APPENDIX M

IMPACT OF TRANSPORT

SAN ANTONIO EAC REGION ATTAINMENT DEMONSTRATION

MARCH 2004

Appendix M

Table of Contents

Transport into the San Antonio Region: Introduction
Wind allows for transport of air pollution over great distances. Through pollution transport, areas that do not generate significant air pollution can be affected by air from other areas of high pollution production. Evidence for transport and its effects on the local San Antonio area are based on two sources: archived meteorological and special event data (which may be local, state, national or international in scope, and is limited in time only by the availability of data archives) and local photochemical modeling analysis (and so is restricted to the time and domain of the specific modeling episode).

Analyses of regional and national patterns help provide an understanding of events that may affect local ozone levels. Such analyses include meteorological patterns, reoccurring regional or synoptic events, and/or pollution patterns due to placement and impact of regional pollutant generators. Historical meteorological data in the San Antonio area; information on transport, wind speed and wind direction; air movement identified through HYSPLIT back trajectories; and other important meteorological variables affecting ozone concentrations in the San Antonio region are discussed in detail in appendix A. Some of these materials will be addressed in the current appendix to characterize the relationship between pollution transport into the San Antonio region and high ozone readings locally.

The second source of transport data includes information provided from the 1999 CAMx photochemical model used to demonstrate attainment in this document set. While this data set is more spatially and temporally limited, hence with restraints in generalizability, it provides a far richer context because of the analytical tools available within the CAMx model.

Analysis of Meteorological Data: Regional Haze/Smoke Events
Significant regional haze/smoke events periodically affect the ozone levels in San Antonio. In instances such as these, fine particulate matter (PM 2.5) is transported into the area. Transported PM 2.5 may impact local ozone readings, even if PM concentrations are well below the NAAQS for fine particulate matter.

San Antonio experienced high levels of ozone at the same time that heavy smoke was present during the May 1998 Mexico/Central America smoke event. This case has been well documented as a transport incident and will be discussed for the sake of comparison to a haze event in September 2002, during which high levels of ozone were generated locally. During both events, San Antonio experienced high levels of PM 2.5 and had several ozone exceedances. During yet another smoke episode in May 2002, lighter PM and smoke were accompanied by moderate ozone readings.

In May 1998, a large air mass containing smoke from agriculture fires in Mexico and Central America traveled across the state of Texas and as far north as the Dakotas. EPA received requests from nine states to exclude certain days of ozone data during this episode from compliance calculations. EPA reviewed the various requests in consultation with experts outside of the EPA, including those from the National Oceanic and Atmospheric Administration and the National Aeronautics and Space Administration. The EPA concurred with most of the requests from those nine states. (Seitz, 2000) Every year the potential exists for San Antonio to experience similar air quality events due to agricultural burning. In May of 2002, smoke traveled from agricultural fires into Texas.

The September 2002 haze event was caused by pollutants transported from the Midwest, primarily the Ohio & Mississippi Valleys (TCEQ, 2003). The San Antonio region experienced elevated peak 8-hr average ozone levels of 111, 97, and 92 ppb on September 12th, 13th, and 14th, respectively. In addition, the regional background levels of ozone were elevated during these days. The TCEQ described the area's lowest peak eight-hour measurement of 75 ppb as a "conservative estimate of the regional ozone background levels," based on the September 12, 2002, CAMS 503 (Bulverde, Texas) readings (TCEQ, 2003b). The CAMS 23 reading on September 12th of 111 ppb in San Antonio, was the highest eight-hour ozone average for the region in 2002. According to TCEQ (2003), the "difference of 36 ppb between the measured eight-hour area maximum of 111 ppb and the estimated regional background level of 75 ppb was likely caused by local air pollution sources in the San Antonio area. The estimated 36 ppb local contribution was 32 percent of the 111 ppb area eight-hour peak."

Figure M-1: Hourly PM 2.5 and 8-hr Average Ozone for San Antonio, 2002 Ozone Season

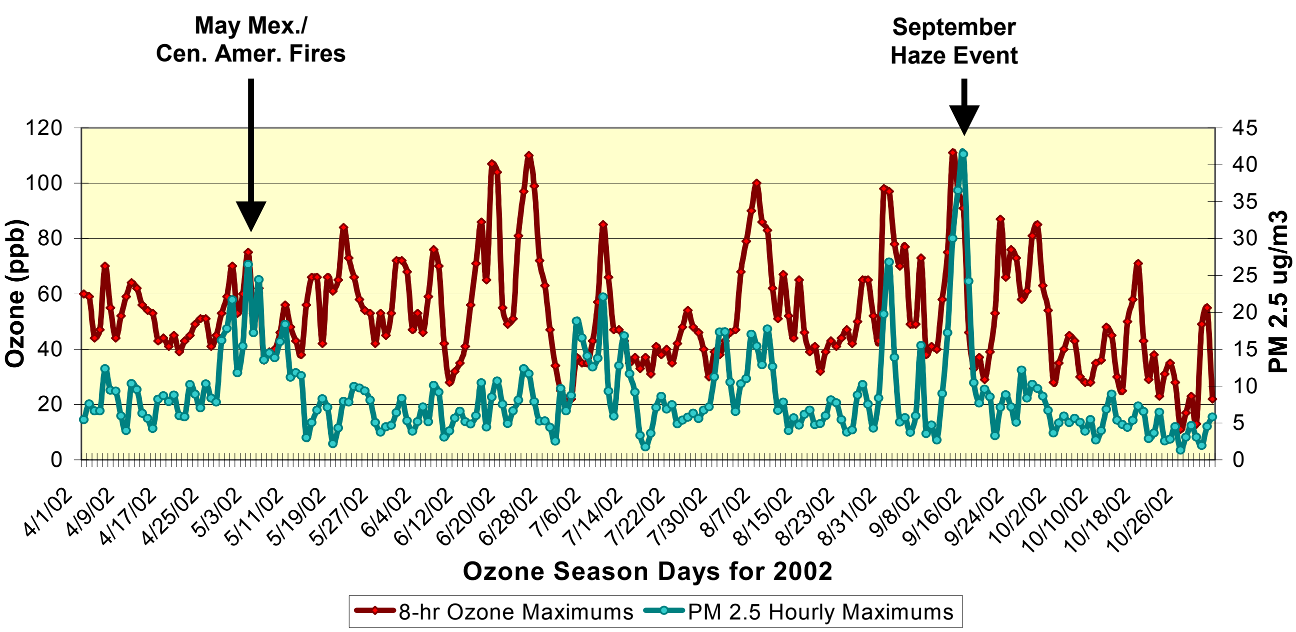


Figure M-1 displays a comparison between PM 2.5 and ozone readings for the 2002 ozone season. The May Mexico/Central America smoke and September Ohio Valley haze periods are marked for reference. The highest eight-hour average ozone reading for 2002 was recorded at CAMS 23 on September 12, coincident with high PM 2.5 readings. The second, third and fourth highest 2002 readings at CAMS 23 occurred between June 17-24, when PM 2.5 readings were markedly lower.

The transport of pollutants from Ohio Valley to Texas can be traced by following the weather patterns at that time. In the Northern Hemisphere, winds move in a clockwise rotation around high-pressure areas; thus, the position of the high affects wind direction. The arrows show the approximate direction of the winds with respect to the high-pressure cell in Figure M-2 (TCEQ, 2003c). The presence of this cell moving across the country from west to east, driven by the jet stream, is the most likely cause of the pollutant migration. Figure M-3, displays a progression of high ground-level ozone mass from the Midwest down into Texas during the same episode (EPA, 2003).

Figure M-2. High Pressure Cell on Sept. 7, 2002 and Same Cell on Sept. 12, 2002

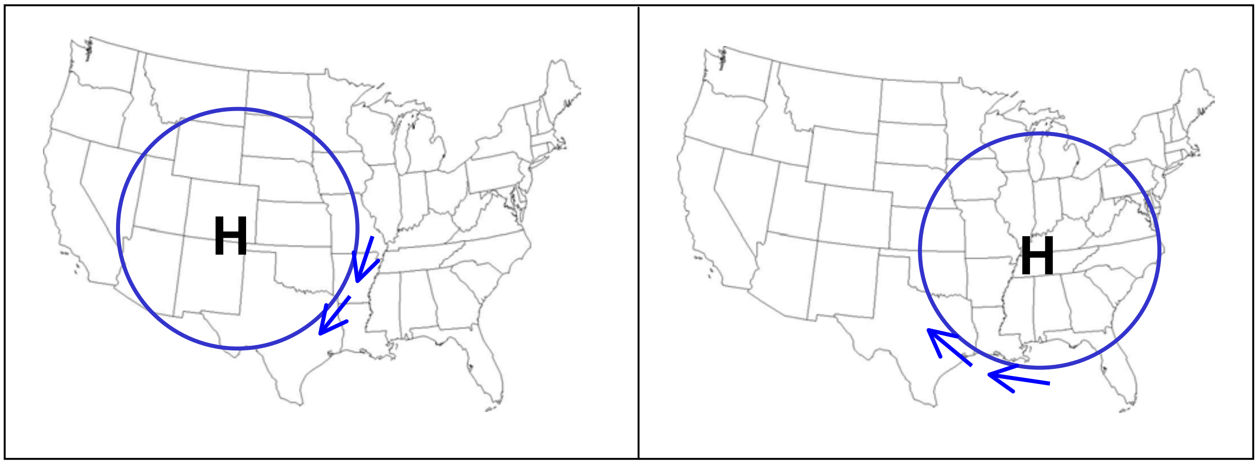
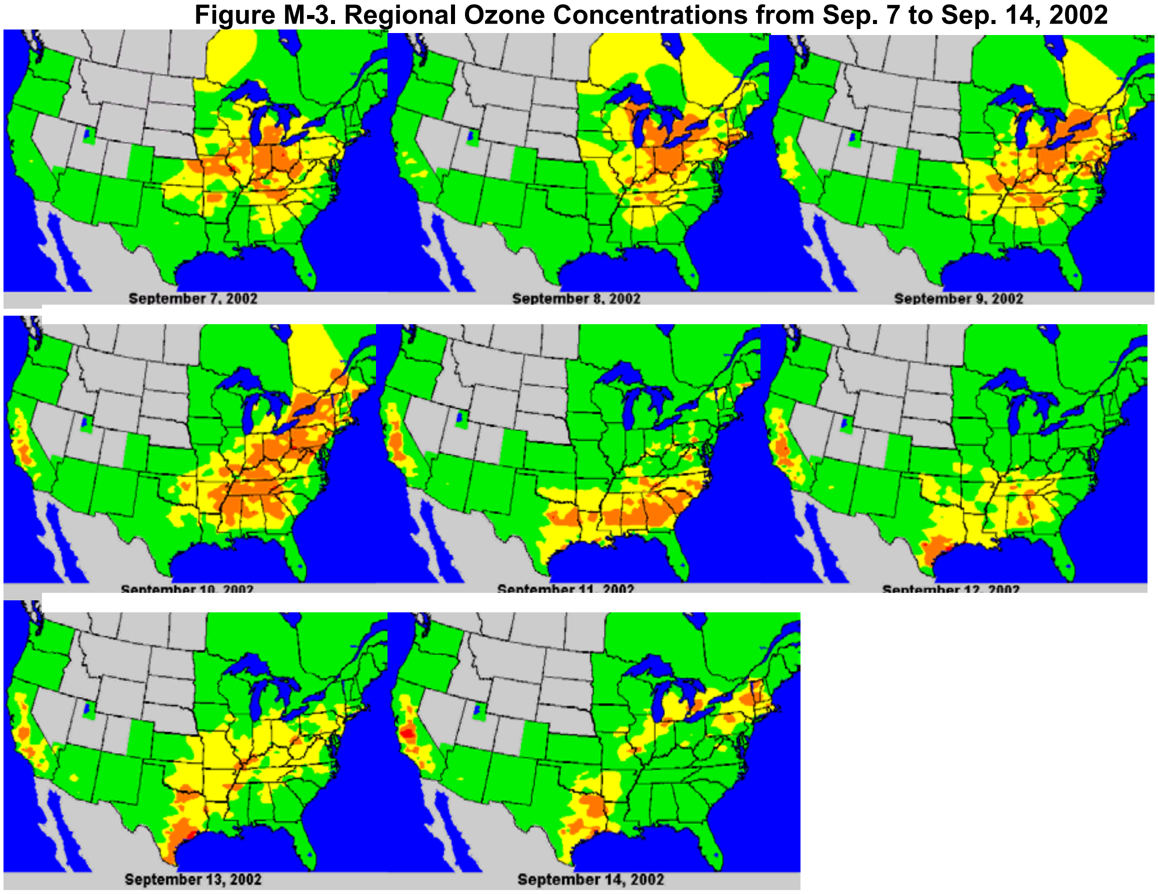


Figure M-3. Regional Ozone Concentrations from Sep. 7 to Sep. 14, 2002



Air Parcel Paths: HYSPLIT model

The HYSPLIT[1] model provided an approximate path of the air coming into San Antonio for the September 2002 haze event as shown in figures M-4 through M-6. Each back trajectory[2] path was computed for a 144-hour (6-day) period.

Figure M-4. Back Trajectories: Sept. 12, 2002

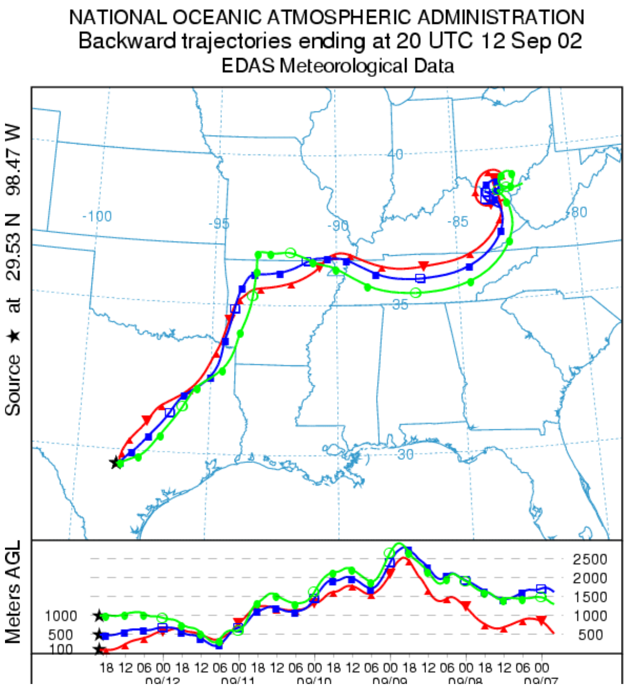
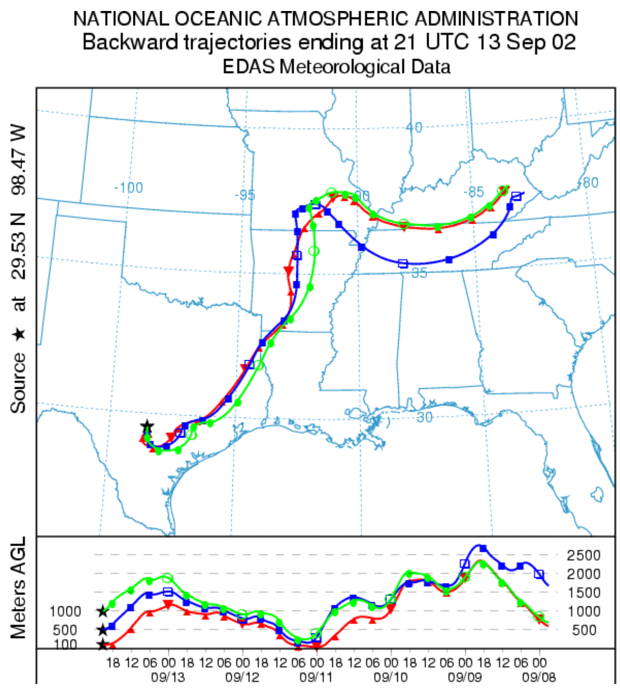


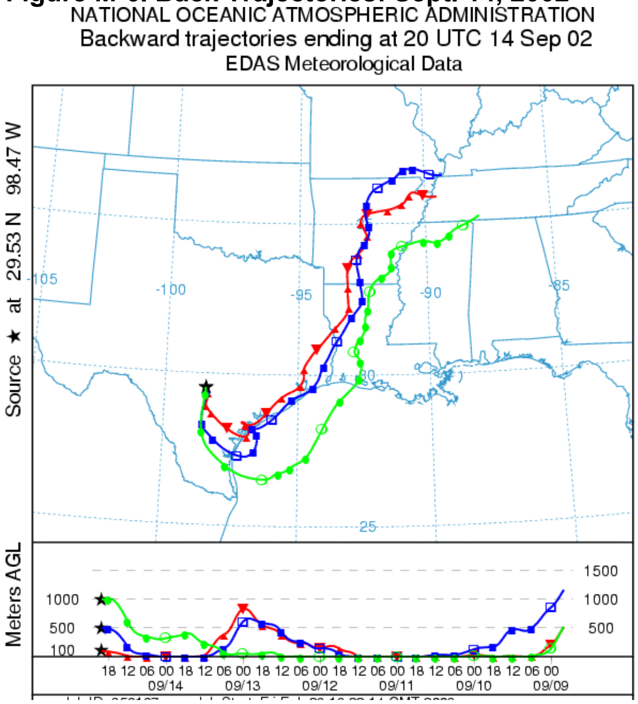
Figure M-5. Back Trajectories: Sept. 13, 2002



[1] The HYSPLIT model runs described here are based on historical meteorological data sets archived by the National Centers for Environmental Prediction within the National Oceanic and Atmospheric Administration. The HYSPLIT model allows the user to access this archived data as model input specific to place and time.

[2] Given a geographic destination for an air parcel, back trajectories show the path followed by the parcel before reaching the destination

Figure M-6. Back Trajectories: Sept. 14, 2002



As described previously, the ozone levels recorded in San Antonio during mid-September 2002 coincided with high PM levels. There is strong evidence that both the ozone and PM measured across the local area were part of a wide pattern of transport across the entire eastern half of the United States. The May 1998 Mexican smoke event was considered an exceptional event. Consequently, the EPA excused local area ozone levels from consideration for regulatory purposes since these exceedances were the result of transport. Evidence of transport is provided by numerous sources including HYSPLIT wind patterns, appearance of shifting elevated ozone concentrations archived by EPA, and wind patterns documented by TCEQ during the September 2002 event.

Analysis of Local Ozone Levels and Selected Regional Precursor Sources

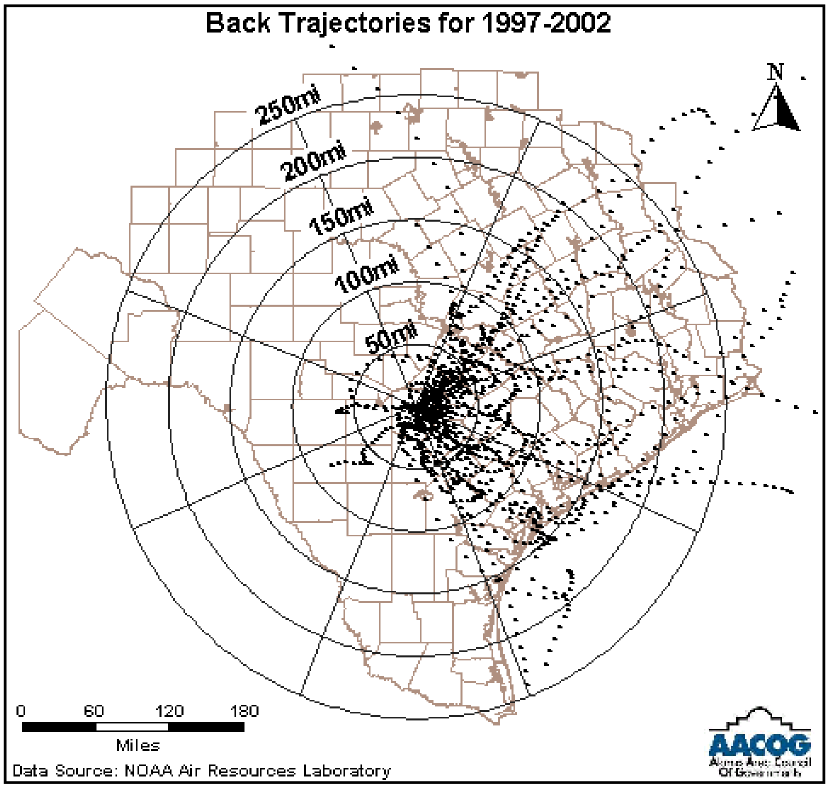
The HYSPLIT model was also used to identify typical air parcel paths during ozone exceedance days in the San Antonio region[3] between 1997 and 2002. This was accomplished by running back-trajectories for the forty-two exceedance days in the San Antonio region that occurred from 1997 to 2002.

With San Antonio as the end point, Figure M-7[4] displays all air parcel pathways for the forty-two exceedance days. Each back-trajectory represents 33-hour paths in order to cover the regional air quality modeling area. The figure also indicates that, on high ozone days, air parcels rarely originated from the west, northwest, south or southwest over the six-year period investigated.

[3] The HYSPLIT model is used in development of the Conceptual Model; see Appendix A.

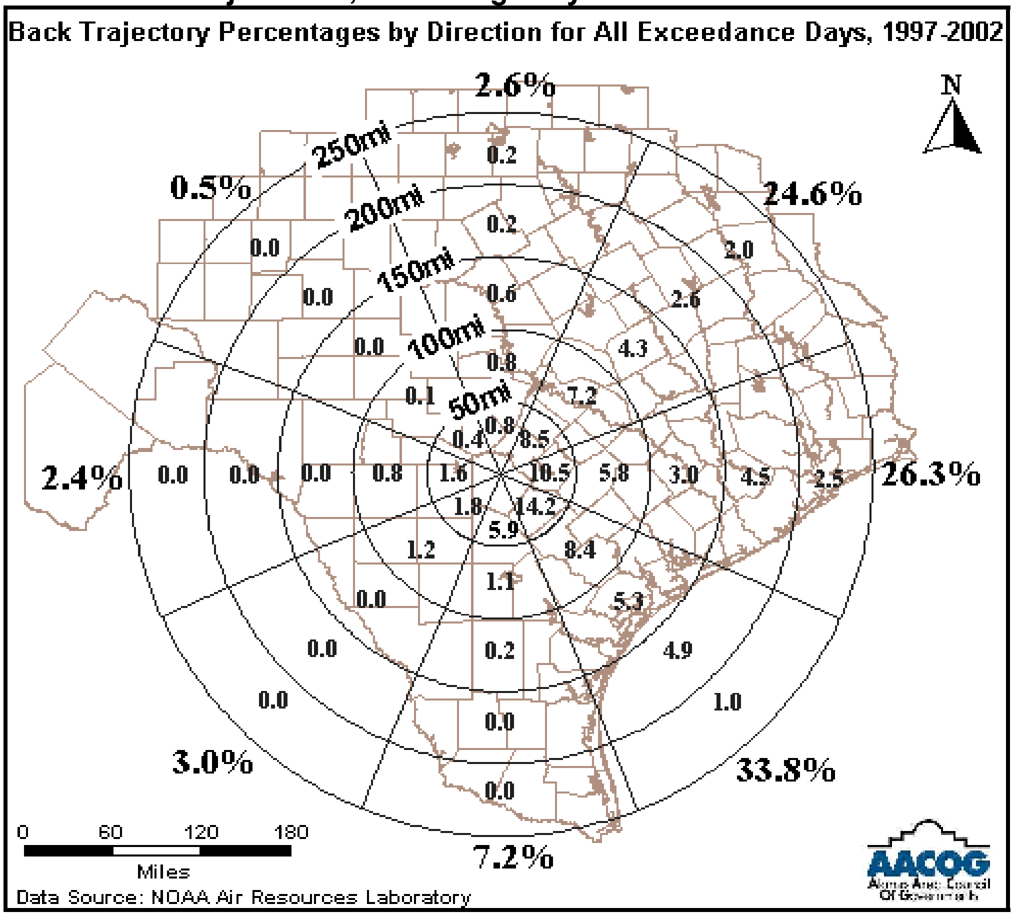
[4] Because the HYSPLIT model outputs both graphical and ASCII-text latitude/longitude/altitude coordinate sets by hour, the output is both display-ready and suitable for further analysis, as performed to typify wind patterns associated with high ozone days.

Figure M-7. General Pattern of Air Parcels Paths Arriving in San Antonio



The HYSPLIT model back-trajectory output provides hourly latitude / longitude / altitude locations of air parcels. Figure M-8 provides the percentage of air parcels allocated within each region of the map. The total for each octant is located just outside the 250-mile circle.

Figure M-8. Back Trajectories; Percentages by Direction



The image shows that within 50 miles of the designated endpoint, the San Antonio International Airport (SAIA), 8.5 % of the air parcels originated from the northeast, 18.5% of the air parcels came from the east, and 14.2 % came from the southeast. It is worth noting that the entire San Antonio Early Action Compact region, i.e., Bexar, Comal, Guadalupe and Wilson Counties, lies within the 50-mile radius shown.

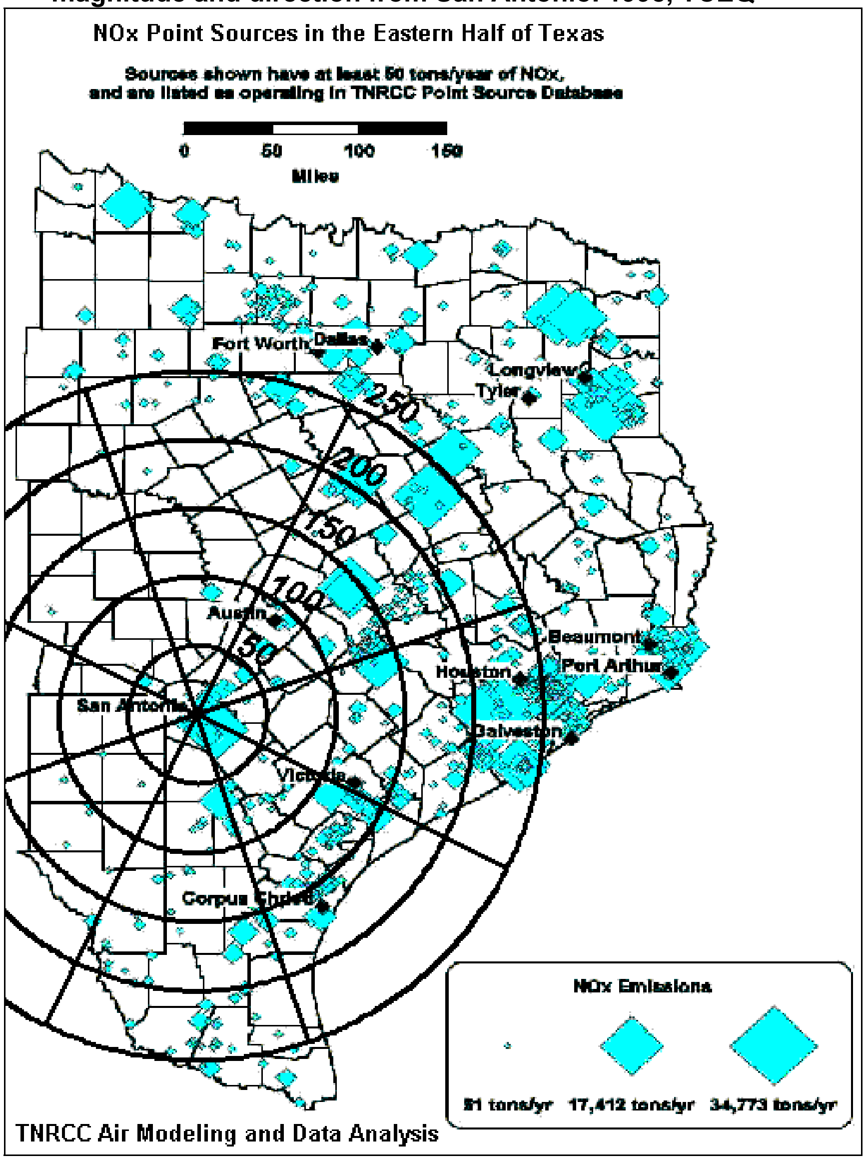
Between 50 and 100 miles of the SAIA, 0.8% of the air parcels originated from the west. East of SAIA but outside the 250-mile boundary, the figure in bold indicates that 26.3% of all air parcels came from the eastern octant, where the Houston/Galveston area is located.

Use of back trajectories to identify wind patterns coincident with high local ozone levels is typically a technique used by modelers to select new modeling episodes, as discussed in Appendix A. These calculations show the frequency with which air parcels pass through a given region before coming into San Antonio on a high ozone day. This, in turn, is important in discussing the influence of ozone precursor sources along the back trajectories on ozone levels in the San Antonio region.

Major Point Sources along Back Trajectories on days of High Ozone

Figure M-9 shows the location of major point sources in Texas, identified by distance and direction from San Antonio in the same manner as the back trajectory air patterns. Given the predominant wind patterns for air arriving in San Antonio on high ozone days and the location of important point sources, it is clear that air typically passes over many of these point sources prior to arriving in San Antonio, where high ozone levels are then recorded. Consequently, there is a strong correlation between the location of point sources in Texas and air pathways associated with historical high ozone readings in San Antonio. This correlation is supported by further analysis using the photochemical model, as follows.

Figure M-9. NOx Point Sources in the Eastern Half of Texas by their distance, magnitude and direction from San Antonio. 1998, TCEQ



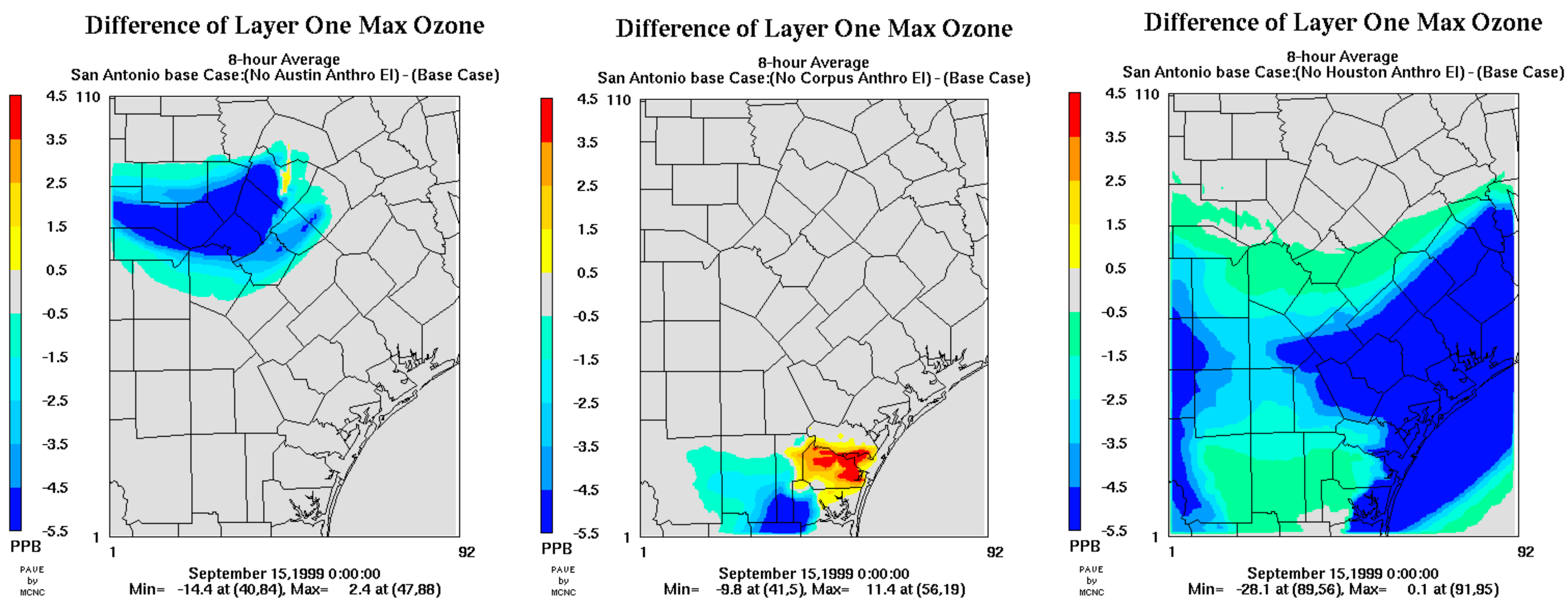
Modeling: Removal of Anthropogenic Pollution from the Emission Inventory
The evidence for transport can be further demonstrated by conducting a series of modeling runs in which all of the anthropogenic emissions from the adjacent metropolitan areas are removed from the CAMx emission inventory for the modeled episode. Sensitivity runs were employed to determine the impact of transport on ozone concentrations in the San Antonio region during the 1999 episode. These runs required the application of a masking program to the model to "zero out" the anthropogenic VOC, NOx, and CO emissions for three urban Texas areas: Austin, Corpus Christi, and Houston. Transported emissions from each of these areas can impact ozone concentrations in the San Antonio area.

PAVE Graphics
After removing anthropogenic emissions generated by Austin, Corpus Christi, and Houston from the 1999 base case, the model's output was processed through a graphics software program (PAVE) to provide visual depictions of estimated ozone concentrations. The following series of figures compare daily changes in ozone concentrations, predicted by the model, as the result of removing the anthropogenic emissions associated with each of the three urban areas during the September 15-20, 1999 episode.

The software program uses colors to distinguish between variations in ozone concentrations. The red and orange areas indicate predicted increases in ozone levels while blue and green areas indicate reductions in ozone concentrations.

These results indicate that, under the meteorological conditions experienced during the September 1999 episode, removing the anthropogenic emissions from Houston caused the greatest reductions (as indicated by blue and green shading) in SAER ozone concentrations when compared to other sources of transport. Removing Austin anthropogenic emissions typically impacted ozone concentrations in the northern SAER region. Removing anthropogenic Corpus Christi emissions had the least impact on the four SAER counties during the September 1999 episode.

Figure M-10. Results of "zero out" model runs for Wednesday, September 15, 1999.



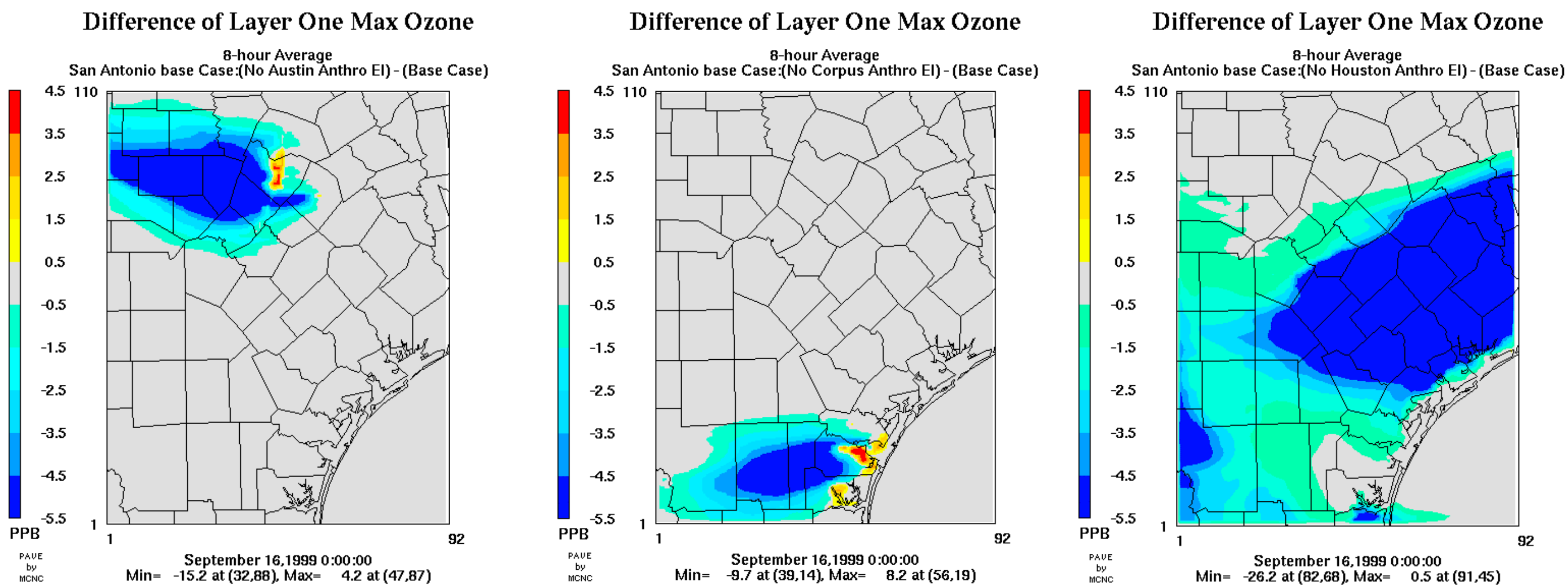
Zero out Austin Anthropogenic Emissions

Zero out Corpus Christi Anthropogenic Emissions

Zero out Houston Anthropogenic Emissions

As shown, removing Austin and Houston anthropogenic precursor emissions reduced modeled ozone concentrations in each SAER county (or a portion of a county) on September 15th. However, removing Corpus Christi anthropogenic emissions had no projected impact on SAER ozone concentrations. The red and orange areas near and in the Corpus Christi metropolitan area indicate increased ozone levels due to reduced NOx scavenging.

Figure M-11. Results of “zero out” model runs for Wednesday, September 16, 1999.

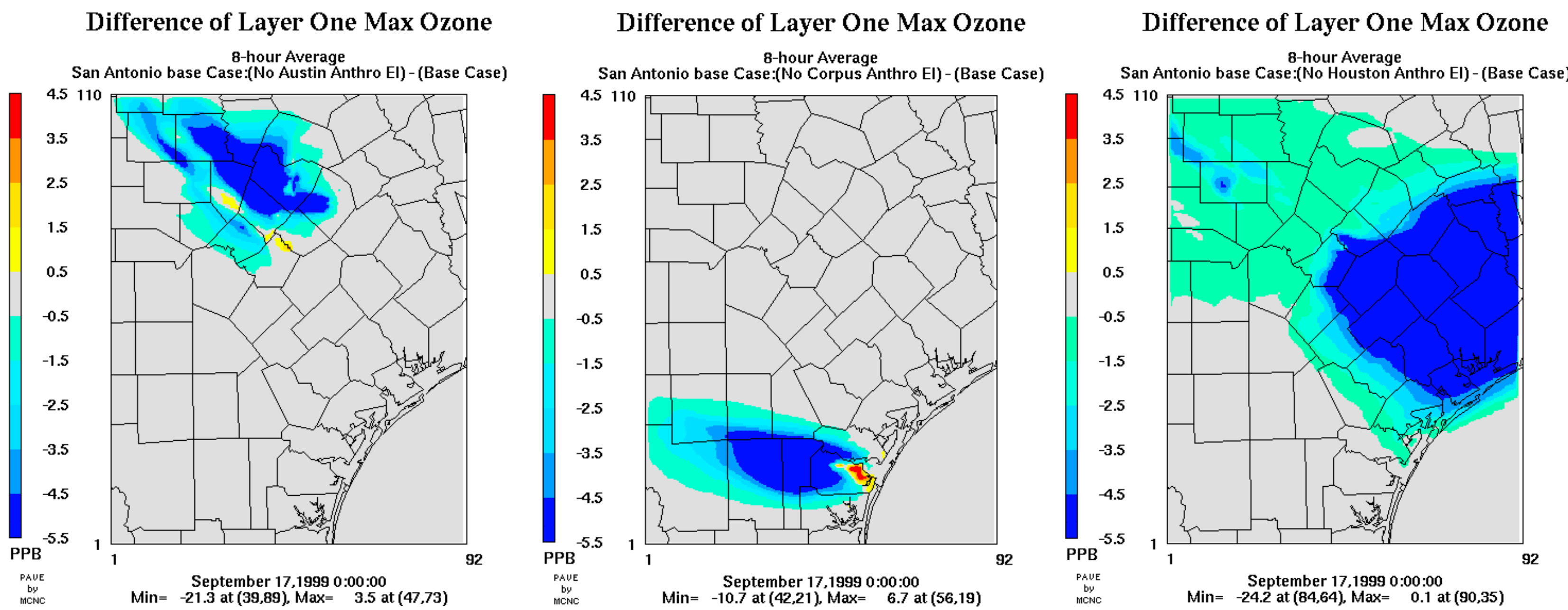


Zero out Austin Anthropogenic Emissions

Zero out Corpus Christi Anthropogenic Emissions

Zero out Houston Anthropogenic Emissions

Figure M-12. Results of "zero out" model runs for Wednesday, September 17, 1999.

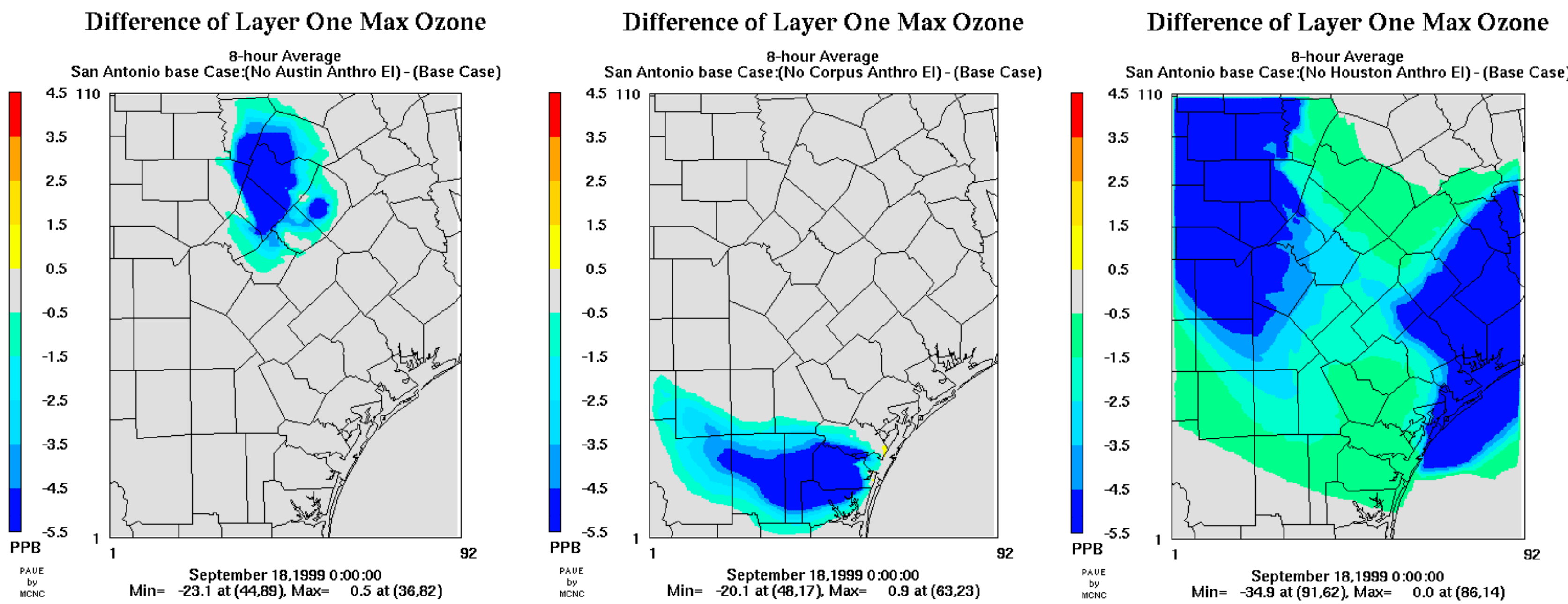


Zero out Austin
Anthropogenic Emissions

Zero out Corpus Christi
Anthropogenic Emissions

Zero out Houston
Anthropogenic Emissions

Figure M-13. Results of "zero out" model runs for Wednesday, September 18, 1999.



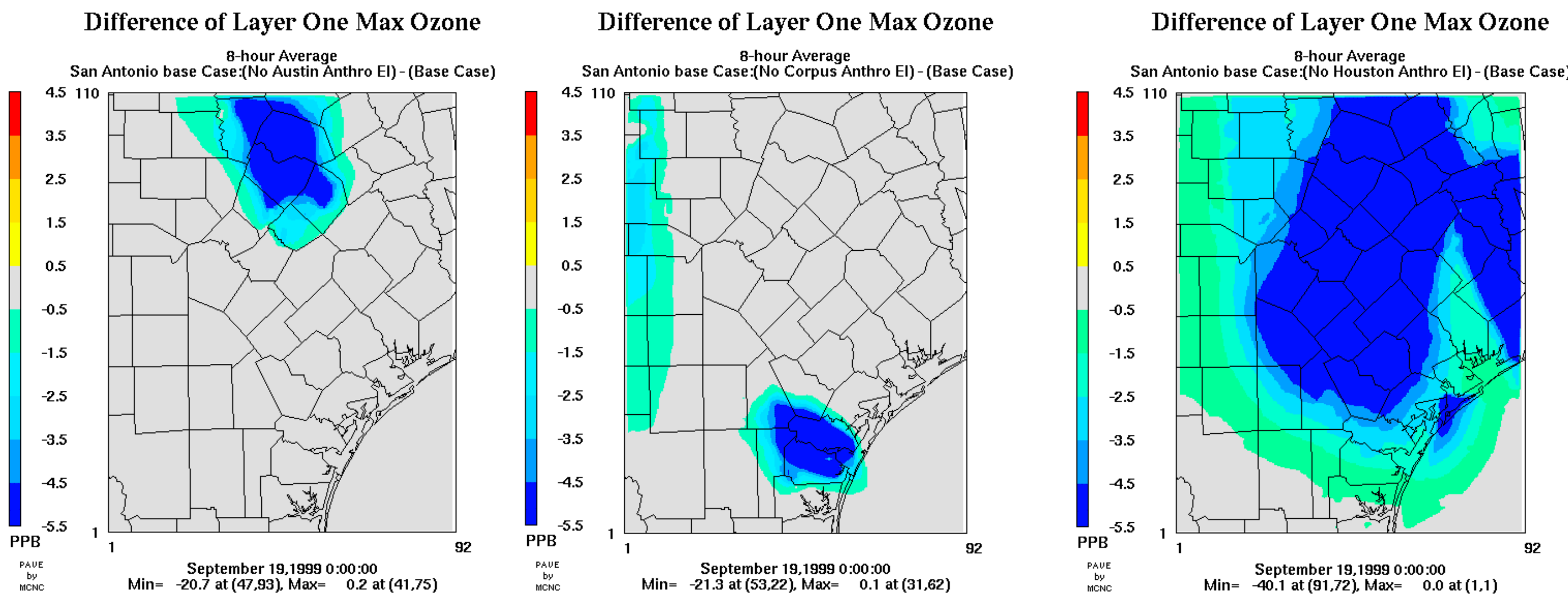
Zero out Austin Anthropogenic Emissions

Zero out Corpus Christi Anthropogenic Emissions

Zero out Houston Anthropogenic Emissions

Blue and green plumes indicate predicted ozone reductions. In the Corpus Christi graph, the plume stretches a considerable distance downwind of the urban area. The downwind plume shows less evidence of NOx scavenging than on most other days for this region. The plot for Houston clearly shows the effect of the reduction for two days, demonstrated by the two large distinct blue lobes.

Figure M-14. Results of "zero out" model runs for Wednesday, September 19, 1999.

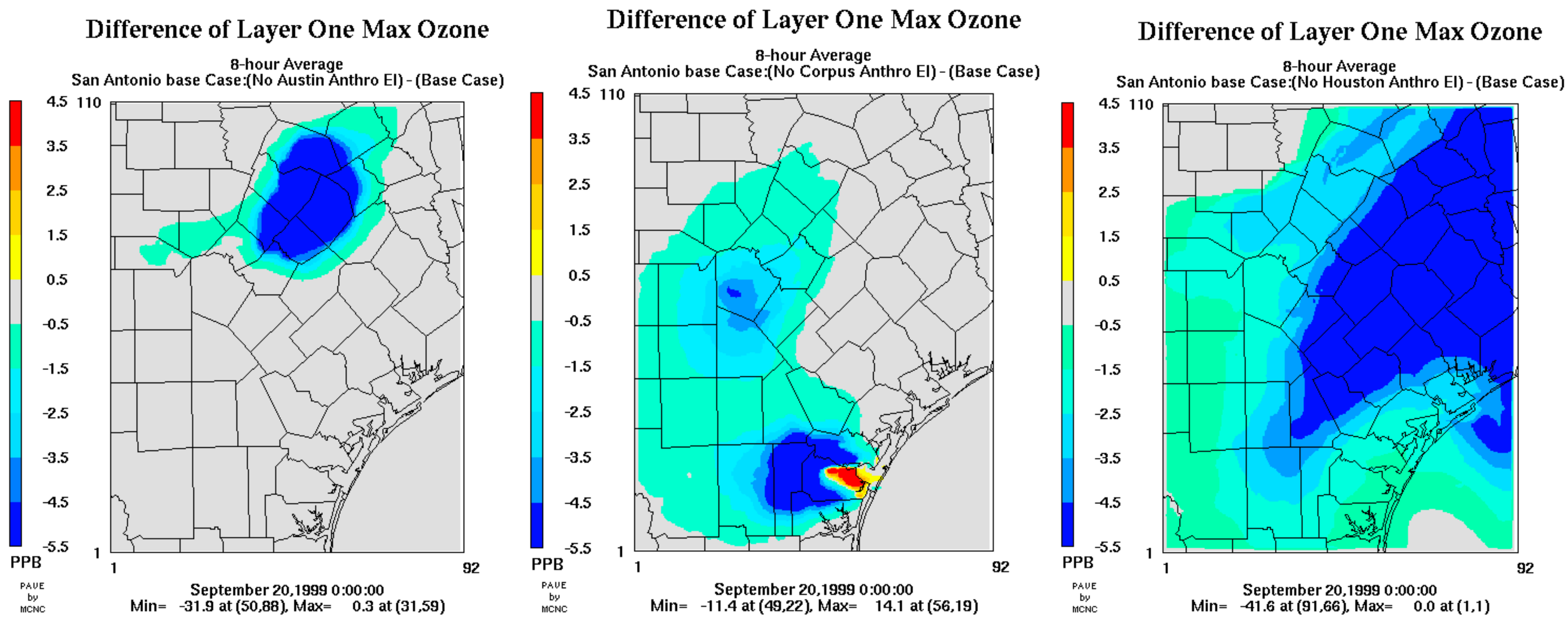


Zero out Austin
Anthropogenic Emissions

Zero out Corpus Christi
Anthropogenic Emissions

Zero out Houston
Anthropogenic Emissions

Figure M-15. Results of “zero out” model runs for Monday, September 20, 1999.



Zero out Austin Anthropogenic Emissions

Zero out Corpus Christi Anthropogenic Emissions

Zero out Houston Anthropogenic Emissions

Graphical Display of Data

The preceding graphical representations of the change in ozone due to reductions in anthropogenic regional emissions are based on photochemical modeling output data. Predicted effects of these reductions at various CAMS in the San Antonio region were analyzed numerically as well. The following graphs specifically show these impacts on the design value. The calculation of design values was based on instructions received from the EPA and TCEQ. The procedure entailed averaging the ozone levels for each day of the episode with reduced precursor levels and comparing this average to the design value for the episode. In this way, the impact on the design value of any precursor reduction scenario can be estimated.

As figure M-16 indicates, removing the Houston/Galveston area anthropogenic emissions lowers the CAMS 58 design value by about 2.60 parts per billion. This impact is considerably greater than the impacts that are estimated from removing Austin and Corpus Christi area anthropogenic emissions. In figure M-17 removing the Houston/Galveston area emissions shows a reduction of 2.72 ppb at CAMS 23, which is also considerably greater than estimated reductions after removing Austin and Corpus Christi area anthropogenic emissions.

Figure M-16. Design Value Reduction due to the Removal of Houston, Austin, and Corpus Christi Anthropogenic Emissions, CAMS 58, Sept. 1999

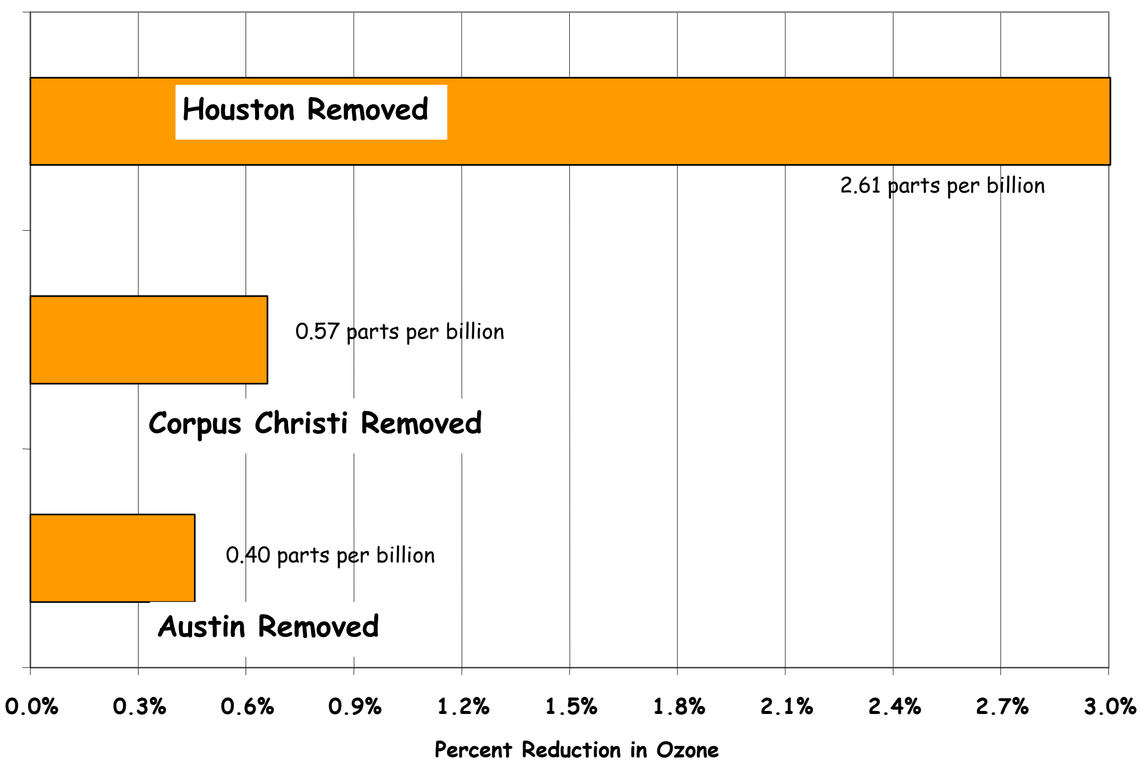


Figure M-17. Design Value Reduction due to the Removal of Houston, Austin, and Corpus Christi Anthropogenic Emissions, CAMS 23, Sept. 1999

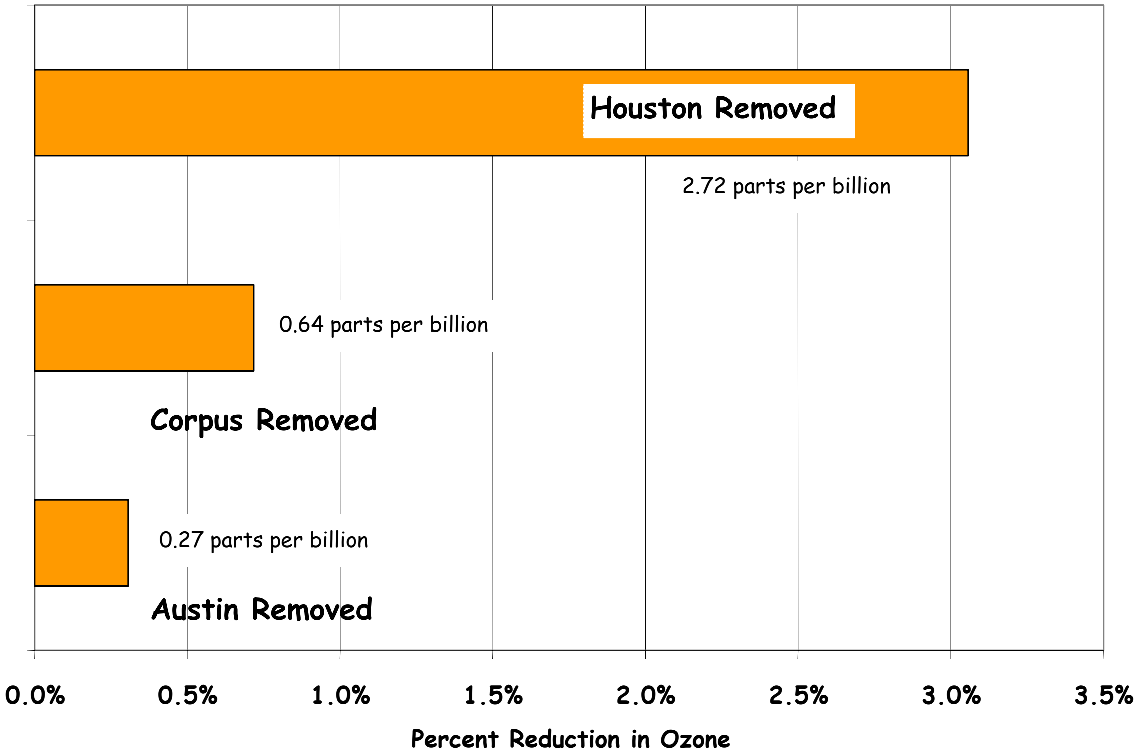
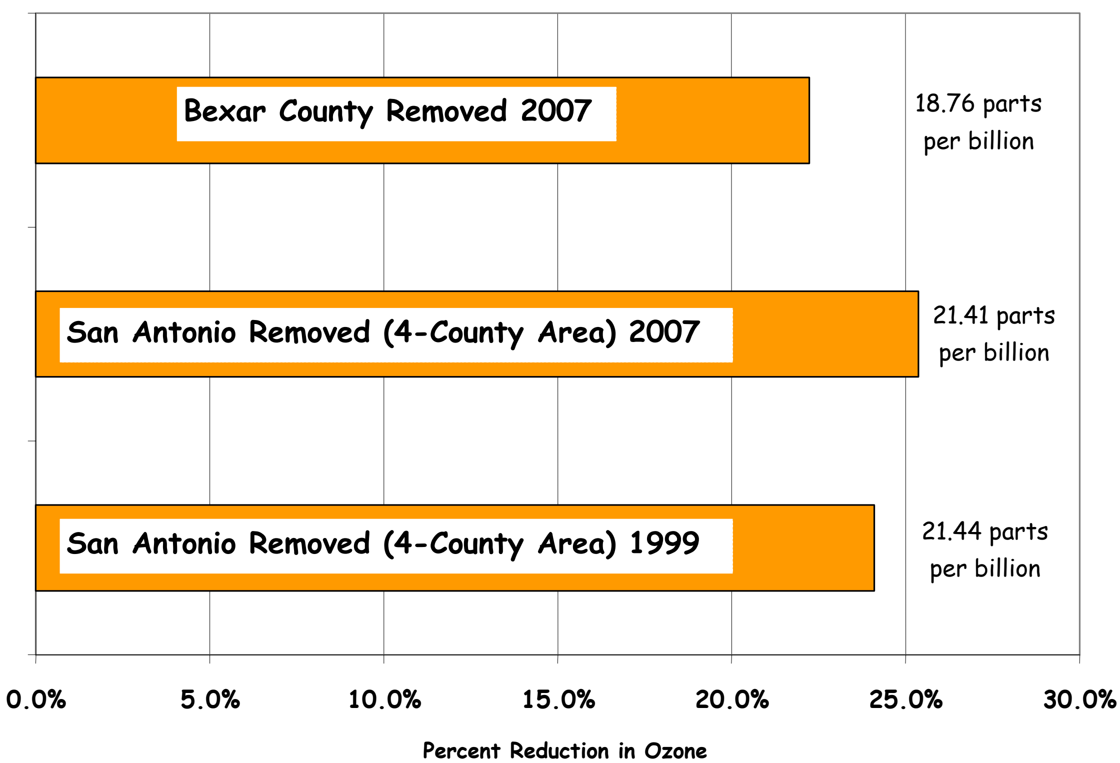


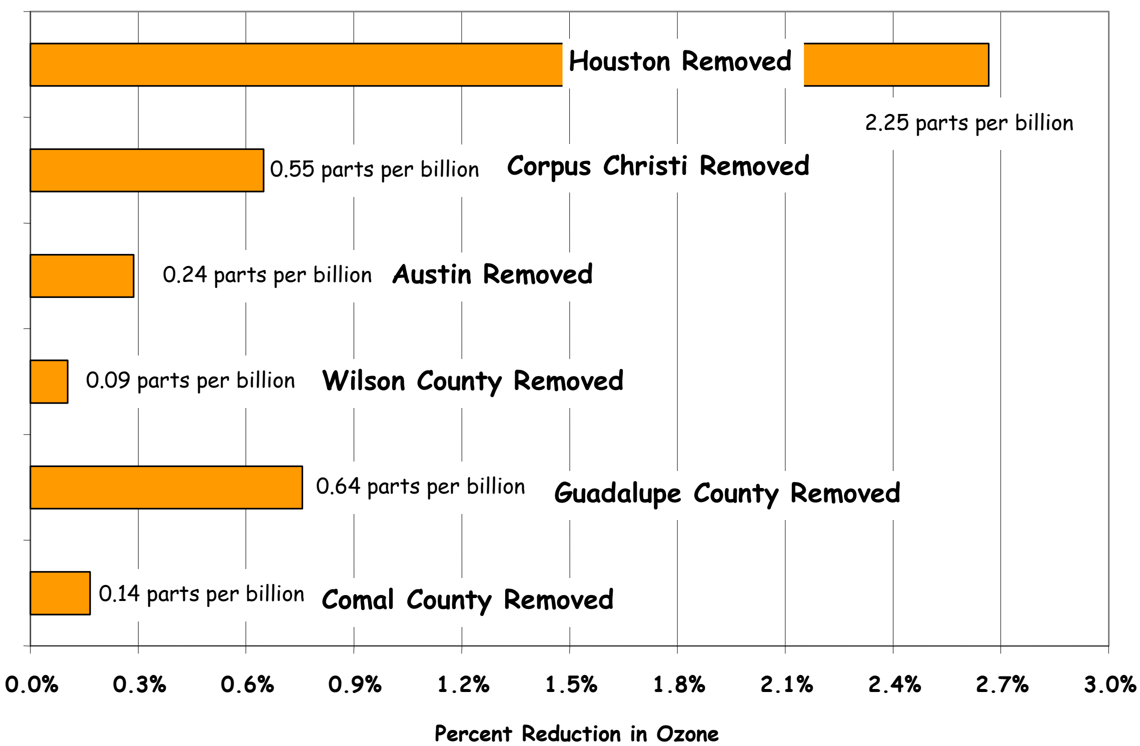
Figure M-18. Design Value Reduction due to the Removal of Bexar County and San Antonio Region Anthropogenic Emissions, CAMS 23, Sept. 1999 and 2007



Further analysis of the emission inventory for the Sept. 1999 episode revealed that removal of local (i.e., Bexar, Comal, Guadalupe and Wilson Counties) anthropogenic emissions cause an average reduction of about 25% of the peak ozone predicted around CAMS 23 during this episode. Figure M-18 shows the results of this additional analysis. The figure indicates that the proportion of emissions attributed to and originating in the local San Antonio region is predicted to increase from 1999 to 2007. Hence, the region's contribution to the design value for the Sept. 1999 episode was around 24.09% of the total design value, or 21.44 parts per billion of ozone; the estimated 2007 contribution is around 25.36%, or 21.41 ppb.

In addition, the analysis further indicates that, due to the implementation of air quality control strategies in the Houston/Galveston area by the year 2007, the amount of pollution transport from this area will noticeably decrease. However, this region still remains the largest emissions contributor to San Antonio as compared to the other contributing regions in Texas. This can be seen in Figure M-19. Contributions from other regions affecting the air quality in San Antonio region are also shown for comparison purposes.

Figure M-19. Design Value Reduction due to the Removal of Emissions from Various Contributing Areas at CAMS 23, Sept. 2007



Comparing the results of zero out runs for Austin, Corpus Christi, Houston and San Antonio, it is predicted that removing the SAER anthropogenic emissions has, by far, the greatest impact on local ozone concentrations. Therefore, it is clear the San Antonio region contributes to its own air quality problem. The 1999 base simulation predicts that without the SAER anthropogenic precursor emissions, ozone concentrations within the San Antonio region would be reduced by as much as ~24%. Although this provides an indication of the significance of SAER-generated anthropogenic emissions, it also indicates that approximately three-quarters of the ground-level ozone in the SAER is a product of natural and transported emission sources – emissions over which the SAER has no control.

Removing Houston's anthropogenic emissions had the greatest impact on San Antonio area ozone levels. Without the reductions credited to the Houston area for 2007 (attributed to reductions achieved through the Houston SIP), for example, the San Antonio region would likely fail to show attainment as it currently does.

Tables M-1 through M-3 provide the projected reduction in ozone concentrations (percent difference between Base Case F and the sensitivity run) within the 7x7 grids surrounding three San Antonio monitors after removing anthropogenic emissions for Austin, Corpus Christi, or Houston. For comparison purposes, anthropogenic VOC, NOx, and CO emissions generated in the 4-county San Antonio region were also removed from the model during one of the sensitivity runs. Results of removing or zeroing out precursor emissions are provided for both the base year and attainment year simulations.

The highest predicted ozone concentrations, in parts per billion, for each day of the September 13 – 20 episode were averaged for the areas near the three monitors listed in the columns labeled "Predicted Average O_3" in the tables below. These modeled results indicate that, under the meteorological conditions experienced during the September 1999 episode, removing the anthropogenic emissions from Houston had the greatest impact on SAER ozone concentrations when compared to other sources of transport.

The most significant reductions in predicted ozone concentrations were associated with removing anthropogenic precursor emissions generated in the 4-county San Antonio region. While transport contributes to ground-level ozone buildup in Central Texas, a significant portion of the ozone problem is created locally. This is particularly evident in figure M-18, which illustrates the importance of local precursor emissions on local ozone concentrations.

Table M-1. CAMS 23

Sensitivity Run	Year	Design Value	% Reduction
Base Case F	1999	89.00	---
Zero Austin	1999	88.73	0.31%
Zero Corpus Christi	1999	88.36	0.72%
Zero Houston	1999	86.28	3.06%
Zero San Antonio (4-county area) 1999	1999	67.56	24.09%
Base Case F	2007	84.42	---
Zero Austin	2007	84.11	0.29%
Zero Corpus Christi	2007	83.81	0.65%
Zero Houston	2007	82.11	2.67%
Zero San Antonio (4-county area) 2007	2007	63.13	25.35%

Table M-2. CAMS 58

Sensitivity Run	Year	Design Value	% Reduction
Base Case F	1999	87.00	---
Zero Austin	1999	86.60	0.46%
Zero Corpus Christi	1999	86.43	0.66%
Zero Houston	1999	84.39	3.00%
Zero San Antonio (4-county area) 1999	1999	67.47	22.44%
Base Case F	2007	82.04	---
Zero Austin	2007	81.68	0.46%
Zero Corpus Christi	2007	86.43	0.66%
Zero Houston	2007	84.39	3.00%
Zero San Antonio (4-county area) 2007	2007	67.47	22.44%

Table M-3. CAMS 678

Sensitivity Run	Year	Design Value	% Reduction
Base Case F	1999	77.00	---
Zero Austin	1999	76.84	0.21
Zero Corpus Christi	1999	76.23	1.00
Zero Houston	1999	73.97	3.93
Zero San Antonio (4-county area) 1999	1999	66.18	14.06
Base Case F	2007	74.61	---
Zero Austin	2007	74.27	0.33
Zero Corpus Christi	2007	73.97	0.77
Zero Houston	2007	72.31	2.95
Zero San Antonio (4-county area) 2007	2007	62.51	16.33

Ozone Source Apportionment Technology (OSAT) Analysis

The photochemical model can also be used to help demonstrate the relationship between sources of ozone precursors in the emissions inventory, their rates of precursor production, and the contribution these sources make to the total ambient ozone contribution within a given grid cell of the model. The specific limitations of this Ozone Source Apportionment Technology (OSAT) include:

1. the limits to determination of sources or areas beyond the grid in space and time, which the model sees as Boundary Conditions and Initial Conditions, respectively, and;
2. the increased time required for pre-processing, the model OSAT runs themselves, and data post-processing and analysis.

Nevertheless, the OSAT tool does allow a clearer determination of the sources of ambient ozone in the model. And, even given the limits listed above, the number of variables does allow for an analysis containing extensive detail and variability. This additional tool is explained as follows.

The OSAT module of the CAMx photochemical model allows for the identification of sources in specific areas and for the subsequent tracking of their impacts on different areas. This module was used to show the impact of other regions on air quality in San Antonio for the model run referred to as “run18.sos”. The *Anthropogenic Precursor Culpability Assessment* (APCA) option within this module was used to identify ozone formation attributed to the anthropogenic NOx sources, instead of ozone formation attributed to biogenic sources.

The outputs from OSAT analysis, presented in the following pages, identify contributors to the peak levels of ozone recorded at CAMS 23 during the 1999 episode by source regions, by source categories or *emission groups,* and by type of precursor (e.g., NOx).

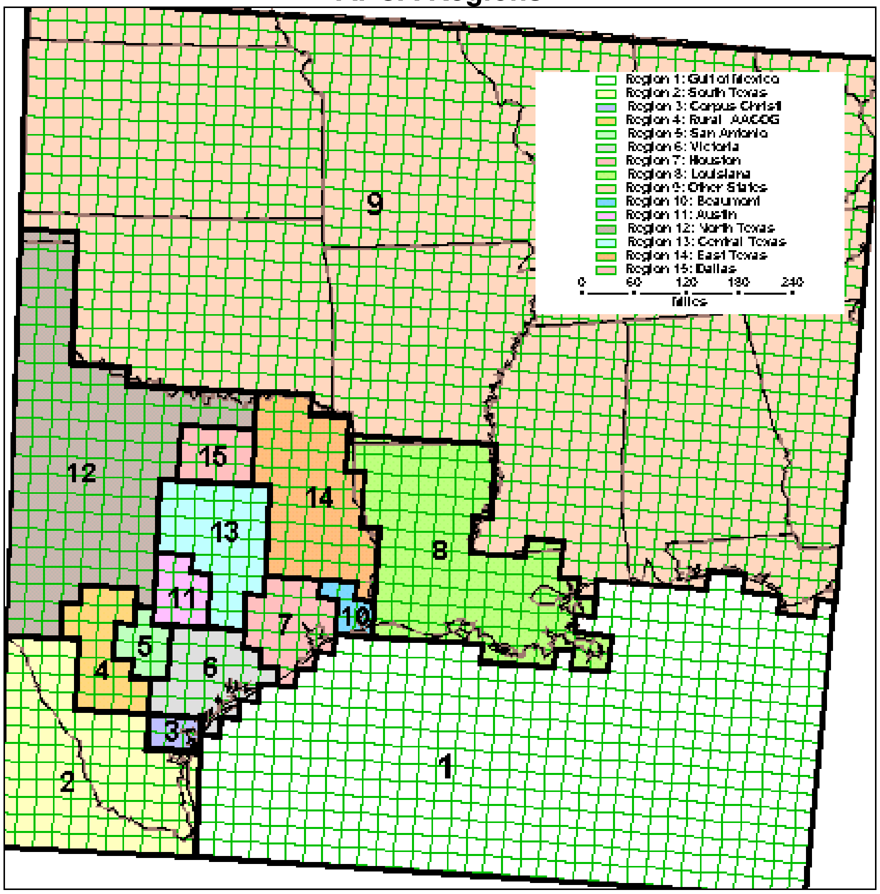
The regions by which sources are identified and distinguished are limited in number. The modeler designs them; the regions are mapped according to the modeling grid domain using grid cells as the smallest units to build the final rectangular source region or subdomain. The names of the regions for this run (Gulf of Mexico, etc.) are listed on the following page.

The precursors are categorized as one of the four major emission groups: Area/Non-Road, Mobile, Elevated Point, or Biogenic sources. The numbers in each list above identify the names and precursor type in the following charts.

The pie charts provided on the following pages are labeled with a one- or two-digit number corresponding to the Source Area ID number (or IC or BC for Initial or Boundary Conditions). This is followed by a comma, which is followed by a three-digit number corresponding to the Source Category ID number. The percentage contribution accompanies this number pair.

The tables accompanying each graph lists, in descending order by percentage contribution, the twelve greatest contributions to ozone at the "receptor" grid cell in the model. The grid cell chosen here contains the CAMS 23 monitor, so the "receptor" designation carries that name. Notice also that each row of the table identifies both a Source Area and an Emissions Group; the same row will have a percentage in the far right hand column. This percentage represents the contribution to ozone at the receptor due to precursor production from that area and that source type. For example, the September 15, 1999 table shows that NOx emissions from Austin's mobile sources contributed 3.6% of the ozone and that VOC emissions from Austin's mobile sources contributed 0.1% of the ozone predicted by the model at the receptor cell, i.e., at CAMS 23.

APCA Regions



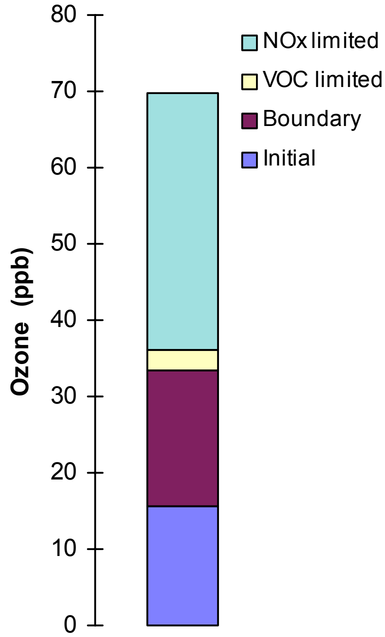
NORTH

Plot Date: March 12, 2004
Compilation Date. March 3, 2004

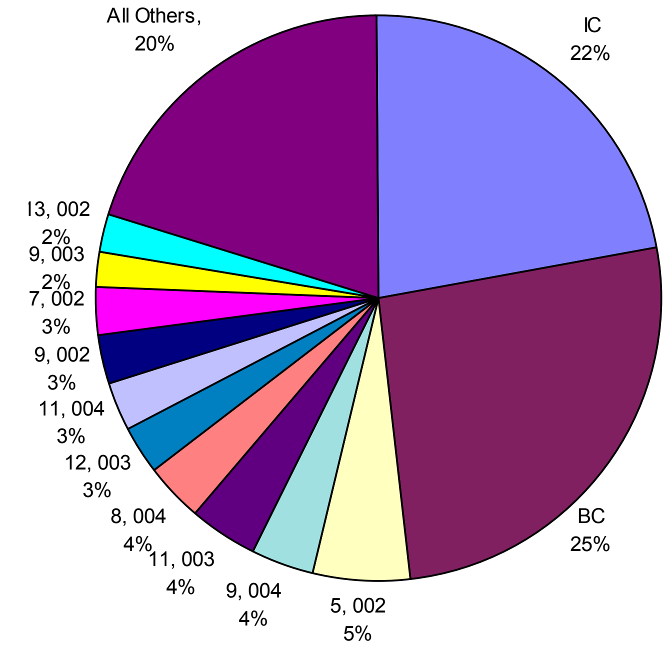
Source Areas used in The CAMx APCA Application	
ID	**Name**
1	Gulf of Mexico
2	South Texas
3	Corpus Christi
5	San Antonio
6	Victoria
7	Houston
8	Louisiana
9	Other States
10	Beaumont
11	Austin
12	North Texas
13	Central Texas
14	East Texas
15	Dallas
IC	Initial Conditions
BC	Boundary Conditions

Emission Groups used in the CAMx APCA Application	
ID	**Category**
001	Biogenic
002	Elevated Point
003	Mobile
004	Area/Non-Road

Contributions By Type



Contributions By Source Area

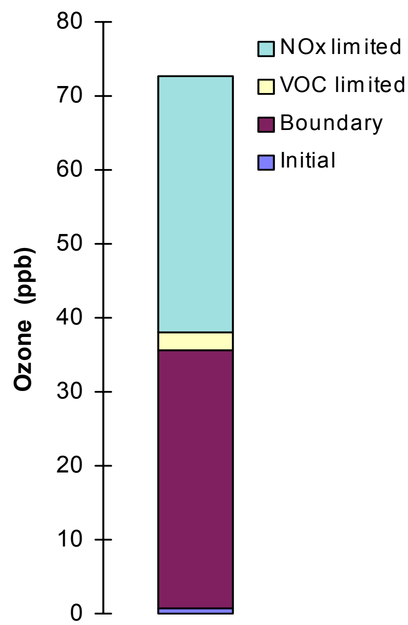


Receptor = San Antonio CAMS 23
Time = 13 To 14
Date = 9/15/1999
Scenario = CAMx v3.10 run18.sos.apca Sep 13-20 1999
Total Ozone = 70 ppb

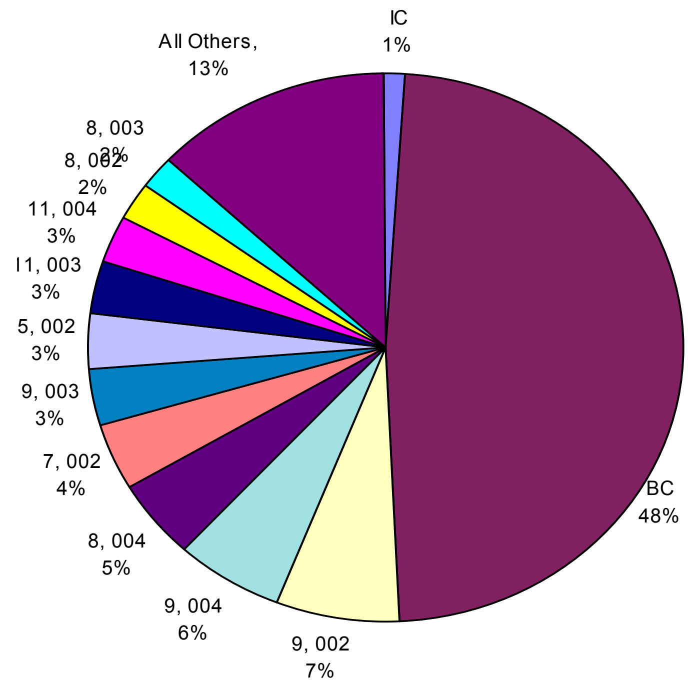
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					22.3%
Boundary Conditions	BC					25.6%
San Antonio	5	Elevated Point	002	5.5%	0.0%	5.5%
Other States	9	Area/Non-Road	004	3.3%	0.5%	3.8%
Austin	11	Mobile	003	3.6%	0.1%	3.7%
Louisiana	8	Area/Non-Road	004	3.4%	0.1%	3.5%
North Texas	12	Mobile	003	2.7%	0.1%	2.8%
Austin	11	Area/Non-Road	004	2.6%	0.1%	2.7%
Other States	9	Elevated Point	002	2.7%	0.0%	2.7%
Houston	7	Elevated Point	002	2.6%	0.0%	2.7%
Other States	9	Mobile	003	1.9%	0.2%	2.2%
Central Texas	13		002	2.1%	0.0%	2.1%
All Others						20.3%
Total						100%

Contributions By Type



Contributions By Source Area

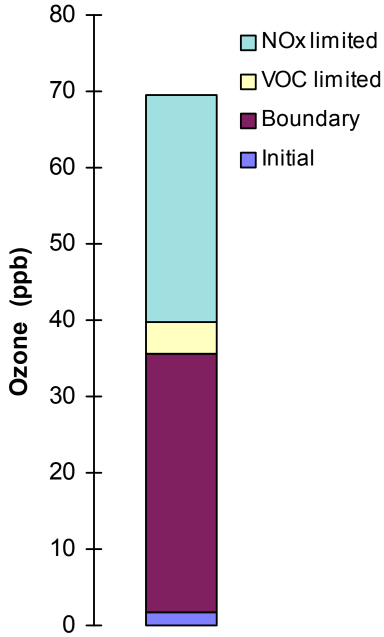


Receptor = San Antonio CAMS 23
Time = 12 To 13
Date = 9/16/1999
Scenario = CAMx v3.10 run18.sos.apca Sep 13-20 1999
Total Ozone = 73 ppb

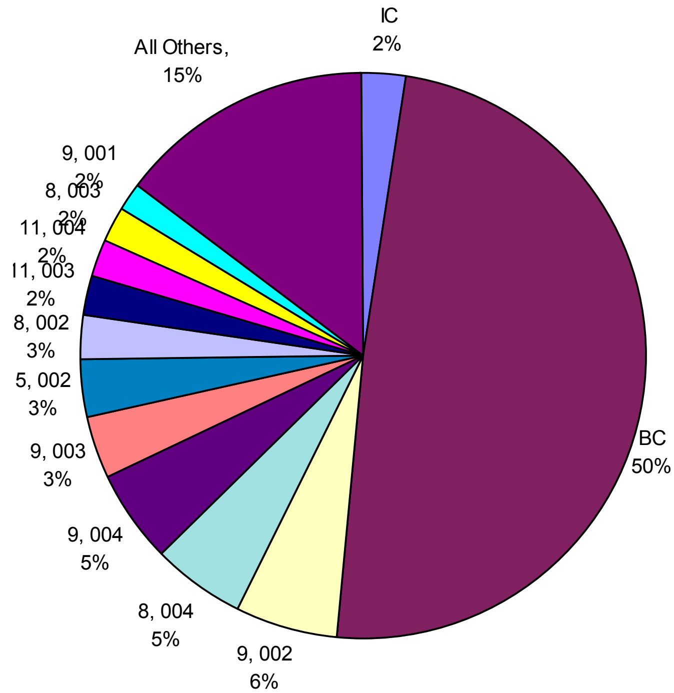
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					1.2%
Boundary Conditions	BC					47.9%
Other States	9	Elevated Point	002	6.7%	0.0%	6.7%
Other States	9	Area/Non-Road	004	4.9%	0.9%	5.8%
Louisiana	8	Area/Non-Road	004	4.8%	0.1%	4.9%
Houston	7	Elevated Point	002	3.8%	0.0%	3.8%
Other States	9	Mobile	003	3.0%	0.4%	3.4%
San Antonio	5	Elevated Point	002	3.2%	0.0%	3.2%
Austin	11	Mobile	003	3.1%	0.0%	3.2%
Austin	11	Area/Non-Road	004	2.6%	0.1%	2.6%
Louisiana	8	Elevated Point	002	2.3%	0.0%	2.3%
Louisiana	8	Mobile	003	1.9%	0.0%	1.9%
All Others						13.1%
Total						100%

Contributions By Type



Contributions By Source Area

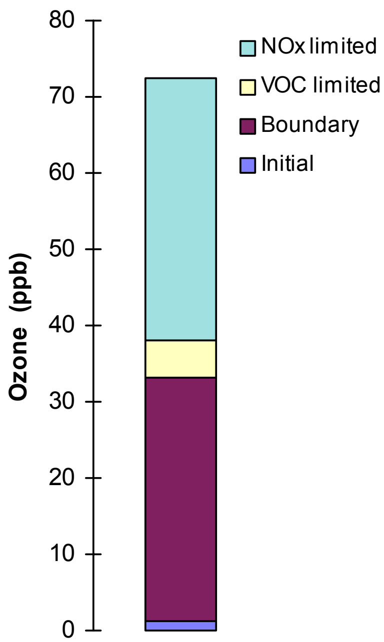


Receptor = San Antonio CAMS 23
Time = 12 to 13
Date = 9/17/1999
Scenario = CAMx v3.10 run18.sos.apca Sep 13-20 1999
Total Ozone = 70 ppb

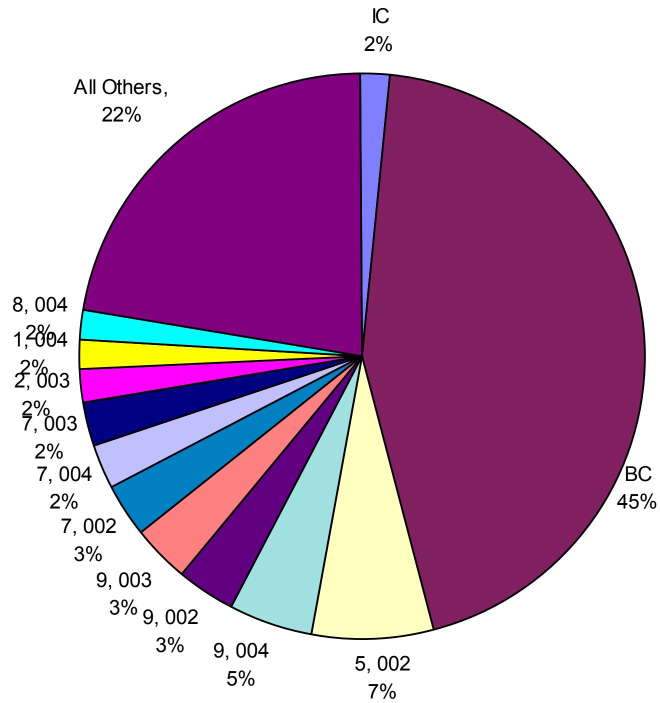
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					2.4%
Boundary Conditions	BC					48.9%
Other States	9	Elevated Point	002	5.7%	0.0%	5.8%
Louisiana	8	Area/Non-Road	004	5.2%	0.2%	5.4%
Other States	9	Area/Non-Road	004	4.0%	1.3%	5.3%
Other States	9	Mobile	003	2.9%	0.6%	3.5%
San Antonio	5	Elevated Point	002	3.4%	0.0%	3.4%
Louisiana	8	Elevated Point	002	2.7%	0.0%	2.7%
Austin	11	Mobile	003	2.0%	0.1%	2.1%
Austin	11	Area/Non-Road	004	1.9%	0.2%	2.1%
Louisiana	8	Mobile	003	1.8%	0.1%	1.9%
Other States	9	Biogenics	001	0.8%	0.8%	1.6%
All Others						14.8%
Total						100%

Contributions By Type



Contributions By Source Area

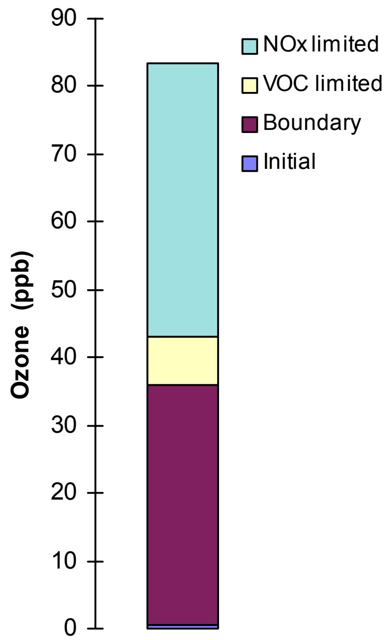


Receptor = San Antonio CAMS 23
Time = 13 To 14
Date = 9/18/1999
Scenario = CAMx v3.10 run18.sos.apca Sep 13-20 1999
Total Ozone = 72 ppb

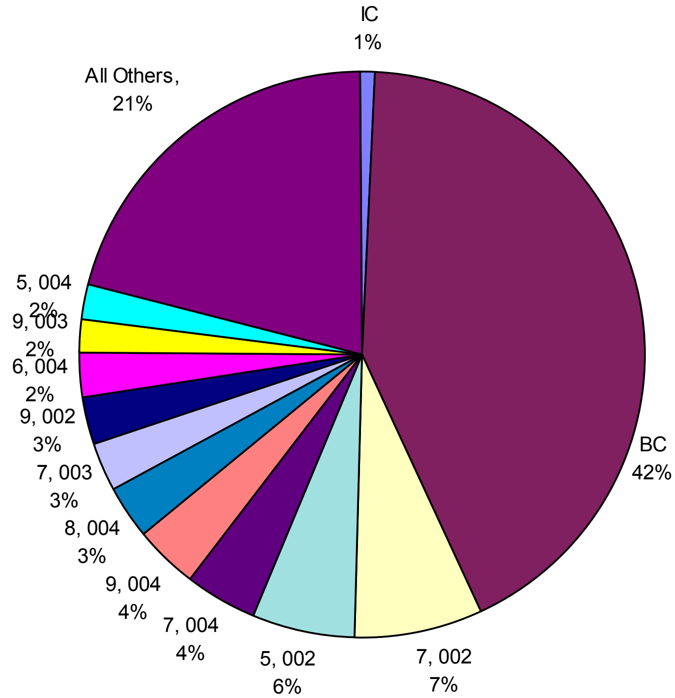
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					1.8%
Boundary Conditions	BC					44.1%
San Antonio	5	Elevated Point	002	6.9%	0.0%	7.0%
Other States	9	Area/Non-Road	004	3.7%	0.9%	4.7%
Other States	9	Elevated Point	002	3.3%	0.0%	3.3%
Other States	9	Mobile	003	2.9%	0.4%	3.3%
Houston	7	Elevated Point	002	3.0%	0.1%	3.1%
Houston	7	Area/Non-Road	004	1.7%	0.7%	2.4%
Houston	7	Mobile	003	2.0%	0.3%	2.4%
North Texas	12	Mobile	003	1.9%	0.2%	2.1%
Austin	11	Area/Non-Road	004	1.6%	0.1%	1.7%
Louisiana	8	Area/Non-Road	004	1.5%	0.1%	1.7%
All Others						22.4%
Total						100%

Contributions By Type



Contributions By Source Area

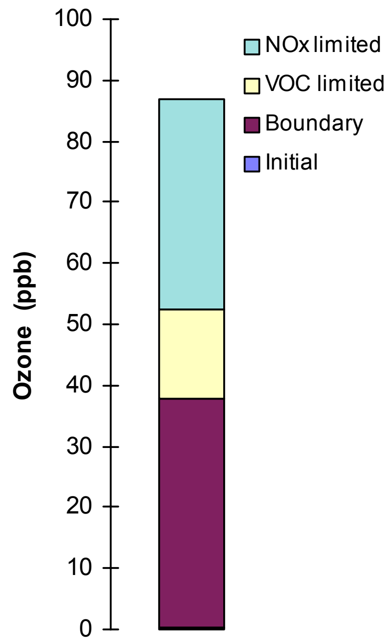


Receptor	**=**	**San Antonio CAMS 23**
Time	**=**	**13 To 14**
Date	**=**	**9/19/1999**
Scenario	**=**	**CAMx v3.10 run18.sos.apca Sep 13-20 1999**
Total Ozone	**=**	**84 ppb**

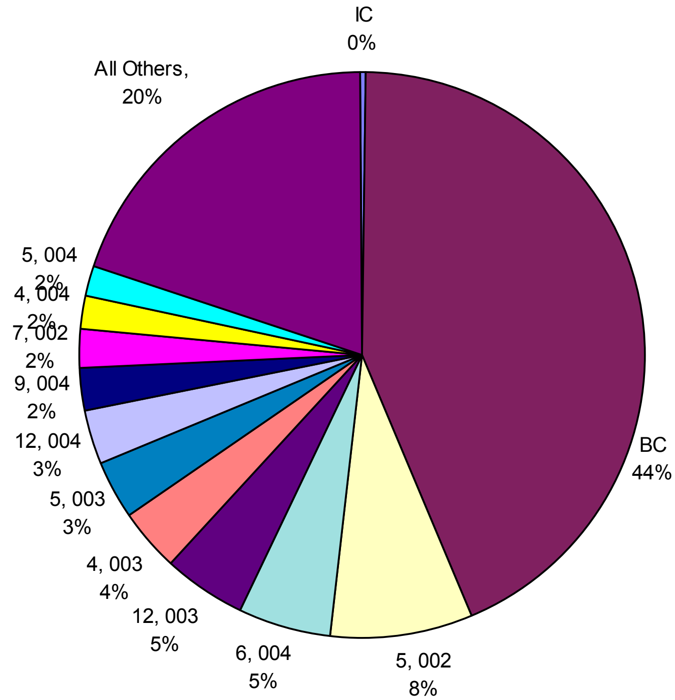
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					0.7%
Boundary Conditions	BC					42.4%
Houston	7	Elevated Point	002	7.0%	0.2%	7.2%
San Antonio	5	Elevated Point	002	5.7%	0.1%	5.8%
Houston	7	Area/Non-Road	004	3.2%	1.1%	4.2%
Other States	9	Area/Non-Road	004	2.8%	0.8%	3.6%
Louisiana	8	Area/Non-Road	004	2.8%	0.3%	3.0%
Houston	7	Mobile	003	2.5%	0.3%	2.8%
Other States	9	Elevated Point	002	2.6%	0.0%	2.7%
Victoria	6	Area/Non-Road	004	1.8%	0.6%	2.4%
Other States	9	Mobile	003	1.8%	0.3%	2.1%
San Antonio	5	Area/Non-Road	004	1.3%	0.6%	1.9%
All Others						21.1%
Total						100%

Contributions By Type



Contributions By Source Area



Receptor = San Antonio CAMS 23
Time = 14 To 15
Date = 9/20/1999
Scenario = CAMx v3.10 run18.sos.apca Sep 13-20 1999
Total Ozone = 87 ppb

Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
Initial Conditions	IC					0.3%
Boundary Conditions	BC					43.4%
San Antonio	5	Elevated Point	002	7.9%	0.1%	8.1%
San Antonio	4, 5	Mobile	003	4.6%	2.5%	7.1%
Victoria	6	Area/Non-Road	004	1.8%	3.2%	5.1%
North Texas	12	Mobile	003	3.1%	1.7%	4.7%
San Antonio	4, 5	Area/Non-Road	004	1.5%	2.2%	3.7%
North Texas	12	Area/Non-Road	004	1.3%	1.6%	2.9%
Other States	9	Area/Non-Road	004	1.7%	0.7%	2.4%
Houston	7	Elevated Point	002	2.2%	0.1%	2.3%
Houston	7	Area/Non-Road	004	1.1%	0.6%	1.7%
Other States	9	Elevated Point	002	1.6%	0.0%	1.6%
All Others						16.6%
Total						100%

Note that the contributions due to the Initial Conditions drop quickly, from 22% to approximately zero, by the end of the episode. This is anticipated, given the nature and definition of Initial Conditions. The Boundary Conditions quickly assume a greater importance than the 25% contribution on the first modeling day, September 15, 1999.

The greatest contribution by total percentage from San Antonio sources listed for any one day is 19%, on September 20th. Furthermore, September 20th is the only day when all San Antonio anthropogenic sources appear on the list of top 12 contributing sources. However, Elevated Point sources from San Antonio are consistently among the top twelve sources for every day of the episode. The hourly time periods for each daily analysis were chosen for their high hourly ozone values.

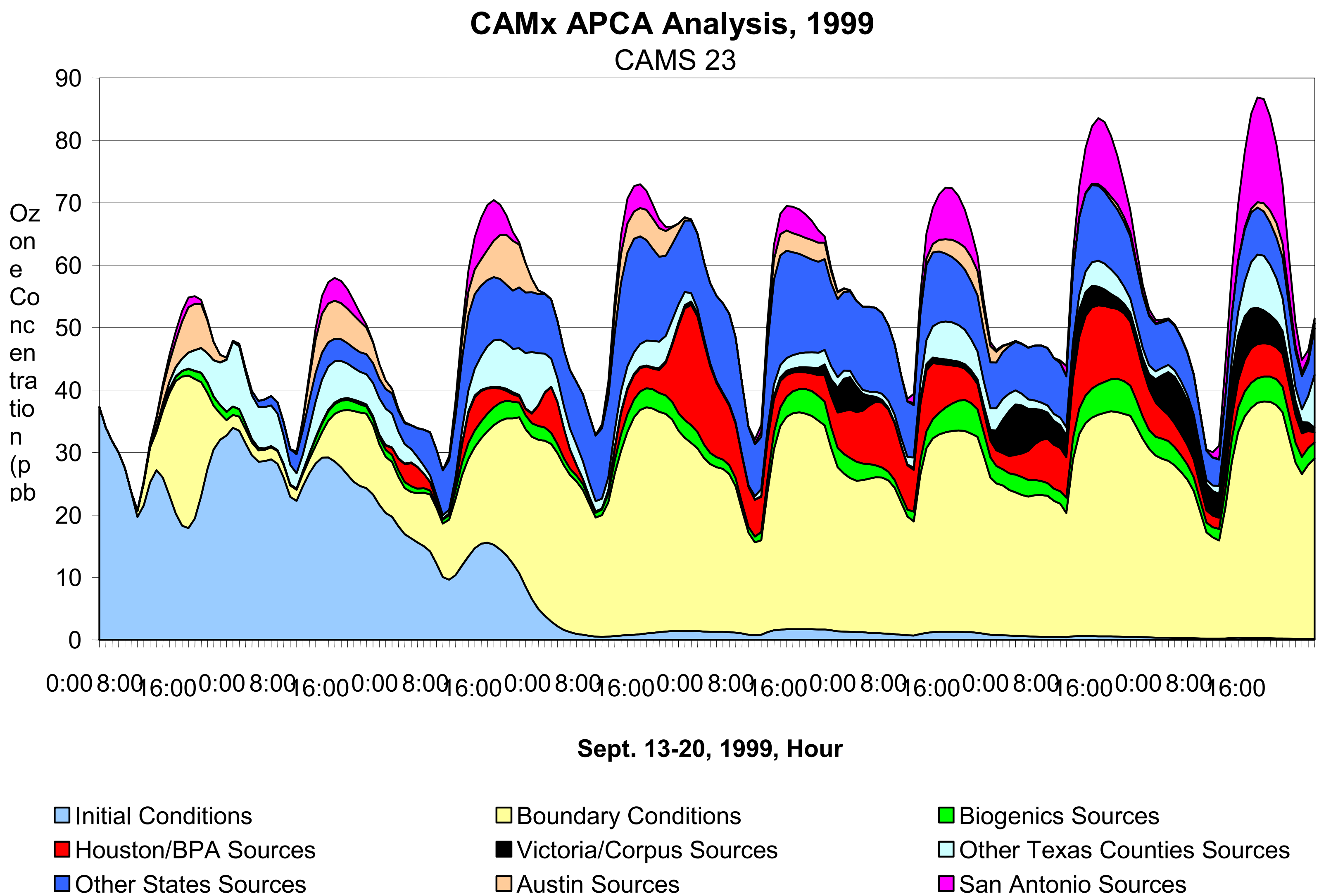
Both the consistent importance of the Boundary Conditions as a contribution source, as well as the low value of contribution from San Antonio anthropogenic emissions (never greater than 20%) in this run analysis, indicate transport is an important component of ozone concentrations in the local area.

To lend further evidence, a ribbon graph was produced, employing the OSAT module, to depict hourly ozone concentrations in parts per billion (ppb) contributed by San Antonio's neighboring areas during the September 1999 episode. To generate this graph, CAMS 23 was specified in the coordinate of the CAMx grid as a "point" for defining the receptor. Concentrations at the point are determined using bi-linear interpolation of the surrounding four coarse-grid surface cells as described in the ENVIRON CAMx User's Guide, Version 3.00 pages 5-17.

The following graph, which clearly shows the diurnal variation of ozone during the episode, uses different colors to identify the amount of ozone generated from each *source category* included in the study area. The San Antonio source category (magenta shading), with the exception of the eighth episode day, appears to have contributed a small portion of the total ozone concentrations during this episode.

The impacts of initial conditions (light blue), boundary conditions (yellow), and biogenic sources are represented at the bottom of the graph . As the graph reveals, contributions from sources such as other states (dark blue) and the Houston area (red) at times exceed 18 ppb.

Maximum contribution levels for selected areas during various days of the episode are:
Other states – 18.2 ppb on the fourth day.
Houston/ Beaumont and Port Arthur – 19.2 ppb on the fourth day.
San Antonio – 16.7 ppb on the eighth day.



CAMx APCA Analysis, 1999
CAMS 23
Ozone Concentration (ppb
90
80
70
60
50
40
30
20
10
0
0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00
Sept. 13-20, 1999, Hour
Initial Conditions
Boundary Conditions
Biogenics Sources
Houston/BPA Sources
Victoria/Corpus Sources
Other Texas Counties Sources
Other States Sources
Austin Sources
San Antonio Sources

The OSAT module was also used to show the impact of other regions on air quality in 2007 for San Antonio. In 2007, Area and Non-Road sources contributed a higher percentage of ozone production than 1999. As shown in table M-4, in 1999, Area and Non-Road emissions accounted for 33% of the ozone production near CAMS 23. In 2007, these categories contributed 42% of ozone production. However, the contribution from Point and Mobile emission sources decreased over the same period. The values listed in the table are for peak ozone concentrations averaged over the six primary modeling days (September 15 – 20, 1999) for each year.

Table M-4. Contribution to Ozone by Emission Group for 1999 and 2007, CAMS 23

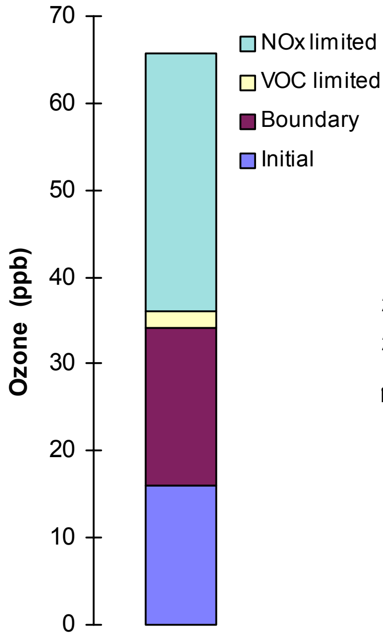
Emission Group	1999		2007	
	Average ppb.	Weighted percentage*	Average ppb.	Weighted percentage*
Initial Conditions	3.4	-	3.5	-
Boundary Conditions	32.0	-	32.4	-
Biogenic	3.6	8.9%	4.0	11.5%
Point	12.9	32.0%	8.9	25.4%
Mobile	10.4	25.8%	7.6	21.6%
Area/Non-Road	13.5	33.4%	14.5	41.5%
Total	75.8	100.0%	70.8	100.0%

*percentages do not include Initial Conditions and Boundary Conditions

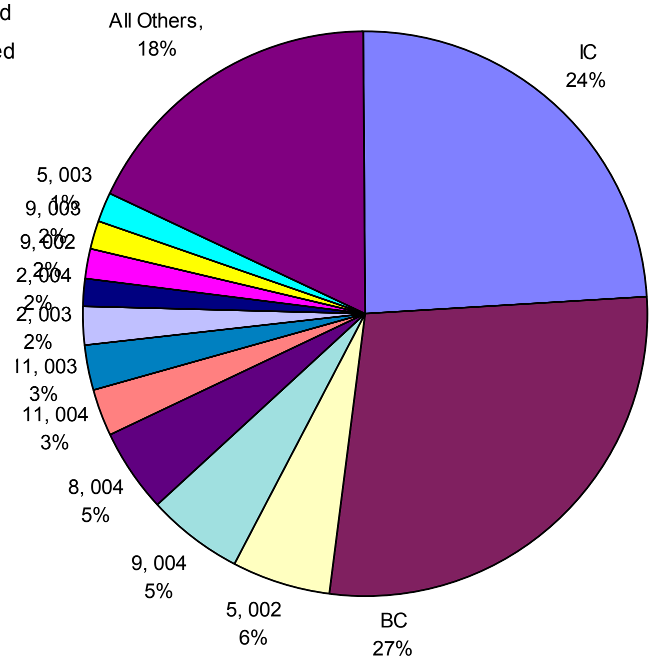
OSAT analyses were also conducted on the 2007 future case. The outputs from the 2007 OSAT analysis, presented in the following pages, identify contributors to the peak levels of ozone recorded at CAMS 23 by source regions, by emission groups, and by type of precursor. The tables accompanying each graph lists, in descending order by percentage contribution, the twelve greatest contributions to ozone at the "receptor," or grid cell in the model for 2007. As with 1999, the grid cell chosen here contains the CAMS 23 monitor, so the "receptor" designated carries that name.

Each row of the table identifies both a Source Area and an Emissions Group; the same row will have a percentage in the far right hand column. This percentage corresponds to the contribution to ozone at the receptor due to precursor production from that area and that source type.

Contributions By Type



Contributions By Source Area

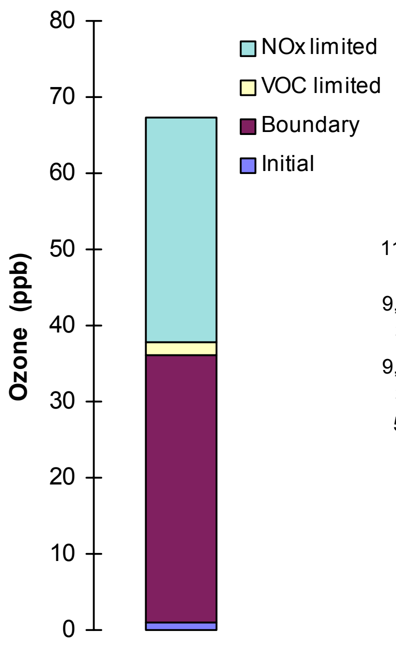


Receptor	**=**	**San Antonio CAMS 23**
Time	**=**	**13 To 14**
Date	**=**	**9/15/2007**
Scenario	**=**	**CAMx v3.10 run18.2007.apca Sep 13-20 1999**
Total Ozone	**=**	**66 ppb**

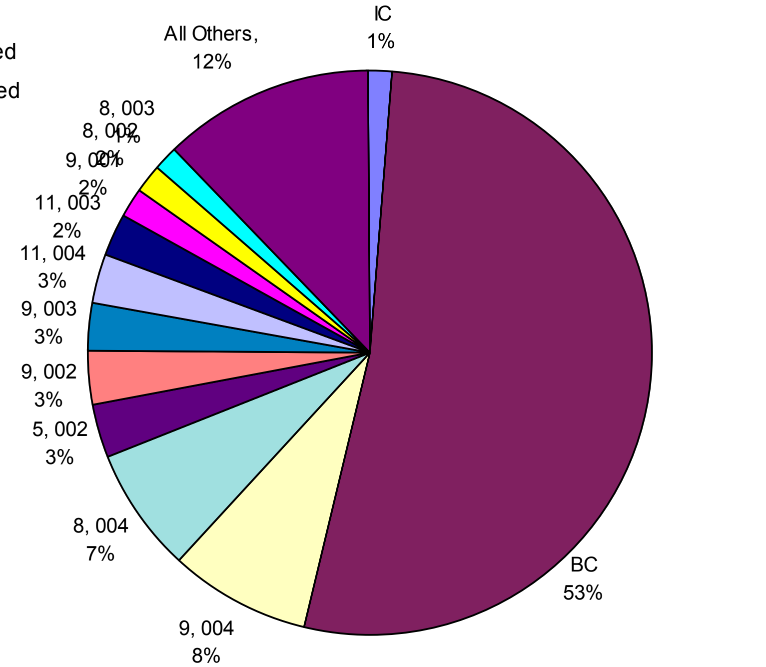
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
IC	IC					24.3%
BC	BC					27.7%
San Antonio	5	Elevated Point	002	5.6%	0.0%	5.6%
Other States	9	Area/Non-Road	004	5.1%	0.4%	5.5%
Louisiana	8	Area/Non-Road	004	4.6%	0.1%	4.7%
Austin	11	Area/Non-Road	004	2.7%	0.1%	2.8%
Austin	11	Mobile	003	2.5%	0.0%	2.6%
North Texas	12	Mobile	003	2.0%	0.1%	2.1%
North Texas	12	Area/Non-Road	004	1.6%	0.2%	1.8%
Other States	9	Elevated Point	002	1.8%	0.0%	1.8%
Other States	9	Mobile	003	1.6%	0.1%	1.7%
San Antonio	5	Mobile	003	1.4%	0.0%	1.5%
All Others						18.1%
Total						100%

Contributions By Type



Contributions By Source Area

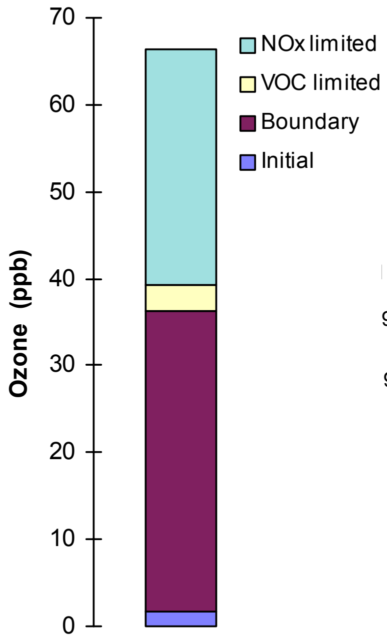


Receptor = San Antonio CAMS 23
Time = 12 To 13
Date = 9/16/2007
Scenario = CAMx v3.10 run18.2007.apca Sep 13-20 1999
Total Ozone = 67 ppb

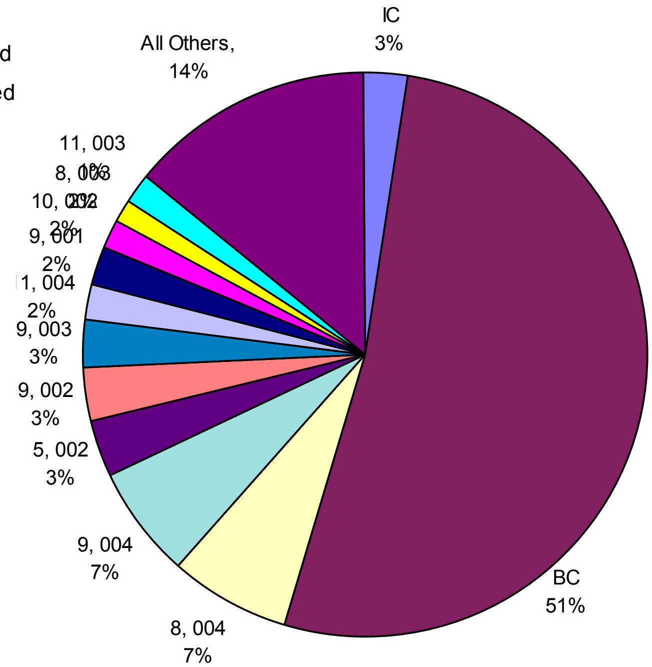
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from*		
				NOx	*VOC*	*Total*
IC	IC					1.3%
BC	BC					52.4%
Other States	9	Area/Non-Road	004	7.5%	0.5%	8.1%
Louisiana	8	Area/Non-Road	004	7.0%	0.0%	7.1%
San Antonio	5	Elevated Point	002	3.2%	0.0%	3.2%
Other States	9	Elevated Point	002	3.0%	0.0%	3.1%
Other States	9	Mobile	003	2.7%	0.1%	2.8%
Austin	11	Area/Non-Road	004	2.7%	0.1%	2.7%
Austin	11	Mobile	003	2.3%	0.0%	2.4%
Other States	9	Biogenics	001	1.2%	0.6%	1.8%
Louisiana	8	Elevated Point	002	1.6%	0.0%	1.6%
Louisiana	8	Mobile	003	1.5%	0.0%	1.5%
All Others,	All Others					12.2%
Total						100%

Contributions By Type



Contributions By Source Area

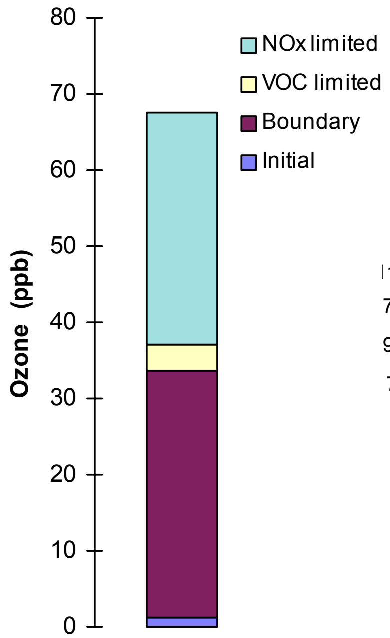


Receptor = San Antonio CAMS 23
Time = 12 To 13
Date = 9/17/2007
Scenario = CAMx v3.10 run18.2007.apca Sep 13-20 1999
Total Ozone = 66 ppb

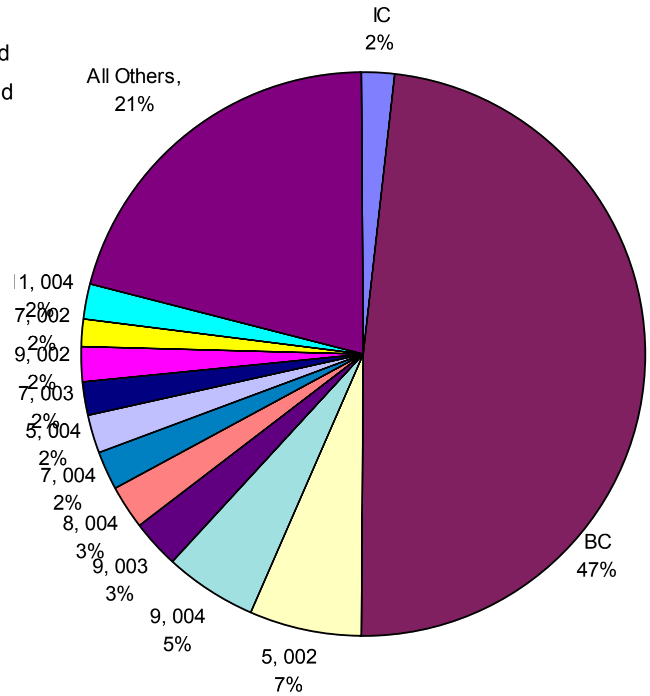
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
IC	IC					2.6%
BC	BC					51.9%
Louisiana	8	Area/Non-Road	004	6.8%	0.1%	6.9%
Other States	9	Area/Non-Road	004	5.7%	0.8%	6.5%
San Antonio	5	Elevated Point	002	3.2%	0.0%	3.2%
Other States	9	Elevated Point	002	2.9%	0.0%	2.9%
Other States	9	Mobile	003	2.6%	0.2%	2.8%
Austin	11	Area/Non-Road	004	1.9%	0.2%	2.1%
Other States	9	Biogenics	001	1.3%	0.8%	2.1%
Beaumont	10	Elevated Point	002	1.6%	0.0%	1.7%
Louisiana	8	Mobile	003	1.5%	0.0%	1.6%
Austin	11	Mobile	003	1.4%	0.0%	1.5%
All Others,	All Others					14.3%
Total						100%

Contributions By Type



Contributions By Source Area

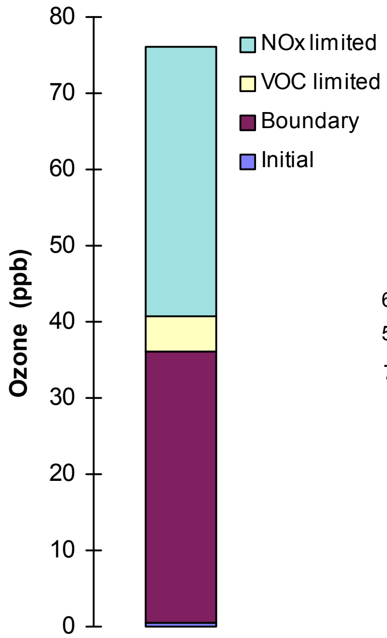


Receptor = San Antonio CAMS 23
Time = 13 To 14
Date = 9/18/2007
Scenario = CAMx v3.10 run18.2007.apca Sep 13-20 1999
Total Ozone = 68 ppb

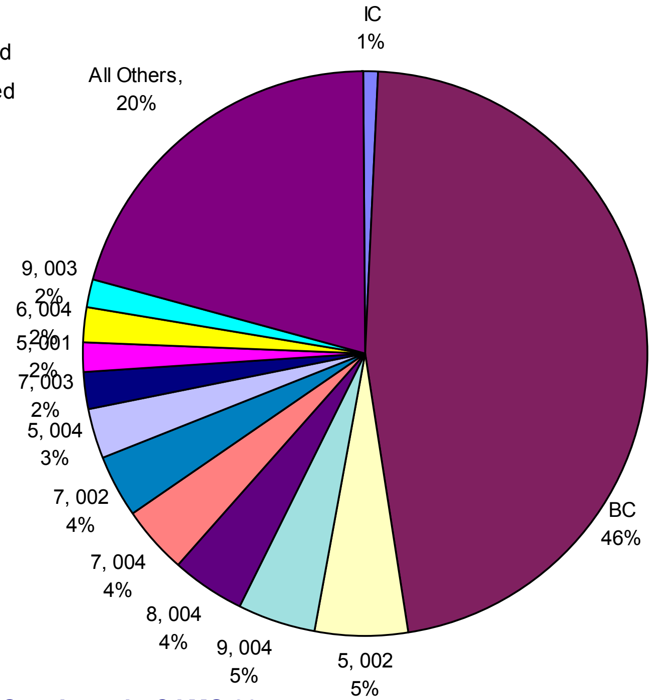
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
IC	IC					2.0%
BC	BC					48.0%
San Antonio	5	Elevated Point	002	6.5%	0.0%	6.5%
Other States	9	Area/Non-Road	004	4.7%	0.6%	5.2%
Other States	9	Mobile	003	2.5%	0.2%	2.7%
Louisiana	8	Area/Non-Road	004	2.5%	0.1%	2.6%
Houston	7	Area/Non-Road	004	1.8%	0.5%	2.3%
San Antonio	5	Area/Non-Road	004	2.0%	0.2%	2.1%
Houston	7	Mobile	003	1.8%	0.1%	2.0%
Other States	9	Elevated Point	002	1.9%	0.0%	1.9%
Houston	7	Elevated Point	002	1.7%	0.1%	1.8%
Austin	11	Area/Non-Road	004	1.6%	0.1%	1.7%
All Others,	All Others					21.2%
Total						100%

Contributions By Type



Contributions By Source Area

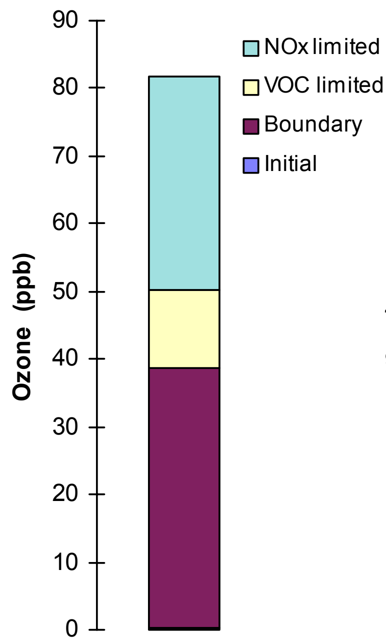


Receptor	**=**	**San Antonio CAMS 23**
Time	**=**	**13 To 14**
Date	**=**	**9/19/2007**
Scenario	**=**	**CAMx v3.10 run18.2007.apca Sep 13-20 1999**
Total Ozone	**=**	**76 ppb**

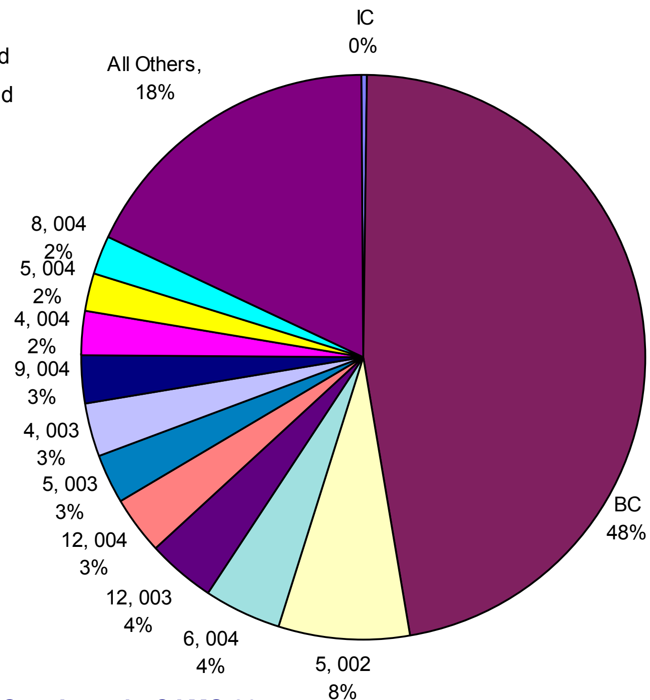
Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
IC	IC					0.8%
BC	BC					46.6%
San Antonio	5	Elevated Point	002	5.2%	0.1%	5.2%
Other States	9	Area/Non-Road	004	4.0%	0.5%	4.5%
Louisiana	8	Area/Non-Road	004	4.1%	0.1%	4.2%
Houston	7	Area/Non-Road	004	3.1%	0.7%	3.8%
Houston	7	Elevated Point	002	3.6%	0.2%	3.8%
San Antonio	5	Area/Non-Road	004	2.4%	0.4%	2.7%
Houston	7	Mobile	003	2.0%	0.1%	2.1%
San Antonio	5	Biogenics	001	1.3%	0.6%	1.9%
Victoria	6	Area/Non-Road	004	1.3%	0.4%	1.7%
Other States	9	Mobile	003	1.6%	0.1%	1.7%
All Others,	All Others					20.9%
Total						100%

Contributions By Type



Contributions By Source Area



Receptor = San Antonio CAMS 23
Time = 14 To 15
Date = 9/20/2007
Scenario = CAMx v3.10 run18.2007.apca Sep 13-20 1999
Total Ozone = 82 ppb

Detailed Ozone Apportionment

Source Area		*Emission Group*		*Percent Ozone from NOx*	*VOC*	*Total*
IC	IC					0.4%
BC	BC					46.9%
San Antonio	5	Elevated Point	002	7.4%	0.1%	7.6%
San Antonio	5, 4	Mobile	003	4.3%	1.5%	5.9%
San Antonio	5, 4	Area/Non-Road	004	2.5%	2.2%	4.6%
Victoria	6	Area/Non-Road	004	1.5%	2.9%	4.4%
North Texas	12	Mobile	003	2.7%	1.1%	3.7%
North Texas	12	Area/Non-Road	004	1.8%	1.6%	3.3%
Other States	9	Area/Non-Road	004	2.4%	0.5%	2.9%
Louisiana	8	Area/Non-Road	004	2.0%	0.1%	2.1%
Houston	7	Area/Non-Road	004	1.1%	0.5%	1.6%
Victoria	6	Biogenics	001	0.8%	0.7%	1.5%
All Others,	All Others					15.1%
Total						100%

The greatest contribution, by total percentage, from San Antonio sources listed for any one day is 18% on September 20 in 2007 compared to 19% in 1999. The only day all San Antonio anthropogenic sources appear in the list of top twelve contributors is September 20th.

The contribution made to San Antonio ozone concentrations by Houston's elevated point sources decreases significantly when projected to 2007. This is especially evident on the last three days of the modeling episode (Sept. 18th, 19th, and 20th). On September 19th in 1999, emissions from Houston's elevated point sources contributed 7.2% of ozone production (first on the list). For the same day in 2007, Houston's elevated point sources contributed 3.8% of the ozone in San Antonio and was ranked 5th.

The values in Table M-5 provide comparisons of peak ozone averages over the six primary modeling days, by contribution source, for 1999 and 2007. Overall, Houston's contributions decreased from 14.8 percent on average in 1999 to 11.5% in 2007. This shows the reduction that control strategies in the Houston's SIP are projected to have on San Antonio Ozone levels. Although Houston's contribution decreased in 2007, contributions from other regions remained high, as indicated by the data listed in Table M-5. When averaged over the six primary modeling days, San Antonio contributed only 8.5 ppb in 1999 and 7.7 ppb in 2007.

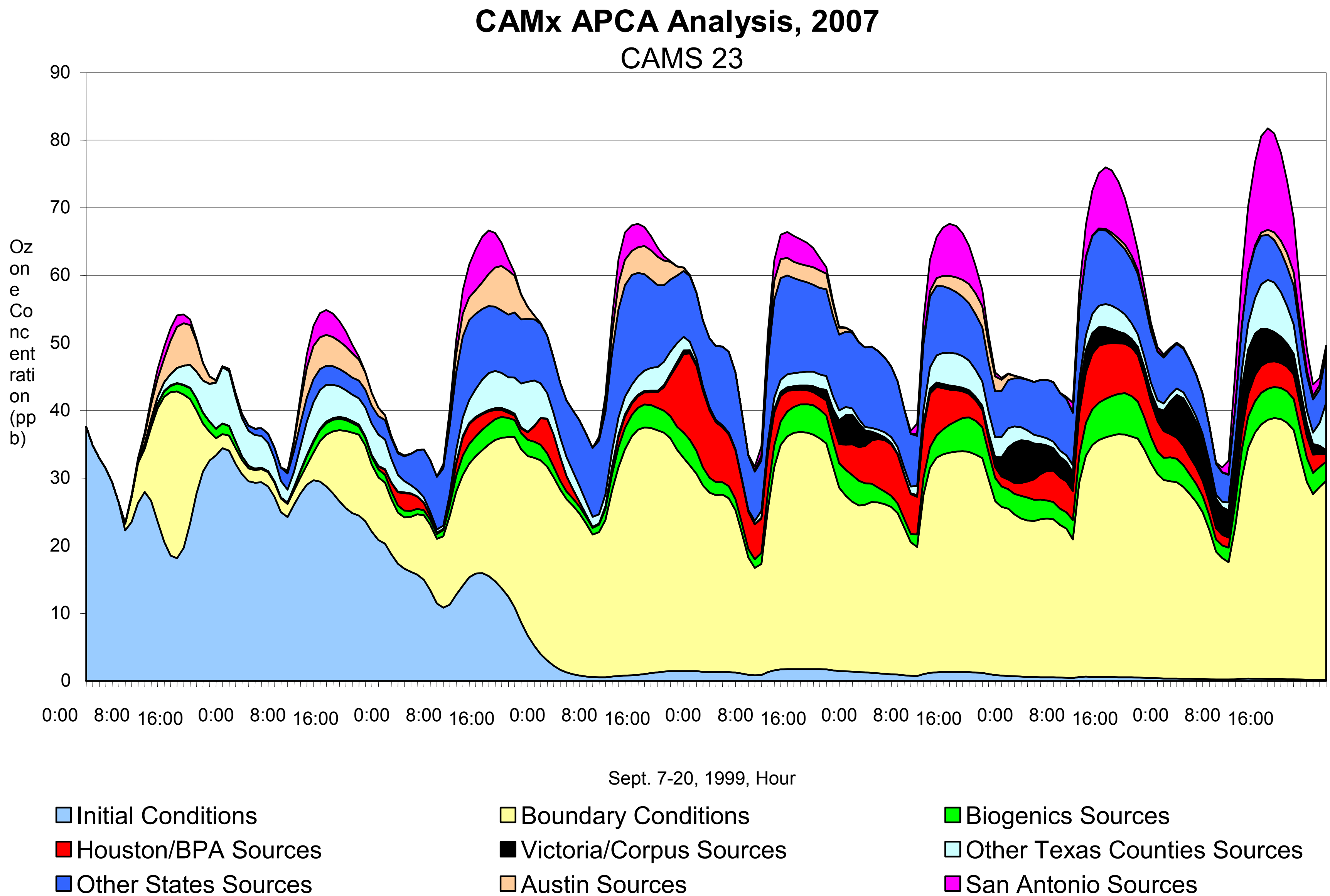
Table M-5. Contribution to Ozone by Source Area for 1999 and 2007, CAMS 23

Emission Group	1999		2007	
	Average ppb.	Weighted percentage*	Average ppb.	Weighted percentage*
Initial Conditions	3.4		3.5	
Boundary Conditions	32.0		32.4	
Biogenics Sources	3.6	8.9%	4.0	11.5%
Houston/BPA Sources	6.1	14.8%	4.1	11.5%
Victoria/Corpus Sources	1.8	4.1%	1.5	3.9%
Other Texas Counties Sources	5.1	12.7%	4.2	11.8%
Other States Sources	12.7	32.3%	11.4	33.4%
Austin Sources	2.6	6.9%	2.2	6.5%
San Antonio Sources	8.5	20.4%	7.7	21.5%
Total	75.8	100.0%	70.8	100.0%

*percentages do not include Initial Conditions and Boundary Conditions

The following graph shows the hourly contribution from each source in the San Antonio region. San Antonio source category (magenta shading), with the exception of the eighth day, contributed a small portion of the total ozone concentrations during this episode.

Maximum contribution levels for selected areas during various days of the episode are:
Other states – 16. 5 ppb in 2007 (18.2 ppb in 1999) on the fourth day.
Houston/ Beaumont and Port Arthur – 12.7 ppb in 2007 (compared to 19.2 ppb in 1999) on the fourth day.
San Antonio – 15.0 ppb in 2007 (16.7 ppb in 1999) on the eighth day.


CAMx APCA Analysis, 2007
CAMS 23
Ozone Concentration (ppb)
90
80
70
60
50
40
30
20
10
0
0:00
8:00
16:00
Sept. 7-20, 1999, Hour
Initial Conditions
Boundary Conditions
Biogenics Sources
Houston/BPA Sources
Victoria/Corpus Sources
Other Texas Counties Sources
Other States Sources
Austin Sources
San Antonio Sources

Conclusion
The effects of transport on local ozone levels have been verified across parts of the United States, notably during the May 1998 smoke episode and the September 2002 haze event. Furthermore, EPA excluded certain days of ozone data from compliance calculations in nine states due to the May 1998 fires. Historically, as air arrives in San Antonio during a day of local high ozone levels, the air typically flows from the east across a variety of point sources throughout the state of Texas.

An analysis of the 1999 photochemical model has been used to demonstrate evidence of transport. It is important to keep in mind that the results from the model analysis pertain to a single episode, and so illustrate a result specific to that particular episode. On the other hand, the September 13-20, 1999 period was chosen specifically because the wind patterns were typical of ozone episodes for the region, as documented in Appendix A. Reducing anthropogenic emissions from selected Texas cities in the 1999 photochemical model also shows the influence of transport from individual sources.

Finally, the local 2007 design value of 84.35 ppb is lowered only 21.97 ppb by removing all anthropogenic emissions in the four-county Early Action Compact region of San Antonio. This indicates that the maximum ozone reductions possible through enactment of local strategies in the San Antonio EAC region is limited. Moreover, the limited depth of ozone reductions through local actions indicates the degree to which successful air quality efforts can best be achieved through state and federal efforts coupled with local actions. Success of the San Antonio Clean Air Plan relies upon support of our local planning effort by the Texas Commission on Environmental Quality and the US Environmental Protection Agency. However, it also strongly relies on the success of TCEQ and EPA to fully enact both the State Implementation Plan revisions currently proposed by the state of Texas, notably for Houston, and on continued support for and enactment of further state and federal air quality rules.

Addendum: the State of Texas
The State of Texas is also very active in consideration of transport issues.

The Sonoma Technology study (MacDonald et al., 1999) was supported by TCEQ and reported that, on average, 40% of San Antonio's peak ozone was locally generated. Furthermore, the study concluded that background ozone was around 70 ppb, with local sources adding approximately 45 ppb. Sonoma analysts also studied the impact of transport from two high-ozone aircraft flight days where long-range trajectories were available. Analysts concluded that high ozone episodes were associated with local stagnation and/or recirculation during night and morning hours. During one case (August 28, 1998 flight), it was determined that material was transported from the south with background ozone at 69 ppb. During the second case (October 9, 1998 flight), material was transported from the northeast with background ozone at 78 ppb.

Other actions by the State are equally proactive. R. B. "Ralph" Marquez, TCEQ Commissioner, spoke before the US House of Representatives' Subcommittee on Energy and Air Quality on July 22, 2003. He gave the subcommittee two examples of transport as he recognized them. From his remarks:

> The first example is one of interstate transport which demonstrates a September 2002 haze episode in which haze formed in the Midwestern U.S. and moved across the eastern U.S. and into the southern states and Texas over several days. Our analysis of satellite imagery and monitor readings of ozone and particulate matter shows the impact of pollutant transport on Texas communities during the September episode. For example, 8-hour ozone values in Houston climbed from 41 ppb on September 9 to144 ppb on September 13, 2002. On those same days, particulate matter climbed from 7 micrograms/cubic meter to 56 micrograms/cubic meter. Similar increases for these pollutants occurred in other major metropolitan areas, Dallas-Fort Worth, San Antonio, and Beaumont-Port Arthur. The second case is an example of intrastate transport on a day (September 1, 2000) when the Beaumont-Port Arthur (BPA) area exceeds the one-hour ozone standard at least partially due to transport from the Houston area. In fact, when we reviewed all of the 1-hour ozone exceedances between 1998 and 2002, we found that approximately one-half of the exceedances occurred on days when there was a contribution from Houston. In addition, the highest monitored readings in BPA occurred on days when there was a contribution from Houston. <u>'Bump Up' (2003)</u>

The Air Improvement Resources (AIR) Committee continues to support these findings and is dedicated to finding solutions to transport issues. On March 3, 2004, the AIR Executive and Advisory Committees approved the following text, which was subsequently sent in a letter to TCEQ Chairman Kathleen Hartnett White:

> Dear Chairman White,
> As you are certainly aware, transport of ozone and ozone precursors into the San Antonio region can be a significant component of our area's high ozone and high PM2.5 levels. The effects of smoke from Mexico on our local air pollution in 1998 were well documented by the US Environmental Protection Agency. Former TCEQ Chairman Huston reported to us that evidence of haze as distant as the Ohio River Valley has coincided with widespread high pollution and visibility reductions here in mid-September 2002. In a letter to AIR Committee Chairman Jay Millikin dated April 4, 2003, Chairman Huston wrote, "In every ozone exceedance recorded to date in the San Antonio area, we have measured high background levels coming into the area." While he also cautioned that "each urban area of the state, including San

Antonio, contributes significantly to its own pollution," this fact in and of itself does not diminish the effect of transport.

The Air Improvement Resources Committee requests the Texas Commission on Environmental Quality to develop an action plan to deal with transport issues. We hope that action by the state of Texas, in coordination and collaboration with other states in this country and with our neighbors in Mexico, as well as any other sources of pollution that come to us from beyond our borders, can help us meet our air pollution challenge effectively.

We remain committed to improving local air quality through our Early Action Compact, other local endeavors undertaken by local citizens and agencies, and our continuing cooperation with the state provided by legislated aid.

The letter was signed by Chairman Jay Millikin, a Commissioner of Comal County, Texas, and Vice Chairman Nelson Wolff, County Judge of Bexar County, Texas.

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EPA's John S. Seitz before the US Senate Subcommittee On Clean Air, Wetlands, Private Property And Nuclear Safety, November 13, 2000: http://www.senate.gov/~epw/107th/sei_1113.htm

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http://energycommerce.house.gov/108/Hearings/07222003hearing1025/Marquez1615.htm