The frequency of such episodes is controlled by meteorology and varies widely in place and time. Polluted air masses from urban and industrialized areas can affect suburban and rural areas for considerable distances downwind over 1000 km (approx. 621 miles) for ozone, and several thousands of kilometers for some of the precursors.

## Oxides of Nitrogen

The upper tropospheric NO<sub>x</sub> levels are maintained by lightning, stratospheric injection, high flying aircraft and convective transport of surface pollution. Thus, to determine an estimate of ozone production potential of the atmosphere, and to assess to what extent the ozone production in the atmosphere is altered by people's activities, it is necessary to know the atmospheric NO<sub>x</sub> content. However at most locations on land, particularly in the mid-latitudes, the NO<sub>x</sub> levels in ambient air is influenced by anthropogenic emissions. Studies conducted in the Netherlands suggest that the effect of anthropogenic NO<sub>x</sub> emissions are felt on a regional scale, ie. several hundred kilometers.

Some NO, is removed from the boundary layer of the atmosphere by dry deposition. Studies have also shown that more than 50% of NO<sub>x</sub> may be converted into peroxyacetyl nitrate (PAN). The decay of PAN is temperature dependent. In the presence of low NO/NO<sub>x</sub> ratios and cooler air masses, the decay rate of PAN is sufficiently long enough to allow it to be transported over very large distances. Therefore, during a turbulent exchange of cooler air with considerable PAN concentrations, the air parcel could be transported and raised in temperature resulting in NO<sub>x</sub> forming again by decomposition of PAN. In turn, the NO<sub>x</sub> which is created, could enter the photochemical reaction pathway along with carbon monoxide and hydrocarbons leading to the formation of ozone. Indeed, it has been noted that atmospheric NO<sub>x</sub> levels in the rural and remote troposphere can be strongly influenced by PAN.

## Hydrocarbons

Many hundreds of different volatile organic compounds are emitted into the atmosphere both by anthropogenic and natural sources. In general, it has been shown that the highest hydrocarbon concentrations are observed in the morning hours and in early evening, while the minimum occurs at nighttime. Additionally, the highest hydrocarbon content is observed from Tuesday through Friday. Because of the similarity of the composition of hydrocarbon components and the peculiar diurnal and weekly variations in concentrations in different cities it appears that the common source of their emission is due to motor vehicles. In addition, there has also been evidence of a seasonal variation in the atmospheric presence of volatile hydrocarbons with concentrations at their lowest in the summer and early autumn. This is due in part to the compound's lifetime in the atmosphere which is minimal in summer depending on the intensity of photochemical processes.

A desert region such as SEDAB, would seem to have the potential to be more impacted by urban emissions because of the decreased amount of vegetation. In addition, the higher temperatures and solar radiation of the desert would increase the photochemical reactivity rates leading to the conversion of volatile organics into ozone.

It has been shown that the total amount of hydrocarbons in the air depends on the contribution of both sources and can vary by more than one order of magnitude over a short period of time. In addition, anthropogenic sources profoundly affect the chemical composition of the atmosphere even in non-industrial areas with a low population density at a considerable distance from large cities.

#### Interrelationship of Exceedances and Other Factors

There is a general tendency for ozone concentrations to be lower in urban areas than in downwind rural areas, because in urban areas some ozone is removed by reactions with other pollutants. In fact, elevated ozone concentrations have been measured in many downwind rural areas where local ozone precursor sources are lacking. In polluted atmospheres these reactions constitute a major sink for ozone.

In view of the fact that the transport evaluation should consider available data, information and research the following is being suggested for further documentation and investigation:

- Determine the amount of NO<sub>x</sub> in the upper and lower atmosphere in the SEDAB and all upwind areas.
- Determine the amount of NO<sub>x</sub> that is converted to PAN in the SCAB region and its relative presence in SEDAB.
- Accurately estimate the amount of biogenic and geogenic emissions in the SEDAB
- Assess the transport of SCAB biogenic and geogenic emissions to SEDAB and evaluate the ozone formation potential.
- Evaluate to what degree the atmosphere over the rural portions of the Mojave desert is impacted by the ozone precursor emissions of very urbanized upwind locales (eg. So. Calif. and Clark Co.).

#### **B. Potential Source Contributions to the Ozone Episode**

The April 1992 report prepared by Sonoma Technology Inc. for the ARB, does not discuss SCAB and SEDAB emission source contributions to ozone exceedances. However, the ARB staff report in their transport evaluation does include the emission inventory for SCAB and SEDAB and but does not address the possibility of any other sources outside the couple as potential contributors to the pollution burden.

The ARB report states that emissions in SCAB are due to "large scale urbanization including the associated mobile and heavy industrial sources". The total combined emissions for ROG and NOx is 2,300 tons per day. While it is also reported that emissions in SEDAB are largely due to several large stationary sources associated with raw material processing, etc. The report states that SEDAB emissions for ROG and NOx combined is only 440 tons per day.

*Since the ARB report identified a specific path that the polluted air parcel traveled for 48 hours, the MDAQMD thought it prudent to undertake a cursory review as to what SEDAB sources could have been contributing to the air parcel. Since the polluted air parcel came from an the area near Needles, the total emission inventory for SEDAB should not necessarily be considered. Rather, only those sources which could contribute ozone precursors to the air parcel in the Barstow vicinity or those sources near the Needles area 48 hours or earlier should be considered. The MDAQMD staff reviewed its emission inventory and determined the SEDAB sources operating in the vicinity around Barstow, including the area north and east, out to the border of Nevada and Arizona. The following table illustrates the estimated daily NOx emissions from these SEDAB sources located in study area.*

1990 NOx emissions in the SEDAB study area

On Road Vehicles	7.72
Trains	5.82
Other Mobile Sources	1.35
Area Sources	0.19
Point Sources	<u>28.60</u>

Total 43.68 tons/day

SCAB Emissions

Since, the limited data contained in the ARB staff report does not convincingly prove that the Barstow exceedance was caused by locally generated ozone or ozone precursors, then information from adjacent areas should be reviewed. The ARB report cites the South Coast Air Basin as having total NOx and Rog emissions of 2,300 tons per day. This represents well over a five fold increase above the total emissions in SEDAB, and more than fifty-three times the amount of total emissions generated in the exceedance area.

Since the ARB constructed a wind trajectory for the polluted air parcel that ends up next to the Nevada and Arizona border with California, a preliminary look at emissions being generated in the adjacent area should be considered. This is being suggested because the polluted air mass (or polluted layers) may have originated in these states.

## State of Nevada

District Staff, in the limited time available, was able to obtain some emission data that is significant. One very large source of pollutant emissions close to Needles, is the Southern California Edison Mohave Station Power Plant at Laughlin, Nevada. This coal fired generating station alone, has on average emitted over 55 tons of NO<sub>x</sub>, 45 tons of SO<sub>2</sub>, 0.3 tons of VOC's and 2.57 tons of CO per day. The 20,383 tons of NO<sub>x</sub> emissions produced annually by the Mohave power plant almost equals all the NO<sub>x</sub> emissions (23,954 tons/year) being produced by the major stationary sources in the MDAQMD. In addition, Clark County has other power plants which contribute another 9 tons per day of NO<sub>x</sub> from fuel combustion.

Clark County Nevada, which includes the large metropolitan area of Las Vegas, had a population of 703,400 in 1988 alone. The growth rate was reported to be about 3.5 % during that period. In addition, there were an estimated 17.2 million visitors to Las Vegas in the same year. There is substantial vehicular traffic on Interstate Highway 15 towards Las Vegas, with approximately 23,300 vehicles crossing the state line. The hydrocarbons emissions from vehicular traffic can play a significant role in ozone production. Lastly, the Las Vegas area is a federal nonattainment area for carbon monoxide and has a total 1990 inventory of 359 tons per year.

## State of Arizona

In 1989 the MDAQMD received a large number of air quality complaints from the citizens in the Needles area. As a result of the investigation of these complaints, it was determined that extensive aerial spraying was being conducted on the thousands of acres of farmland in Arizona just across the border from California. The chemical being sprayed was a cotton defoliant and considered a reactive hydrocarbon. The spraying was being done in an uncontrolled manner which allowed the hydrocarbon emissions to be directly and extensively injected into the atmosphere. Such aerial spraying regularly occurs at cotton harvesting time, by crop dusters during the daylight hours in the warm September period. This activity potentially represents a significant source of ozone precursors impacting the SEDAB.

Preliminary information from Mohave County in Arizona indicates that approximately 10 tons per day of NO<sub>x</sub> is emitted from mobile sources. Specifically, travel on Interstate Highway 40 into Arizona is estimated on average, at 9,000 vehicles per day. In addition, there is a significant recreational boat usage of the Colorado River, Lake Havasu and Lake Mohave which contribute to the ROG emissions that can easily be transported into SEDAB. The emission inventory data above, though limited, illustrates that substantial sources of ozone precursors were potentially emitted in the air parcel which ARB determined was originated near the California-Nevada-Arizona border.

In view of the fact that the transport evaluation should consider available data, information and research the following is being suggested for further documentation and investigation:

- Obtain available data on the emission inventory of Nevada especially the Las Vegas metropolitan area.
- Obtain available data on the emission inventory of Arizona especially the area in close proximity to Needles.
- Compare the relative emission contribution potential from all areas and evaluate the impact on the overall photochemistry in the atmosphere on a large scale.

### C. Temporal Considerations of Ozone Episode

ARB staff utilized several analytical methods using temporal data that could have some causal connection to transport. First, the diurnal distribution of the hours of exceedance was noted. The report states that "there is a significant shoulder of exceedances" at Barstow from 0900 to 1400 PST which "may result from the carryover of ozone or precursors from the previous day. However, the report conjectures (in a general sense) that since such exceedances have a diurnal pattern closely resembling local source effects, they represent the best opportunity for identifying possible local contributions.

*To date, there has only been a single exceedance occurrence (April 29, 1989) which was used in an ARB hearing, as evidence of a locally generated ozone exceedance in SEDAB. The first hour of the occurrence did fall within the period 0900 to 1400 PST but a single occurrence should not be used as proof of a pattern. It is just as likely one exceedance during that time period could be due to carry-over of transported precursors from the prior day or could indicate the presence of an ozone reservoir in the upper atmosphere which was transported to the surface layer.*

As stated earlier, the transport evaluation relied on a manually constructed backward trajectory covering a 48 hour period just prior to the exceedance hour. The report states that the trajectory indicates the location of the parcel of air 24 hours earlier was about 40-50 miles northeast of Barstow. The report does not include any information or data about conditions in Nevada or Arizona during the 48 hour time period under review. Nor does the report indicate whether ARB staff considered what may have occurred 3-4 days prior to the exceedance, which would have been September 11-12, 1989.

**The following items should be considered in any transport evaluation for SEDAB:**

- **Utilize an adequate time interval for ozone formulation and transport analysis (5-7 days).**
- **Obtain all available meteorological data for the region during the time interval under review.**

## **V. IMPLICATIONS FOR THE FUTURE**

### **A. Need for Comprehensive Study**

The foregoing discussion illustrates the many different circumstances and variables that should be scrutinized in order to adequately investigate and evaluate ozone exceedances in a region. The ARB staff did not utilize many of the available analytical techniques in performing the SEDAB case study on the September 15, 1989 "inconsequential day".

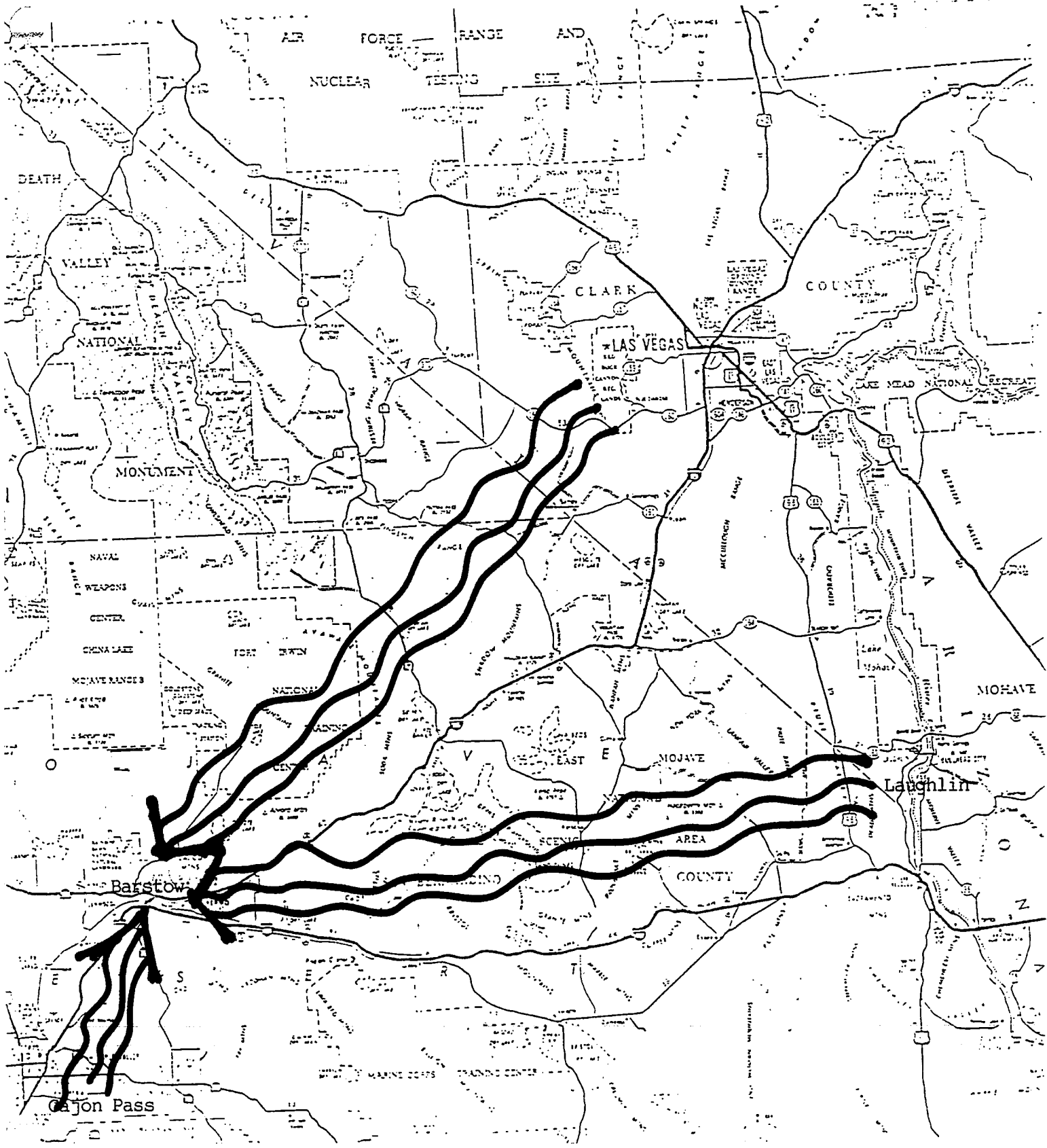
It is apparent a number of questions remain and the answers cannot be obtained unless more data and information is acquired and analyzed with more technically sophisticated methods and tools. In light of this, the MDAQMD is requesting that a comprehensive ozone transport evaluation be performed. It is hoped that the a state of the art study would employ the best available techniques and models. The MDAQMD is asking ARB for its commitment and support in accomplishing this goal.

## **VI. CONCLUSION**

The ARB has a very difficult yet important task in meeting its responsibility to perform ozone transport assessment evaluations. The seriousness of this duty becomes more apparent in light of the regulatory requirements for mitigation and the development of effective control strategy to expeditiously achieve the state standard for ozone in both upwind and downwind districts. To date, there still remains more questions than answers regarding the complex behavior of ozone exceedances in the multi-jurisdictional region impacted.

To adequately address this issue is of paramount importance to the MDAQMD, because of a duty to safeguard the health and welfare of the people from air pollution and to responsibly use regulatory authority. It is presumed that the ARB shares these concerns and is also committed to solving the serious ozone problem in Southern California. To this end, the MDAQMD is seeking the establishment of a strong partnership between all appropriate state and local agencies, private enterprise, and the community in order to work toward the answers and solutions that are needed.

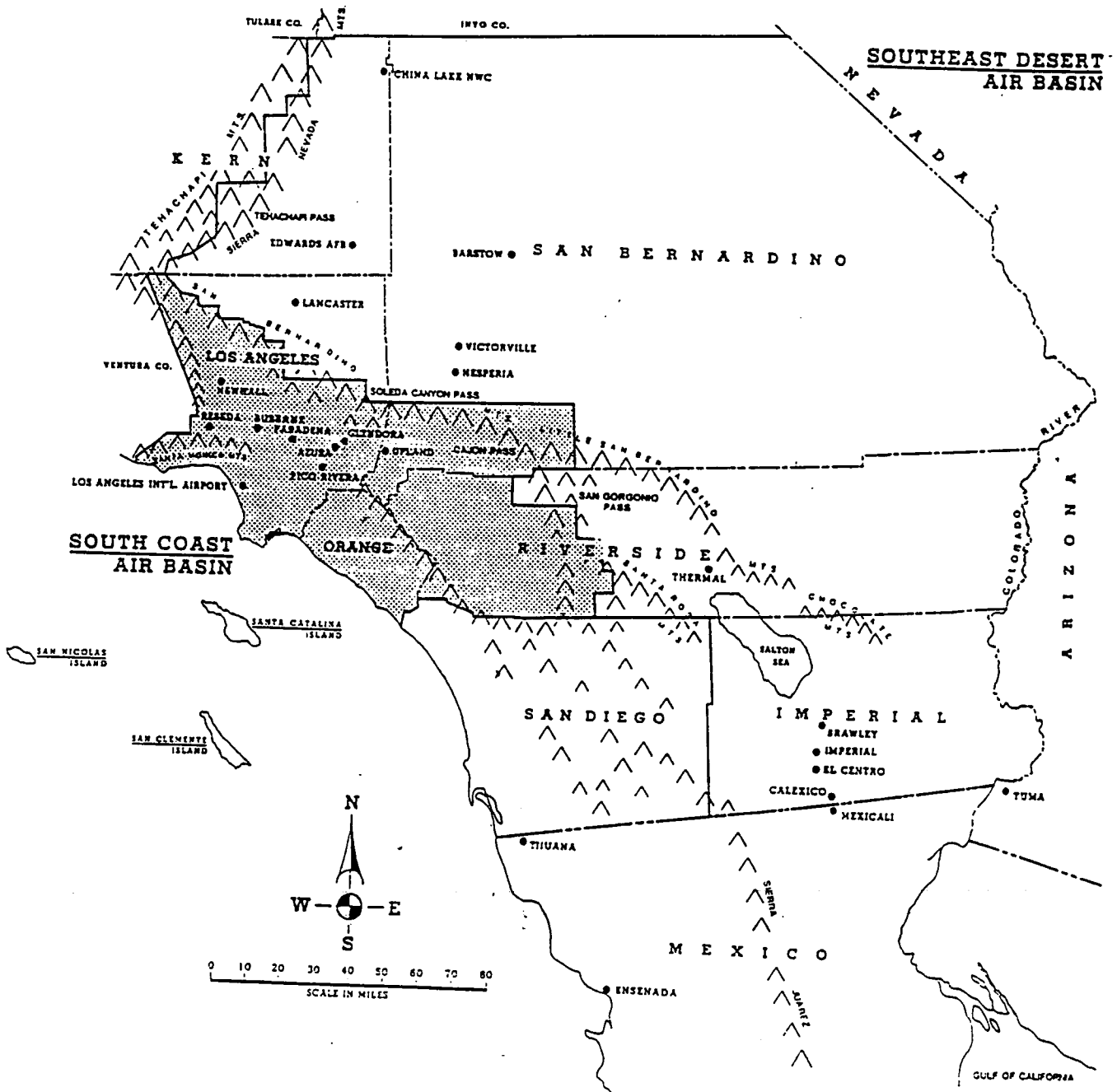
ATTACHMENT 1



Barstow to Las Vegas = 131 Miles  
Barstow to Laughlin = 122 Miles  
Barstow to Cajon Pass = 52 Miles



FIGURE VII.1  
TRANSPORT COUPLE  
SOUTH COAST TO SOUTHEAST DESERT



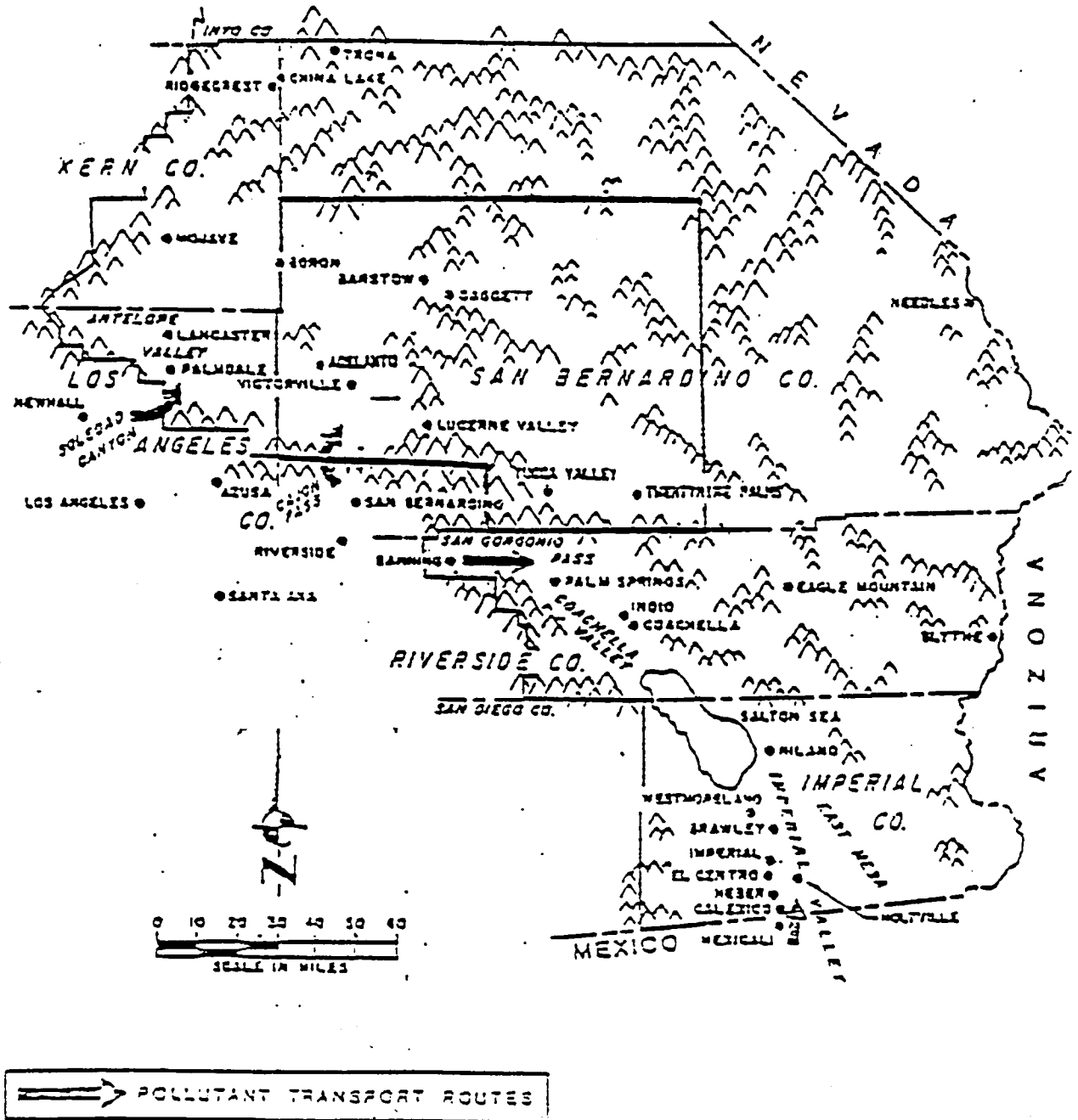
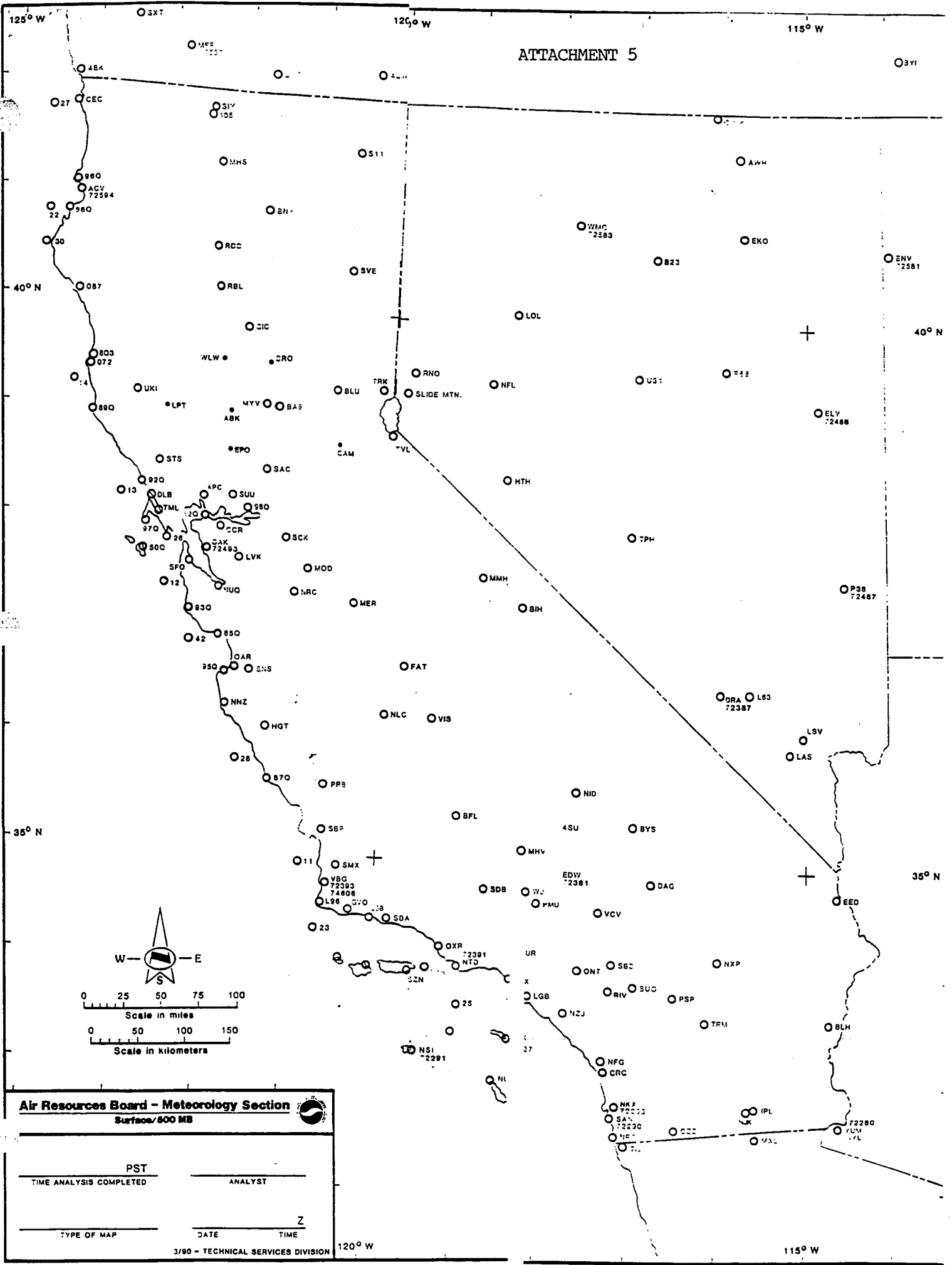


Figure 2

Southeast Desert Air Basin  
and the MAP Planning Area

# ATTACHMENT 5



**Air Resources Board - Meteorology Section**  
 Surface/500 MB

PST		ANALYST	
TIME ANALYSIS COMPLETED			
TYPE OF MAP		DATE	Z TIME

NORTH AMERICAN CHEMICAL COMPANY  
TESTIMONY FOR CARB HEARING AUGUST 12, 1993  
SOUTHEAST DESERT AIR BASIN OZONE ATTAINMENT

---

Introduction:

Today's comments follow and support previous testimony on the subject of ozone attainment given February 18, 1993.

Transport:

North American Chemical Company (NACC) understands that CARB has designated the San Bernardino portion of the Southeast Desert Air Basin (SEDAB) as non-attainment for ozone based upon a one day exceedance in Barstow on September 15, 1989.

NACC supports the District's position that too little is known about transport factors in the SEDAB to conclude that transported ozone or ozone precursors did not cause this exceedance.

We believe there is a misinterpretation of the data by concluding that transport was not a factor. There appear to be flaws in the analysis, which potentially invalidate the conclusions.

First, CARB concluded, through modeling the event in reverse, that the source of the ozone was a point some 20-30 miles northwest of Needles. We are not aware of any facilities or human activities in that locality which could generate sufficient ozone to cause the reported exceedance.

Second, by reasonable adjustment of modeling parameters, the Laughlin, Nevada area can be shown as a potential source of the reported pollution. Here there are a power plant, human population and transportation corridors capable of generating the magnitude of pollution seen on this day.

While the meteorological conditions may have ruled out transport from the South Coast Air Basin, there is not enough information to similarly exclude the Laughlin area. Additional evaluation of the Barstow exceedance day and study of desert area transport phenomena, in general, are required before one can say that transport was not a factor.

Cost:

NACC is concerned that adoption of CARB's approach may cause significant unproductive expenditures on the part of all parties involved. Until the cause of the ozone exceedance is understood and cost effective remedies developed, money may be expended on remedies which do not solve the problem.

California industry and the public can not afford to spend money on potentially unproductive environmental remediation. NACC stands willing to work with the District and CARB to solve the area's environmental problems by furthering our understanding of their causes and developing effective solutions.

Conclusions:

Thank you for your attention and for providing NACC with the opportunity to address this important matter. I will respond to your questions, if you have any.

Ross H. May  
North American Chemical Company

aug12

# FEATHER RIVER AIR QUALITY MANAGEMENT DISTRICT

8

Serving the Counties of Yuba and Sutter  
463 Palora Avenue, Yuba City, CA 95991-4711  
916/634-7659 FAX 916/634-7660 Burn Information 916/741-6299

Kenneth L. Corbin  
Air Pollution Control Officer

STATE OF CALIFORNIA  
AIR RESOURCES BOARD  
RECEIVED 8/10/93  
BY BOARD SECRETARY

93-10-2  
8/12/93

XC: *Bel members*  
JS MHS  
JD TSD  
JB *Legal*

August 5, 1993

Air Resources Board  
P. O. Box 2815  
Sacramento, California 95812

Subject: August 12 public hearing on  
amendments to the Transport Identification and  
Mitigation regulations.

Dear Board Members:

In December of 1989, the Air Resources Board adopted regulations which identified 14 transport couples. In these regulations, the Broader Sacramento Area (BSA) was defined to include all of Yuba and Sutter Counties. This action had the effect of placing Yuba and Sutter in a serious nonattainment area designation, even though data shows that the major cause of our ozone violations are caused by transport from the Sacramento Area.

In December of 1990, the Air Resources Board requested that the Environmental Protection Agency (EPA) change their nonattainment boundaries to include the southern portion of Sutter County in the Sacramento Metropolitan Statistical Area. The EPA took this action in December of 1992, over the protests of the Boards of Supervisors of Yuba and Sutter Counties.

In May of 1992, the Air Resources Board amended their regulations to remove all of Yuba County and the Northern portion of Sutter County from the BSA, making the state boundaries the same as the federal boundaries. In their Resolution # 92-44, the Air Resources Board stated that the BSA was being amended "to contain all significant existing and planned developments that are or will become the origin of commuter vehicle trips into Sacramento County". The Resolution also stated that "Sutter County's General Plan Amendment provides for development of 25,000 acres in the Southeast portion of the County, including an increase of 57,000 new households".

AIR RESOURCES BOARD

August 5, 1993

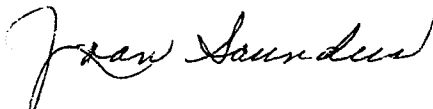
PAGE 2

Because South Sutter is included in the federal nonattainment area (the Sacramento Metropolitan Area), the Feather River Air Quality Management District must prepare a Rate of Progress Plan showing a reduction of Volatile Organic Compounds and submit it to the EPA by November of this year. Of concern to our Board is the cost of preparing such a plan (estimated at \$25,000) and the need to find emission reductions where none exist. We will also be included in the Federal Implementation Plan (FIP) for Sacramento and be subject to the same restrictions, even though we are talking about several thousand acres of rice fields.

In June of this year, the voters of Sutter County approved a referendum which has put on hold any development in South Sutter County. While this action has been appealed, it will be several years before this issue will be resolved and development, as indicated in the General Plan Amendment, may never occur.

In consideration of the action taken by the voters of Sutter County to stop development in the South Sutter area and in recognition that there are no significant sources of emissions and of the cost of preparing plans which are not needed, our Board is requesting that the Air Resources Board take action to remove the remainder of the South Sutter area from the Broader Sacramento Area and place it in the Upper Sacramento Valley. We are further requesting that the Air Resources Board initiate a request to the EPA to modify its designation which placed South Sutter in the Sacramento Metropolitan Area and change the area designation back to the Yuba City Metropolitan Statistical Area.

Sincerely,



Joan Saunders, Chairman  
Feather River Air Quality Management District

MONTEREY BAY CLEAN AIR COALITION

The Monterey Bay Clean Air Coalition is a historic partnership of public and private sector interests representative of the Monterey Bay Region. The Coalition's membership includes nearly every city and the overwhelming majority of private sector employers in the Monterey Bay region. The number of private sector jobs represented in this effort exceeds 154,000 of the 220,000 private sector jobs in the Monterey Bay economy.

Over the course of the last year , Coalition partners have organized together to build a base of knowledge, to promote a better understanding of the technical issues driving the air quality policies of the Monterey Bay Unified Air Pollution Control District. The Coalition partners through separate and distinct community and private sector associations have arrived at the same conclusion: It is absolutely essential for the communities and employers of the Monterey Bay Region to critically think through and constructively participate in the public policy process governing the development, interpretation, and implementation of the region's Air quality Management Plan.

The Coalition's objective is to achieve the air quality goals mandated by State and Federal laws while working together to retain and enhance the economic competitiveness of the region.



Early in 1993, Coalition partners commissioned a Santa Rosa consulting firm, Sonoma Technology, Inc., to prepare a report entitled: "Ozone Nonattainment Planning Policy Issues Affecting Local Jurisdictions and Businesses In The Monterey Bay Unified Air Pollution Control District".

The report identified a number of issues and offered recommendations to maintain the critical balance between protection of the region's air quality and the economic viability of Monterey, Santa Cruz and San Benito counties.

The Coalition partners believe that air quality regulation should emphasize cost effective measures and avoid unnecessary and marginally effective controls. Overregulation is costly and destroys the level playing field that Monterey Bay employers must have in order to maintain their national and statewide competitiveness.

The Coalition is not interested in becoming a political advocate or a watch dog over the policy makers of the Air District. Rather, the mission is to provide education, awareness, and a forum for the employers and communities in the region who recognize the value of fully participating in the air quality policy decision making process.

JJR/bp

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MONTEREY BAY CLEAN AIR COALITION ROSTER

PRIVATE SECTOR

Associated General Contractors  
California Strawberry Board  
Growers Shippers Vegetable Association  
Monterey Board of Realtors  
Monterey County Farm Bureau  
Monterey County Hospitality Association  
Monterey Peninsula Builders Exchange  
Monterey Peninsula Chamber of Commerce  
Monterey Peninsula Property Owners Association  
Monterey/Carmel Council Of Realtors  
Moss Landing Chamber of Commerce  
Pajaro Valley Chamber of Commerce  
Salinas Area Chamber of Commerce  
Salinas Association of Realtors  
Salinas Valley Builders Exchange  
San Benito County Chamber of Commerce  
Santa Cruz Area Chamber of Commerce  
Scotts Valley Chamber of Commerce  
Watsonville Economic Development Group  
Watsonville Food Processors Association

PUBLIC SECTOR

City of Capitola  
City of Carmel  
City of Gonzales  
City of Hollister  
City of King  
City of Marina  
City of Monterey  
City of Pacific Grove  
City of Salinas  
City of Sand  
City of Scotts Valley  
City of Seaside  
City of Watsonville  
  
Salinas Valley Memorial Hospital

August 11, 1993

Mr. James D. Boyd, Executive Officer  
California Environmental Protection Agency  
Air Resources Board  
State of California  
P O Box 2815  
Sacramento, CA 95812

RE: Inappropriate use of Pinnacles data to calculate ozone design value in North Central Coast Air Basin

Dear Mr. Boyd:

The Monterey Bay Clean Air Coalition is a partnership comprised of nearly every city, business and industry group in the Monterey Bay region. The Clean Air Coalition has dedicated itself to the task of analyzing the Air Quality Management Plan of the Monterey Bay Unified Air Pollution Control District. (A list of member organizations is attached.)

The Coalition has formulated a series of recommendations that we believe are warranted and necessary in order for the Plan to become a more scientifically defensible document that more accurately depicts the nature of the air quality in our district and thereby engenders environmental regulations that are prudent and appropriate to the level of the problem.

The Clean Air Coalition has been keenly concerned with the question of transport pollution and how it affects our area. Therefore, we read with interest your staff's report entitled "Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone concentrations in California", dated June, 1993.

Based on that report, we request that you direct your staff to no longer base its "ozone design value" calculation for the North Central Coast Air Basin on exceedance readings from the Pinnacles. The report concludes that all but two of 22 exceedance readings in the Pinnacles are either due to "overwhelming" or "significant" transport. The other two exceedance days are characterized as "inconclusive."

We object to basing an entire regulatory program on exceedance readings that cannot be conclusively attributed to our air basin.

The ozone design value in our district should be based on readings from a monitoring station that is representative of air quality in the district. It should not be based on a monitoring station that has no readings that have inconsequential transport impacts.

(Ozone design value is perhaps the most critical determination your staff makes for an air district. It establishes the level of pollution reduction necessary for a district to achieve the state standard, e.g, a design value of 0.11ppm requires a 30% reduction in precursor emissions; a 0.10ppm ODV results in a 20% reduction requirement).

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It is simply unacceptable from a scientific or public policy perspective to base the highly significant design value calculation for the air district on readings from the Pinnacles monitoring station. The exceedances there have little to do with pollution generated in our district; moreover, as stated in your report there is no conclusive evidence linking the Pinnacles exceedances to pollution sources in our district.

As a second and related supporting argument, we also note that the Pinnacles monitoring station is not operated by the MBUAPCD or EPA, but by the National Park Service. The site does not meet the EPA criteria that govern the placement of ozone monitoring stations used for regulatory purposes (from the standpoint of local representativeness). This alone should be sufficient cause to require you to use a different monitor for calculating our ozone design value. In any case, ARB staff analysis of transport pollution underscores why care should be taken to base regulation on monitoring sites that meet the criteria for representativeness.

The following points (citations from your staff's June 1993 report) are offered to support our contentions:

**1. Pollution at the Pinnacles is Transport Pollution.**

Table II.2 (p. II.5) characterizes the impact of transport pollutants from San Francisco Bay Area to North Central Coast as "overwhelming" and "significant", based on Pinnacles data (p. II.4, first full paragraph). Unlike other transport couples there are no days or exceedances for which the transport can be characterized as "inconsequential."

The descriptive text (p. VII.19) supports the conclusion of Table II.2:

"The staff has found that the contribution of the SFBAAB emissions to exceedances of the state ozone standard in the NCCAB on a few days is inconclusive, is significant on a few days, and on other days is overwhelming...the staff recommends that the Board continue to classify the transport from the SFBAAB to the NCCAB as 'overwhelming' on some days and 'significant' on some others."

Given that there are no exceedances which can positively be attributed to local pollution sources, there is no reasonable basis to support an ozone design value based on any Pinnacles reading.

**2. There is no basis in using the two "inconclusive" days to justify a Pinnacles-based ozone design value.**

The description of the exceedance day May 7, 1990 (beginning on page VII.24) notes that the Pinnacles "was the only location to exceed throughout central California" on that day. Furthermore:

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"The trajectory analysis suggests the possibility of transport, but is based on insufficient data. The presence of the marine layer in the Salinas Valley and San Benito Valley, but not at Pinnacles, suggests that Pinnacles was not impacted by emissions within the NCCAB. Pinnacles was the only location throughout central and northern California to exceed the ozone standard, suggesting no local or transported source for the emissions impacting Pinnacles." (p. VII.25, final paragraph).

Curiously this totally isolated reading which "was not impacted by emissions within the NCCAB" and for which there is no clear explanation appears to be the basis for the ARB's determination of the NCCAB ozone design value! An ARB staff memo on the Sonoma Technology Inc., critique of the Monterey district AQMP states:

"Not all Pinnacles days are overwhelmed; there is at least one day that is considered "shared". It had a concentration of 0.11ppm and it is Monterey's ODV for the time being." (p. 2 of attachment 1 of June 16, 1993 memo to Catherine Witherspoon, attached).

It is troubling that this assertion is made despite the fact that there is nothing in the ARB staff's transport pollution analysis that lends any credence to the use of this ozone violation day to make any conclusions about air quality in the North Central Coast Basin.

**3. Even if ARB staff could support an assertion that the two "inconclusive" days are "shared" between the San Francisco basin and the Monterey district, the relative contribution of the Monterey district is comparatively minimal.**

Table VII.4 (p. VII.28) is instructive on this point: San Francisco emissions are nearly eight times greater than Monterey's, and the Santa Clara/San Mateo emissions most likely to contribute to Pinnacles exceedances are an astounding 34 times higher than the San Benito emissions!

Based on this evidence your staff concludes: "that the emissions in San Benito County did not significantly contribute to ozone exceedances at Hollister and Pinnacles." (p. VII.27).

One must conclude therefore that even a "shared" day would have an overwhelming or significant contribution from San Francisco district emissions and minimal contribution from Monterey emissions.

**4. Use of the Pinnacles data for regulatory purposes in our air district is inconsistent with the Monterey district Air Quality Management Plan.**

The AQMP for the Monterey district notes that the Pinnacles data are "not considered particularly useful for a variety of reasons including station proximity to a major emission source

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and the length of time a station is operated...it is useful to point out that data from the Pinnacles National Monument air monitoring site are analyzed separately. Although this station is considered ambient, it is not located in a populated area and is not operated by the District." (p. 4-2, Monterey district AQMP, 1991).

The ARB has approved both the 1991 and 1989 AQMPs by the district which contain this language. Yet, administratively, your staff has determined that it will use the Pinnacles data to calculate ozone design value. If the Pinnacles data were considered important "data of record", the ARB staff should have directed the district to revise the AQMP language during the review process last year.

Consistent with the AQMP, we urge you instead to administratively designate another station in the district which is representative of air quality generated within the district for purposes of determining local ozone design value.

Since the ozone design value is probably the most critical determination for a district in terms of its regulatory program, ARB administrative decisions should be consistent with the language in the AQMP. If the ARB wishes to make the Pinnacles data a cornerstone of air quality planning in our region, they should have a clear and unequivocal scientific basis for doing so. That basis should be well-documented in the AQMP and not determined subsequently through an "administrative determination" which is inconsistent with the local AQMP.

**5. The National Park Service's Pinnacles monitoring station is not representative of air quality attributable to the local district and, as such, does not meet applicable EPA siting criteria.**

It is our understanding that California uses EPA monitoring objectives and criteria to site monitoring stations. EPA criteria for locating State and Local Air Monitoring Stations call for monitoring stations to meet the following four objectives:

- a. to determine the highest concentrations expected to occur in the area;
- b. to determine representative concentration in areas with high population density;
- c. to determine the impact on ambient pollution levels of significant sources or source categories;
- d. to determine general background concentration levels.

We acknowledge that the ARB has certified this station for quality control. Nonetheless, we believe that the Pinnacles station does not meet any practical test for local representativeness (b). It is not located anywhere near population in our district. It is irrelevant as a determinant of ambient pollution (c) because of its susceptibility to transport. It is only relevant to high concentration (a) and background concentration levels (d) if the goal of ozone monitoring is to measure transport impacts.

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Yet again, these Pinnacles data, despite their collection from a station that clearly does not meet EPA siting criteria, are considered to be the basis or "data of record" for the most critical determination made regarding our district. This is as wrong as it could be.

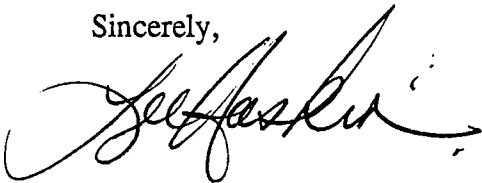
### Conclusion

In conclusion, we urge you to rectify this situation by recalculating the Monterey district ozone design value based on readings from another district monitoring station that is not significantly affected by transport pollution, that is representative of air quality in the district, and which meets all EPA siting criteria. We urge you also as a matter of policy to insist that design value determinations be based on data from district-operated monitors.

We appeal, therefore, to your good sense and judgment in this matter. Correcting this situation will do much to positively maintain the credibility of your agency with the regulated community, which in fact does support the goal of achieving clean air in California.

Thank you for your consideration.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lee Haskin".

Lee Haskin  
for the Monterey Bay Clean Air Coalition

MONTEREY BAY CLEAN AIR COALITION ROSTER

PRIVATE SECTOR

Associated General Contractors  
California Strawberry Board  
Growers Shippers Vegetable Association  
Monterey Board of Realtors  
Monterey County Farm Bureau  
Monterey County Hospitality Association  
Monterey Peninsula Builders Exchange  
Monterey Peninsula Chamber of Commerce  
Monterey Peninsula Property Owners Association  
Monterey/Carmel Council Of Realtors  
Moss Landing Chamber of Commerce  
Pajaro Valley Chamber of Commerce  
Salinas Area Chamber of Commerce  
Salinas Valley Builders Exchange  
San Benito County Chamber of Commerce  
Santa Cruz Area Chamber of Commerce  
Scotts Valley Chamber of Commerce  
Watsonville Food Processors Association

PUBLIC SECTOR

City of Carmel  
City of Capitola  
City of Gonzales  
City of Hollister  
City of King *City*  
City of Marina  
City of Monterey  
City of Pacific Grove  
City of Salinas  
City of Seaside  
City of Scotts Valley  
City of Watsonville  
  
Salinas Valley Memorial Hospital



State of California  
AIR RESOURCES BOARD

D R A F T

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

TRIENNIAL REVIEW

June 1993

Staff Report: Initial Statement of Reasons

Prepared by

Technical Support Division

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 Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

since the Broader Sacramento Area was identified as causing "overwhelming" transport to the Upper Sacramento Valley in the previous transport assessment<sup>2</sup>.

The transport impact from the San Francisco Bay Area Air Basin on air quality measured at the Pinnacles monitor in the North Central Coast Air Basin was also evaluated since data from this monitor were not considered in the 1990 assessment. The staff does not propose to add any new finding for the San Francisco Bay Area to the North Central Coast Air Basin couple.

After reviewing a recent transport assessment of the South Coast Air Basin to the San Diego Air Basin done by the staff of the San Diego Air County Pollution Control District and reevaluating the San Joaquin Valley transport to the Southeast Desert Air Basin, the staff reaffirmed its 1990 findings in both cases. Other previously identified couples were not reevaluated because new data did not suggest any changes to the previous assessment.

The staff also assessed two other prospective couples but does not recommend that they be identified at this time. These two couples are: (1) Southeast Desert Air Basin to the South Coast Air Basin and (2) San Luis Obispo County to the San Joaquin Valley Air Basin. The staff did not find any evidence of transport of ozone precursors or ozone that would impact violations in these downwind areas.

Table II.2 summarizes the staff's proposed findings for 6 new couples, the reassessment of the previously identified couples, and the unchanged findings of the 1990 assessment. The new or revised findings are highlighted with bold lettering.

## 2. Mitigation Changes

The staff recommends that the Board amend the mitigation regulation (Title 17, CCR, section 70600) to assign mitigation responsibilities to the upwind areas based on new findings of overwhelming transport. These proposed mitigation requirements are consistent with the present mitigation requirements. The staff proposes that the regulation be amended to require those upwind air basins identified as causing overwhelming impacts to adopt control measures sufficient to attain the ozone standard within the impacted areas. An upwind air basin that is identified as causing overwhelming impacts in portions of a downwind air basin, will be responsible only for attainment in portions of the downwind air basin and under those conditions that are impacted by overwhelming transport and not for attainment in the entire downwind air basin. Under these circumstances, the portion of the downwind air basin is generally a small band near the boundary of the upwind area. The downwind air basin is not relieved of control responsibilities for those days not affected by overwhelming transport nor for days on which local emissions contribute to ozone violations. The proposed text of the mitigation regulation can be found in Appendix D.

TABLE II.2

Summary of Staff Recommendations on  
Impact of Transported Air Pollutants from  
Upwind Areas on Downwind Ozone Concentrations

Transport Couples	Transport Characterization*
1. Broader Sacramento Area to Mountain Counties	0
2. San Joaquin Valley to Mountain Counties	0
3. San Francisco Bay Area to Mountain Counties	S
4. Mexico to Southeast Desert	0, S
5. Mexico to San Diego	0, S, I
6. San Joaquin Valley to South Central Coast	S, I
7. San Francisco Bay Area to Broader Sacramento Area	0, S, I
8. San Francisco Bay Area to San Joaquin Valley	0, S, I
9. South Coast to Southeast Desert	0, S, I
10. Broader Sacramento Area to Upper Sacramento Valley	0, S, I
<b>11. San Francisco Bay Area to North Central Coast</b>	<b>0, S,</b>
12. San Joaquin Valley to Southeast Desert	0, I
13. South Coast to San Diego	0, S, I
14. South Coast to South Central Coast	S, I
15. South Central Coast to South Coast	S, I
16. San Joaquin Valley to Broader Sacramento Area	S, I
17. San Joaquin Valley to Great Basin Valleys	0
18. Broader Sacramento Area to San Joaquin Valley	S, I
19. Broader Sacramento Area to San Francisco Bay Area	S, I
20. Calif. Coastal Waters to South Central Coast	S

\* 0 = overwhelming  
S = significant  
I = inconsequential

Note: Bold lettering identifies the proposed new couples and their proposed transport characterizations. Couples numbered 1 through 6 are the proposed new couples. The staff recommends changes to the mitigation regulation with new responsibilities to mitigate overwhelming impacts for couples 7 and 8. Couples 9 and 10 have new responsibilities within the planning process but without changes to the mitigation regulation. Couples 11 through 13 were reevaluated but with no new characterization of transport. There was no new assessment for couples numbered 14 through 20.

## C. San Francisco Bay Area to North Central Coast

### 1. Summary and Recommendations

The 1990 transport assessment classified transport from the San Francisco Bay Area Air Basin (SFBAAB) to the North Central Coast Air Basin (NCCAB) as "overwhelming" on some days and "significant" on others. A reassessment of this transport couple was performed because of the availability of new data from the Pinnacles monitoring site. The staff's recent analysis shows that transport from the SFBAAB occurred on the 26 days during 1990 through June 1992 when the state ozone standard was exceeded in the NCCAB.

The staff recommends that the Board continue to classify the transport from the SFBAAB to the NCCAB as "overwhelming" on some days and "significant" on some others. Since the staff classified transport as "overwhelming" and "significant" in the previous assessment, no additional mitigation is required of the SFBAAB.

### 2. Conclusions

The staff has found that the contribution of the SFBAAB emissions to exceedances of the state ozone standard in the NCCAB on a few days is inconclusive, is significant on a few days, and on other days is overwhelming. The staff's conclusions are based on an analysis of air quality and meteorological data for the 26 days during 1990 through June 1992 when the state ozone standard was exceeded in the NCCAB.

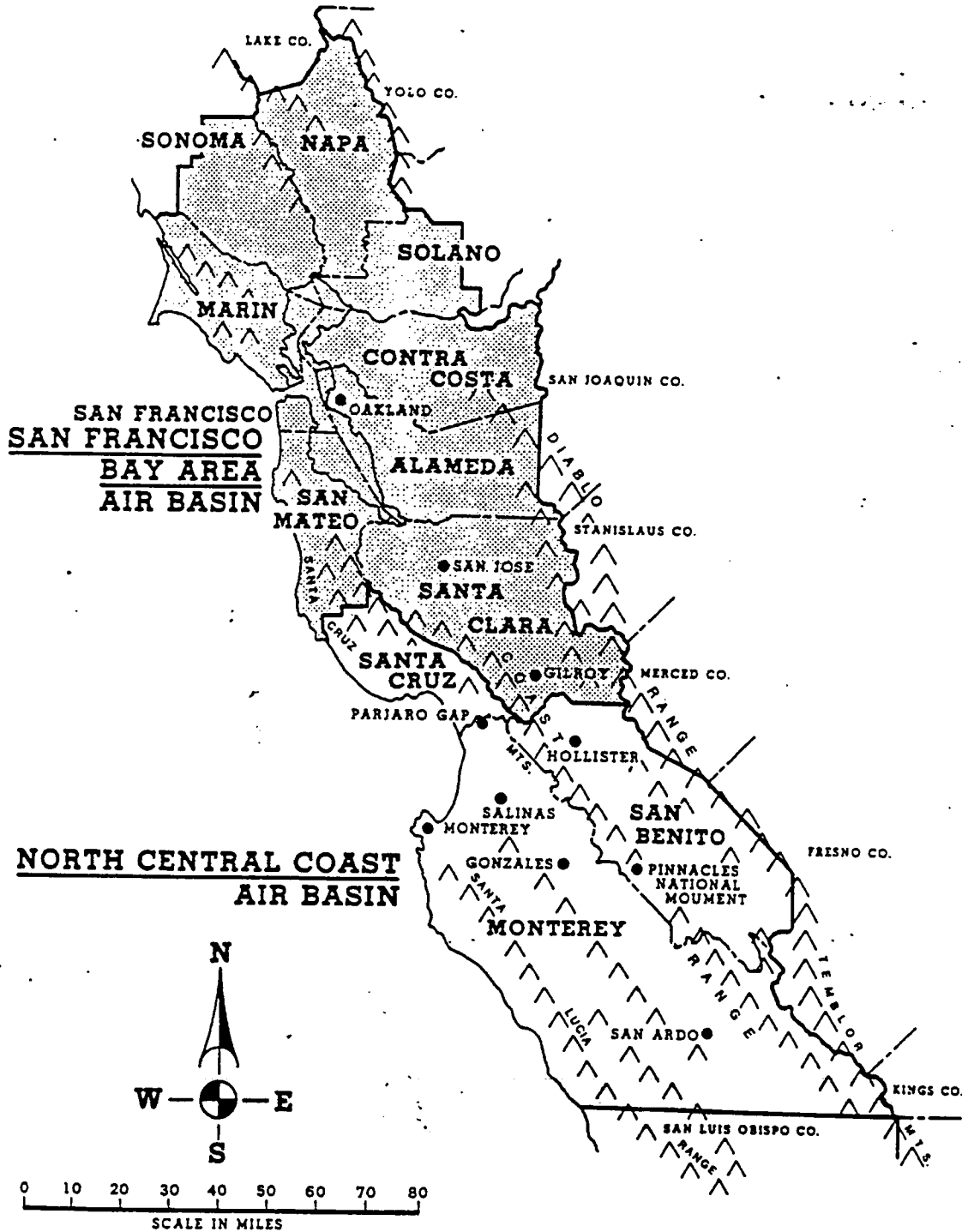
### 3. Geographic Setting

The NCCAB includes Monterey, San Benito, and Santa Cruz Counties. The SFBAAB comprises Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties and parts of Solano and Sonoma Counties. A map of these areas is provided in Figure VII.3.

The dominant geographic feature influencing air flow in the SFBAAB and the NCCAB is the Coast Range. The Coast Range comprises a series of parallel northwest to southeast oriented ridges and valleys. The ridges range in elevation from 2,000 feet at the coast to over 3,000 feet inland. Between the ridges lie the San Francisco Bay, the Santa Clara Valley, the San Benito Valley, and the Salinas Valley. Beginning at the south end of the San Francisco Bay, the Santa Clara Valley extends southeastward for 35 miles from San Jose until it merges with the San Benito Valley at the Santa Clara County line. The San Benito Valley extends southeastward from the Santa Clara County line for approximately 35 miles to the Pinnacles National Monument. The Santa Clara-San Benito Valley combination gently slopes upward from an elevation of 80 feet at San Jose to an elevation of 300 feet at Hollister, 45 miles southeast of San Jose. The two valleys without any physical barrier to the flow of air between them provide the topographic setting for transport from the SFBAAB into the NCCAB.

FIGURE VII.3

TRANSPORT COUPLE  
SAN FRANCISCO BAY AREA TO NORTH CENTRAL COAST



The Salinas Valley lies to the west of and parallel to the San Benito River Valley. The Salinas Valley extends approximately 75 miles southeastward from Salinas to San Ardo. The ridge dividing the Salinas Valley and the San Benito Valley ranges in elevation from 200 feet at the Pajaro Gap northwest of Hollister to 3,400 feet northeast of Gonzales.

#### 4. Analysis

The staff's assessment of transport was based on data for 1990 through June 1992 ("study period"). Both air quality and meteorological data were used in the transport analysis during the study period. Ozone air quality data were available from 7 monitoring sites in the NCCAB and operated by the Monterey Bay Unified Air Pollution Control District (MBUAPCD). During the study period, 26 days exceeded the state ozone standard within the NCCAB. Moreover, four air monitoring stations exceeded the ozone standard, and Pinnacles topped the group with 22 days of ozone exceedances. In addition, ozone data were available for the SFBAAB, San Joaquin Valley Air Basin (SJVAB), and South Central Coast Air Basin.

Meteorological data used in this study consisted of wind speed, wind direction, and sea-level atmospheric pressure from the Department of Defense, the National Weather Service, the Federal Aviation Administration, the U. S. Coast Guard, the National Oceanic and Atmospheric Administration data buoys, the National Park Service, the air pollution control districts, and from private industrial meteorological monitoring stations.

The ARB staff began the assessment of the impact of transported emissions on ozone concentrations in the NCCAB by first identifying those air monitoring stations in the NCCAB which exceeded the state standard for ozone during the study period. The staff then performed a meteorological and emissions inventory analysis to determine the source air basin(s) and degree of emissions impact.

Before initiating a meteorological analysis of exceedance days in the NCCAB, the staff evaluated the exceedance days as to whether the peak daily concentration met the criteria of an extreme concentration (see Chapter III for discussion on extreme concentrations). Those concentrations greater than the extreme concentration values for each station were deleted from the transport assessment. The extreme concentration "filter" reduced the number of exceedance days considered during the study period from 26 to 21 for evaluation.

Additional exceedance days were eliminated from the assessment when the exceedance day appeared to be due to overwhelming transport impact. Since the ARB staff<sup>1,2</sup> had already established that transported emissions from the SFBAAB could have an overwhelming impact on NCCAB, only those exceedance days which appeared to be due to local emissions were evaluated. A simple method was developed to identify overwhelming days. The presence of winds from between 271 and 089 degrees on the day of and day before the exceedance at Pinnacles was used to identify 10 NCCAB exceedance days as having overwhelming transport. Predominant winds from the two north

quadrants at Pinnacles suggest that the SFBAAB or San Joaquin Valley likely had overwhelming transport impact. Upon applying this additional "filter" to the list of exceedance days, the number of exceedance days which tend to not be days of overwhelming transport was reduced from 21 to 11 days.

Meteorological, air quality, and source contribution analyses were conducted for the 11 days suspected as impacted by significant or inconsequential transport. A back trajectory analysis was started at the hour of the peak ozone concentration for each exceedance day and extended back in time for at least 12 hours. Some of the back trajectories were extended back in time up to 37 hours in order to identify the source region. The back trajectories were constructed manually from hourly hand plotted wind observations. Where wind information was nonexistent, wind directions were estimated based on hourly surface isobaric charts, and wind speeds were interpolated or extrapolated from observations.

In addition to the trajectory analyses, the spatial extent of ozone exceedances on NCCAB exceedance days were examined; ARB and National Weather Service weather charts were examined; near sea-level, profiler measurements, ridge and mountain top winds were examined for surface and aloft transport potential; the spatial distribution of the daily maximum temperatures were examined to determine the extent of the marine layer intrusion into the coastal and inland valleys of the SFBAAB and NCCAB; and the temperature inversion and wind data for Oakland were examined for marine layer thickness and transport potential. These data types were examined to validate the trajectory analyses.

Also, a qualitative evaluation of the transported contribution of emissions to the exceedance location in the NCCAB was conducted using the trajectory analyses and emission inventory data. A qualitative evaluation determined whether the transport contribution was inconsequential, significant, or overwhelming. The transport was deemed as inconsequential if the back trajectory stayed within the NCCAB. A significant determination was made if the back trajectory originated in an upwind air basin, but also passed through significant source areas of the NCCAB. An overwhelming determination was made if the back trajectory originated in an upwind air basin and passed over a region of insignificant local emissions.

Table VII.3 summarizes the staff's analysis. One exceedance day at Pinnacles of 11 pphm, May 7, 1990 which the staff classified as inconclusive, and one exceedance day of 10 pphm on September 24, 1991, at Hollister which the staff classified as affected by significant transport from the SFBAAB and are described below. Readers are referred to the ARB Technical Report<sup>3</sup> for a detailed discussion of the staff's analyses for the all days.

TABLE VII.3

Source Air Basin(s) of NCCAB  
Ozone Exceedances and SFBAAB Transport Contribution

Exceedance Date	Exceedance Location	Peak Ozone Conc.)	Hour(s) of Peak Ozone Concentration (PST)	Source Air Basin	SFBAAB Transport Contribution
05-07-90	Pinnacles	11	1800	Inconclusive	Inconclusive
05-08-90	Pinnacles	10	1400	Inconclusive	Inconclusive
07-11-90	Hollister	10	1300	SFBAAB & NCCAB	Significant
07-11-90	Pinnacles	11	1000	SFBAAB	Overwhelming
07-12-90	Pinnacles	10	1500-1600	SFBAAB	Overwhelming
07-18-90	Pinnacles	11	1700	SFBAAB	Overwhelming
08-10-90	Pinnacles	10	1800	SFBAAB	Overwhelming
06-09-91	Pinnacles	10	1800	SFBAAB	Overwhelming
09-04-91	Pinnacles	10	1600	SFBAAB	Overwhelming
09-24-91	Hollister	10	1300-1400	SFBAAB & NCCAB	Significant
09-24-91	Pinnacles	10	1800	SFBAAB & NCCAB	Significant
05-04-92	Pinnacles	10	1600	SFBAAB	Overwhelming
06-03-92	Pinnacles	11	1800	SFBAAB	Overwhelming



a. May 7, 1990

Pinnacles exceeded the state standard for ozone on May 7, 1990 with the maximum concentration of 11 pphm occurring at 1800 PST. Pinnacles was the only location to exceed throughout central California on May 7, 1990.

Wind data from two San Francisco Bay Area Air Quality Management District (SFBAAQMD) meteorological tower sites identify the wind flow at elevated levels. The Mt. Hamilton wind data suggest that flow aloft was conducive to the transport of air pollutants from the SFBAAB to the NCCAB via the Santa Clara Valley during the late morning, afternoon, and evening hours. The Mt. Pise wind data also suggest that the flow aloft was conducive to the transport of air pollutants from the SFBAAB to the offshore areas of the SFBAAB and northwest coastal area of the NCCAB during the morning hours.

Wind data from the San Jose, San Martin, Gilroy and Pinnacles air monitoring stations identify whether the surface winds were conducive to demonstrating surface transport through the Santa Clara Valley from San Jose. The surface wind data suggest that transport of pollutants from the SFBAAB could have been transported as far as Gilroy during the late morning and early afternoon hours. However, without Hollister wind data for this day and some of the Pinnacles wind data missing from morning to early afternoon, its difficult to judge whether surface transport of SFBAAB pollutants made it to Hollister and then to Pinnacles. A convergence zone in the Santa Clara Valley set up by 1500 PST on May 7 between San Jose and Gilroy, thereby shutting off any possibility of surface transport southward from the SFBAAB to the NCCAB.

A fairly strong inversion (9 degrees C) was based at 700 feet with a top at 2300 feet at 0400 PST on May 7, 1990 at Oakland. The low height of the inversion base suggests that surface emissions were concentrated in a shallow layer. The 1600 PST inversion base and top lowered to 400 feet and 1500 feet, respectively. The inversion intensity decreased to only 2 degrees C. Winds at the surface were moderately strong and from the west-northwest, but at 3000 feet were light and blew from the east. The Oakland inversion data and winds suggest that SFBAAB emissions were trapped below the 700 feet level and could have transported southward toward the NCCAB based on the afternoon winds. However, the highest inversion base for May 7 was 700 feet at Oakland (718 feet-msl) which would suggest that Pinnacles (1100 feet-msl) was above the influence of the marine layer.

The staff prepared an isotherm analysis of the daily maximum temperature on May 7, 1990 for the central California region. The Pinnacles daily maximum temperature of 90 degrees Fahrenheit is similar to the daily maximum temperatures in the San Joaquin Valley and Gilroy area. The Salinas and San Benito Valleys were engulfed in modified marine air as evidenced by daily maximum temperatures in the 70's and low 80's. Temperatures were 7 degrees Fahrenheit cooler at Hollister (83 degrees F) than Gilroy (90 degrees F), which are 12 miles apart at a similar elevation and in adjacent valleys. The analysis further suggests that Pinnacles was not in the marine layer which engulfed the majority of the NCCAB.

The back trajectory indicated that air parcels which arrived at the Pinnacles at the time of the maximum concentration originated from just east of the Farallon Islands at 0800 PST that same day and from San Jose at 0800 PST that same day. The trajectory indicates that air parcels from off the coast of the SFBAAB traveled southeastward off the coast and then came into the Monterey Bay. The parcels then traveled into the San Benito Valley from the Monterey Bay via the Pajaro Gap. Once the parcels reached the San Benito Valley they converged with air parcels moving southward from the SFBAAB via the Santa Clara Valley. The air parcels then continued the journey to the Pinnacles through the San Benito and Bear Valleys. Whether the flow splits off to the Santa Clara Valley or not in the back trajectory analysis is dependent on the estimated wind speed and direction between Pinnacles and Hollister for 1500-1800-PST. If the winds were stronger, the trajectory arrives at Hollister during the presence of the convergence zone between Gilroy and San Jose. In this case, the trajectory never backs into the Santa Clara Valley, but instead only backs into the Monterey Bay area through the Pajaro Gap. This sensitivity to estimated winds, along with the lack of valid wind data from Hollister and missing data from Pinnacles (0800-1400 PST) casts some uncertainty on the validity of the trajectory path.

The maximum ozone concentration of 8 pphm at Gilroy occurred at 1500-1600 PST, and took place at the same time the wind direction shifted from northwesterly to southeasterly (1500 PST). This suggests that the NCCAB was the source of emissions, not the SFBAAB. Moreover, the occurrence of the time of maximum ozone concentration at 1200-1300 pm for Hollister seems to imply local sources only. A progressive timing of the maximum ozone concentration is indicative of transport from the SFBAAB to the NCCAB via the Santa Clara Valley.

Reviewing the aloft data from Oakland and Vandenburg AFB, there does not appear to be a strong case for transport from the SFBAAB to the NCCAB. The weak southerly flow at 850 mb (-5000 feet msl) at Oakland during the afternoon, but northerly during the morning suggests that transport was only possible during the early morning hours of May 7. The few hours of southwest to west flow (1500-1700 PST) following the 7 hours of missing data from Pinnacles is in agreement with the Oakland 850 mb flow and seems to support the lack of transport from the SFBAAB to the NCCAB. The trajectory analysis suggests the possibility of transport, but is based on insufficient data. The presence of the marine layer in the Salinas Valley and San Benito Valley, but not at Pinnacles, suggests that Pinnacles was not impacted by emissions within the NCCAB. Pinnacles was the only location throughout central and northern California to exceed the ozone standard, suggesting no local or transported source for the emissions impacting Pinnacles. As a result of the analyses, the staff concluded that the data was not conclusive enough to determine the transport contribution of emissions impacting Pinnacles from the SFBAAB on May 7, 1990. However, the staff could not rule out that transport aloft did occur.

A back trajectory indicated that air parcels which arrived at Hollister, during the period of the maximum concentration, originated from off the coast of the SFBAAB near the Farallon Islands the previous day, as well as the San Jose area during the morning commute on September 24. Due to the convergence of wind at Hollister from airflow coming from the Santa Clara Valley and from the Monterey Bay via the Pajaro Gap, two back trajectories were constructed. Both trajectories suggest that morning emissions in the San Jose area and Monterey Bay area contributed to the exceedance at Hollister at the time of the daily maximum concentration.

Based on the spatial extent of the area of ozone exceedances, the inversion data, the maximum temperature analysis, and the trajectory analysis the staff concluded that the emissions contributing to the ozone exceedance at Hollister came from both the SFBAAB and the NCCAB on September 24, 1991. Due to emissions from both air basins contributing to the exceedance at Hollister, the staff concluded that the contribution of emissions from the SFBAAB was significant.

## 5. Emission Inventory

The most recent emission inventory data available is the 1989 statewide, air basin, and county totals compiled by the ARB staff<sup>5</sup>. While emission totals provide only general information, they were useful for determining the relative difference in emissions between various areas. The staff used this information to gain a general indication of the potential for upwind and downwind areas to contribute to ozone concentrations.

Ozone precursor emissions consist primarily of emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). The 1989 emission inventory data, as shown in Table VII.4, indicate that ozone precursor emissions in the SFBAAB are 1,370 tons/day. This is more than seven times the ozone precursor emissions for the NCCAB (179 tons/day).

Santa Clara and San Mateo Counties are the two counties in the SFBAAB located closest to the NCCAB and therefore have the greatest potential for impacting air quality in the NCCAB, especially San Benito County. When the ozone precursor emissions for the two SFBAAB counties are compared to those for San Benito County, the disparity is even greater than for the entire air basins. Ozone precursor emissions for Santa Clara and San Mateo counties (442 tons/day) are 34 times those for San Benito County (13 tons/day). In addition, ozone precursor emissions for Santa Clara and San Mateo counties are over 7 times those for San Benito and Santa Cruz Counties (60 tons/day).

The staff did not make a quantitative determination of the relative contribution of the emissions in San Benito County versus the contribution of the emissions in Santa Clara and San Mateo Counties to the ozone concentrations measured at Hollister and Pinnacles. The staff could not make a quantitative determination because the emission data are not resolved spatially or temporally and air quality models were not available for these areas. The staff concluded that the emissions in San Benito County did not

**TABLE VII.4**

**Emissions Comparison by Air Basin and County  
Based on 1989 Emission Inventory**

Area	Emissions (Ton/Day)		
	ROG	NOx	Total
San Francisco Bay Area Air Basin	790	580	1370
Santa Clara County	180	130	310
San Mateo County	74	58	132
North Central Coast Air Basin	90	89	179
San Benito County	6	7	13
Santa Cruz County	28	19	47
Monterey County	56	63	119
Ratio			
SFBAAB:NCCAB	8.8	6.5	7.7
Santa Clara+San Mateo:San Benito	42.3	26.9	34.0
Santa Clara+San Mateo:San Benito+Santa Cruz	7.5	7.2	7.4

---

significantly contribute to ozone exceedances at Hollister and Pinnacles.

**6. Summary of Previous Transport Studies**

Previous studies have shown strong evidence of transport from the SFBAAB to the NCCAB. Preliminary studies such as Blumenthal, et al.<sup>6</sup> demonstrated the movement of air pollutants from the SFBAAB southeastward past San Jose.

Dabberdt<sup>7</sup> in a 1980 field study found transport up the Santa Clara Valley to Hollister although the occurrence was sporadic. He found that the movement of two separate marine air masses, one eastward from Monterey Bay and the other southeastward through the Santa Clara Valley, apparently sets up a convergence zone in the northern San Benito Valley (refer to discussion in assessments section). He found on most occasions that the marine air from the Monterey Bay inhibited material transported from the SFBAAB from going south of Gilroy. On other occasions, he saw the marine intrusion break down for short periods enabling transport of air from the SFBAAB to Hollister.

Dabberdt also found no significant ozone transport from Los Gatos to Scotts Valley and Aptos. He detected another transport route where

California

M O R A N D U M

To : Catherine Witherspoon  
Assistant Executive Officer

Date : June 16, 1993

Subject : Comments on Final STI  
Report

Through: Dean Saito, Manager *DS*  
Southern California Liaison Section

From : Jim Nyarady *JN*  
Monterey District Liaison  
Air Resources Board

I have completed my review of Sonoma Technology's (STI) final report, entitled "Ozone Nonattainment Planning and Policy Issues Affecting Local Jurisdictions and Businesses in the Monterey Bay Unified Air Pollution Control District", dated February 1993. I received a copy of the final report on May 19, 1993, from Mr. Lee Haskin, representing the Monterey Bay Clean Air Coalition, the group that commissioned the report.

In general, the final report is much improved over the draft report I briefly reviewed in February 1993. However, there still are several concerns I have with the STI report. These are summarized below. In addition, I have included detailed comments in Attachment 1. Some of these concerns also apply to STI's May 12, 1993, presentation to the Monterey District Board.

#### Pinnacles data

Throughout the report, the authors question whether the Pinnacles data should be considered data of record. According to our Technical Support Division, the Pinnacles data have been quality assured since July 1987, so those data are data of record and are included in our determination of Monterey's design value.

#### Determination of ozone design value

There also is some confusion in the report regarding just what Monterey's design value is. The report states that Monterey's design value is 0.11 ppm, as measured at Carmel Valley, but later states that it is 0.13 ppm at Carmel Valley. Monterey's design value was 0.11 ppm at Carmel Valley prior to our Board's amendments to the designation criteria in May 1992. One of the primary changes to the criteria was the use of a 1-in-1 year recurrence rate, instead of a 1-in-7 years recurrence rate. Using the 1-in-1 criteria, Monterey's design value is still a 0.11 ppm, but as measured at Pinnacles. There are many other related comments dealing with ozone design value issues addressed in Attachment 1. ←

nonattainment-transitional for ozone is no longer a request; it occurs by operation of law under the 1992 amendments to the Act.

- ES-4 1 Districts other than those mentioned are investigating such programs as well. The ARB has adopted guidance for such mobile source emission reduction credits in January 1993. The Act now requires districts to allow alternative strategies for meeting TCM requirements (H&SC 40919(f))...
- 1-1 Table Same comment as on ES-1. Table.
- 1-5 3 The 1-in-1 ODY of 0.11 ppm is not based on Carmel Valley; it is based on Pinnacles.
- 1-5 8 Not all Pinnacles days are overwhelmed; there is at least one day that is considered "shared". It had a concentration of 0.11 ppm, and it is Monterey's ODY for the time being.
- 1-6 6 The conditions on ARB's approval of Monterey's plan are not really focused on TCMs and ISR; 3 of 5 conditions deal with TCMs and none with ISR. It is important to point out that the conditions in the ARB resolution differ from the recommendations in the August 1992 staff report, from which the information in the STI report seems to be taken. Some of the concerns identified in the staff report were corrected prior to the September ARB Board hearing, thus the conditions in the resolution differ from the concerns in the staff report. The District's responses to 4 of these conditions were submitted to ARB in December 1992, and the NSR rule was adopted in April 1993.
- 1-6 Section 1.5 title The title is incorrect; it should be "1992 Revisions to State Ozone Planning Requirements".
- 1-7 1 The Pinnacles data cannot be excluded, so the point is moot.
- 1-7 4 The District does not have to demonstrate attainment by a specific date, but by the earliest practicable date.
- 1-7 5 The ARB staff recommends that the District wait to revise their plan until the transport issue is either resolved by new technical data (SJVAQS/AUSPEX) or by a policy decision, probably by the end of 1993. This still would allow the District to meet the statutory requirement of a plan revision by the end of 1994.
- 1-7 6 Same comment as on ES-2, paragraph 4.

*Pat Hatchers*

U.S. FOREST  
SERVICE

12

Madam Chairwoman, Board Members and Staff:

Thank you for the opportunity to comment on the Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone concentrations in California.

The Forest Service administers seventeen National Forests in California, covering 20-million acres, or close to 20-percent of the total land area. Eight of these National Forests, around 8-million acres, are located in the Sierra Nevada. National Forests in the Sierra also contain eight Class I Wilderness areas, covering 1.25 million acres.

We support the designation of the new transport couples which acknowledge the high ozone levels experienced in the Sierra. We agree that the high levels of ozone documented within the Sierra Nevada result from overwhelming transport of pollutants originating from urban areas.

Air quality standards were established to protect human health and the welfare of California residents. These standards deal with our concern for potential health impact to National Forest visitors. A case in point would be the affects on visitors who spent 1.4 million visitor days (one person per 12 hour day) in National Forest Class I Wilderness Areas in the Sierra last year. In addition, we believe the current ozone standard does not adequately protect sensitive species of vegetation in the National Forests. Sensitivity to ozone pollution varies among plant species. Studies have demonstrated that the more sensitive ponderosa and Jeffrey pines begin to show visible ozone injury at concentrations between 0.05 ppm and 0.06 ppm. An ongoing cooperative study between the California Air Resource Board, Forest Service, National Park Service and UC-Davis (Sierra Cooperative Ozone Impact Assessment Study), has documented visible ozone injury to ponderosa and Jeffrey pine on these Federal units in the Sierra Nevada.

We do have some concern that no further efforts will be made to do research on the transport of pollutants into the Lake Tahoe Basin. Lake Tahoe was recently designated as an attainment area for ozone, which presumably may have led to this recommendation. We would like to continue looking at transport in the Basin, because ozone damage is still occurring, and we feel the sources of pollutants are still in debate.

In a study conducted in 1987, and repeated in 1991, respectively 30% and 40% of the Jeffrey pines surveyed in the Lake Tahoe Basin displayed ozone injury. The injury on the trees surveyed during these two drought years, may increase this year because more favorable growing conditions exist. We feel it is important that research into pollutant transport into this air basin be continued. While the ozone standard may not be exceeded in the Lake Tahoe Air Basin, forest health is at risk to this pollutant. Unless more is known regarding its source, reducing ozone pollution effects to the forest will be difficult.

-----  
Presented by, Jerry Gause, Regional Air Resource Manager, Pacific Southwest Region, USDA-Forest Service, San Francisco, at a California Air Resource Board Hearing on Impacts of Transported Pollutants on Ozone Concentrations in California, and to consider amendments to the Transport Identification and Mitigation Regulations; on August 12, 1993, in Sacramento, California.

We believe air pollution, along with uncontrolled wildfires is one of the more serious external threats to National Forests in the Sierra, and has for years taken its toll in the National Forests in Southern California, where trees have lost their vigor, and many eventually succumb to forest insects and diseases.

We appreciate the Boards formal recognition of the overwhelming transportation of ozone and precursors to the Sierra Nevada, and would encourage that there be some recognition by the Board, dealing with ozone impacts on vegetation, and that you take another look at continuing research of transport of sources in the Lake Tahoe Basin.

We have a long history in working with CARB and local air districts on air quality in the National Forests, and will of course continue to carry on that working relationship.

x x x x x





# United States Department of the Interior



NATIONAL PARK SERVICE  
P.O. Box 577  
Yosemite National Park, California 95389

IN REPLY REFER TO:

N3615

August 4, 1993

Ms. Jananne Sharpless  
Chairperson  
California Air Resources Board  
2020 "L" Street  
Sacramento, California 95815

Dear Ms. Sharpless:

We appreciate the opportunity to comment on the Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations in California. Yosemite, Sequoia and Kings Canyon National Parks support your conclusion that the high levels of ozone documented within the Sierra result from "overwhelming transport" of pollutants from the San Joaquin Valley, and the Broader Sacramento Area and "significant transport" from the San Francisco Bay Area to the entire Sierra. The National Park Service's Environmental Protection Agency (EPA) certified ozone monitors document exceedences of the State standard for ozone at these Parks since monitoring began.

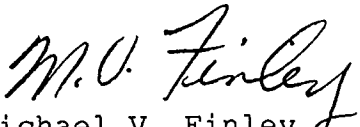
Primary and Secondary air quality standards were established to protect human health and welfare. These parks are concerned about impacts to visitors, many of whom choose to recreate through hiking, backpacking, biking or other physical activity. Traveling to the mountains, many visitors assume the air is clean and may be unaware that episodes of high ozone in combination with strenuous activities are unhealthy and aggravate respiratory problems. In Acadia National Park, Maine, and Shenandoah National Park, Virginia, resource managers have posted signs warning visitors when high pollution levels exist. We believe the designation of the Mountain Counties non-attainment for ozone and the new transport couples are the first steps in educating Californians that pollutants generated in their communities are impacting the Sierra.

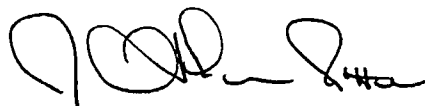
The Sierra Nevada is world renowned for spectacular mountains, scenic vistas and vast wilderness areas. The Clean Air Act of 1977 recognized the importance of maintaining air quality in our national parks and wilderness areas by designating all national parks larger than 6000 acres and wilderness areas greater than

5000 acres and in existence on August 7, 1977 as Class 1 areas. This designation affords the greatest protection against air quality deterioration. As managers of Class 1 areas, we are required by The Federal Clean Air Act and subsequent amendments to protect all air quality related values such as visibility, water quality, and biological resources. We are very concerned about the added stress that air pollution places on the vegetation of the Sierra. The secondary standard for ozone, which is designed to protect air quality related values, is the same as the primary standard of 0.09 parts per million (ppm) and does not adequately protect sensitive vegetation. Sensitivity to ozone pollution varies among plant species, but studies have demonstrated that ponderosa and Jeffrey pines begin to show visible ozone injury at concentrations between 0.05 and 0.06 ppm. An ongoing cooperative study between California Air Resources Board, the National Park Service, and the U.S. Forest Service has documented visible ozone injury on every national park and national forest in the Sierra from Lake Tahoe south to Lake Isabella. Surveys indicate 30% of the trees in Yosemite and 40% of the trees in Sequoia and Kings Canyon National Parks show visible ozone injury.

We believe air pollution is the most serious external threat in the Sierra. We cannot begin to address this complex problem without the support and cooperation of state and local air pollution control districts. We sincerely appreciate the State's formal recognition that ozone exceedences in the Sierra are the result of transport from the Central Valley, and San Francisco Bay areas. We would like to continue to work closely with CARB and local air pollution control districts in the development of transport mitigation measures. We appreciate the leadership and diligence your staff has shown in addressing these difficult issues. Thank you, and we look forward to working with you in the future.

Sincerely,

  
Michael V. Finley  
Superintendent,  
Yosemite National Park

  
J. Thomas Ritter  
Superintendent,  
Sequoia and Kings  
Canyon National Parks



# KEEP TAHOE BLUE

## League to Save Lake Tahoe

989 Tahoe Keys Boulevard, Suite 6  
South Lake Tahoe, CA 96150  
(916)541-5388

August 10, 1993

California Air Resources Board  
2020 L Street  
Sacramento, California 95814

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\* Member of Executive Committee

RE: ASSESSMENT AND MITIGATION OF THE IMPACTS OF  
TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN  
CALIFORNIA, STAFF REPORT - JUNE 1993

Dear Members of the Board,


The League to Save Lake Tahoe strongly disagrees with your staff's recommendation, contained in the above-entitled report, to discontinue research into the transport of pollutants to the Lake Tahoe basin. The report concludes on page VIII.2 that such research is not recommended because the Lake Tahoe air basin has been redesignated as "in attainment" for the State ozone standard.

We believe such research should be conducted for the following reasons. First, although the Lake Tahoe Basin may be in attainment for the statewide standard for ozone, it is not in attainment for the Tahoe Regional Planning Agency's standard. California has a commitment, through its participation in the bistate Tahoe Regional Planning Compact, to attainment of TRPA standards as well as its own statewide standards. Accordingly, research should not be discontinued before the TRPA standard is met. Second, the evidence of high ozone levels near the crest of the Sierra south of Lake Tahoe, cited in your report on page IV.9, is a cause of serious concern, particularly in light of the vegetation damage from ozone that has been noted in the Lake Tahoe Basin.

I am enclosing herewith a copy of a section of the Tahoe Regional Planning Agency's most recent evaluation of the Lake Tahoe Basin's Environmental Threshold Carrying Capacities, which notes the need for more study of ozone transport.

Thank you for your consideration of these comments.

Sincerely,

  
Rochelle Nason  
Executive Director

Enclosure

L:air

League

1991 EVALUATION

Environmental Threshold Carrying Capacities and  
the Regional Plan Package

---

F I N A L   D R A F T

Tahoe Regional Planning Agency

November 4, 1991

To attain and maintain CO thresholds and federal and state standards, TRPA should implement the Regional Transportation Plan - Air Quality Plan, particularly the plan to complete the Loop Road System and to introduce oxygenated motor fuels into the Region during winter months.

## Ozone

### Applicable Standards

The TRPA threshold standards for air quality include the following numerical standard: "Maintain ozone concentrations at or below 0.08 parts per million averaged over one hour." The applicable California standard for ozone is 0.09 ppm, 1-hour average, not to be exceeded. The Nevada standard for the Tahoe Region is 0.10 ppm, 1-hour average. The applicable federal National Ambient Air Quality Standard is 0.12 ppm, 1-hour average.

Of the four one-hour ozone standards, the TRPA threshold is the most stringent.

TRPA did not adopt interim performance targets for Ozone pursuant to Chapter 32 of the Code of Ordinances. For proposed targets, see Appendix A, Section I.

## Monitoring Program

The California Air Resources Board (CARB) monitors ozone concentrations continuously at the Lake Tahoe Boulevard station in the City of South Lake Tahoe. CARB's Bijou School station was discontinued after 1989. The Nevada Division of Environmental Protection (NDEP) monitors ozone concentrations continuously at the Stateline-Nevada station in Douglas County.

## Results

All of the following results reflect the highest recorded concentration during a given year. This "first-high" value represents the peak recorded concentration. For a summary of ozone results, see Table 19.

Exceedances of the most stringent 1-hour standard, TRPA's 0.08 ppm, have been recorded every year since the threshold was adopted at one or more of the monitoring stations.

In 1989, ozone concentrations exceeded the California standard for the first time during the period of record. A one-hour reading of 0.10 ppm was recorded once during July and once during September at the Lake Tahoe Boulevard station. Because less than three exceedances were recorded, California classified the Tahoe Region as a nonattainment-transitional area for ozone. Data collected during 1990 show no exceedances of the California ozone standard at the Lake Tahoe Boulevard station.

Ozone concentrations at the Stateline-Nevada station have exceeded the Nevada 1-hour standard twice since 1982, in 1983 (0.101 ppm) and in 1988 (0.110 ppm).

Since 1982, no exceedances of the federal 1-hour ozone standard have been recorded.

There is no apparent trend in ozone concentrations recorded at the monitoring sites. From 1981 through 1989, ozone concentrations were relatively constant at both California stations, varying from a low of 0.08 ppm to a high of 0.10 ppm. Concentrations at the Stateline-Nevada station

showed more fluctuation, from 0.066 ppm to 0.110 ppm, but with no apparent trend.

Because ozone is a secondary pollutant formed in the atmosphere, peak concentrations may be found miles downwind of source areas of the precursor gas emissions (reactive hydrocarbons and oxides of nitrogen). Thus, transport of ozone or its precursors into the Region from upwind areas may be a significant factor in observed ozone concentrations.

TRPA's threshold Study Report (1982) said that background concentrations of ozone include long range transport, natural ozone, and ozone from the preceding day. Currently, CARB does not recognize the Tahoe Air Basin as a receptor of ozone transport, but two independent tracer studies (Palmer, 1975 and Lehrman, 1981) indicate that transport into the Region is possible.

Tom Cahill, Ph.D., from the Crocker Nuclear Laboratory at UC-Davis, testified in February 1990 that, under typical conditions, ozone in the Tahoe Region is the result of transport to the Region from outside sources. This conclusion is supported by the fact that maximum ozone concentrations in the Region occur in the late afternoon and early evening (rather than around noon, when one would expect the highest concentrations to occur involving local emissions), and by the fact that ozone concentrations have stayed flat over time while precursor  $\text{NO}_x$  emissions and concentrations in the Region have decreased because of the cleaner fleet.

More study is needed of the contribution of upwind emissions of ozone precursors to ozone concentrations observed in the Tahoe Region.

#### Conclusions and Recommendations

The Tahoe Region does not attain the threshold standard for ozone. Nor does the Region attain the California and Nevada state standards every year. The Region does attain the federal standard.

To attain and maintain the threshold standard, TRPA should implement the control measures of the draft Regional Transportation Plan - Air Quality Plan, documented in Appendix A of this report, recognizing that there are strong indications that transport from upwind areas may be a significant contributor to ozone concentrations in the Region.

TRPA should support additional research into both the mechanisms which contribute to ozone concentrations in the Tahoe Region and the environmental effects of ozone within the Region, particularly on vegetation.

### Inhalable Particulates

#### Applicable Standards

There is no TRPA threshold standard for particulate matter per se. Applicable California standards include two standards for suspended particulate matter less than 10 microns in diameter ( $PM_{10}$ ): 30  $\mu g/m^3$ , annual geometric mean, and 50  $\mu g/m^3$ , 24-hour average. The corresponding federal and Nevada standards are 50  $\mu g/m^3$  and 150  $\mu g/m^3$ , respectively.

TRPA did not adopt interim performance targets for particulate matter pursuant to Chapter 32 of the Code of Ordinances. For proposed targets, see Appendix A, Section I.

#### Monitoring Program

CARB monitors  $PM_{10}$  concentrations at the Lake Tahoe Boulevard station. TRPA's two aerosol samplers (see Visibility, below) also provide data on  $PM_{10}$  concentrations.

#### Results

$PM_{10}$  measurements by TRPA and CARB show that the federal standards and the California annual geometric mean standard are in attainment, but that the Region does not attain the California 24-hour standard, based on a 1989





**MONTEREY BAY**  
**Unified Air Pollution Control District**  
*serving Monterey, San Benito, and Santa Cruz counties*

**ABRA BENNETT**  
**Air Pollution Control Officer**

24580 Silver Cloud Court • Monterey, California 93940 • 408/647•9411 • FAX 408/647•8501

**August 3, 1993**

STATE OF CALIFORNIA  
 AIR RESOURCES BOARD  
 RECEIVED 8/6/93  
 BY BOARD SECRETARY  
 XC: *See memo to*  
 JS MHS  
 JD TSD  
 JB Regal

**Board Secretary**  
**California Air Resources Board**  
**P.O. Box 2815**  
**Sacramento, CA 95812**

**SUBJECT: AUGUST 12, 1993, PUBLIC HEARING TO CONSIDER THE TRIENNIAL REPORT OF ASSESSMENT AND MITIGATION OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA AND TO CONSIDER AMENDMENTS TO THE TRANSPORT IDENTIFICATION AND MITIGATION REGULATIONS**

**Dear Sir:**

The Monterey Bay Unified Air Pollution Control District has reviewed the CARB June 1993 Staff Report: Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations in California, and has the following comments.

The Staff Report is primarily intended to address California Health and Safety Code section 39610, which requires CARB to assess the relative contribution of upwind emissions to downwind ozone levels and to establish commensurate mitigation requirements. The draft report evaluates recent air quality data in the North Central Coast Air Basin (NCCAB) as it relates to contributions from the San Francisco Bay Area Air Basin (SFBAAB). This analysis determined that there is a mix of overwhelming and significant influence from the SFBAAB on ozone concentrations downwind and recommends no change to the mitigation responsibilities of the Bay Area Air Quality Management District.

Although CARB is meeting its basic responsibility as set out in HSC section 39610, we are concerned that a number of days during which violations of the California ozone ambient air quality standard were recorded in the NCCAB were not analyzed. Our records indicate that the following days have not been analyzed.

**DISTRICT BOARD MEMBERS**

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 Chair  
*Monterey County*

Supervisor Ruth Kesler,  
 Vice Chair  
*San Benito County*

Supervisor Sam Karas,  
*Monterey County*

Supervisor Tom Perkins  
*Monterey County*

Supervisor Judy Pennycook  
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Supervisor Fred Keeley  
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Supervisor Walter Symons  
*Santa Cruz County*

Supervisor Richard Scagliotti  
 Alternate  
*San Benito County*



Board Secretary  
CARB  
August 3, 1993  
Page 2


<u>AM STATION</u>	<u>DATE</u>	<u>PEAK CONC (pphm)</u>
Pinnacles	7/27/92	10
Pinnacles	7/28/92	11
Pinnacles	8/1/92	10
Pinnacles	8/11/92	10
Pinnacles	8/13/92	10
Pinnacles	8/19/92	11
Pinnacles	10/11/92	10
Hollister	10/11/92	10

We would also note that the violations exceedances recorded to date in 1993 are as follows. These are preliminary data.

<u>AM STATION</u>	<u>DATE</u>	<u>PEAK CONC (pphm)</u>
Pinnacles	6/14/93	10
Pinnacles	6/16/93	11
Pinnacles	6/19/93	10
Pinnacles	6/23/93	12
Carmel Valley	6/24/93	11
Watsonville	6/24/93	10
Hollister	6/25/93	10
Scotts Valley	6/25/93	10
Monterey	7/31/93	11
Scotts Valley	7/31/93	10
Scotts Valley	8/1/93	10

We appreciate the opportunity to comment. If you have any questions regarding this correspondence, contact Douglas Quetin or me anytime.

Sincerely,

  
Abra Bennett  
Air Pollution Control Officer

cc: S. Gouze, CARB



**MONTEREY BAY**  
**Unified Air Pollution Control District**

*serving Monterey, San Benito, and Santa Cruz counties*

**ABRA BENNETT**  
**Air Pollution Control Officer**

24580 Silver Cloud Court • Monterey, California 93940 • 408/647•9411 • FAX 408/647•8501

August 3, 1993

STATE OF CALIFORNIA  
 AIR RESOURCES BOARD  
 RECEIVED 8/6/93  
 BY BOARD SECRETARY  
 XC: *Ad members*  
 JS MHS  
 JD TSD  
 JB Regal

Board Secretary  
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 P.O. Box 2815  
 Sacramento, CA 95812

**SUBJECT: AUGUST 12, 1993, PUBLIC HEARING TO CONSIDER THE TRIENNIAL REPORT OF ASSESSMENT AND MITIGATION OF THE IMPACTS OF TRANSPORTED POLLUTANTS ON OZONE CONCENTRATIONS IN CALIFORNIA AND TO CONSIDER AMENDMENTS TO THE TRANSPORT IDENTIFICATION AND MITIGATION REGULATIONS**

Dear Sir:

The Monterey Bay Unified Air Pollution Control District has reviewed the CARB June 1993 Staff Report: Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations in California, and has the following comments.

The Staff Report is primarily intended to address California Health and Safety Code section 39610, which requires CARB to assess the relative contribution of upwind emissions to downwind ozone levels and to establish commensurate mitigation requirements. The draft report evaluates recent air quality data in the North Central Coast Air Basin (NCCAB) as it relates to contributions from the San Francisco Bay Area Air Basin (SFBAAB). This analysis determined that there is a mix of overwhelming and significant influence from the SFBAAB on ozone concentrations downwind and recommends no change to the mitigation responsibilities of the Bay Area Air Quality Management District.

Although CARB is meeting its basic responsibility as set out in HSC section 39610, we are concerned that a number of days during which violations of the California ozone ambient air quality standard were recorded in the NCCAB were not analyzed. Our records indicate that the following days have not been analyzed.

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Board Secretary  
CARB  
August 3, 1993  
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<u>AM STATION</u>	<u>DATE</u>	<u>PEAK CONC (pphm)</u>
Pinnacles	7/27/92	10
Pinnacles	7/28/92	11
Pinnacles	8/1/92	10
Pinnacles	8/11/92	10
Pinnacles	8/13/92	10
Pinnacles	8/19/92	11
Pinnacles	10/11/92	10
Hollister	10/11/92	10

We would also note that the violations exceedances recorded to date in 1993 are as follows. These are preliminary data.

<u>AM STATION</u>	<u>DATE</u>	<u>PEAK CONC (pphm)</u>
Pinnacles	6/14/93	10
Pinnacles	6/16/93	11
Pinnacles	6/19/93	10
Pinnacles	6/23/93	12
Carmel Valley	6/24/93	11
Watsonville	6/24/93	10
Hollister	6/25/93	10
Scotts Valley	6/25/93	10
Monterey	7/31/93	11
Scotts Valley	7/31/93	10
Scotts Valley	8/1/93	10

We appreciate the opportunity to comment. If you have any questions regarding this correspondence, contact Douglas Quetin or me anytime.

Sincerely,

  
Abra Bennett  
Air Pollution Control Officer

cc: S. Gouze, CARB

12 August 1993

Subject: Text of Testimony given before the California Air Resources Board, August 12, 1993 in Sacramento, California

According to the California Air Resources Board(ARB) June 1993 Staff Report entitled " Assessment and Mitigation of Transported Pollutants on Ozone Concentration in California", ARB staff concluded in 1990 that emissions in San Bernardino County are enough to produce ozone concentrations that exceed the state standard, without transport from outside the basin, especially from the South Coast Air Basin.

After reviewing the report, it occurred to me that ARB staff may have arrived at this conclusion without considering all of the potentially significant factors in the area which may have an effect. For example:

ARB staff may not have been aware of the fact that Barstow is at the confluence of major interstate highways and railways. As such, Barstow is a major port of entry into southern and central California for trains, trucks, and automobiles and their attendant criteria pollutants.

Additionally, Friday September 15, 1989, the day ARB staff chose for their analysis, probably was a typical Friday in Barstow with the usual heavy weekend traffic bound for Las Vegas, Laughlin, or the Colorado River. Since the population of Barstow is only 20,000, it is fairly obvious the majority of this traffic originates elsewhere, most probably from the South Coast Air Basin.

Thus, it may be worth considering whether emissions from mobile sources which are 'just passing through' the South-Eastern Desert Air Basin(SEDAB), would be an overwhelming contributor to the ozone levels in Barstow. If this is indeed the case, it should be noted that there is little a local air district could do to control emissions from mobile sources engaging in interstate commerce. Thus, it just seems logical that before costly controls are required on stationary sources in the SEDAB, additional study may be necessary to determine whether these controls would effectively reduce ozone levels throughout the vast region of the SEDAB.

Finally, on page VII.5, paragraph 1, ARB staff show that the air mass which was over Barstow on Friday September 15, 1989 originated within the SEDAB some 20-30 miles northwest of Needles and was not impacted by transport from outside the SEDAB. However, ARB staff may have not been aware of the potential for transport from such fast growing areas near the borders of the SEDAB, such as Las Vegas and Laughlin Nevada, as well as the coal fired Southern California Edison Mojave Power plant.

In closing, it seems to me that had ARB staff worked closely with Mojave Air District staff, they would have been made aware of these local factors, and in the light of this additional information, they may have decided that additional and more recent study is necessary before basing such a major multi-million dollar decision such as this one, on incomplete and/or outdated information.

It is my sincere hope that ARB work in accordance with and as required by Sections 39610(b) and 39610(d) of the California Health and Safety code which require that the ARB work in cooperation with local air districts to update its transport analysis every three years.

Sincerely,

*Thomas R. DeCosta*

Thomas R. DeCosta  
Environmental Engineer  
U.S. Army National Training Center  
Fort Irwin, California