

Summary of Episode Selection Recommendation

As part of the Bay Area 2004 SIP submittal, an air quality model will be applied to analyze the connection between the emission of ozone precursors and the occurrence of ozone throughout central California. Once good model performance is obtained in replicating ozone for a set of historical episodes, the model will be applied to demonstrate that the proposed emission controls in the SIP will lead to the attainment of the ozone standard in the Bay Area.

Our initial modeling protocol stipulated that only episodes occurring during the CCOS field study would be modeled because of the requisite observational data base needed to support model inputs and performance measures. Promising Bay Area episodes for modeling occurred on:

- June 15, 2000 and
- July 31-August 1, 2000.

However, preliminary evaluation of these two episodes indicated that (1) the July 31 peak ozone reached only 126 ppb (2 ppb over the standard), and (2) good model performance for the June 2000 episode might be difficult to achieve because of the highly localized nature of the single Livermore exceedance. Furthermore, ozone pattern (cluster) analysis of all episodes since 1995 indicated that both 2000 episodes were of the same type (Type 2). Representation of both Type 1 and Type 2 episodes identified from cluster analysis is desirable since it increases the generality of this analysis. Consequently, two additional episodes were proposed and evaluated:

- July 11-12, 1999 and
- July 9-10, 2002.

The 1999 episode exhibited wide spread ozone exceedances, a phenomena that can usually be simulated well by air quality models. The 2002 episode did not have widespread ozone exceedances, but is a candidate episode because of the possibility of more supporting observations than the 1999 period, and because the ozone patterns matched a recently apparent trend for ozone episodes in the Bay Area (large isolated peak in the Livermore Valley, as in June 2000). However, subsequent analysis indicated that this episode was actually more similar to the 1999 episode, but with lower overall ozone levels that serendipitously resulted in an exceedance pattern similar to the June 2000 case.

We will only be able to model 2 or 3 of these episodes due to schedule and current resource limitations. Therefore, we have prioritized these episodes by considering the following criteria:

- availability of data for model input and performance evaluation;
- widespread ozone exceedances;

- coverage of different representative ozone categories;
- ability to investigate weekday-weekend emissions variations;
- ability to assess inter-regional transport.

We have selected the June 15, 2000 and July 31, 2000 episodes because these periods were part of the CCOS field study and day-specific emissions data will be made available for them by the ARB. For the third episode we recommend July 11-12, 1999 because:

- routine air quality and meteorological data for this period are archived (data for July 9-10, 2002 will not be readily available until 2003, which may cause delays in our modeling schedule);
- this episode occurred on Sunday and Monday (there is interest in modeling the influence of weekend emissions);
- this episode had more exceedances (3 per day) than the 2002 case (1 per day);
- the ozone pattern for this episode falls into Type 1, complementing the 2000 episodes;
- this episode shows significant transport possibilities to the Central Valley.

The ARB is interested in the July 1999 episode as well, but cannot currently commit to develop emissions data for the 1999 nor the 2002 cases. Pending new developments for additional funding, the lack of emissions data may preclude the use of these two non-CCOS episodes from this SIP analysis.

Summary of Considerations for Episode Selection

	Episode			
	July 1999	June 2000	July 2000	July 2002
Observed Ozone Maxima and Number of Exceedances				
Ozone Maxima	156 ppb at Concord	152 ppb at Livermore	126 ppb at Livermore	160 ppb at Livermore
Number of Exceedances	6 over 2 days	1 on 1 day	1 on 1 day	2 over 2 days
Ozone Pattern				
Episode Category ¹	1	2	2	1
Suitability for the Study of Transport ²				
Ranking	Best	Poor	Moderate	Moderate
Availability of Emissions Inputs				
CARB Day Specific Emissions	N/A	ARB delivery in January 2003	ARB delivery in December 2002	N/A
Suitable for Weekend-Weekday Analysis				
Episode Days	Sun-Mon	Thurs	Mon	Tue-Wed
Air Quality Database				
Routine Surface and PAMS data ³	CARB California AQ Data 1980-2000 CD-ROM	CCAQS database	CCAQS database	in AIRS database after 2002
CCOS routine data ⁴	N/A	few available	available	N/A
CCOS IOP data ⁵	N/A	N/A	available	N/A
Meteorological Database				
RAOB	4 NWS sites (2 per day)	5 NWS sites (2 per day)	5 NWS sites (2 per day)	4 NWS sites (2 per day)
Profiler	5 ETL sites	16 ETL sites	23 ETL sites	13 in BAMI archive (incl. ETL sites)
Surface	Routine Obs	Routine + CCOS Obs	Routine + CCOS Obs	Routine Obs

¹Episode categories are from David Fairley's "Episode Representativeness" report.

²Suitability was determined by HYSPLIT trajectory analysis to various ozone exceedance locations outside Bay Area. It was extracted from Steve Soong's "Meteorological Conditions" and "An evaluation of transport of pollutant from the Bay Area" reports.

³Data includes O₃, NO, NO_x, HC, CO, speciated HC observations.

⁴Surface O₃, NO, NO_y, canister CO, CO₂, NO₂, PAcN, HCHO were measured. Continuous NMOC, particle nitrate, etc. were also measured at research sites.

^{13}C , CO_2 , speciated NMOC were measured at S1, S2 sites and aircraft observations were taken as well.