Progress Report
for the
Central Oklahoma Early Action Compact
State Implementation Plan

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to the
United States Environmental Protection Agency Region VI
by the
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Technical Support Document

prepared by Environ (3-28-2005)

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prepared by The Oklahoma Department of Environmental Quality

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Technical Support Document

prepared by

Environ 3-28-2005

Technical Support Document

Photochemical Modeling for the Tulsa and Oklahoma City
8-Hour Ozone Early Action Compact (EAC)
State Implementation Plan (SIP)

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1. INTRODUCTION

BACKGROUND

The US Environmental Protection Agency (EPA) 1-hour ozone National Ambient Air Quality Standard (NAAQS) has a threshold of 0.12 ppm (124 ppb) with an expected exceedance rate of no more than once per year over three consecutive years (i.e., with complete data capture compliance with the 1-hour ozone NAAQS requires that the fourth highest daily maximum 1-hour ozone concentration in three years at every ozone monitor to be less than or equal to 0.12 ppm). Areas that violate the 1-hour ozone NAAQS are classified as ozone nonattainment areas. Ozone nonattainment areas must develop an ozone emissions control plan and demonstrate that they will attain the ozone NAAQS by the date specified in the Clean Air Act Amendments (CAAA) in a State Implementation Plan (SIP). The SIP ozone attainment demonstration is usually accomplished using air quality modeling. The Tulsa and Oklahoma City areas of Oklahoma are currently classified as 1-hour ozone attainment areas.

In 1997, EPA promulgated a new ozone NAAQS that is potentially more stringent than the 1-hour standard. The new form of the ozone NAAQS is based on ozone measurements averaged over eight hours; a violation of the 8-hour ozone standard occurs when the average of the fourth highest 8-hour ozone concentration over three consecutive years exceeds 0.08 ppm (84 ppb). The 8-hour ozone nonattainment area designations were based on ambient measurements taken during the three years between 2001-2003. Regions that are currently designated as nonattainment of the 1-hour ozone NAAQS must still attain this standard (i.e., have three consecutive years over which the fourth highest hourly ozone concentrations at all monitors are 124 ppb or less). Once an ozone nonattainment region attains the 1-hour ozone NAAQS, the 1-hour standard can be revoked by EPA and the area would be required to meet only the 8-hour standard.

Both the Tulsa and Oklahoma City areas have exceeded the 8-hour ozone standard in the past. Currently, the two areas have 8-hour ozone Design Values that are close to, but below the standard. In April 2004, both Tulsa and Oklahoma City were designated as attainment of the 8-hour ozone standard based on 2001 – 2003 observed ozone data. However, both Tulsa and Oklahoma City elected to stay in the EAC program to protect against being declared nonattainment before 2007.

Early Action Compact (EAC) Protocol

The Texas Natural Resources Conservation Commission (now Texas Commission on Environmental Quality, TCEQ) has developed, in cooperation with the US EPA, a Protocol for Early Action Compacts (EACs). The TCEQ EAC was finalized in March 2002. The basic principals of the EAC are for local air quality planners to commit to early implementation of emission controls as needed to achieve the 8-hour ozone standard by 2007, in return EPA will defer declaring the area nonattainment of the 8-hour ozone standard until 2007. In order for an area to be allowed to opt-in to an 8-hour ozone EAC they must currently attain the 1-hour ozone standard. If an area opts-in to an 8-hour ozone EAC then they must meet specific milestone deliverables that are listed in Table 1-1; if an area fails to meet an EAC milestone deliverable or attain the 8-hour ozone standard in 2007 they revert back to standard 8-hour ozone nonattainment and must meet all traditional nonattainment requirements.

Table 1-1. Key dates for the Early Action Compact (EAC) requirements.

Date	Item
December 31, 2002	Submit signed EAC with Milestones
June 16, 2003	Identify/describe local strategies being considered for use in the EAC Plan
March 31, 2004	Submit attainment demonstration modeling and The Plan to State
December 31, 2004	State submits SIP with the local Area Plan to EPA
December 31, 2005	Implement any required rules
December 31, 2007	Attain the 8-hour ozone standard

OBJECTIVES

Tulsa and Oklahoma City have elected to opt-in to the 8-hour ozone EAC. Thus, they are required to develop emissions and photochemical modeling databases needed to prepare an 8-hour ozone attainment plan to be included in a State implementation Plan (SIP) that is submitted to EPA by December 2004. The first step in the development of a photochemical modeling database for SIP planning is the development of a Modeling Protocol (ENVIRON, 2002) that conforms to the requirements in EPA guidance documents (EPA, 1991, 1999). The key objectives in developing an all new photochemical modeling database for Oklahoma are as follows:

- To select an 8-hour ozone modeling episode(s) for the Tulsa and Oklahoma City metropolitan areas (ENVIRON, 2002);

- To create a modeling domain on a Lambert Conformal Projection (LCP) to be consistent with the MM5 meteorological model with a coarse grid domain extent sufficiently large to treat multi-day transport of ozone and precursors from significant source areas outside of Oklahoma (ENVIRON, 2002);

- To create multiple nested-grids with 4-km grid spacing for Tulsa, Oklahoma City and other major areas in Oklahoma (e.g., Lawton). All nested grids will telescope at a 3:1 ratio (e.g., 36, 12, 4km) to be compatible with the MM5 meteorological modeling grid system (ENVIRON, 2002);

- To produce refined meteorological inputs for the entire domain using version 3 of the Fifth-Generation Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Mesoscale Model (MM5), while optimizing performance in the fine-grid Oklahoma subdomain containing Tulsa and Oklahoma City (ENVIRON, 2003a; Jia and Morris 2003a; 2003b);

- To incorporate the latest available emissions data for Oklahoma as well as other areas within the regional-scale grid domain (Morris, Tai and Jia, 2003);

- To create a CAMx Base Case simulation of the selected episode, including diagnostic tests, performance evaluation, and basic sensitivity analyses (Morris, Tai and Jia, 2003);

- To develop a 2007 future-year Base Case photochemical modeling emissions database and estimate future-year base case 8-hour ozone Design Values following EPA's Design Value scaling procedures outlined in their 8-hour ozone guidance (EPA, 1999) (Morris et al., 2004a);

- To perform 2007 VOC/NOx emissions reduction sensitivity tests and estimate 2007 8-hour ozone Design Values under different VOC/NOx emission reduction regimes for control strategy planning (Morris, Tai and Jia, 2003);

- To perform ozone source apportionment modeling to identify the contributions of geographic regions and source categories to elevated ozone concentrations in Tulsa and Oklahoma City (Morris et al, 2004b);

- Provide technical information to be used in the March 30, 2004 "Clean Air Action Plan for the Central Oklahoma Early Action Compact and the Tulsa Metropolitan Area 8-Hour Ozone Early Action Compact" (ODEQ, 2004);

- Perform revised Base Case and Future-Year modeling of the August 1999 episode using an expanded domain and update the 8-hour ozone attainment demonstration (this document);

- To project emissions to 2012 and demonstrate that 8-hour ozone attainment would continued to be achieved (this document); and

- To provide the CAMx modeling database, pre- and post-processor systems, display programs, and other data and programs developed to meet these objectives before designated representatives from Tulsa, Oklahoma City, Oklahoma DEQ, EPA and other interested parties (in progress).

This is the Technical Support Document (TSD) to the Tulsa and Oklahoma City 8-hour ozone EAC SIP. It presents the results of the development of the 1999, 2002, 2007 and 2012 Base Case emissions scenarios and 2007 control strategies, the CAMx photochemical grid modeling simulation of the August 1999 Base Case emissions scenario and model performance evaluation, the 2007 photochemical modeling and attainment demonstration, including weight of evidence analysis, and emissions analysis for 2012 to demonstrate attainment would continue to be achieved. Details on the Oklahoma 8-hour ozone EAC activities can be found on its website:

- http://www.deq.state.ok.us/AQDnew/whatsnew/SIP/EAC.htm

INITIAL OKLAHOMA PHOTOCHEMICAL MODELING ANALYSIS

Initial photochemical modeling analysis of Okalahoma for the August 1999 episode was performed to demonstrate attainment of the 8-hour ozone standard in 2007 and was included in the Oklahoma Clean Air Action Plan (CAAP) that was submitted to EPA during March 2004

(Morris Tai and Jia, 2003; Morris et al., 2004a; ODEQ, 2004). Photochemical modeling was conducted using the EPS emissions, MM5 meteorological and CAMx photochemical models. The initial Oklahoma photochemical modeling was performed using a 36/12/4 km grid structure with the 4 km grid focused on Oklahoma and the 36 km grid including the Gulf Coast States and several states to the northeast of Oklahoma (see Figure 1-1).

1999 Base Case modeling was conducted along with a model performance evaluation that compared the model estimated ozone concentrations with observed values and demonstrated that EPA's ozone model performance goals (EPA, 1991; 1999) were mostly achieved (Morris Tai and Jia, 2003). Emissions were then projected to 2002 and 2007 and the effects of several 2007 emission control strategies were analyzed and attainment of the 8-hour ozone standard in 2007 was demonstrated (Morris et al., 2004a). The modeled ozone estimates exhibited small sensitivity to local emission controls in the Tulsa and Oklahoma City areas, thus ozone source apportionment modeling was conducted in order to better understand the cause and source of elevated ozone concentrations in Oklahoma (Morris et al., 2004b).

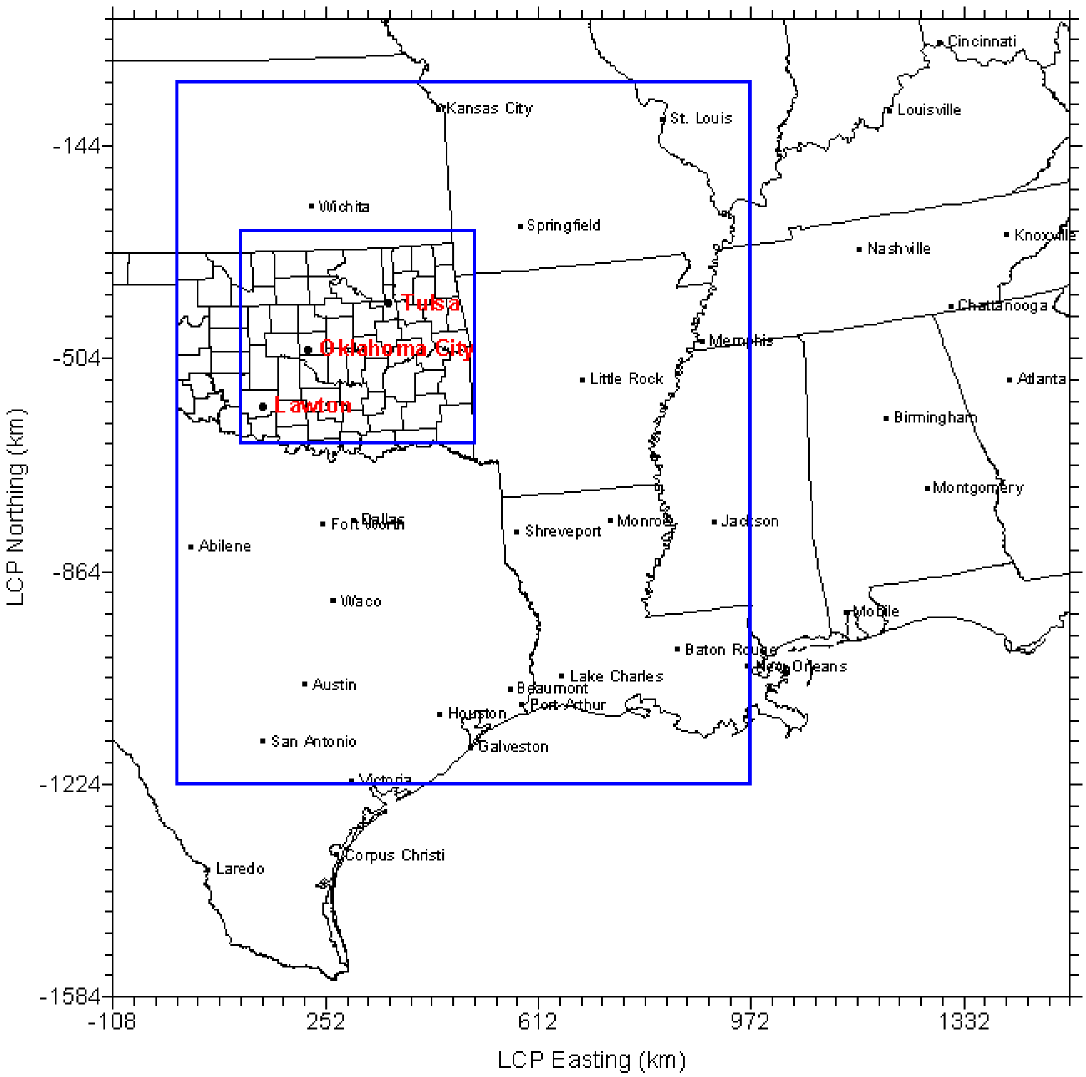


Figure 1-1. Initial Oklahoma 36/12/4 km modeling domain used in the preliminary 8-hour ozone modeling of the August 1999 episode.

Initial Ozone Source Apportionment Modeling

CAMx includes several "probing tools" that provide additional information on the photochemical model simulation to aid in understanding the modeling results, diagnosing model performance issues and provide guidance for developing effective ozone emission control strategies. One such probing tool is the Ozone Source Apportionment Technology (OSAT) that uses reactive tracers for VOC and NOx source groups to apportion ozone. When ozone is formed in the model, it is attributed to source groups based on whether ozone formation was more VOC-limited or NOx-limited and the relative contribution of each source group's VOC or NOx emissions to the total precursor, respectively. OSAT is a mass balance accounting system that tracks ozone source apportionment to user specified geographic regions and source categories (i.e., source groups) and accounts for all ozone in the model. For the Oklahoma ozone source apportionment, the Anthropogenic Emissions Precursor Culpability Assessment (APCA) version of OSAT was utilized. APCA differs from the standard OSAT ozone source apportionment in that ozone is only allocated to biogenic emissions when ozone formation is due to the interaction of biogenic VOC with biogenic NOx. Thus in the case when ozone is formed due to the interaction between biogenic VOC and anthropogenic NOx under VOC-limited conditions, where OSAT would attribute the ozone formed to the biogenic VOCs, APCA redirects the ozone attribution to the anthropogenic NOx recognizing that biogenic VOC can not be controlled. Thus, the APCA ozone source apportionment provides more control strategy relevant information. It is the version used by EPA to perform state ozone culpability assessments as part of the NOx SIP Call (EPA, 1998a,b) and proposed Clean Air Interstate Rule (EPA, 2004a,b).

For the Oklahoma APCA ozone source apportionment modeling, the 36/12/4 km modeling domain (Figure 1-1) was divided up into 11 geographic sources regions as shown in Figure 1-2. These source regions were as follows:

1. Tulsa MSA;
2. Oklahoma City MSA;
3. Southwestern Oklahoma;
4. Southeastern Oklahoma;
5. Northeastern Oklahoma;
6. Northwestern Oklahoma;
7. Northern Texas;
8. Southern Texas;
9. Kansas;
10. LA/AR/MO/IL; and
11. Southeastern US.

In addition, separate ozone source apportionment was obtained for four source categories as follows:

1. On-Road Mobile Sources;
2. Other Low-Level Anthropogenic Emissions;
3. Elevated Point Sources; and
4. Biogenic Sources

As initial conditions (IC) and boundary conditions (BC) are always treated as 2 source groups, this results in a total of 46 source groups (46 = 11 x 4 + 2) that were tracked for the Oklahoma ozone source apportionment modeling.

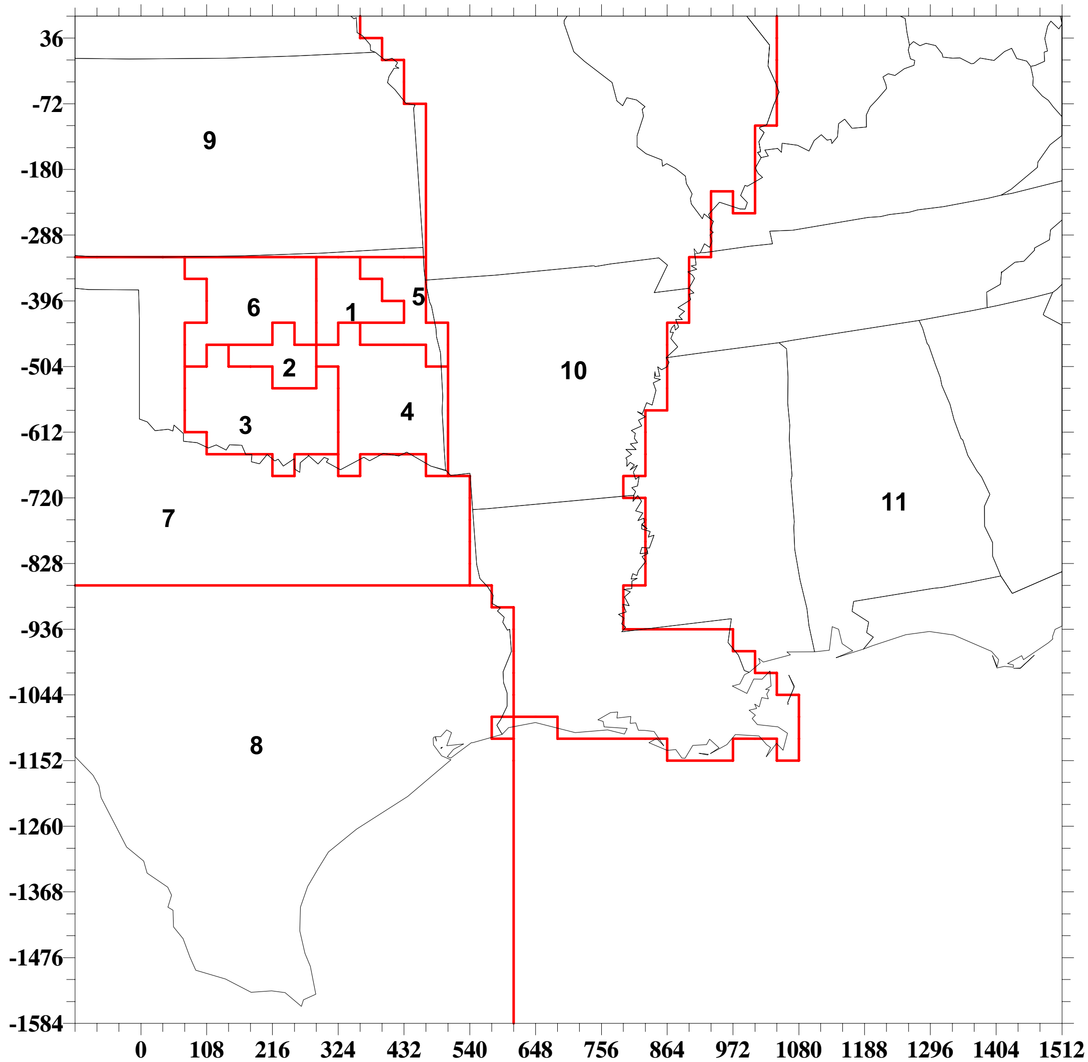


Figure 1-2. Source regions used in the Oklahoma ozone source apportionment modeling.

Figure 1-3 displays ozone source apportionment modeling results for seven high ozone days at the Skiatook ozone monitor in Tulsa; Skiatook was the monitor with the highest projected 2007 8-hour ozone Design Values in either the Tulsa or Oklahoma City MSAs. For three of the high ozone days, the region that contributes the most to elevated ozone concentrations at the Skiatook monitor is the Tulsa MSA. Of sources in the Tulsa MSA, on-road mobile sources always contributes the most to elevated ozone at Skiatook, with other low-level anthropogenic emissions in Tulsa usually contributing more than elevated point sources emissions. On three of the other 7 high ozone days, boundary conditions (BCs) are the highest contributor to elevated 8-hour ozone at Skiatook. BCs contributions are due to the assumed concentrations along the lateral boundaries of the 36 km grid (see Figure 1-1) and above the region top of the modeling domain. On one day (August 28, 1999), emissions from the Northeast Oklahoma subregion contribute the most, with the elevated point sources in this subregion being the highest contributor.

With Boundary Conditions (BCs) the second most important source group contributing to elevated ozone in Tulsa, after emissions from the Tulsa MSA itself, their specification for future-year control strategy modeling is critical. Boundary conditions for the initial Oklahoma modeling were based on EPA's August 1999 Base Case simulation using the Models-3 Community Multiscale Air Quality (CMAQ) modeling system. EPA did not perform any future-year CMAQ modeling. Thus in the initial Oklahoma modeling future-year BCs were also based on the 1999 Base Case CMAQ simulation. As there are significant regional controls being implemented in the eastern US between 1999 and 2007 (e.g., NOx SIP Call, Tier 2 on-road mobile sources, heavy duty diesel and nonroad rules) that would reduce transported ozone represented by the BCs, then the initial Oklahoma 2007 modeling used overstated BCs that likely affected the future-year 8-hour ozone Design Value projections. This prompted an update to the Oklahoma August 1999 photochemical modeling database to expand the domain to explicitly account for the reductions in regional emissions, which is discussed in this document.

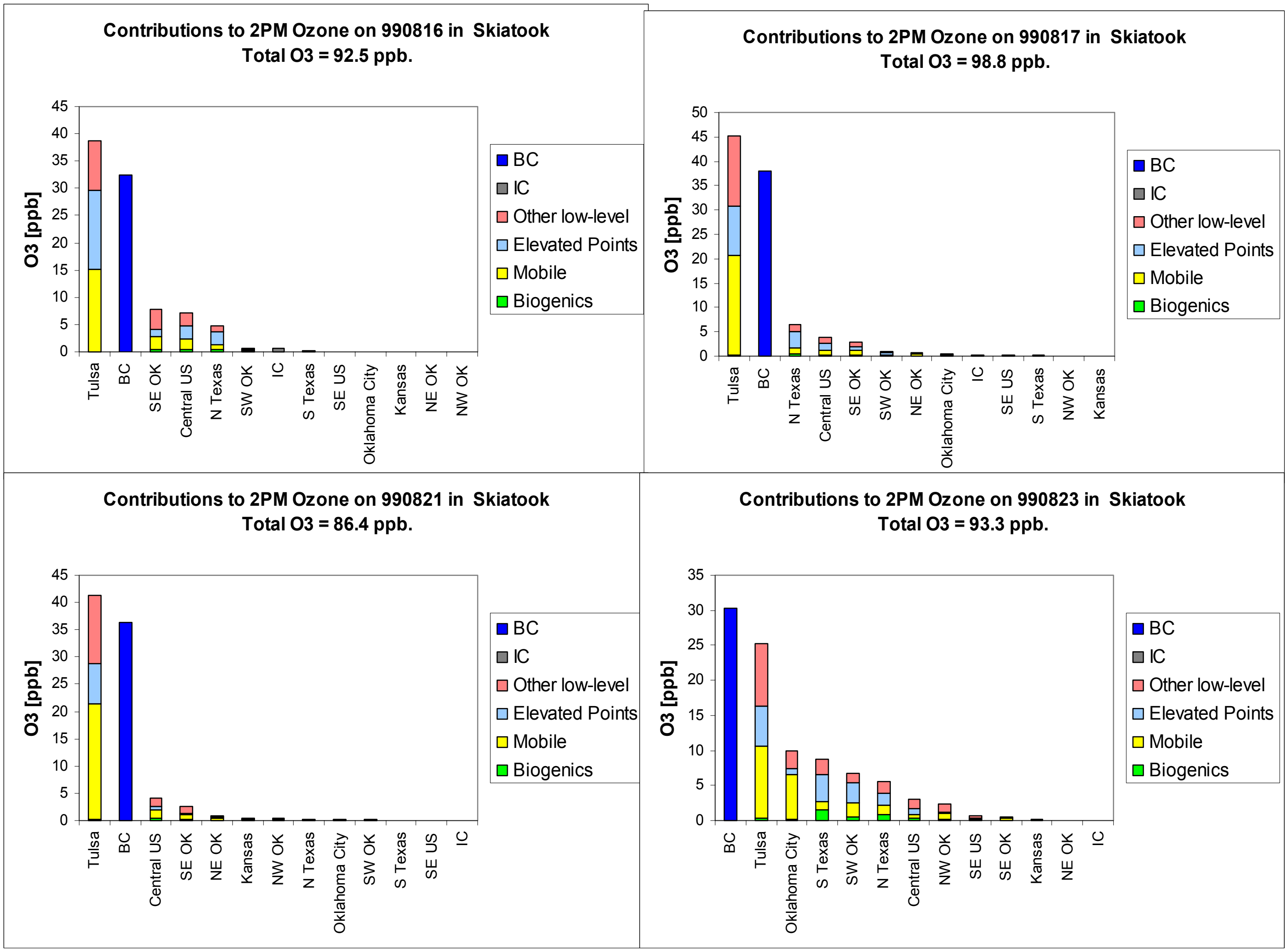


Figure 1-3a. APCA ozone source apportionment modeling results showing contributions to 8-hour ozone at the Skiatook monitor for the 1999 Base Case emissions scenario.

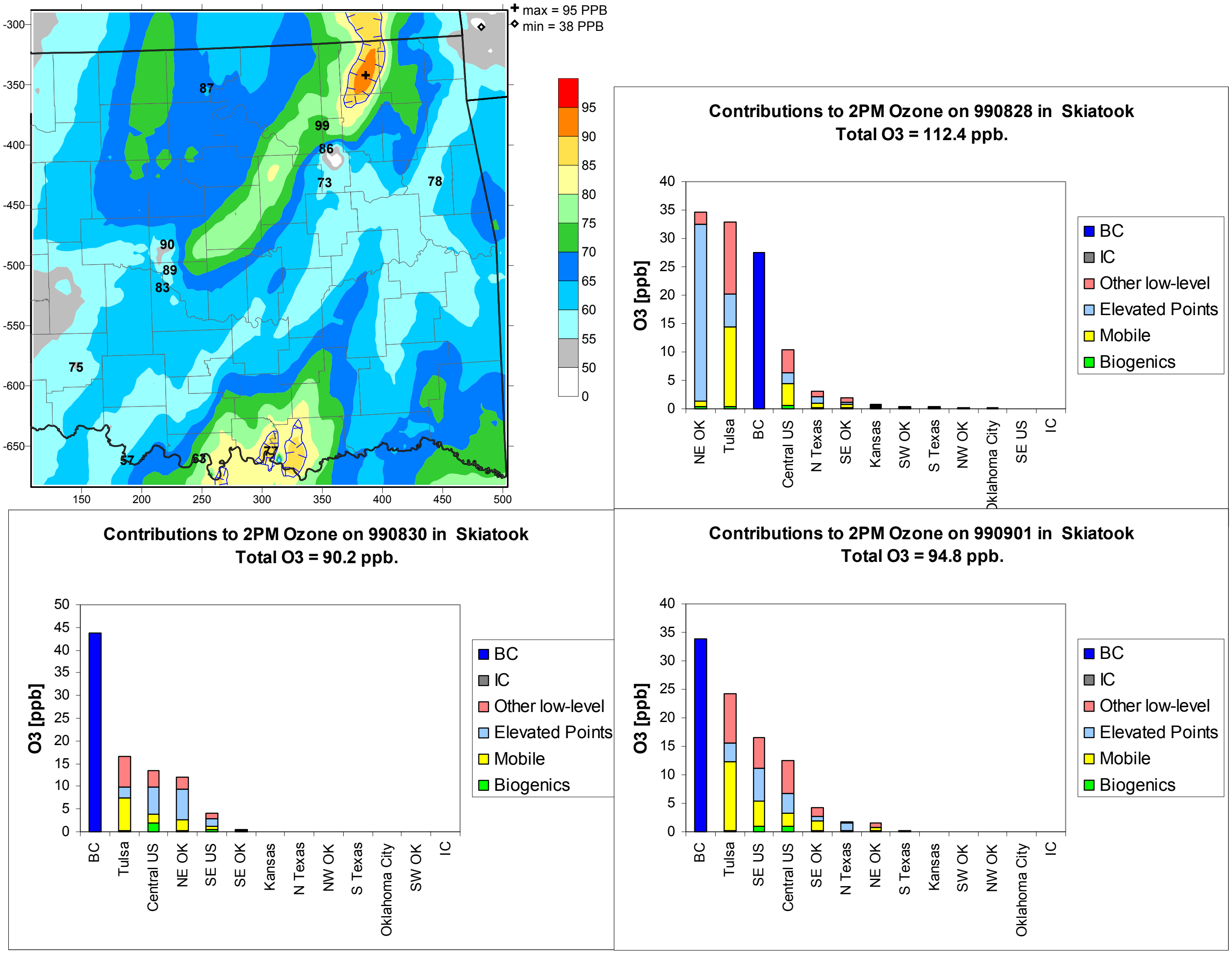


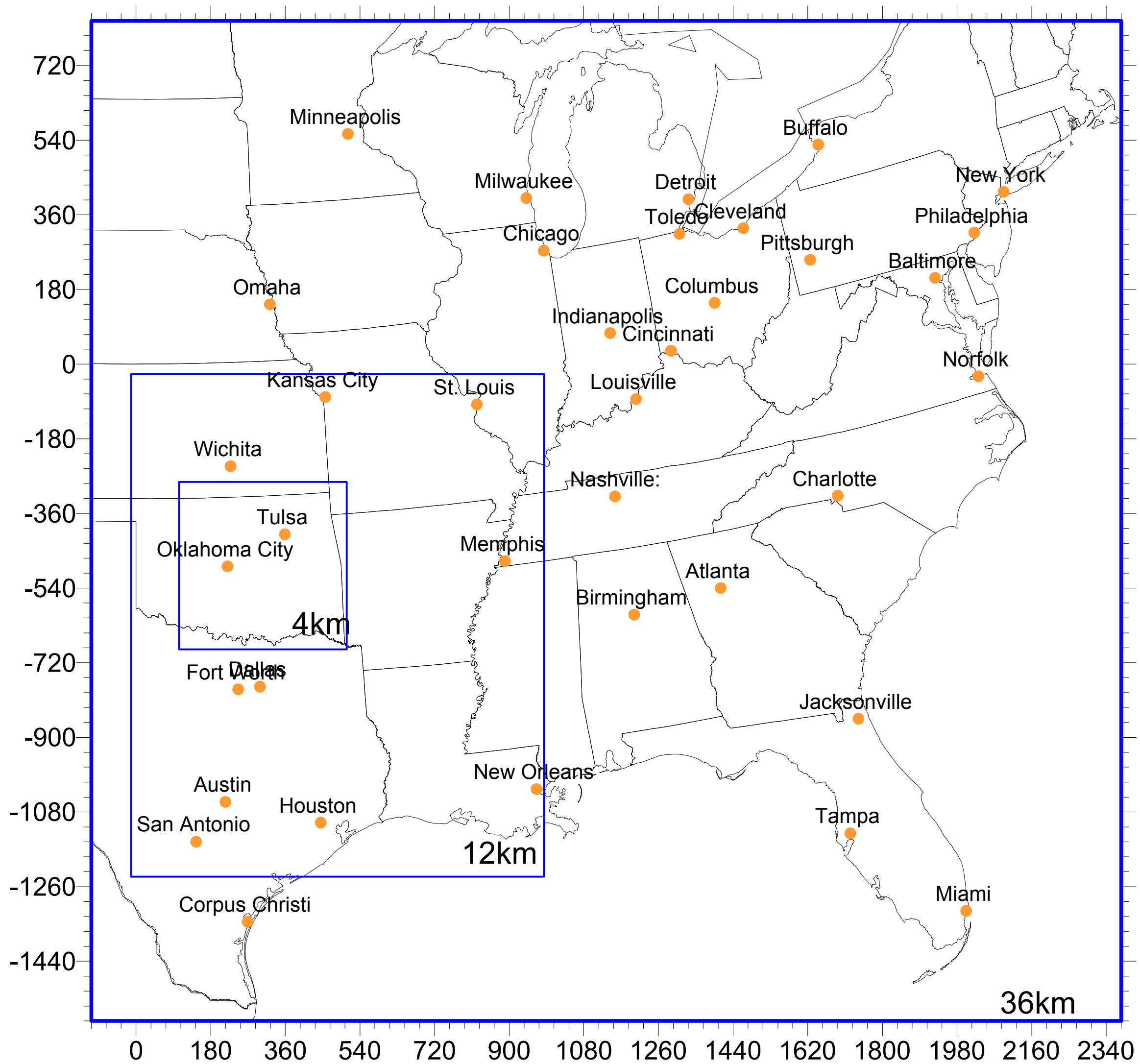
Figure 1-3b. APCA ozone source apportionment modeling results showing contributions to 8-hour ozone at the Skiatook monitor for the 1999 Base Case emissions scenario.

UPDATED AUGUST 1999 PHOTOCHEMICAL MODELING DATABASE

This report discusses the development of an updated Oklahoma August 1999 photochemical modeling database using an expanded modeling domain that is used to project future-year 8-hour ozone Design Values as part of the Tulsa and Oklahoma 8-hour ozone EAC SIP. Table 1-2 summarizes the updates in the Oklahoma August 1999 photochemical modeling database from the initial database (Morris, Tai and Jia 2003; Morris et al., 2004a). The 36 km grid domain size was increased by a factor of 2.2 as depicted in Figure 1-4. The region top was moved upward from approximately 4,000 m AGL to approximately 12,000 m AGL. And the CMAQ August 1999 BCs were replaced by constant default values used previously. This is discussed in more detail in Section 2.

Table 1-2. Summary of updates to the Oklahoma August 1999 photochemical modeling database.

Parameter	Initial	Updated
Modeling Domain	See Figure 1-1; 45 x 46 36-km domain	See Figure 1-4; 69 x 67 36-km domain
Region Top	~4-km	~12-km
Boundary Conditions	CMAQ August 1999 Base Case	Constant values by boundary segment
CAMx Version	V4.02	V.4.10s



CAMx Modeling Domain for ODEQ

	nx x ny	SW to NE Corners
CAMx 36km	69 x 67	(-108, -1584) to (2376, 828)
CAMx 12km	83 x 101*	(-12, -1236) to (984, -24)
CAMx 04km	101 x 101*	(104, -688) to (508, -284)

* includes buffer cells

Figure 1-4. Updated Oklahoma 36/12/4 km modeling domain using expanded 36 km domain to include the entire eastern US.

2. UPDATE TO THE AUGUST 1999 OKLAHOMA PHOTOCHEMICAL MODELING DATABASE

The initial Oklahoma August 1999 photochemical modeling database was developed following the procedures in the Modeling Protocol (ENVIRON, 2002) and is documented in Morris, Tai and Jia (2003) and Morris et al. (2004 a, b). The Oklahoma 8-hour ozone modeling approach used three main models:

MM5: Version 5 of the Mesoscale Model to generate three-dimensional wind, temperature, water vapor and other meteorological fields for the August 1999 episode.

EPS2x: The Emissions Processing System version 2x (EPS2x) that was used to process Version 2 of the 1999 Nation Emissions Inventory (NEIv2) and local emissions information into the gridded hourly speciated emissions data needed for photochemical modeling.

CAMx: The Comprehensive Air Quality Model with extensions (CAMx) a photochemical grid model that uses the gridded speciated hourly emissions from EPS2x and three-dimensional meteorological fields from MM5 and estimates ozone and other air pollution concentrations.

Below we briefly summarize the development of the initial Oklahoma August 1999 photochemical modeling database followed by a discussion of the updates made to use an expanded modeling domain (Figure 1-4).

OVERVIEW OF THE DEVELOPMENT OF THE INITIAL OKLAHOMA MODELING DATABASE

MM5 Meteorological Modeling

The MM5 model was applied for the August 13 through September 1, 1999 period on a 108/36/12/4 km grid with the 4 km grid focused on Oklahoma. The evaluation of the MM5 model for the first part of the episode (August 13-25, 1999) is documented in an April 2003 report (ENVIRON, 2003), whereas an evaluation for the entire episode is documented by Jia and Morris (2003a,b). The MM5 model performance was fairly typical of what has been seen in past MM5 modeling studies to support air quality modeling. Although the performance of the MM5 meteorological model varied day-to-day, the performance was generally better during the first part than latter part of the episode and was better in the Tulsa than Oklahoma City areas. More details can be found in the project reports that are available on the Oklahoma EAC website:

http://www.deq.state.ok.us/AQDnew/whatsnew/SIP/EAC.htm

EPS2x Emissions Modeling

Emissions were generated for the 36/12/4 km modeling grid using the 1999 NEI national emissions inventory updated with information for Oklahoma and Texas, including a link-based on-road mobile source inventory for Tulsa and Oklahoma City. A 1999 Base Case, 2002 Base Case and 2007 Base Case and control scenarios were developed. Details are provided in Section 3 of this report.

CAMx Modeling

CAMx model inputs were prepared following the procedures in the Modeling Protocol (ENVIRON, 2002). Figure 1-1 displays the initial 36/12/4 km modeling domain used by CAMx for the 8-hour ozone EAC modeling of Oklahoma. Boundary Conditions (BCs) in the initial Oklahoma photochemical modeling database were based on a 1999 Base Case simulation of EPA's Models-3 CMAQ model system.

UPDATES TO THE OKLAHOMA PHOTOCHEMICAL MODELING DATABASE

Ozone source apportionment modeling suggested that Boundary Conditions (BCs) (i.e., the assumed concentrations along the lateral edges of the 36 km domain and above the region top) were the second most important contributor to elevated 8-hour ozone concentrations in the Tulsa area after Tulsa MSA emissions. Thus, the Oklahoma August 1999 photochemical modeling database was expanded to explicitly simulate emissions in the eastern US using a larger modeling domain (Figure 1-4) rather than prescribe their effects through boundary conditions. There were four main updates to the Oklahoma modeling database:

- Expansion of the 36 km grid to include all of the eastern United States (see Figures 1-1 and 1-4);
- Extensions of the model region top to above the tropopause;
- Update of the Boundary Conditions;
- Use of latest version of CAMx.

During the process of making these updates the incremental changes in ozone were examined. In general the updates had very little effect on ozone in Oklahoma as evident by nearly identical ozone model performance in the expanded Oklahoma modeling presented in Chapter 4 and that presented previously using the smaller modeling domain and earlier version of CAMx (Morris, Tai and Jia, 2003b).

Expansion of 36-km Modeling Domain

The 36 km regional-scale modeling domain was expanded from a 45 x 46 36 km grid used in the initial modeling (see Figure 1-1) to a 69 by 67 36 km grid used in the updated modeling with the expanded grid (see Figure 1-4). This results in the inclusions of all of the eastern US states and their emissions in the modeling analysis and lessons the dependency on the BCs.

<u>Development of Updated Meteorological Inputs</u>

The existing August 1999 MM5 meteorological model output (ENVIRON, 2003a; Jia and Morris 2003a,b) were processed using MM5CAMx to generate new CAMx meteorological inputs for the expanded domain. However, as shown in Figure 2-1, the original MM5 108/36/12/4 km grid structure 36 km grid did not cover all of the eastern US, where a 36 km

CAMx grid was desired for the expanded domain. Thus, for those regions in the CAMx 36 km grid but outside of the MM5 36 km grid (e.g., portions of Minnesota, Wisconsin, New York and further to the northeast), the MM5 meteorological variables on the 108 km grid were interpolated to the CAMx 36 km grid. This should introduce little uncertainty in the analysis because these regions are so far away from Oklahoma. Further, the key emissions in the Midwest where the NOx SIP Call controls should achieve the most emissions reductions benefits (e.g., Ohio River Valley) are well within the MM5/CAMx 36 km grid.

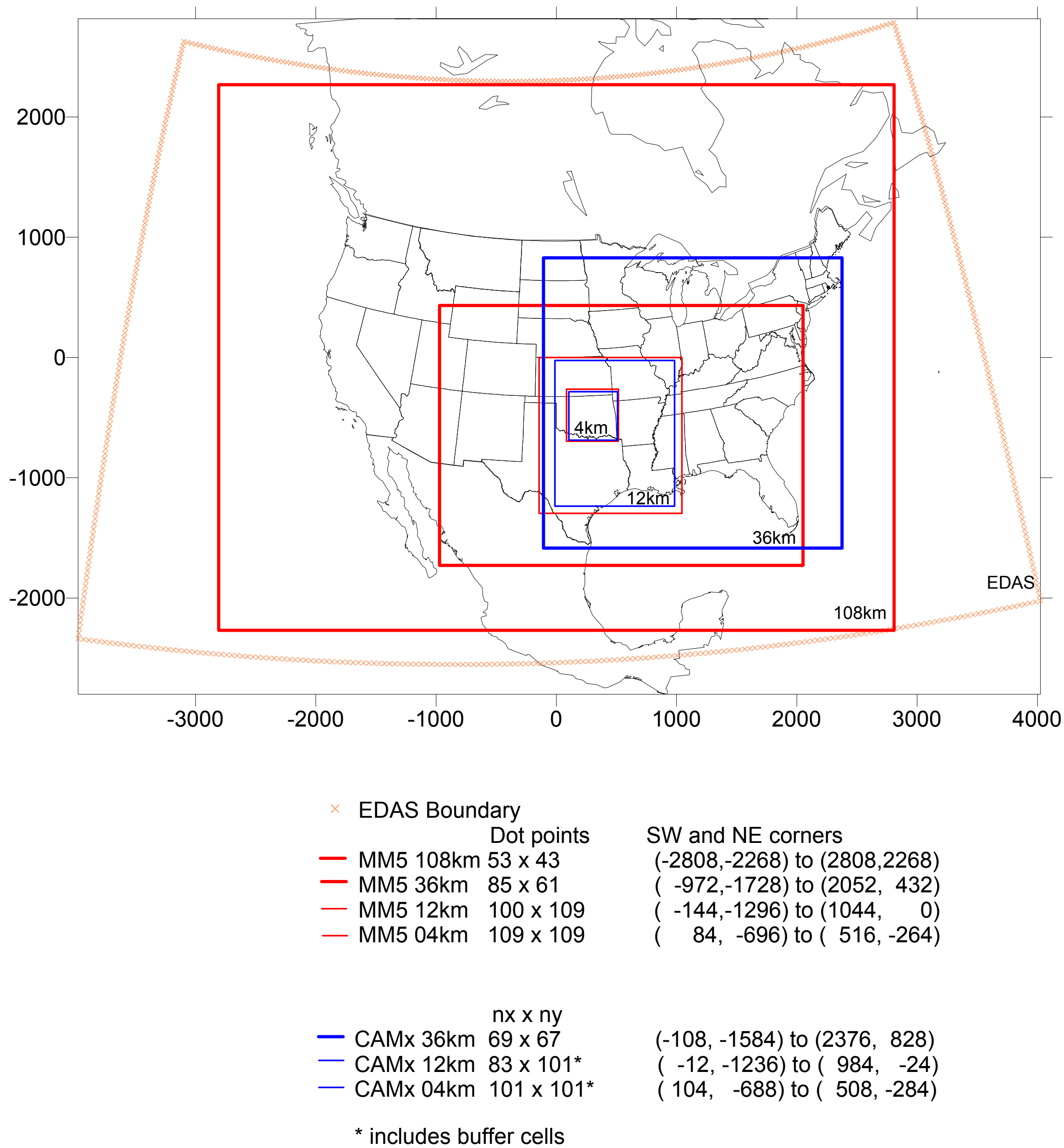


Figure 2-1. Relationship between MM5 108/36/12/4 km modeling domains and the expanded grid CAMx 36/12/4 km modeling domains.

Development of New Emission Inputs

The development of the emission inventories are discussed in detail in Section 3. Outside of Oklahoma and Texas, the 1999 Base Case emissions were based on the 1999 NEI v2 inventory, the 2002 Base Case emissions were based on the 2002 NEI, and the 2007 Base Case emissions were based the 2007 Heavy Duty Diesel Rulemaking emissions. Oklahoma emissions were based on projections for Oklahoma and Texas emissions were based on analysis by the TCEQ.

Defining Updated Region Top

The initial Oklahoma modeling database used 15 vertical layers in CAMx that exactly matched the lowest 15 vertical layers in the MM5 model with a region top of approximately 3,650 m above ground level (AGL). Recent sensitivity modeling for the Dallas-Fort Worth region suggested that a region top of over 10,000 m AGL is needed to limit the influence of the top BCs on surface ozone concentrations. Thus, for the updated Oklahoma photochemical modeling database using the expanded domain, we added four additional layers to the CAMx vertical structure so that the new region top was approximately 12,700 m AGL and CAMx used 19 vertical layers.

Updated Boundary Conditions

Boundary Conditions (BCs) were a source of several sensitivity tests in the initial Oklahoma photochemical modeling analysis (Morris, Tai and Jia, 2003a). First clean background values were used for the initial concentrations (ICs) and boundary conditions (BCs). These values were similar to the clean values used by the Ozone Transport Assessment Group (OTAG) for regional scale modeling of the Eastern US (OTAG, 1997) and are referred to as the OTAG Clean BCs. Changes from the OTAG values are the use of constant values of 40 ppb for ozone and 100 ppb for CO. The OTAG clean initial and boundary concentrations are shown in Table 2-1.

The second set of BCs used varied the BC concentrations along boundary segments to account for cleaner and more polluted areas. Some of the boundaries of the 36 km modeling domain cover areas with high emission densities so that the OTAG clean BCs are likely not representative. The northern portion of the eastern boundary runs through the Midwestern US including southern Illinois, Indiana and Ohio where high emissions, ozone concentrations and precursors are known to exist (See Figure 1-1) that are higher than assumed in the OTAG clean air background values. Higher concentrations would also be expected in the northern portion of the eastern boundary. A similar situation existed with the Dallas-Fort Worth 1-hour ozone modeling who analyzed air quality data to come up with more representative concentrations for initial and boundary conditions as shown in Table 2-2 (Mansell et al., 2003). Different boundary conditions (BCs) are prescribed for different segments of the outer 36 km domain boundary (Figure 1-1) as follows:

- East/Northeast: The concentration values in column 2 of Table 2-2 were applied along the East and Northeast segment of the 36-km grid (from Florida through Missouri counter clockwise) vertically through 1700 m, corresponding to CAMx layers 1 through 11.

- West Northwest: Values from column 3 of Table 2-2 were applied along the Northwest, Western and Southwestern boundary segment (Nebraska through Mexico counter clockwise) also vertically through the first 1700 m of the modeling domain.
- South: The Southern segment of the boundary (from Mexico to Florida on the eastern boundary counter clockwise), as well as all boundaries above 1700 m (CAMx layer 12 through 15) and the initial conditions used ozone and precursor concentrations from the last column of Table 2-2 which represents cleaner air than the other boundaries as would be expected over the Gulf of Mexico and aloft.

The third set of BCs were based on output from EPA's Models-3 CMAQ modeling system for an August 1999 Base Case simulation that was used to define three-dimensional (3-D) hourly varying BCs. Although the CMAQ 3-D BCs likely provided better representation of the concentrations along the boundaries, EPA only ran CMAQ for the August 1999 Base Case conditions. Thus, all future-year (2007) modeling had to use BCs representative of 1999 Base Case conditions. As seen in Figure 1-1, the northern and eastern boundaries of the old 36 km grid runs through portions of the Midwest and Southeast US where there will be substantial reductions in emissions and incoming pollutant concentrations due to regional control strategies (e.g., NOx SIP Call, Tier 2 and other Rules) between 1999 and 2007.

For the updated BCs using the expanded domain, the CMAQ results could not be used because insufficient time was available for EPA to process the data, the Oklahoma expanded the domain to beyond that used by CMAQ and there are questions regarding the representativeness of the CMAQ 1999 Base Case BCs for future-year modeling. Thus, for the updated expanded domain modeling we went back to the second approach for defining BCs based on emissions density using the values in Table 2-2 along line segments of the new expanded Oklahoma 36 km domain (Figure 1-4). As most major cities now lie within the modeling domain the Polluted or East/Northeast BC concentrations were not used in the expended grid modeling. Instead, the Oceanic background concentrations were used for BCs on the eastern boundaries and the southern boundary from the southeastern corner until Mexico (Figure 1-4). And the Background or West/Northwest concentrations were used for BCs along the southern segment over Mexico, the western boundary and the northern boundary.

Version of CAMx

The initial Oklahoma photochemical modeling used CAMx Version 4.02. Since then there have been two updates to the model (Version 4.03 and 4.10s). For the updated modeling we used the August 2004 Version 4.10s of the model that is publicly available from the CAMx website (www.camx.com).

Table 2-1. OTAG clean BC values used for CAMx First initial and boundary concentrations.

Species	Concentration (ppb)
O3	40.0
NO	0.000049
NO2	0.08555
CO	100.0
PAR	3.078
HCHO	1.068
ETH	0.005315
ALD2	0.1051
TOL	0.006043
PAN	0.03834
HNO2	0.000728
HNO3	1.525
H2O2	2.263

Table 2-2. Second Initial and boundary concentrations for the initial base case simulation and the updated base case simulation.

Species	Polluted East/Northeast Segment Concentration (ppb)[1]	Background West/Northwest Segment Concentration (ppb)[2]	Oceanic Southern Segment Concentration (ppb)[3]
O3	40.0	40.0	40.0
NO	0.1	0.1	0.1
NO2	1.0	1.0	1.0
CO	200.0	200.0	100.0
PAR	14.9	14.9	14.9
HCHO	2.1	2.1	0.05
ETH	0.51	0.51	0.15
ALD2	0.555	0.555	0.05
TOL	0.18	0.18	0.0786
PAN	0.1	0.1	0.1
HNO2	0.001	0.001	0.001
HNO3	3.0	3.0	1.0
H2O2	3.0	3.0	1.0
OLE	0.3	0.3	0.056
XYL	0.0975	0.0975	0.0688
ISOP	3.6	0.1	0.001
MEOH	8.5	0.001	0.001
ETOH	1.1	0.001	0.001

1. Not used in expanded grid modeling.
2. Used on western and northern boundaries and southern boundary over Mexico.
3. Used on eastern boundaries and southern boundary over water.

Ozone Model Performance Database

Up to 15 ozone monitoring sites were operating in Oklahoma during the August 1999 episode. These sites are shown in Figure 2-2, along with additional monitoring site that have come online in more recent years. These ozone monitors were disaggregated into seven subregions for the model performance evaluation as follows:

- Oklahoma 4-km Fine Grid: Includes all 15 Oklahoma ozone monitors.
- Tulsa Subregion: Includes the Skiatook, Tulsa and Glenpool monitors.
- Oklahoma City Subregion: Includes the OSDH, Moore and Goldsby monitors.
- Ponca City Subregion: Includes the Ponca City monitor.
- Northeastern Oklahoma: Includes Miami, Tahlequah and Stillwell.
- Lawton Subregion: Includes the Lawton monitor.
- Southern Oklahoma: Includes the Terral, Burneville and Texoma monitoring sites along the Red River.

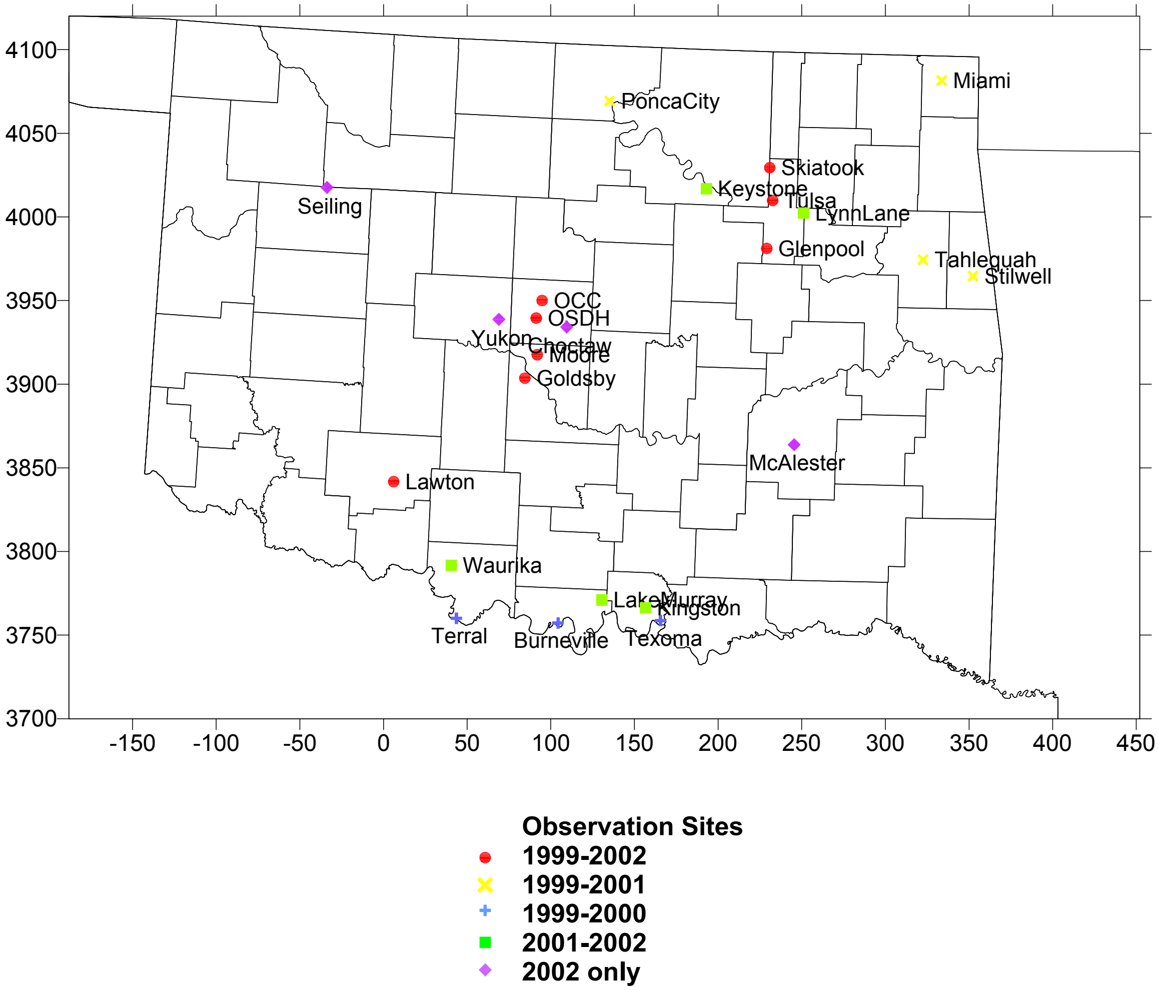


Figure 2-2. Locations of ozone monitors in Oklahoma.

3. EMISSIONS MODELING

This section describes the emission inventory preparation for the August 13 – September 1, 1999 modeling episode for the Oklahoma Department of Environmental Quality (ODEQ). Emission inventories are processed using version 2x of the Emissions Processing System (EPS2x) for area, off-road, on-road mobile and point sources (ENVIRON, 2001). The purpose of the emissions processing is to format the emission inventory for CAMx photochemical modeling. Specifically, the emission inventory is allocated:

- Temporally – to account for seasonal, day of week and hour of day variability
- Spatially – to reflect the geographic distributions of emissions
- Chemically – to account for the chemical composition of VOC and NOx emissions in terms of the Carbon Bond 4 (CB4) chemical mechanism used in CAMx.

Emissions for different major source groups (e.g., mobile, off-road mobile, area, point and biogenic) are processed separately and merged together prior to CAMx modeling. This simplifies the processing and assists quality assurance (QA) and reporting tasks. The biogenic inventories are generated with GloBEIS.

The August 13 – September 1,1999 episode, a Friday through Wednesday, is being modeled in CAMx using a Lambert Conformal Projection (LCP) nested grid configuration with grid resolutions of 36, 12 and 4 km (Figure 1-4). In CAMx, emissions are separated between surface (surface and low level point) emissions and elevated point source emissions. For the surface emissions, a separate emission inventory is required for each grid nest, i.e., three inventories. For elevated point sources, a single emission inventory is prepared covering the entire domain and all grid nests.

The emissions modeling domains used to generate the required CAMx ready inventories are:

1. **Oklahoma Area 4 km Grid**. The Oklahoma emissions grid has 99 x 99 cells at 4 km resolution and covers the same area as the CAMx 4 km nested grid shown in Figure 1-4.

2. **Regional 12 km Emissions Grid**. The regional emissions grid has 135 x 138 cells at 12-km resolution and covers the old 36km grid area shown in Figure 1-1. This emissions grid is used for the 12 km CAMx grid by "windowing out" emissions for the appropriate region.

3. **Extended Regional 36 km Emissions Grid**. The extended regional emissions grid is slightly larger than the CAMx modeling domain (see Figure 1-4). The emissions modeling domain origin is 75 x 73 grid cells with origin (-324.,-1584.). The CAMx modeling domain is "windowed" out of the emissions processing domain.

Emission modeling inventories were prepared for the 1999 base year and for 2002 and 2007 future years. In addition, emission estimates were generated for the Oklahoma City and Tulsa MSAs for 2012. The emissions data sources and processing are described separately below for point, on-road mobile, area and off-road, and biogenic sources. Following the data descriptions are summary tables.

DATA SOURCES FOR 1999

Point Sources

Point source data were obtained from several different sources, processed separately and merged prior to modeling. The data include:

- Oklahoma electric generating units (EGUs)
- Oklahoma non-EGUs
- Texas EGUs
- Texas non-EGU point sources
- Other 12 km State point sources
- Other 36 km State point sources

The point source data are processed for a typical peak ozone (PO) season weekday and weekend day. The exception is Oklahoma and Texas EGUs, which are hourly episode day specific data, based on continuous emissions monitor (CEM) data that were reported to EPA's "Acid Rain" database.

The hourly EGU data for Oklahoma and Texas are taken from the EPA's Acid Rain Program Database. The file *1999OKQ3.zip* was downloaded from http://www.epa.gov/camdis01/prepack/1999OKQ3.zip. This file unzips to the text file *1999OKQ3.csv*. The 1999 episode data was extracted, locations were converted to the LCP coordinate system and the data was reformatted to AFS input format for processing in EPS2x. The Texas file *1999TXQ3.zip* was downloaded from http://www.epa.gov/camdis01/prepack/1999TXQ3.zip. This file unzips to the text file *1999TXQ3.csv*. The data were similarly processed into the AFS input format.

For all states in the 12 km grid, other than Texas, the National Emission Inventory (NEI) 1999 Version 2 for Criteria Pollutants data is used. The files ***SS**99CritPt1002.zip – Final 1999 NEI Version 2 Criteria Emissions from Point Sources in Microsoft Access* (where **SS** is the two character state abbreviation) were downloaded from EPA's FTP site. These files contain a set of point source tables. The data is processed to (1) relate separate data tables by common fields, (2) query to extract peak ozone season data and (3) export the resultant data table to an ASCII text file for processing through EPS2x.

For all remaining states in the extended regional 36 km grid the 1999 NEI Final Version 3 for Criteria Pollutants data is used. The files ***SS**99critptfinal0104.zip – Final 1999 NEI Version 3 Criteria Emissions from Point Sources in Microsoft Access* (where **SS** is the two character state abbreviation) were downloaded from EPA's FTP site. These files contain a set of point source tables. The data is processed to (1) relate separate data tables by common fields, (2) query to extract the most detailed data within the August episode and (3) export the resultant data table to an ASCII text file for processing through EPS3.

Different versions of the NEI were used to generate emissions for the 12 km (v2) and 36 km grid (v3) due to the fact that the processing was done at different times. The emissions modeling for the 12 km modeling domain was conducted during early 2003 when the NEI v2 was available and used (Morris, Jia and Tai, 2003a,b). The 36 km grid was expanded in 2004 to include more states to the North and East, as well as portions of Southern Canada. At the time the emissions modeling was performed for the expanded 36 km domain a new final version of the NEI was available (NEI v3) so was used. However, due to time and resource constraints and a desire to be consistent with the previous modeling (Morris et al., 2003a, b; 2004; OKEQ 2004) the emissions in the 12 km domain were not remodeled so were based on the NEI v2.

The Oklahoma EGUs were identified and removed from the NEI v2 inventory in order to avoid double counting of emissions. The Oklahoma non-EGU data were sent to ODEQ for review and corrections prior to processing.

The Texas Commission on Environmental Quality (TCEQ) Point Source Data Base (PSDB) version 15a for 1999 is the basis of the non-EGU Texas data which was provided by TCEQ in EPS2 AFS input format. The files *afs.PSDB_0813-2299_REv6b_latlon_negu* and *afs.0813-2299minorpts_nna* were downloaded from the TCEQ FTP site ftp://ftp.TCEQ.state.tx.us/pub/AirQuality/AirQualityPlanningAssessment/Modeling/file_transfer/NearNon/.

For Canada the 1995 Ontario emission inventories was used as available from:
www.ec.gc.ca/pdb/ape/ape-tables Files:

/Nox 95 _ e.cfm
/Co 95 _ e.cfm
/SOX95 _ e.cfm
/VOC 95 _ e.cfm

No Mexican emissions were included in the modeling.

Offshore emissions for the Gulf of Mexico were obtained from the TCEQ and are the same emissions 1-hour ozone for Houston/Galveston and Dallas-Fort Worth.

CAMx includes a Plume-in-Grid module that tracks emissions from large point sources until the plum size is commensurate to the grid cell size at which the emissions are released to the grid. Plume-in-grid treatment is determined by the amount of NOx a point source emits. Within the 4-km modeling domain 2 tons NOx on any episode day is the criteria for selection. For the extended regional emissions grid, the NOx criteria is 25 tons per day on any episode day.

Mobile Sources

The category of on-road mobile source emissions includes emissions from vehicles certified for highway use – cars, trucks, and motorcycles. Oklahoma emissions from these vehicles were estimated by combining EPA emission factors from the MOBILE6.2 model, expressed in grams per mile (g/mile), with vehicle miles traveled (VMT) activity data. For the counties that include portions of the Indian Nations Council of Governments (INCOG) and Association of Central Oklahoma Governments (ACOG) transportation networks, detailed emissions were estimated using link-level transportation modeling. For the rest of the Oklahoma counties, county-level Highway Performance Monitoring System (HPMS) VMT data were used.

Average daily speed and link-level activity data for portions of Creek, Osage, Tulsa and Wagoner Counties were provided by the INCOG. The ACOG provided data for Canadian, Cleveland, Logan, and Oklahoma Counties. These estimates were provided for 1995 and 2025. These data were interpolated to estimate the 1999 inventory. HPMS VMT and speed data were provided by the Oklahoma Department of Transportation (ODOT). Both types of data were reported separately for urban and rural areas and within those categories, by HPMS facility class.

MOBILE6.2 emission factors were used in two different applications, depending upon the VMT data source. For link-based data, the M6LINC system was used to combine the MOBILE6.2 emission factors with the link-level VMT and speeds. For counties or portions of counties not covered under the INCOG or ACOG networks, county-level HPMS VMT data were used. Where appropriate, the VMT from the INCOG or ACOG networks (including intrazonal trips) must first be taken out. To this end, the county was first identified for each link using GIS software. Then VMT was calculated for each county by summing all links within the county. National average speeds derived from HPMS data for each facility class were used. Emissions were spatially allocated using road mileage data from the USGS, or in the case of the link-based emissions, directly into grid cells via M6LINC.

The TCEQ provided the on-road mobile emissions inventory for Texas. Texas Transportation Institute (TTI) prepared mobile source emissions for all Texas counties under contract to the TCEQ. Emission factors are from the EPA's MOBILE6 model. VMT for 1999 are based on transportation models in all near nonattainment (NNA) counties that have a complete transportation model and were based on a rural HPMS method elsewhere. Refer to "1999 and 2007 Near Nonattainment Area Domain On-Road Mobile Source Modeling Emissions Inventories for 201 HPMS-Based Texas Counties" (ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/NearNonattainmentAreas/MobileEI/mobile6/NonLink_Final.wpd) and "1999 and 2007 Near Nonattainment Area Domain On-Road Mobile Source Modeling Emissions Inventories for the TDM Network Link-Based Texas Counties" (ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/NearNonattainmentAreas/MobileEI/mobile6/Link_Final.wpd) for a complete description of the TTI process.

TTI calculated emissions for each hour for four day-of-week scenarios: Monday-Thursday, Friday, Saturday and Sunday. These data were downloaded from the TCEQ site ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/NearNonattainmentAreas/MobileEI/non_link/. The temperatures are for average August/September 1999 conditions in each county. The emissions are adjusted from the average temperature scenario to day specific temperatures and humidity in each county for the August 13 – 22 episode days which were common days to a recent Texas modeling effort. The remaining ODEQ episode days use the average temperature conditions.

The Texas NNA counties for which link based transportation model data are used:

Tyler-Longview:	Gregg, Smith
Austin:	Hays, Travis, Williamson
San Antonio:	Bexar
Corpus Christi:	Nueces, San Patricio
Victoria:	Victoria

These data were processed by TCEQ and provided in model ready format. Similarly to the HPMS based processing the NNA counties were adjusted to reflect day specific temperature and humidity differences for the August 13 –22 episode days.

The NEI 1999 Version 2 for Criteria Pollutants, released by EPA in October 2002, is the basis for the on-road mobile regional emissions inventory for states other than Oklahoma and Texas in the 12 km grid. The data file *99neiv2asciimobile.zip - 1999 NEI Version 2 Criteria Emissions from Onroad Mobile Sources in ASCII text format* was acquired from EPA's FTP site (ftp.epa.gov). The documentation is provided at ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/onroad/Or_Doc99v2_Oct02.pdf. The NEI 1999 on-road emission inventory is processed to (1) extract the typical peak ozone season day data, (2) reformatted to the EPS2x AMS input file format and (3) processed through EPS2x.

The NEI 1999 Version 3 for Criteria Pollutants, released by EPA in December 2003, is the basis for the on-road mobile regional emissions inventory for states in the extended regional modeling domain outside the 12 km grid. The data file *99v3onroadascii.zip - 1999 NEI Version 3 Criteria Emissions from Onroad Mobile Sources in ASCII text format* was acquired from EPAs web page http://www.epa.gov/ttn/chief/net/1999inventory.html. The documentation is provided at ftp://ftp.epa.gov/EmisInventory/finalnei99ver3/haps/documentation/onroad/nei_onroad_jan04.pdf . The NEI 1999 on-road emission inventory is processed to (1) extract the best available data

for the August episode, (2) reformatted to the EPS3 AMS input file format and (3) processed through EPS3.

Area Sources

For all states in the 12 km grid other than Texas, the NEI 1999 Version 2 for Criteria Pollutants, released by EPA in November 2002, is the basis for the area regional emissions inventory. The data file *99neiv2asciiarea.zip - 1999 NEI Version 2 Criteria Emissions from Area Sources in ASCII text format* was acquired from EPA's FTP site. The documentation is provided at ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/area/Ar_Doc99v2_Oct02.pdf . The NEI 1999 area emission inventory is (1) processed to extract the typical peak ozone season day data, (2) reformatted to the EPS2x AMS input file format and (3) processed through EPS2x. The Oklahoma data was sent to ODEQ for review and corrections prior to processing.

The TCEQ provided emission inventories for Texas area sources. The data were downloaded from the TCEQ FTP site at /pub/AirQuality/AirQualityPlanningAssessment/Modeling/file_transfer/TX99AreaNR. The file *ams. TX_99.area_base1* is in EPS2x input file format.

For all states in the extended regional modeling domain outside of the 12 km grid, the NEI 1999 Final Version 3 for Criteria Pollutants, released by EPA in December 2003, is the basis for the area extended regional emissions inventory. The data file *99neiv3areaasci.zip - 1999 NEI Version 3 Criteria Emissions from Area Sources in ASCII text format* was acquired from EPA's FTP site. These area emissions are (1) processed to extract the best available data for the August episode, (2) reformatted to the EPS3 AMS input file format and (3) processed through EPS3.

Off-Road Sources

For all states in the 12 km grid other than Texas, the NEI 1999 Version 2 for Criteria Pollutants, released by EPA in October 2002, is the basis for the off-road regional emissions inventory. The data file *99neiv2asciinonroad.zip - 1999 NEI Version 2 Criteria Emissions from Nonroad Sources in ASCII text format* was acquired from EPA's FTP site. The NEI 1999 off-road emission inventory is (1) processed to extract the typical peak ozone season day data, (2) reformatted to the EPS2x AMS input file format and (3) processed through EPS2x.

The Oklahoma non-road model categories, which include aircraft, railroad, and commercial marine, were developed by ENVIRON. (ENVIRON, 2002. Development of Mobile Source Emission Inventories for Oklahoma. October.) The final Oklahoma off-road inventory was sent to ODEQ for review and corrections prior to processing.

The Texas off-road inventory included the output from NonRoad2002 ver2.1d which were generated by ENVIRON with the addition of the non-nonroad model categories extracted from the TCEQ provided off-road emission inventory. The non-nonroad data were downloaded from the TCEQ FTP site at /pub/AirQuality/AirQualityPlanningAssessment/Modeling/file_transfer/TX99AreaNR. The file *ams. TX_99.NR_base1* is in EPS2x input file format.

For all states in the extended regional modeling domain outside of the 12 km grid, the NEI 1999 Final Version 3 for Criteria Pollutants, released by EPA in December 2003, is the basis for the area extended regional emissions inventory. The data file *99neiv3nonroadasci.zip - 1999 NEI Version 3 Criteria Emissions from Nonroad Sources in ASCII text format* was acquired from EPA's FTP site. These area emissions are (1) processed to extract the best available data for the August episode, (2) reformatted to the EPS3 AMS input file format and (3) processed through EPS3.

Biogenic Sources

Biogenic emissions were calculated for the 36-km, 12-km, and 4-km modeling grids using GloBEIS 3.1. These emissions were calculated for each episode day for each of the grids.

GloBEIS3 requires domain definition, land use, temperature, photosynthetically active radiation (PAR), wind speed, and humidity input files. The episode date and domain are common to previous biogenic emissions modeling for Texas. Input files for domain definition, land use, and PAR were acquired from TCEQ and are based on TCEQ LULC data for Texas and EPA BELD LULC data for all other states while the hourly solar radiation (PAR) data were based on GOES satellite data (Jimenez and Yarwood, 2002). The meteorological data, including wind speed, humidity, and MM5 temperature were extracted from CAMx meteorological data files.

The drought index input file was generated from Palmer Drought Index (PDI) data obtained from the Climate Prediction Center. Drought severity is reported weekly for each climate division as defined by the Climate Prediction Center. Graphical representations of the drought index are available via the web site http://www.cpc.ncep.noaa.gov/. These data were obtained in ASCII format from the FTP site (ftp://ftp.ncep.noaa.gov/pub/cpc/htdocs/temp2/) for the modeling episode. Gridded fields of the PDI were developed for the modeling grid using the Arc/INFO 7.2x GIS software.

EMISSIONS SUMMARIES FOR 1999

All emission estimates in the following tables reflect gridded, model ready emissions in tons per day (tpd). This means that for partial counties and/or states at the edge of a modeling domain, only the portion of emissions that is within the modeling domain is reported.

Tables 3-1 to 3-3 are Oklahoma county emission summaries by major source type for those counties within the Oklahoma City and Tulsa metropolitan areas. For those data that have day-specific emissions August 21 – August 23 are used to represent a typical Saturday, Sunday and Weekday respectively.

Table 3-4 indicates the day specific summary of Oklahoma CEM NOx emissions by county.

Table 3-5 is the Oklahoma City and Tulsa transportation network link based on-road mobile tpd emissions.

Table 3-6 to 3-8 summarize the day specific Oklahoma on-road mobile HPMS based emissions by county.
Table 3-9 summarizes the gridded emissions by major source type for all states in the modeling domain.

Table 3-10 summarizes the gridded biogenic tpd emissions by state for the first ten days of the modeling episode.

Table 3-1. Oklahoma City and Tulsa 1999 NOx tpd emissions by major source type.

	NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.61	0.56	0.54	6.90	6.65	6.37	6.05	6.23	6.18	2.80	2.80	2.80	10.34	7.22	7.70
	Cleveland	40027	2.32	2.14	2.05	3.50	3.33	3.00	4.07	4.19	4.20	0.14	0.07	0.07	0.69	0.67	0.67
	Logan	40083	0.12	0.12	0.11	4.30	4.23	4.16	1.55	1.60	1.61	0.83	0.83	0.83	2.80	2.80	2.80
	McClain	40087	0.07	0.07	0.07	2.16	2.08	1.91	4.85	4.99	5.06	0.40	0.40	0.40	0.99	0.99	0.99
	Oklahoma	40109	16.40	15.10	14.45	21.25	19.66	17.62	104.84	98.55	80.32	1.91	1.81	1.81	19.55	10.91	12.45
	Pottawatomie	40125	1.08	1.00	0.96	3.54	3.44	3.35	7.36	7.36	7.25	0.02	0.02	0.02	0.39	0.39	0.39
	Subtotal		**20.61**	**18.99**	**18.18**	**41.66**	**39.39**	**36.41**	**128.72**	**122.93**	**104.61**	**6.10**	**5.93**	**5.93**	**34.77**	**22.98**	**25.00**
Tulsa MSA	Creek	40037	0.93	0.87	0.83	4.35	4.27	4.08	4.90	4.99	4.97	1.08	1.08	1.08	3.43	3.43	3.43
	Osage	40113	0.15	0.14	0.14	4.85	4.99	4.85	2.67	2.69	2.66	1.52	1.52	1.52	0.07	0.07	0.07
	Rogers	40131	0.60	0.56	0.55	7.01	7.05	6.84	5.73	5.84	5.81	0.16	0.12	0.12	79.16	81.99	78.33
	Tulsa	40143	20.71	19.06	18.24	23.78	22.25	20.24	78.86	71.69	56.68	0.55	0.53	0.53	46.45	41.93	37.21
	Wagoner	40145	1.39	1.29	1.24	4.63	4.74	4.68	3.27	3.34	3.32	0.02	0.02	0.02	0.04	0.04	0.04
	Subtotal		**23.78**	**21.92**	**20.99**	**44.61**	**43.30**	**40.68**	**95.42**	**88.55**	**73.44**	**3.33**	**3.26**	**3.26**	**129.14**	**127.45**	**119.08**

Table 3-2. Oklahoma City and Tulsa 1999 VOC tpd emissions by major source type.

	VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	6.83	6.83	6.82	1.20	1.67	1.64	6.37	6.11	6.30	0.82	0.70	0.70	0.50	0.49	0.49

	Cleveland	40027	8.99	8.99	8.99	5.50	7.97	7.92	5.97	5.72	6.12	0.35	0.25	0.25	0.10	0.10	0.10
	Logan	40083	2.90	2.90	2.90	0.65	1.21	1.20	1.98	1.92	2.02	0.51	0.51	0.51	0.20	0.20	0.20
	McClain	40087	3.31	3.31	3.31	0.50	1.45	1.42	4.49	4.32	4.57	0.47	0.47	0.47	1.68	1.68	1.68
	Oklahoma	40109	37.41	37.39	37.38	11.97	15.24	14.83	144.82	127.53	112.47	4.56	2.73	2.73	2.76	0.41	0.41
	Pottawatomie	40125	4.83	4.83	4.83	0.67	1.18	1.17	7.56	7.19	7.23	0.31	0.30	0.30	0.49	0.49	0.49
	Subtotal		**64.27**	**64.24**	**64.23**	**20.50**	**28.73**	**28.19**	**171.18**	**152.78**	**138.71**	**7.02**	**4.97**	**4.97**	**5.72**	**3.35**	**3.35**
Tulsa MSA	Creek	40037	6.45	6.45	6.45	0.84	2.14	2.11	5.26	5.05	5.20	0.78	0.74	0.74	0.20	0.20	0.20
	Osage	40113	2.60	2.60	2.60	2.25	7.58	7.55	3.10	3.00	3.06	1.38	1.38	1.38	0.01	0.01	0.01
	Rogers	40131	4.41	4.41	4.41	1.61	5.07	5.04	6.46	6.21	6.40	0.24	0.17	0.17	0.67	0.67	0.67
	Tulsa	40143	30.38	30.35	30.34	12.44	16.02	15.61	60.18	52.13	45.96	6.26	5.64	5.64	1.14	0.93	0.93
	Wagoner	40145	3.40	3.40	3.40	1.11	3.63	3.62	3.86	3.71	3.82	0.03	0.01	0.01	0.00	0.00	0.00
	Subtotal		**47.23**	**47.20**	**47.19**	**18.25**	**34.43**	**33.93**	**78.86**	**70.10**	**64.44**	**8.70**	**7.95**	**7.95**	**2.01**	**1.81**	**1.81**

Table 3-3. Oklahoma City and Tulsa 1999 CO tpd emissions by major source type.

	CO		**Area**			**Off-road**			**Onroad**			**Low Pts**			**Elev Pts**		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.37	0.36	0.36	14.81	18.64	18.13	45.18	43.26	44.24	2.50	2.50	2.50	2.25	2.31	2.31
	Cleveland	40027	4.94	4.91	4.90	74.64	86.58	85.93	31.74	30.58	31.76	0.05	0.05	0.05	0.35	0.30	0.30
	Logan	40083	0.58	0.58	0.58	5.77	8.43	8.30	11.95	11.59	11.91	0.83	0.83	0.83	2.38	2.38	2.38
	McClain	40087	0.65	0.65	0.65	4.13	6.91	6.64	35.90	34.31	35.53	0.33	0.33	0.33	0.73	0.73	0.73
	Oklahoma	40109	16.08	15.89	15.79	200.02	275.86	271.33	629.01	548.63	480.45	2.17	2.15	2.15	1.54	1.51	1.51
	Pottawatomie	40125	1.92	1.90	1.90	9.87	12.70	12.42	53.15	51.59	51.88	1.18	0.94	0.94	2.62	1.34	1.34
	Subtotal		**24.54**	**24.29**	**24.17**	**309.25**	**409.12**	**402.74**	**806.93**	**719.95**	**655.77**	**7.05**	**6.79**	**6.79**	**9.88**	**8.56**	**8.56**
Tulsa MSA	Creek	40037	1.95	1.94	1.93	8.82	14.20	13.77	36.44	35.19	35.83	0.81	0.81	0.81	0.47	0.46	0.46
	Osage	40113	1.11	1.11	1.11	10.94	24.61	24.37	19.97	19.55	19.79	1.11	1.11	1.11	0.02	0.02	0.02
	Rogers	40131	4.09	4.08	4.08	12.16	23.67	23.21	43.29	41.85	42.59	0.07	0.05	0.05	6.57	6.57	6.57
	Tulsa	40143	18.95	18.70	18.58	204.89	279.30	274.86	526.61	457.76	394.31	0.58	0.52	0.52	8.29	8.08	8.08
	Wagoner	40145	3.22	3.21	3.20	8.73	16.88	16.72	25.11	24.28	24.72	0.15	0.15	0.15	0.01	0.01	0.01
	Subtotal		**29.32**	**29.04**	**28.90**	**245.55**	**358.67**	**352.92**	**651.43**	**578.63**	**517.24**	**2.73**	**2.63**	**2.63**	**15.35**	**15.14**	**15.14**

Table 3-4. Oklahoma 1999 episode day CEM tpd emissions.

NOx	Caddo	Canadian	Choctaw	Comanche	Kay	Mayes	Muskogee	Noble	Oklahoma	Rogers	Seminole	Tulsa	Woodward
Data	40015	40017	40023	40031	40071	40097	40101	40103	40109	40131	40133	40143	40153
Fri., 8/13	24.45	7.07	18.42	14.20	2.28	50.42	61.61	47.52	25.07	62.33	14.56	40.29	7.26
Sat., 8/14	11.38	6.02	12.73	11.62	1.91	47.92	45.76	41.25	14.97	61.67	19.85	26.84	6.09
Sun., 8/15	20.01	8.31	15.16	10.43	1.80	33.72	38.44	46.24	15.48	60.76	19.31	30.39	7.44
Mon., 8/16	27.77	8.10	19.02	13.11	1.60	13.34	60.72	46.07	17.13	71.82	22.49	58.32	6.43
Tues., 8/17	33.28	8.19	19.81	12.69	1.68	21.54	65.99	50.41	16.29	79.90	26.42	60.47	7.02
Wed., 8/18	33.97	8.27	22.24	12.02	1.68	37.02	68.33	49.37	17.44	70.40	28.23	58.01	8.78
Thurs., 8/19	30.53	7.61	22.41	14.85	1.60	38.01	76.14	52.32	13.85	69.13	20.37	44.65	8.47
Fri., 8/20	20.43	4.11	22.15	12.62	1.68	42.74	69.20	39.43	10.22	66.23	20.97	21.71	7.11
Sat., 8/21	26.61	3.93	19.64	13.59	2.05	46.44	60.33	44.05	7.46	72.49	15.00	25.56	4.75
Sun., 8/22	22.94	4.41	18.78	12.92	2.17	46.18	67.07	42.15	9.00	68.83	17.45	20.85	4.53
Mon., 8/23	30.30	7.29	23.18	12.35	2.39	50.49	67.74	49.27	15.87	69.65	21.66	29.74	7.29
Tues., 8/24	19.44	5.97	19.46	12.43	2.62	51.17	71.97	44.40	9.96	66.59	19.59	28.17	7.61
Wed., 8/25	19.20	7.85	22.78	12.06	2.82	50.69	71.10	43.47	13.90	69.34	21.10	25.86	4.74
Thurs., 8/26	28.22	8.51	23.21	12.19	2.54	43.76	80.98	38.52	14.92	70.72	26.41	35.81	6.72
Fri., 8/27	21.46	5.07	22.03	13.20	2.50	50.38	73.89	41.72	11.34	66.31	18.54	30.16	4.95
Sat., 8/28	26.49	5.58	22.32	11.03	2.46	54.70	68.27	23.23	15.17	66.36	25.60	39.32	3.95
Sun., 8/29	23.50	5.28	21.19	12.47	2.45	52.17	60.01	23.65	13.63	66.70	27.01	35.18	3.86
Mon., 8/30	25.56	5.41	20.49	12.50	2.58	52.01	51.11	43.40	13.01	65.48	22.29	35.16	8.13
Tues.,8/31	26.78	3.59	18.17	12.03	2.78	52.77	69.41	50.79	12.11	58.88	20.97	33.23	8.51
Mon. 9/01	30.52	4.76	17.83	10.32	2.75	52.58	67.16	47.13	13.95	42.64	18.71	36.63	7.71

Table 3-5. Oklahoma 1999 episode day on-road mobile link based tpd emissions.

NOX			VOC			CO		
	Oklahoma City Area	Tulsa Area		Oklahoma City Area	Tulsa Area		Oklahoma City Area	Tulsa Area
Data	40109	40143	Data	40109	40143	Data	40109	40143
Fri., 8/13	98.55	75.53	Fri., 8/13	126.75	43.43	Fri., 8/13	533.62	460.98
Sat., 8/14	81.27	58.63	Sat., 8/14	101.84	32.50	Sat., 8/14	422.35	361.91
Sun., 8/15	63.28	43.91	Sun., 8/15	83.14	25.29	Sun., 8/15	344.32	292.18
Mon., 8/16	91.97	68.89	Mon., 8/16	119.69	39.89	Mon., 8/16	497.69	427.71
Tues., 8/17	97.60	73.93	Tues., 8/17	126.12	42.57	Tues., 8/17	520.70	447.24
Wed., 8/18	97.72	73.88	Wed., 8/18	130.36	44.01	Wed., 8/18	535.50	459.39
Thurs., 8/19	95.74	72.80	Thurs., 8/19	122.03	41.18	Thurs., 8/19	509.55	437.75
Fri., 8/-20	101.46	78.14	Fri., 8/-20	123.39	42.11	Fri., 8/-20	525.29	451.96
Sat., 8/21	81.30	58.63	Sat., 8/21	101.84	32.51	Sat., 8/21	421.49	361.13
Sun., 8/22	63.27	43.75	Sun., 8/22	84.86	25.79	Sun., 8/22	348.06	296.69
Mon., 8/23	88.10	66.03	Mon., 8/23	117.91	39.42	Mon., 8/23	497.28	427.06
Tues., 8/24	95.38	72.57	Tues., 8/24	120.42	40.51	Tues., 8/24	502.86	432.31
Wed., 8/25	95.89	73.01	Wed., 8/25	119.92	40.44	Wed., 8/25	507.08	436.90
Thurs., 8/26	94.86	71.63	Thurs., 8/26	129.13	43.93	Thurs., 8/26	540.16	465.28
Fri., 8/27	97.55	74.32	Fri., 8/27	132.87	45.71	Fri., 8/27	561.83	485.26
Sat., 8/28	76.37	55.06	Sat., 8/28	101.36	32.42	Sat., 8/28	426.26	367.67
Sun., 8/29	62.65	43.39	Sun., 8/29	83.40	25.37	Sun., 8/29	344.51	292.88
Mon., 8/30	89.91	67.55	Mon., 8/30	115.34	38.37	Mon., 8/30	483.42	415.25
Tues.,8/31	96.23	72.90	Tues.,8/31	124.16	41.91	Tues.,8/31	515.40	443.31
Mon. 9/01	95.15	72.26	Mon. 9/01	121.57	41.07	Mon. 9/01	510.74	438.60

Table 3-6. Oklahoma gridded 1999 episode day on-road mobile NOx tpd emissions.

County Name	NOx	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	1.74	1.78	1.78	1.77	1.77	1.77	1.76	1.78	1.76	1.77	1.74	1.77	1.78	1.72	1.70	1.74	1.74	1.75	1.74	1.77
Alfalfa	40003	1.02	1.02	1.01	0.99	1.00	1.01	1.02	1.03	1.01	1.00	0.99	1.02	1.02	0.99	0.99	1.00	0.98	0.99	0.99	1.01
Atoka	40005	2.59	2.64	2.64	2.67	2.64	2.63	2.63	2.68	2.65	2.62	2.57	2.69	2.65	2.59	2.59	2.60	2.63	2.63	2.60	2.64
Beaver	40007	1.36	1.37	1.34	1.32	1.33	1.37	1.35	1.37	1.35	1.34	1.34	1.35	1.36	1.32	1.37	1.34	1.34	1.32	1.34	1.36
Beckham	40009	4.02	4.06	4.01	4.09	4.01	4.10	4.04	4.09	4.06	4.04	4.02	4.06	4.04	4.01	4.09	4.04	4.04	4.06	4.02	4.07
Blaine	40011	1.44	1.47	1.44	1.43	1.44	1.48	1.45	1.47	1.46	1.44	1.41	1.45	1.47	1.42	1.42	1.43	1.41	1.43	1.43	1.45
Bryan	40013	4.42	4.50	4.50	4.53	4.50	4.48	4.44	4.55	4.53	4.57	4.39	4.39	4.48	4.42	4.39	4.44	4.44	4.48	4.44	4.48
Caddo	40015	4.89	5.04	4.98	5.10	4.99	5.09	4.98	5.07	5.04	5.10	4.89	5.01	5.01	4.92	4.92	4.94	4.89	4.94	4.94	5.01
Canadian	40017	6.05	6.27	6.20	6.18	6.20	6.29	6.20	6.27	6.23	6.18	6.05	6.20	6.20	6.10	6.05	6.12	6.05	6.24	6.12	6.17
Carter	40019	5.99	6.09	6.07	6.09	6.12	6.09	6.01	6.16	6.12	6.15	6.15	5.94	6.06	6.06	5.94	5.94	5.94	6.15	6.01	6.06
Cherokee	40021	3.74	3.83	3.83	3.81	3.80	3.80	3.78	3.83	3.79	3.80	3.75	3.80	3.83	3.71	3.67	3.75	3.75	3.77	3.75	3.80
Choctaw	40023	1.71	1.74	1.74	1.76	1.76	1.73	1.72	1.76	1.75	1.76	1.70	1.70	1.73	1.71	1.70	1.73	1.72	1.73	1.72	1.73
Cleveland	40027	4.07	4.22	4.17	4.17	4.17	4.23	4.15	4.22	4.19	4.20	4.07	4.20	4.17	4.11	4.07	4.07	4.07	4.15	4.11	4.15
Coal	40029	0.67	0.69	0.69	0.69	0.69	0.69	0.68	0.70	0.69	0.68	0.67	0.70	0.69	0.67	0.67	0.68	0.68	0.68	0.68	0.69
Comanche	40031	9.43	9.58	9.54	9.54	9.58	9.72	9.54	9.67	9.62	9.59	9.35	9.59	9.53	9.43	9.43	9.45	9.35	9.45	9.35	9.58
Cotton	40033	1.37	1.40	1.39	1.39	1.40	1.42	1.38	1.41	1.40	1.42	1.36	1.36	1.39	1.39	1.37	1.38	1.36	1.38	1.36	1.40
Craig	40035	2.99	3.02	3.02	3.01	3.00	3.00	2.99	3.02	2.99	3.00	2.96	3.01	3.02	2.93	2.90	2.96	2.96	2.96	3.02	3.00
Creek	40037	4.94	5.03	5.00	4.99	4.99	5.02	4.94	5.05	4.99	4.97	4.90	5.02	5.03	4.84	4.88	4.90	5.05	4.94	5.05	4.99
Custer	40039	4.51	4.55	4.52	4.57	4.51	4.59	4.52	4.59	4.55	4.52	4.52	4.55	4.57	4.50	4.45	4.52	4.52	4.55	4.51	4.57
Delaware	40041	3.74	3.78	3.78	3.77	3.76	3.76	3.74	3.78	3.74	3.76	3.70	3.77	3.78	3.66	3.62	3.69	3.70	3.72	3.70	3.76
Dewey	40043	0.90	0.92	0.91	0.89	0.90	0.92	0.91	0.92	0.91	0.91	0.91	0.91	0.91	0.90	0.89	0.91	0.91	0.91	0.90	0.91
Ellis	40045	0.65	0.66	0.65	0.64	0.64	0.66	0.65	0.66	0.65	0.65	0.65	0.65	0.65	0.64	0.66	0.65	0.65	0.65	0.64	0.65
Garfield	40047	5.32	5.37	5.32	5.27	5.29	5.32	5.29	5.37	5.35	5.27	5.22	5.32	5.36	5.21	5.17	5.22	5.30	5.30	5.22	5.35
Garvin	40049	5.28	5.41	5.38	5.38	5.41	5.46	5.36	5.45	5.41	5.46	5.46	5.46	5.35	5.35	5.25	5.25	5.25	5.46	5.30	5.35
Grady	40051	4.10	4.23	4.18	4.19	4.20	4.27	4.18	4.26	4.22	4.27	4.10	4.20	4.20	4.13	4.10	4.10	4.10	4.27	4.14	4.18
Grant	40053	0.85	0.86	0.85	0.83	0.84	0.85	0.85	0.86	0.85	0.84	0.83	0.85	0.85	0.83	0.82	0.84	0.86	0.86	0.86	0.84
Greer	40055	0.52	0.53	0.52	0.54	0.52	0.53	0.52	0.53	0.53	0.52	0.52	0.53	0.52	0.52	0.54	0.52	0.51	0.53	0.52	0.52
Harmon	40057	0.29	0.30	0.29	0.30	0.29	0.30	0.29	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.30	0.29	0.29	0.30	0.29	0.29
Harper	40059	0.74	0.74	0.73	0.72	0.72	0.74	0.73	0.74	0.73	0.73	0.73	0.73	0.74	0.72	0.75	0.73	0.73	0.72	0.73	0.74
Haskell	40061	1.19	1.24	1.24	1.24	1.23	1.22	1.22	1.24	1.23	1.23	1.19	1.22	1.23	1.19	1.19	1.21	1.21	1.23	1.21	1.23
Hughes	40063	1.36	1.40	1.41	1.41	1.40	1.39	1.38	1.41	1.40	1.39	1.42	1.38	1.40	1.37	1.37	1.37	1.42	1.38	1.37	1.39
Jackson	40065	2.15	2.15	2.15	2.17	2.15	2.19	2.15	2.18	2.16	2.17	2.15	2.15	2.15	2.14	2.17	2.12	2.10	2.16	2.12	2.15
Jefferson	40067	0.75	0.76	0.76	0.76	0.76	0.76	0.75	0.77	0.77	0.78	0.74	0.74	0.76	0.75	0.75	0.75	0.74	0.78	0.74	0.76
Johnston	40069	1.39	1.41	1.41	1.42	1.41	1.41	1.39	1.43	1.42	1.44	1.44	1.44	1.40	1.39	1.37	1.39	1.39	1.41	1.39	1.41
Kay	40071	5.47	5.50	5.44	5.41	5.44	5.47	5.44	5.50	5.44	5.38	5.39	5.48	5.48	5.29	5.29	5.38	5.46	5.38	5.46	5.47
Kingfisher	40073	1.69	1.72	1.70	1.69	1.70	1.71	1.69	1.72	1.71	1.69	1.66	1.70	1.72	1.67	1.66	1.67	1.66	1.74	1.67	1.69
Kiowa	40075	1.36	1.37	1.36	1.39	1.36	1.39	1.36	1.38	1.37	1.39	1.36	1.36	1.36	1.36	1.34	1.36	1.33	1.37	1.34	1.36
Latimer	40077	1.14	1.19	1.19	1.19	1.19	1.17	1.18	1.19	1.18	1.19	1.14	1.17	1.18	1.14	1.14	1.17	1.17	1.17	1.17	1.18
LeFlore	40079	5.57	5.78	5.82	5.80	5.78	5.69	5.75	5.80	5.75	5.78	5.69	5.68	5.75	5.64	5.57	5.69	5.69	5.72	5.69	5.75
Lincoln	40081	5.29	5.39	5.38	5.33	5.35	5.38	5.29	5.41	5.38	5.29	5.25	5.38	5.38	5.23	5.23	5.20	5.25	5.29	5.25	5.33
Logan	40083	1.58	1.61	1.59	1.58	1.59	1.59	1.58	1.61	1.60	1.61	1.55	1.59	1.60	1.56	1.55	1.55	1.55	1.58	1.56	1.58
Love	40085	3.35	3.40	3.39	3.39	3.40	3.40	3.36	3.44	3.42	3.46	3.33	3.33	3.39	3.35	3.35	3.36	3.33	3.46	3.33	3.39
McClain	40087	4.85	5.03	4.96	4.96	4.96	5.04	4.94	5.03	4.99	5.06	4.85	5.06	4.96	4.87	4.85	4.85	4.85	4.94	4.89	4.93
McCurtain	40089	4.03	4.11	4.15	4.16	4.15	4.09	4.05	4.15	4.13	4.15	4.09	4.00	4.08	4.05	4.00	4.09	4.09	4.11	4.09	4.13
McIntosh	40091	4.00	4.14	4.14	4.12	4.10	4.10	4.07	4.15	4.12	4.10	4.00	4.07	4.12	4.02	4.02	4.00	4.04	4.07	4.04	4.10
Major	40093	1.47	1.47	1.44	1.43	1.45	1.46	1.45	1.47	1.46	1.45	1.43	1.45	1.47	1.42	1.42	1.44	1.41	1.43	1.43	1.45
Marshall	40095	1.44	1.47	1.46	1.46	1.47	1.47	1.44	1.48	1.47	1.50	1.50	1.43	1.46	1.44	1.44	1.43	1.43	1.46	1.43	1.46
Mayes	40097	5.55	5.68	5.68	5.65	5.64	5.64	5.61	5.68	5.61	5.58	5.50	5.65	5.68	5.50	5.44	5.55	5.56	5.55	5.68	5.64

County Name	NOx	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Murray	40099	1.98	2.02	2.02	2.03	2.03	2.05	1.99	2.05	2.03	2.06	2.06	2.06	2.01	1.98	1.98	1.97	1.97	2.06	1.99	2.01
Muskogee	40101	7.85	8.15	8.09	8.13	8.13	8.05	8.00	8.15	8.09	8.05	7.85	8.00	8.17	7.85	7.91	7.93	7.93	8.00	7.93	8.09
Noble	40103	3.45	3.49	3.45	3.43	3.45	3.46	3.43	3.49	3.46	3.41	3.38	3.47	3.47	3.37	3.35	3.41	3.49	3.41	3.49	3.46
Nowata	40105	0.94	0.95	0.95	0.94	0.94	0.94	0.94	0.95	0.94	0.94	0.93	0.95	0.95	0.92	0.91	0.93	0.93	0.93	0.95	0.94
Okfuskee	40107	2.12	2.20	2.19	2.19	2.19	2.19	2.16	2.21	2.19	2.17	2.21	2.16	2.20	2.14	2.14	2.14	2.21	2.16	2.21	2.17
Oklahoma	40109	16.75	17.35	17.16	17.11	17.16	17.32	17.08	17.35	17.25	17.05	16.75	17.32	17.32	16.92	16.75	16.75	16.75	17.11	16.94	17.08
Okmulgee	40111	4.51	4.68	4.65	4.67	4.64	4.67	4.59	4.69	4.64	4.62	4.55	4.59	4.68	4.54	4.54	4.55	4.55	4.59	4.67	4.64
Osage	40113	2.69	2.72	2.69	2.68	2.70	2.70	2.68	2.72	2.69	2.66	2.67	2.71	2.71	2.61	2.61	2.66	2.67	2.66	2.73	2.70
Ottawa	40115	4.86	4.91	4.91	4.89	4.88	4.88	4.86	4.91	4.86	4.88	4.81	4.89	4.91	4.76	4.71	4.80	4.81	4.80	4.81	4.88
Pawnee	40117	1.82	1.85	1.82	1.81	1.83	1.83	1.81	1.85	1.82	1.80	1.79	1.84	1.84	1.78	1.77	1.80	1.85	1.80	1.79	1.82
Payne	40119	5.46	5.52	5.46	5.43	5.46	5.49	5.43	5.52	5.49	5.40	5.36	5.50	5.50	5.34	5.30	5.36	5.48	5.40	5.36	5.49
Pittsburg	40121	5.15	5.33	5.28	5.33	5.28	5.26	5.26	5.35	5.31	5.25	5.15	5.25	5.31	5.18	5.18	5.20	5.20	5.28	5.20	5.28
Pontotoc	40123	3.17	3.24	3.22	3.24	3.24	3.22	3.21	3.27	3.26	3.20	3.26	3.20	3.26	3.17	3.14	3.18	3.18	3.21	3.18	3.22
Pottawatomie	40125	7.12	7.38	7.36	7.33	7.33	7.36	7.25	7.40	7.36	7.25	7.36	7.25	7.36	7.17	7.17	7.19	7.19	7.26	7.19	7.29
Pushmataha	40127	1.39	1.44	1.44	1.45	1.44	1.42	1.42	1.45	1.44	1.44	1.42	1.42	1.44	1.39	1.39	1.42	1.42	1.43	1.42	1.44
RogerMills	40129	0.65	0.67	0.66	0.65	0.65	0.67	0.66	0.67	0.66	0.66	0.66	0.66	0.66	0.65	0.67	0.66	0.66	0.66	0.65	0.66
Rogers	40131	5.78	5.91	5.91	5.87	5.87	5.87	5.84	5.91	5.84	5.81	5.73	5.89	5.91	5.73	5.67	5.78	5.79	5.78	5.90	5.87
Seminole	40133	3.88	4.03	4.02	4.00	4.00	4.02	3.96	4.04	4.02	3.96	4.04	3.96	4.00	3.91	3.91	3.92	3.92	3.96	3.92	3.98
Sequoyah	40135	6.08	6.31	6.33	6.31	6.29	6.23	6.26	6.31	6.26	6.29	6.20	6.19	6.26	6.14	6.08	6.20	6.20	6.23	6.20	6.29
Stephens	40137	3.26	3.31	3.30	3.31	3.33	3.37	3.30	3.36	3.33	3.35	3.23	3.35	3.30	3.30	3.23	3.23	3.23	3.35	3.27	3.30
Texas	40139	0.85	0.85	0.84	0.82	0.83	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.85	0.82	0.85	0.84	0.84	0.82	0.83	0.85
Tillman	40141	0.91	0.93	0.92	0.94	0.93	0.94	0.92	0.93	0.93	0.94	0.90	0.94	0.92	0.92	0.91	0.91	0.90	0.91	0.90	0.93
Tulsa	40143	12.93	13.14	13.06	13.06	13.06	13.11	13.06	13.17	13.06	12.93	12.83	13.11	13.17	12.68	12.68	12.93	12.83	12.93	12.92	13.06
Wagoner	40145	3.30	3.36	3.38	3.35	3.35	3.35	3.34	3.38	3.34	3.32	3.27	3.35	3.38	3.24	3.24	3.27	3.27	3.30	3.37	3.35
Washington	40147	3.59	3.63	3.63	3.61	3.61	3.61	3.59	3.63	3.59	3.57	3.56	3.62	3.63	3.49	3.49	3.56	3.56	3.56	3.60	3.61
Washita	40149	2.63	2.65	2.62	2.69	2.63	2.68	2.64	2.67	2.65	2.64	2.63	2.65	2.64	2.62	2.69	2.64	2.64	2.65	2.63	2.66
Woods	40151	0.92	0.92	0.91	0.89	0.90	0.91	0.91	0.92	0.91	0.91	0.91	0.91	0.92	0.89	0.89	0.90	0.91	0.89	0.90	0.91
Woodward	40153	2.13	2.15	2.11	2.08	2.10	2.15	2.12	2.15	2.12	2.10	2.11	2.12	2.13	2.10	2.13	2.11	2.11	2.12	2.10	2.13

Table 3-7. Oklahoma gridded 1999 episode day on-road mobile VOC tpd emissions.

County Name	VOC	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	1.75	1.70	1.70	1.68	1.74	1.74	1.72	1.70	1.72	1.74	1.77	1.68	1.70	1.78	1.79	1.77	1.77	1.77	1.77	1.74
Alfalfa	40003	1.06	1.02	1.08	1.08	1.08	1.05	1.04	1.03	1.05	1.08	1.08	1.04	1.06	1.14	1.14	1.06	1.09	1.08	1.08	1.08
Atoka	40005	2.76	2.60	2.60	2.56	2.60	2.60	2.60	2.46	2.53	2.57	2.63	2.68	2.53	2.76	2.76	2.62	2.60	2.60	2.62	2.60
Beaver	40007	1.34	1.30	1.36	1.37	1.35	1.30	1.32	1.30	1.32	1.36	1.36	1.32	1.34	1.44	1.40	1.36	1.36	1.37	1.36	1.34
Beckham	40009	3.39	3.29	3.35	3.49	3.35	3.24	3.39	3.21	3.29	3.39	3.39	3.29	3.39	3.35	3.49	3.39	3.39	3.30	3.39	3.33
Blaine	40011	1.52	1.45	1.52	1.55	1.54	1.47	1.53	1.45	1.49	1.54	1.55	1.53	1.51	1.63	1.63	1.55	1.55	1.55	1.55	1.53
Bryan	40013	5.08	4.76	4.76	4.63	4.76	4.78	4.80	4.69	4.63	4.92	4.82	4.82	4.71	5.08	4.82	4.80	4.80	4.78	4.80	4.71
Caddo	40015	4.79	4.59	4.68	4.88	4.74	4.52	4.68	4.47	4.60	4.88	4.79	4.73	4.73	5.04	5.04	4.77	4.79	4.77	4.77	4.73
Canadian	40017	6.32	5.87	6.23	6.25	6.23	5.94	6.23	5.87	6.05	6.25	6.32	6.23	6.23	6.67	6.32	6.29	6.32	6.45	6.29	6.16
Carter	40019	6.65	6.22	6.24	6.22	6.05	6.22	6.28	5.87	6.05	6.43	6.43	6.30	6.15	6.15	6.30	6.30	6.30	6.43	6.28	6.15
Cherokee	40021	4.23	4.08	4.08	4.03	4.21	4.21	4.16	4.08	4.15	4.21	4.29	4.21	4.08	4.32	4.33	4.29	4.29	4.28	4.29	4.21
Choctaw	40023	1.99	1.87	1.87	1.84	1.84	1.87	1.88	1.84	1.82	1.84	1.89	1.89	1.85	1.99	1.89	1.87	1.88	1.87	1.88	1.85
Cleveland	40027	5.78	5.33	5.69	5.69	5.69	5.39	5.72	5.33	5.52	5.92	5.78	5.92	5.69	6.16	5.78	5.78	5.78	5.72	5.76	5.63
Coal	40029	0.75	0.69	0.70	0.68	0.70	0.70	0.71	0.67	0.68	0.70	0.71	0.73	0.69	0.75	0.75	0.71	0.71	0.71	0.71	0.70
Comanche	40031	11.79	10.99	11.03	11.03	10.99	10.46	11.03	10.80	10.67	11.39	11.14	11.39	10.86	11.79	11.79	11.10	11.14	11.10	11.14	10.99
Cotton	40033	1.34	1.26	1.26	1.26	1.26	1.21	1.27	1.24	1.23	1.30	1.28	1.28	1.25	1.25	1.34	1.27	1.28	1.27	1.28	1.26
Craig	40035	2.65	2.61	2.61	2.58	2.68	2.68	2.65	2.61	2.65	2.68	2.73	2.58	2.61	2.75	2.76	2.70	2.73	2.70	2.81	2.68
Creek	40037	5.09	4.86	4.99	5.00	5.00	5.06	5.09	4.91	5.00	5.15	5.20	5.06	4.86	5.22	5.50	5.20	5.33	5.09	5.33	5.00
Custer	40039	4.11	3.98	4.10	4.23	4.11	3.92	4.10	3.92	3.98	4.10	4.10	3.98	4.03	4.05	4.36	4.10	4.10	3.99	4.11	4.03
Delaware	40041	3.87	3.80	3.80	3.76	3.91	3.91	3.87	3.80	3.86	3.91	3.99	3.76	3.80	4.01	4.03	3.93	3.99	3.98	3.99	3.91
Dewey	40043	0.93	0.88	0.92	0.93	0.93	0.88	0.92	0.88	0.90	0.92	0.92	0.90	0.91	0.91	0.98	0.92	0.92	0.90	0.93	0.91
Ellis	40045	0.66	0.64	0.67	0.68	0.67	0.64	0.65	0.64	0.65	0.67	0.67	0.65	0.66	0.67	0.70	0.67	0.67	0.66	0.68	0.66
Garfield	40047	6.09	5.97	6.08	6.29	6.27	6.09	6.27	5.97	6.16	6.29	6.33	6.08	5.90	6.73	6.36	6.33	6.50	6.50	6.33	6.16
Garvin	40049	5.13	4.69	4.83	4.83	4.70	4.62	4.84	4.57	4.70	4.98	4.98	4.98	4.77	4.77	4.88	4.88	4.88	4.98	4.86	4.77
Grady	40051	4.39	4.20	4.29	4.35	4.33	4.14	4.29	4.09	4.21	4.48	4.39	4.33	4.33	4.63	4.39	4.39	4.39	4.48	4.37	4.29
Grant	40053	0.87	0.84	0.86	0.89	0.88	0.86	0.86	0.84	0.86	0.88	0.89	0.83	0.83	0.94	0.89	0.87	0.91	0.91	0.91	0.88
Greer	40055	0.60	0.57	0.59	0.61	0.59	0.57	0.59	0.56	0.57	0.59	0.60	0.57	0.59	0.59	0.61	0.59	0.60	0.58	0.60	0.59
Harmon	40057	0.33	0.32	0.32	0.34	0.33	0.31	0.32	0.31	0.32	0.33	0.33	0.33	0.33	0.32	0.34	0.33	0.33	0.32	0.33	0.33
Harper	40059	0.74	0.72	0.76	0.76	0.75	0.72	0.73	0.72	0.73	0.76	0.76	0.73	0.74	0.80	0.78	0.76	0.76	0.76	0.76	0.74
Haskell	40061	1.35	1.31	1.31	1.31	1.34	1.34	1.32	1.26	1.30	1.34	1.35	1.32	1.30	1.35	1.35	1.35	1.35	1.34	1.35	1.34
Hughes	40063	1.56	1.49	1.51	1.51	1.49	1.54	1.52	1.45	1.49	1.54	1.59	1.52	1.49	1.64	1.64	1.55	1.59	1.52	1.55	1.54
Jackson	40065	2.57	2.56	2.57	2.66	2.57	2.44	2.57	2.52	2.49	2.66	2.57	2.56	2.56	2.54	2.66	2.59	2.60	2.49	2.59	2.56
Jefferson	40067	0.87	0.82	0.82	0.82	0.82	0.82	0.82	0.80	0.79	0.84	0.83	0.83	0.81	0.87	0.87	0.82	0.83	0.84	0.83	0.81
Johnston	40069	1.65	1.55	1.55	1.50	1.55	1.55	1.56	1.46	1.50	1.60	1.60	1.60	1.53	1.65	1.57	1.56	1.56	1.55	1.56	1.55

County Name	VOC	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Kay	40071	5.52	5.35	5.44	5.61	5.46	5.52	5.45	5.35	5.46	5.55	5.63	5.29	5.29	5.69	5.69	5.55	5.81	5.55	5.81	5.52
Kingfisher	40073	1.77	1.69	1.79	1.80	1.79	1.74	1.77	1.69	1.74	1.80	1.81	1.79	1.76	1.91	1.81	1.81	1.81	1.85	1.81	1.77
Kiowa	40075	1.47	1.42	1.47	1.51	1.47	1.40	1.45	1.38	1.42	1.51	1.47	1.46	1.46	1.45	1.56	1.46	1.48	1.42	1.47	1.46
Latimer	40077	1.29	1.25	1.25	1.20	1.25	1.27	1.23	1.20	1.23	1.25	1.29	1.26	1.23	1.29	1.29	1.27	1.27	1.27	1.27	1.23
LeFlore	40079	6.37	6.18	6.00	5.93	6.18	6.30	6.11	5.93	6.10	6.18	6.30	6.22	6.10	6.34	6.37	6.30	6.30	6.29	6.30	6.11
Lincoln	40081	4.82	4.61	4.79	4.87	4.74	4.79	4.82	4.66	4.79	4.82	4.91	4.79	4.79	5.18	5.18	4.93	4.91	4.82	4.91	4.87
Logan	40083	1.89	1.79	1.91	1.91	1.91	1.85	1.89	1.79	1.87	1.98	1.93	1.91	1.87	2.05	1.93	1.93	1.93	1.91	1.93	1.89
Love	40085	2.74	2.59	2.60	2.60	2.59	2.59	2.61	2.55	2.53	2.67	2.62	2.62	2.56	2.74	2.74	2.61	2.62	2.67	2.62	2.56
McClain	40087	4.47	4.18	4.41	4.41	4.41	4.23	4.42	4.18	4.30	4.55	4.47	4.55	4.41	4.69	4.47	4.47	4.47	4.42	4.45	4.37
McCurtain	40089	4.79	4.49	4.41	4.23	4.41	4.50	4.53	4.41	4.35	4.41	4.50	4.55	4.44	4.53	4.55	4.50	4.50	4.49	4.50	4.36
McIntosh	40091	3.77	3.67	3.67	3.63	3.72	3.72	3.68	3.53	3.63	3.72	3.77	3.68	3.62	3.95	3.95	3.77	3.75	3.68	3.75	3.72
Major	40093	1.48	1.42	1.49	1.52	1.51	1.47	1.51	1.42	1.47	1.51	1.52	1.51	1.48	1.60	1.60	1.49	1.52	1.52	1.52	1.51
Marshall	40095	1.67	1.56	1.57	1.57	1.56	1.56	1.58	1.54	1.52	1.62	1.62	1.58	1.55	1.67	1.67	1.58	1.58	1.57	1.58	1.55
Mayes	40097	5.60	5.41	5.41	5.35	5.57	5.57	5.51	5.41	5.51	5.66	5.71	5.35	5.41	5.71	5.73	5.60	5.67	5.60	5.84	5.57
Murray	40099	2.05	1.92	1.92	1.87	1.87	1.84	1.94	1.82	1.87	1.99	1.99	1.99	1.90	2.05	2.05	1.95	1.95	1.99	1.94	1.90
Muskogee	40101	8.90	8.28	8.52	8.64	8.64	8.78	8.68	8.28	8.54	8.78	8.90	8.68	8.38	8.90	9.39	8.87	8.87	8.68	8.87	8.54
Noble	40103	2.86	2.81	2.85	2.93	2.86	2.89	2.93	2.81	2.89	2.90	2.95	2.78	2.78	3.11	2.97	2.90	3.02	2.90	3.02	2.89
Nowata	40105	0.97	0.95	0.95	0.98	0.98	0.98	0.97	0.95	0.96	0.98	0.99	0.94	0.95	1.00	1.00	0.98	0.99	0.98	1.02	0.98
Okfuskee	40107	1.90	1.78	1.85	1.83	1.83	1.85	1.85	1.80	1.83	1.88	1.93	1.85	1.78	1.99	1.99	1.89	1.93	1.85	1.93	1.88
Oklahoma	40109	26.09	23.92	25.63	25.77	25.63	25.13	25.34	23.92	24.82	26.74	26.09	25.13	25.13	27.87	26.09	26.09	26.09	25.77	25.98	25.34
Okmulgee	40111	4.94	4.60	4.73	4.79	4.74	4.79	4.82	4.65	4.74	4.87	4.92	4.82	4.60	5.20	5.20	4.92	4.92	4.82	5.04	4.74
Osage	40113	2.99	2.94	2.99	3.08	3.03	3.03	3.08	2.94	2.99	3.05	3.09	2.90	2.90	3.12	3.12	3.05	3.09	3.05	3.19	3.03
Ottawa	40115	4.52	4.44	4.44	4.39	4.57	4.57	4.52	4.44	4.51	4.57	4.66	4.39	4.44	4.68	4.70	4.59	4.66	4.59	4.66	4.57
Pawnee	40117	1.83	1.80	1.83	1.88	1.85	1.85	1.88	1.80	1.83	1.86	1.90	1.78	1.78	2.00	1.90	1.86	1.94	1.86	1.90	1.83
Payne	40119	5.88	5.76	5.86	6.05	5.88	5.95	6.05	5.76	5.95	5.98	6.11	5.70	5.70	6.48	6.13	6.11	6.27	5.98	6.11	5.95
Pittsburg	40121	5.67	5.51	5.60	5.51	5.60	5.62	5.62	5.29	5.45	5.54	5.67	5.54	5.44	5.97	5.97	5.65	5.65	5.60	5.65	5.60
Pontotoc	40123	3.91	3.54	3.65	3.55	3.55	3.65	3.67	3.48	3.59	3.61	3.78	3.61	3.59	3.91	3.70	3.69	3.69	3.67	3.69	3.65
Pottawatomie	40125	7.40	6.90	7.19	7.11	7.11	7.19	7.23	6.98	7.19	7.23	7.55	7.23	7.19	7.80	7.80	7.38	7.38	7.33	7.38	7.31
Pushmataha	40127	1.51	1.47	1.47	1.41	1.47	1.50	1.50	1.41	1.45	1.47	1.50	1.48	1.45	1.51	1.51	1.50	1.50	1.49	1.50	1.45
RogerMills	40129	0.71	0.68	0.71	0.71	0.70	0.68	0.71	0.68	0.69	0.71	0.71	0.69	0.71	0.70	0.73	0.71	0.71	0.69	0.71	0.70
Rogers	40131	6.28	6.06	6.06	6.25	6.25	6.25	6.18	6.06	6.18	6.36	6.41	5.99	6.06	6.41	6.44	6.28	6.37	6.28	6.57	6.25
Seminole	40133	3.99	3.72	3.88	3.83	3.83	3.88	3.95	3.77	3.88	3.90	4.07	3.90	3.83	4.20	4.20	3.98	3.98	3.95	3.98	3.94
Sequoyah	40135	5.88	5.49	5.55	5.49	5.71	5.81	5.65	5.49	5.64	5.71	5.82	5.74	5.64	5.86	5.88	5.82	5.82	5.81	5.82	5.71
Stephens	40137	4.12	3.85	3.86	3.85	3.74	3.66	3.86	3.62	3.74	3.98	3.90	3.98	3.80	3.80	3.90	3.90	3.90	3.98	3.88	3.80
Texas	40139	0.86	0.84	0.88	0.88	0.87	0.84	0.85	0.84	0.85	0.88	0.88	0.85	0.86	0.93	0.90	0.88	0.88	0.88	0.88	0.86

County Name	VOC	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Tillman	40141	1.11	1.04	1.04	1.07	1.04	0.99	1.04	1.02	1.01	1.07	1.05	1.07	1.03	1.03	1.11	1.05	1.05	1.05	1.05	1.04
Tulsa	40143	19.41	18.32	18.93	19.01	19.01	19.25	19.01	18.52	19.01	19.41	19.90	19.25	18.52	19.99	19.99	19.41	19.90	19.41	20.49	19.01
Wagoner	40145	3.75	3.57	3.61	3.73	3.73	3.73	3.68	3.61	3.68	3.79	3.83	3.73	3.61	3.84	3.84	3.83	3.83	3.75	3.92	3.73
Washington	40147	4.09	4.00	4.00	4.13	4.13	4.13	4.09	4.00	4.09	4.21	4.22	3.96	4.00	4.27	4.27	4.16	4.22	4.16	4.36	4.13
Washita	40149	2.31	2.24	2.28	2.38	2.31	2.21	2.31	2.19	2.24	2.31	2.31	2.24	2.31	2.28	2.38	2.31	2.31	2.25	2.31	2.27
Woods	40151	1.01	0.98	1.03	1.04	1.04	1.00	1.00	0.98	1.00	1.03	1.03	1.00	1.01	1.10	1.10	1.02	1.03	1.04	1.04	1.03
Woodward	40153	2.35	2.27	2.38	2.41	2.39	2.27	2.31	2.27	2.31	2.39	2.39	2.31	2.35	2.36	2.47	2.38	2.38	2.32	2.39	2.35

Table 3-8. Oklahoma gridded 1999 episode day on-road mobile CO tpd emissions.

County Name	CO	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	12.93	12.77	12.77	12.63	12.85	12.85	12.76	12.77	12.80	12.85	13.04	12.63	12.77	13.22	13.32	13.04	13.04	12.99	13.04	12.85
Alfalfa	40003	7.35	7.23	7.43	7.55	7.45	7.30	7.33	7.31	7.30	7.45	7.55	7.33	7.35	7.88	7.88	7.39	7.61	7.55	7.55	7.43
Atoka	40005	21.16	19.89	19.89	19.67	19.89	19.98	19.98	19.31	19.52	19.79	20.42	20.21	19.59	21.16	21.16	20.25	19.98	19.98	20.25	19.89
Beaver	40007	9.90	9.83	10.00	10.18	9.95	9.83	9.86	9.83	9.86	10.00	10.00	9.86	9.90	10.63	10.16	10.00	10.00	10.18	10.04	9.90
Beckham	40009	28.13	27.54	27.87	28.49	27.87	27.38	27.98	27.11	27.54	27.98	28.13	27.54	27.98	27.87	28.49	27.98	27.98	27.46	28.13	27.65
Blaine	40011	10.76	10.52	10.76	11.00	10.86	10.63	10.81	10.52	10.62	10.86	11.08	10.81	10.70	11.49	11.49	11.00	11.08	11.00	11.00	10.81
Bryan	40013	35.61	33.53	33.53	32.93	33.53	33.66	34.10	33.18	32.93	34.14	34.36	34.36	33.36	35.61	34.36	34.10	34.10	33.66	34.10	33.36
Caddo	40015	36.61	35.13	35.50	36.28	35.83	34.99	35.50	34.62	35.02	36.28	36.61	35.67	35.67	37.94	37.94	36.31	36.61	36.31	36.31	35.67
Canadian	40017	45.18	42.78	44.05	44.24	44.05	43.25	44.05	42.78	43.26	44.24	45.18	44.05	44.05	46.82	45.18	44.83	45.18	44.97	44.83	43.84
Carter	40019	46.43	43.72	43.90	43.72	42.94	43.72	44.47	42.50	42.94	44.58	44.58	44.81	43.50	43.50	44.81	44.81	44.81	44.58	44.47	43.50
Cherokee	40021	27.66	27.41	27.41	27.09	27.55	27.55	27.33	27.41	27.44	27.55	27.91	27.55	27.41	28.25	28.46	27.91	27.91	27.81	27.91	27.55
Choctaw	40023	13.87	13.06	13.06	12.93	12.93	13.11	13.28	12.93	12.83	12.93	13.39	13.39	12.99	13.87	13.39	13.11	13.28	13.11	13.28	12.99
Cleveland	40027	31.74	30.37	31.11	31.11	31.11	30.75	31.19	30.37	30.58	31.76	31.74	31.76	31.11	32.89	31.74	31.74	31.74	31.19	31.54	30.91
Coal	40029	5.45	5.07	5.13	5.03	5.13	5.13	5.15	4.98	5.03	5.10	5.26	5.21	5.07	5.45	5.45	5.22	5.22	5.15	5.22	5.13
Comanche	40031	73.85	69.71	69.95	69.95	69.71	68.72	69.95	69.06	68.52	71.24	71.28	71.24	69.33	73.85	73.85	70.79	71.28	70.79	71.28	69.71
Cotton	40033	10.52	9.88	9.93	9.93	9.88	9.68	10.06	9.77	9.70	10.04	10.15	10.15	9.83	9.83	10.52	10.06	10.15	10.06	10.15	9.88
Craig	40035	20.85	20.82	20.82	20.60	21.00	21.00	20.85	20.82	20.91	21.00	21.34	20.60	20.82	21.63	21.81	21.14	21.34	21.14	21.62	21.00
Creek	40037	35.65	34.82	35.31	35.18	35.18	35.45	35.65	35.21	35.19	35.83	36.44	35.45	34.82	36.72	38.06	36.44	36.46	35.65	36.45	35.18
Custer	40039	31.96	31.32	31.81	32.44	31.96	31.18	31.81	31.18	31.32	31.81	31.81	31.32	31.45	31.67	33.85	31.81	31.81	31.23	31.96	31.45
Delaware	40041	27.14	27.18	27.18	26.88	27.35	27.35	27.14	27.18	27.24	27.35	27.74	26.88	27.18	28.10	28.31	27.49	27.74	27.63	27.74	27.35
Dewey	40043	6.77	6.63	6.75	6.86	6.77	6.63	6.75	6.63	6.65	6.75	6.75	6.65	6.68	6.71	7.17	6.75	6.75	6.63	6.77	6.68
Ellis	40045	4.75	4.72	4.80	4.88	4.77	4.72	4.73	4.72	4.73	4.80	4.80	4.73	4.75	4.77	4.87	4.80	4.80	4.71	4.82	4.75
Garfield	40047	38.31	38.46	38.47	39.09	38.97	38.31	38.97	38.46	38.62	39.09	39.55	38.47	38.01	41.25	39.82	39.55	39.81	39.81	39.55	38.62

County Name	CO	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Garvin	40049	40.36	37.33	37.92	37.92	37.22	37.16	38.10	36.78	37.22	38.58	38.58	38.58	37.75	37.75	38.94	38.94	38.94	38.58	38.63	37.75
Grady	40051	31.15	29.95	30.24	30.51	30.39	29.87	30.24	29.54	29.85	30.93	31.15	30.39	30.39	32.28	31.15	31.15	31.15	30.93	30.91	30.24
Grant	40053	6.18	6.14	6.15	6.35	6.24	6.13	6.15	6.14	6.13	6.27	6.35	6.07	6.07	6.63	6.40	6.21	6.34	6.34	6.34	6.24
Greer	40055	3.92	3.85	3.88	3.97	3.88	3.84	3.88	3.80	3.85	3.90	3.92	3.85	3.90	3.88	3.97	3.90	4.00	3.83	3.92	3.90
Harmon	40057	2.21	2.17	2.19	2.23	2.21	2.16	2.19	2.14	2.17	2.20	2.21	2.20	2.20	2.19	2.23	2.20	2.25	2.16	2.23	2.20
Harper	40059	5.38	5.34	5.44	5.53	5.41	5.34	5.36	5.34	5.36	5.44	5.44	5.36	5.38	5.78	5.53	5.44	5.44	5.53	5.46	5.38
Haskell	40061	9.35	9.03	9.03	9.03	9.13	9.16	9.08	8.88	8.96	9.13	9.35	9.08	9.00	9.35	9.35	9.28	9.28	9.13	9.28	9.13
Hughes	40063	10.57	10.18	10.22	10.22	10.14	10.33	10.27	10.05	10.14	10.33	10.50	10.27	10.19	10.96	10.96	10.50	10.50	10.27	10.50	10.33
Jackson	40065	16.04	15.99	16.04	16.31	16.04	15.76	16.04	15.84	15.71	16.31	16.04	15.99	15.99	15.90	16.31	16.23	16.34	15.71	16.23	15.99
Jefferson	40067	6.06	5.71	5.73	5.73	5.71	5.71	5.80	5.65	5.60	5.80	5.85	5.85	5.68	6.06	6.06	5.80	5.85	5.80	5.85	5.68
Johnston	40069	11.04	10.41	10.41	10.23	10.41	10.41	10.58	10.14	10.23	10.58	10.58	10.58	10.36	11.04	10.66	10.58	10.58	10.45	10.58	10.41
Kay	40071	38.59	38.33	38.43	38.99	38.30	38.59	38.43	38.33	38.30	38.79	39.15	37.91	37.91	39.95	39.95	38.79	39.75	38.79	39.75	38.59
Kingfisher	40073	12.65	12.36	12.71	12.77	12.71	12.49	12.65	12.36	12.49	12.77	13.04	12.71	12.58	13.51	13.04	12.93	13.04	12.92	12.93	12.65
Kiowa	40075	10.20	10.02	10.20	10.33	10.20	10.00	10.11	9.88	10.02	10.33	10.20	10.16	10.16	10.11	10.79	10.16	10.41	9.98	10.33	10.16
Latimer	40077	8.95	8.65	8.65	8.50	8.65	8.77	8.58	8.50	8.62	8.65	8.95	8.69	8.62	8.95	8.95	8.77	8.77	8.74	8.77	8.58
LeFlore	40079	43.52	42.07	41.83	41.35	42.07	42.65	41.74	41.35	41.91	42.07	42.65	42.27	41.91	43.19	43.52	42.65	42.65	42.49	42.65	41.74
Lincoln	40081	37.61	36.65	37.36	37.78	37.09	37.36	37.61	37.04	37.36	37.61	38.48	37.36	37.36	40.21	40.21	38.80	38.48	37.61	38.48	37.78
Logan	40083	11.62	11.40	11.69	11.73	11.69	11.49	11.62	11.40	11.59	11.91	11.95	11.69	11.59	12.38	11.95	11.95	11.95	11.73	11.87	11.62
Love	40085	24.88	23.31	23.44	23.44	23.31	23.31	23.79	23.02	22.87	23.70	24.00	24.00	23.22	24.88	24.88	23.79	24.00	23.70	24.00	23.22
McClain	40087	35.90	33.90	34.95	34.95	34.95	34.25	35.12	33.90	34.31	35.53	35.90	35.53	34.95	37.21	35.90	35.90	35.90	35.12	35.61	34.80
McCurtain	40089	32.63	30.73	30.42	29.89	30.42	30.85	31.25	30.42	30.30	30.42	30.85	31.49	30.57	31.25	31.49	30.85	30.85	30.73	30.85	30.18
McIntosh	40091	30.31	29.17	29.17	28.96	29.51	29.51	29.37	28.61	28.96	29.51	30.31	29.37	29.05	31.42	31.42	30.31	30.06	29.37	30.06	29.51
Major	40093	10.70	10.51	10.76	11.00	10.86	10.62	10.81	10.51	10.62	10.86	11.00	10.81	10.70	11.49	11.49	10.76	11.09	11.00	11.00	10.81
Marshall	40095	11.60	10.92	10.97	10.97	10.92	10.92	11.11	10.81	10.73	11.10	11.10	11.20	10.87	11.60	11.60	11.20	11.20	10.97	11.20	10.87
Mayes	40097	40.86	40.34	40.34	39.90	40.63	40.63	40.33	40.34	40.33	41.07	41.79	39.90	40.34	41.79	42.12	40.86	41.24	40.86	41.77	40.63
Murray	40099	15.39	14.47	14.47	14.20	14.20	14.19	14.73	14.04	14.20	14.71	14.71	14.71	14.40	15.39	15.39	14.85	14.85	14.71	14.73	14.40
Muskogee	40101	60.28	57.32	58.08	58.30	58.30	58.88	58.57	57.32	57.85	58.88	60.28	58.57	57.97	60.28	62.45	59.84	59.84	58.57	59.84	57.85
Noble	40103	23.81	23.75	23.88	24.27	23.81	23.98	24.27	23.75	23.98	24.16	24.74	23.51	23.51	25.86	24.95	24.16	24.67	24.16	24.67	23.98
Nowata	40105	6.92	6.92	6.92	6.97	6.97	6.97	6.92	6.92	6.94	6.97	7.07	6.84	6.92	7.17	7.22	7.01	7.07	7.01	7.16	6.97
Okfuskee	40107	15.63	14.74	15.03	14.92	14.92	15.03	15.14	14.89	14.92	15.20	15.46	15.14	14.74	16.20	16.20	15.50	15.46	15.14	15.46	15.20
Oklahoma	40109	131.73	126.34	129.30	129.59	129.30	128.27	128.43	126.34	127.14	132.39	131.73	128.27	128.27	136.56	131.73	131.73	131.73	129.59	130.95	128.43
Okmulgee	40111	34.67	32.91	33.37	33.50	33.24	33.50	33.67	33.28	33.24	33.84	34.41	33.67	32.91	35.93	35.93	34.41	34.41	33.67	34.49	33.24
Osage	40113	19.55	19.60	19.63	19.90	19.71	19.71	19.90	19.60	19.55	19.79	19.97	19.38	19.38	20.36	20.36	19.79	19.97	19.79	20.24	19.71
Ottawa	40115	33.86	33.85	33.85	33.49	34.11	34.11	33.86	33.85	33.98	34.11	34.64	33.49	33.85	35.11	35.38	34.33	34.64	34.33	34.64	34.11
Pawnee	40117	13.39	13.40	13.44	13.64	13.49	13.49	13.64	13.40	13.39	13.57	13.88	13.25	13.25	14.50	13.99	13.57	13.86	13.57	13.88	13.39

County Name	CO	Onroad																			
	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Payne	40119	39.09	39.17	39.24	39.79	39.09	39.39	39.79	39.17	39.39	39.57	40.43	38.72	38.72	42.20	40.72	40.43	40.58	39.57	40.43	39.39
Pittsburg	40121	40.32	38.93	39.34	38.93	39.34	39.50	39.50	38.25	38.63	39.14	40.32	39.14	38.78	41.78	41.78	40.01	40.01	39.34	40.01	39.34
Pontotoc	40123	25.37	23.61	23.93	23.51	23.51	23.93	24.02	23.57	23.70	23.80	24.39	23.80	23.70	25.37	24.49	24.31	24.31	24.02	24.31	23.93
Pottawatomie	40125	53.44	50.67	51.59	51.20	51.20	51.59	51.88	51.22	51.59	51.88	53.15	51.88	51.59	55.38	55.38	53.03	53.03	52.35	53.03	52.13
Pushmataha	40127	10.97	10.58	10.58	10.40	10.58	10.74	10.74	10.40	10.50	10.58	10.74	10.64	10.54	10.97	10.97	10.74	10.74	10.70	10.74	10.50
RogerMills	40129	4.85	4.76	4.83	4.91	4.81	4.76	4.83	4.76	4.77	4.83	4.83	4.77	4.83	4.81	4.91	4.83	4.83	4.75	4.85	4.78
Rogers	40131	42.37	41.94	41.94	42.17	42.17	42.17	41.85	41.94	41.85	42.59	43.29	41.46	41.94	43.29	43.61	42.37	42.75	42.37	43.37	42.17
Seminole	40133	29.33	27.79	28.29	28.08	28.08	28.29	28.72	28.09	28.29	28.46	29.10	28.46	28.18	30.39	30.39	29.10	29.10	28.72	29.10	28.60
Sequoyah	40135	45.33	42.86	43.31	42.86	43.67	44.16	43.35	42.86	43.49	43.67	44.36	43.96	43.49	44.97	45.33	44.36	44.36	44.16	44.36	43.67
Stephens	40137	26.17	24.69	24.78	24.69	24.26	24.33	24.78	24.05	24.26	25.17	25.26	25.17	24.55	24.55	25.26	25.26	25.26	25.17	25.08	24.55
Texas	40139	6.19	6.15	6.26	6.37	6.23	6.15	6.17	6.15	6.17	6.26	6.26	6.17	6.19	6.65	6.37	6.26	6.26	6.37	6.28	6.19
Tillman	40141	7.28	6.87	6.89	6.99	6.87	6.76	6.89	6.80	6.75	6.99	7.03	6.99	6.83	6.83	7.28	6.98	7.03	6.98	7.03	6.87
Tulsa	40143	97.62	96.02	97.09	96.63	96.63	97.50	96.63	97.24	96.63	97.62	99.55	97.50	97.24	100.14	100.14	97.62	99.55	97.62	100.60	96.63
Wagoner	40145	24.58	24.07	24.35	24.48	24.48	24.48	24.28	24.35	24.28	24.72	25.11	24.48	24.35	25.30	25.30	25.11	25.11	24.58	25.17	24.48
Washington	40147	26.19	26.26	26.26	26.39	26.39	26.39	26.19	26.26	26.19	26.65	26.74	25.96	26.26	27.25	27.25	26.50	26.74	26.50	27.20	26.39
Washita	40149	18.71	18.33	18.54	18.92	18.71	18.24	18.62	18.05	18.33	18.62	18.71	18.33	18.62	18.54	18.92	18.62	18.62	18.27	18.71	18.40
Woods	40151	6.68	6.64	6.74	6.85	6.77	6.62	6.65	6.64	6.65	6.74	6.74	6.65	6.68	7.15	7.15	6.71	6.74	6.85	6.77	6.74
Woodward	40153	15.60	15.52	15.76	16.01	15.82	15.52	15.54	15.52	15.54	15.82	15.76	15.54	15.60	15.67	16.07	15.76	15.76	15.48	15.82	15.60

Table 3-9. State summary of gridded 1999 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 1999 NEI versions 2 (12 km) and 3 (36 km).

NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	State FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	62	61	60	522	509	509	509	411	358	32	29	29	814	805	802
Arkansas	5	92	85	81	217	191	191	311	258	234	23	23	22	252	251	251
Connecticut	9	14	13	13	87	82	82	268	212	178	26	28	28	43	43	43
Delaware	10	9	8	8	36	33	33	81	65	57	2	1	1	80	64	63
District of Columbia	11	3	3	3	11	11	11	29	22	18	1	1	1	2	2	2
Florida	12	86	82	80	484	450	450	1340	1059	896	13	13	11	1896	1908	1680
Georgia	13	71	67	65	300	278	278	967	783	687	14	13	10	817	811	804
Illinois	17	42	40	39	809	685	685	965	768	657	137	122	118	1089	1047	1034
Indiana	18	94	87	84	462	397	397	712	582	517	196	186	178	1046	1046	1041
Iowa	19	65	60	58	452	338	338	309	257	232	11	11	11	289	289	289
Kansas	20	27	25	24	341	270	270	280	229	204	29	25	24	478	442	437
Kentucky	21	195	180	172	280	263	263	496	409	366	115	108	104	908	907	907
Louisiana	22	253	233	223	694	677	677	427	350	313	100	100	100	906	901	901
Maine	23	4	3	3	33	32	32	51	43	39	14	14	14	15	15	15
Maryland	24	15	15	14	161	147	147	461	367	314	2	2	2	462	439	403
Massachusetts	25	36	34	33	309	299	299	485	374	306	13	12	11	151	152	149
Michigan	26	84	80	78	478	433	433	937	753	653	68	64	62	830	903	883
Minnesota	27	37	35	34	485	398	398	504	410	362	119	111	108	349	334	304
Mississippi	28	8	8	8	226	208	208	390	324	294	39	39	39	490	489	489
Missouri	29	89	83	80	474	409	409	660	536	471	35	33	33	650	650	585
Nebraska	31	29	27	26	286	230	230	171	141	126	63	60	60	99	75	75
New Hampshire	33	8	7	7	34	32	32	122	101	91	11	43	43	34	34	34
New Jersey	34	55	52	50	213	198	198	595	464	387	124	124	124	146	146	146
New York	36	93	87	84	612	572	572	1185	940	801	176	240	228	581	600	541
North Carolina	37	37	36	36	292	265	265	874	714	632	162	154	147	748	748	748
North Dakota	38	33	31	29	178	127	127	50	42	38	0	0	0	227	227	227
Ohio	39	104	97	94	668	603	603	1020	822	714	214	209	201	1322	1228	1003
Oklahoma	40	71	66	63	328	325	314	414	404	370	52	52	52	602	575	570
Pennsylvania	42	149	147	146	445	416	416	1016	824	723	54	47	43	848	826	535
Rhode Island	44	4	4	4	21	20	20	75	58	47	9	9	9	0	0	0
South Carolina	45	53	50	49	146	135	135	472	391	353	20	18	17	393	391	391
South Dakota	46	12	11	10	183	121	121	72	61	56	0	0	0	67	67	67
Tennessee	47	53	50	48	290	273	273	650	527	463	16	15	15	826	818	815
Texas	48	626	612	598	1021	992	921	1404	954	733	620	621	621	2288	2228	2203
Vermont	50	5	5	5	15	13	13	61	51	46	0	0	0	2	2	2
Virginia	51	119	111	107	345	326	326	608	486	419	29	24	24	621	614	610
West Virginia	54	29	27	26	124	120	120	174	145	132	28	30	30	930	928	926
Wisconsin	55	54	51	49	304	254	254	571	469	418	95	95	95	331	331	331
Ontario Prov *	99	1581	1474	1434												

Table 3-9. (Cont.) State summary of gridded 1999 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 1999 NEI versions 2 (12 km) and 3 (36 km)..

VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	State FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	539	539	539	145	127	127	384	309	267	135	103	98	71	63	59
Arkansas	5	268	267	267	85	74	74	205	168	149	40	30	28	55	51	51
Connecticut	9	200	200	200	102	82	82	170	132	110	19	13	9	1	1	1
Delaware	10	34	34	34	36	31	31	51	40	34	27	24	23	8	7	4
District of Columbia	11	27	27	27	5	4	4	23	17	14	0	0	0	0	0	0
Florida	12	836	836	836	595	485	485	1012	788	655	108	63	55	125	119	113
Georgia	13	544	544	544	209	167	167	632	504	434	341	328	323	189	166	155
Illinois	17	764	764	764	382	295	295	671	527	443	230	143	121	76	54	48
Indiana	18	573	573	573	200	156	156	494	397	344	219	126	108	13	13	12
Iowa	19	329	329	329	139	106	106	203	166	147	6	6	6	23	23	23
Kansas	20	227	227	227	91	68	68	193	155	135	66	34	33	25	22	21
Kentucky	21	311	311	311	98	85	85	326	265	234	150	114	99	53	31	20
Louisiana	22	303	303	302	155	140	140	273	221	194	182	181	180	71	71	68
Maine	23	65	65	65	20	17	17	34	28	26	7	6	6	0	0	0
Maryland	24	182	182	182	165	129	129	285	224	189	18	9	6	16	13	8
Massachusetts	25	387	387	387	212	176	176	322	248	202	26	12	8	9	8	7
Michigan	26	734	734	734	378	318	318	656	519	441	96	49	37	77	41	34
Minnesota	27	380	380	380	234	199	199	351	281	243	79	47	44	2	2	2
Mississippi	28	308	308	308	83	73	73	229	188	168	121	118	116	47	46	46
Missouri	29	488	488	488	218	180	180	434	347	300	77	47	44	40	23	19
Nebraska	31	177	177	177	64	48	48	117	95	83	21	15	15	1	1	1
New Hampshire	33	84	84	84	49	41	41	73	59	52	10	5	3	0	0	0
New Jersey	34	413	413	413	245	196	196	398	307	252	83	83	83	10	10	10
New York	36	911	911	911	464	385	385	829	651	546	29	33	30	15	21	18
North Carolina	37	599	599	599	250	204	204	585	470	407	243	131	108	13	11	11
North Dakota	38	89	89	89	35	25	25	31	25	23	0	0	0	3	3	3
Ohio	39	760	760	760	411	328	328	713	566	482	134	85	70	5	5	4
Oklahoma	40	311	310	310	97	219	217	449	414	400	71	66	66	34	31	31
Pennsylvania	42	1288	1288	1288	294	236	236	699	559	481	112	70	58	42	31	26
Rhode Island	44	117	117	117	24	19	19	50	38	31	10	10	10	0	0	0
South Carolina	45	394	394	394	125	104	104	306	250	221	75	49	42	24	21	20
South Dakota	46	86	86	86	41	30	30	45	37	34	0	0	0	4	1	1
Tennessee	47	541	541	541	145	124	124	437	349	301	180	114	96	105	97	92
Texas	48	1737	1395	1193	463	851	837	836	711	612	551	530	530	196	187	188
Vermont	50	39	39	39	17	14	14	39	31	28	3	1	1	0	0	0
Virginia	51	483	482	482	210	168	168	468	373	319	137	82	71	76	59	47
West Virginia	54	142	141	141	46	41	41	122	101	91	37	31	30	32	20	19
Wisconsin	55	497	497	497	205	172	172	370	299	261	104	104	104	8	8	8
Ontario Prov	99	1793	1728	1649												

Table 3-9. (Cont.) State summary of gridded 1999 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 1999 NEI versions 2 (12 km) and 3 (36 km).

CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	State FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	1188	1188	1187	1283	981	981	3990	3230	2828	146	145	142	332	290	286
Arkansas	5	122	121	120	752	581	581	2236	1843	1651	143	143	142	144	140	138
Connecticut	9	98	98	98	1217	874	874	1793	1401	1167	15	12	7	10	10	10
Delaware	10	30	30	30	319	237	237	497	397	341	2	1	1	71	69	52
District of Columbia	11	12	12	12	57	46	46	214	162	128	0	0	0	0	0	0
Florida	12	525	524	524	6252	4408	4408	10147	7962	6679	160	158	157	1080	1015	992
Georgia	13	617	615	614	2570	1846	1846	6965	5590	4838	10	9	7	671	657	655
Illinois	17	163	163	162	4940	3540	3540	6743	5331	4518	196	186	183	142	131	129
Indiana	18	228	225	224	2646	1935	1935	5028	4075	3573	706	632	570	583	583	442
Iowa	19	72	71	71	1569	1137	1137	2186	1801	1613	1	1	1	33	33	33
Kansas	20	67	65	64	1129	800	800	2085	1691	1483	17	14	14	245	234	232
Kentucky	21	203	201	199	975	744	744	3413	2797	2488	254	244	241	40	39	39
Louisiana	22	176	173	172	1256	1006	1006	3040	2473	2180	173	172	172	384	384	382
Maine	23	4	4	4	244	185	185	410	341	309	8	8	8	2	2	2
Maryland	24	76	75	75	1945	1347	1347	3157	2494	2113	1	1	1	370	366	364
Massachusetts	25	292	289	287	2526	1891	1891	3332	2574	2111	4	4	4	29	29	28
Michigan	26	297	295	294	4392	3362	3362	6868	5466	4678	69	57	48	219	165	158
Minnesota	27	138	138	137	2445	1919	1919	3770	3037	2642	52	50	49	19	18	17
Mississippi	28	132	132	132	691	541	541	2304	1908	1720	35	34	34	159	158	158
Missouri	29	259	257	256	2290	1678	1678	4473	3607	3143	65	62	62	234	229	226
Nebraska	31	22	21	21	729	519	519	1237	1012	899	21	19	19	6	5	5
New Hampshire	33	74	74	74	533	408	408	820	671	595	6	8	8	3	3	3
New Jersey	34	189	189	188	2929	2077	2077	3730	2893	2387	54	54	54	27	27	27
New York	36	413	411	410	5574	4120	4120	8538	6736	5693	154	189	181	74	102	90
North Carolina	37	482	482	482	2912	2142	2142	6019	4873	4268	201	190	186	32	32	32
North Dakota	38	11	11	11	334	232	232	347	288	260	0	0	0	22	22	22
Ohio	39	339	338	337	5099	3722	3722	7581	6049	5195	691	613	604	42	39	34
Oklahoma	40	84	83	83	964	1488	1466	2871	2669	2569	41	40	40	149	148	148
Pennsylvania	42	691	690	689	3785	2777	2777	7321	5897	5129	71	54	50	281	277	210
Rhode Island	44	3	3	3	304	220	220	486	374	304	7	7	7	0	0	0
South Carolina	45	351	350	350	1317	978	978	3351	2756	2463	39	38	37	116	116	116
South Dakota	46	12	11	11	407	286	286	509	428	393	0	0	0	2	2	2
Tennessee	47	294	292	292	1550	1170	1170	4596	3703	3223	26	24	23	328	325	322
Texas	48	940	805	672	5393	7776	7638	10712	9586	8370	189	189	189	970	956	964
Vermont	50	28	28	28	225	171	171	439	361	322	0	0	0	4	3	3
Virginia	51	429	423	419	2470	1762	1762	5190	4159	3592	21	18	18	230	221	217
West Virginia	54	126	125	125	429	335	335	1331	1109	1008	68	66	66	252	250	248
Wisconsin	55	195	193	192	2503	1958	1958	3790	3092	2734	86	86	86	54	54	54
Ontario Prov	99	8251	7625	7416												

* Canadian emissions estimates all processed as area sources

Table 3-10. Gridded biogenic emissions by state (tpd).

	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
NOx																				
Alabama	74	69	63	70	72	72	71	67	67	68	68	65	64	67	70	68	72	66	67	65
Arkansas	123	101	98	107	115	124	119	104	104	111	104	101	109	118	119	112	116	112	117	117
Connecticut	4	4	4	4	4	4	4	4	3	3	4	4	4	4	4	4	4	3	4	4
Delaware	20	19	17	18	20	19	18	16	16	16	17	17	17	17	18	17	17	15	16	17
Florida	57	55	55	55	55	55	55	54	53	53	52	53	53	56	56	54	56	54	53	53
Georgia	114	112	104	109	111	113	110	107	105	106	103	102	103	108	108	103	107	103	97	93
Illinois	712	613	640	728	776	649	647	641	643	690	698	614	646	737	773	757	697	584	664	734
Indiana	427	329	349	388	425	378	353	341	353	375	410	346	337	376	416	406	368	305	364	399
Iowa	642	678	750	874	856	729	687	722	772	764	726	687	773	841	908	886	799	705	813	825
Kansas	498	546	626	684	650	602	552	516	584	585	590	562	606	672	675	627	608	601	683	668
Kentucky	129	98	100	118	131	125	120	105	107	115	121	104	105	117	126	123	125	103	121	127
Louisiana	107	103	90	95	100	104	105	103	98	98	98	100	101	104	97	96	100	97	95	88
Maine	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Maryland	45	43	38	40	44	43	41	34	34	33	38	38	37	37	38	39	37	32	33	36
Massachusetts	4	4	4	4	5	4	4	4	3	3	4	4	4	4	4	4	4	3	4	4
Michigan	182	151	159	172	181	154	154	158	162	167	162	173	163	175	190	185	159	137	161	170
Minnesota	348	370	407	447	426	389	362	394	414	421	382	392	426	477	505	451	405	352	456	442
Mississippi	124	109	99	108	114	119	124	112	110	113	113	103	108	113	114	111	113	111	112	108
Missouri	258	239	256	296	307	296	268	256	265	276	261	243	263	293	307	289	295	261	294	305
Nebraska	479	551	650	653	648	598	534	567	601	589	569	531	566	659	703	635	600	632	712	702
New Hampshire	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
New Jersey	15	14	13	13	15	14	13	12	11	11	13	13	13	13	13	13	12	11	12	13
New York	79	74	68	73	83	69	71	65	61	64	73	77	78	82	78	76	65	58	70	75
North Carolina	151	144	134	136	144	146	138	134	129	123	125	127	125	133	137	132	129	109	113	116
North Dakota	125	148	150	145	153	134	141	150	156	158	139	153	162	187	192	146	133	131	184	133
Ohio	283	222	219	236	275	237	232	221	225	240	253	245	231	243	258	253	226	191	230	233
Oklahoma	262	267	292	302	294	293	268	252	272	276	276	273	280	296	311	287	283	269	295	279
Pennsylvania	118	113	96	103	119	108	103	88	84	86	100	101	99	102	103	101	91	78	89	97
Rhode Island	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4
South Carolina	62	60	56	59	62	61	59	56	56	54	55	55	55	59	59	56	57	50	49	49
South Dakota	300	352	414	378	375	348	330	354	383	396	342	350	372	445	483	408	342	352	448	392
Tennessee	113	90	88	104	110	110	107	92	93	99	95	89	93	102	106	101	107	93	103	106
Texas	972	952	935	932	897	917	881	880	872	843	785	801	834	877	878	874	898	836	861	812
Vermont	6	6	5	5	6	5	5	5	4	4	5	6	6	6	5	6	5	4	5	5

	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Virginia	68	65	57	59	66	63	60	53	51	52	54	54	52	55	56	58	57	47	49	54
West Virginia	14	13	11	13	14	13	13	11	10	11	12	12	11	12	12	12	12	10	11	12
Wisconsin	215	210	223	256	243	208	206	222	223	226	227	232	248	269	283	257	224	196	224	239
Ontario Prov	169	164	161	157	146	155	154	154	152	150	136	133	128	143	153	141	142	140	144	145
VOC																				
Alabama	13097	11909	9473	11808	12483	13274	12229	11133	11473	11111	10989	7595	8298	11259	11585	11348	12259	11086	10784	10539
Arkansas	10877	8611	8471	9477	10803	11794	11267	8959	8853	9813	7164	7953	9697	9637	10259	9837	10095	9681	10186	8772
Connecticut	676	514	301	632	838	764	624	463	190	286	630	740	709	347	502	689	576	388	545	622
Delaware	280	252	213	242	316	296	248	162	140	177	244	216	161	213	233	252	217	135	150	171
Florida	10818	9871	9518	10193	9591	9798	9583	8793	9629	8978	8816	9365	9314	10383	10276	9929	10170	9857	8923	8994
Georgia	12322	12390	11291	11872	12323	13950	12328	10595	11086	10494	10301	8242	9647	11547	11689	10633	10934	11079	10316	9587
Illinois	2235	1734	2115	2692	2968	1607	1810	2050	2142	2395	2029	1627	1693	2603	2912	2869	2534	1716	2312	2752
Indiana	2083	968	1483	1904	2222	1500	1364	1383	1557	1736	1830	1025	1099	1459	1937	1996	1792	1211	1839	2130
Iowa	604	1081	1223	1694	1800	959	909	1171	1260	1065	1127	878	1409	1733	2036	1917	1425	1041	1565	1485
Kansas	1143	1324	1668	2011	1859	1698	1420	1171	1506	1237	1548	1335	1549	1583	1844	1677	1634	1357	1818	1847
Kentucky	4612	1973	2512	4009	4951	4194	3760	2448	3155	3779	3854	2550	2664	3393	3979	4022	4087	2809	4125	4194
Louisiana	9150	8744	7286	7922	8426	9013	9109	8848	8058	8228	8154	8116	8740	8970	6377	8237	8396	7690	7355	5631
Maine	183	158	88	161	186	168	147	145	64	91	161	190	202	179	128	165	136	117	165	179
Maryland	1481	1281	951	1280	1585	1406	1278	764	653	795	1134	980	547	918	1089	1252	1086	633	681	918
Massachusetts	993	766	405	876	1147	1006	838	736	317	428	882	1038	1032	720	644	942	792	601	809	915
Michigan	4110	4361	5005	5158	5000	3575	4029	4967	5238	5299	3952	4929	4536	5615	6768	5950	4644	3732	5010	5599
Minnesota	2703	3347	2815	4186	3747	2516	2523	3461	3420	2796	2881	3538	4449	5486	6052	3622	3060	1743	4435	3654
Mississippi	13123	11104	9497	11173	11955	12759	13474	11526	11107	11772	11195	7655	9948	11483	9612	10657	11182	10405	9865	9596
Missouri	7970	6867	8323	10540	11166	10068	8120	7456	8702	8795	6515	6712	7691	7995	10773	10064	9881	7770	9589	9918
Nebraska	807	1177	1547	1513	1438	1303	1137	1277	1355	1096	1220	1132	1255	1711	1963	1435	991	1473	1863	1722
New Hampshire	804	674	346	688	909	735	648	602	260	344	702	855	897	696	478	739	567	464	696	783
New Jersey	1233	1154	924	1130	1303	1245	1075	559	560	724	1098	1025	983	978	1075	1155	967	709	850	946
New York	3046	2612	2500	3255	4160	2776	3012	2086	1643	2171	3390	3707	3656	3052	3110	3480	2471	2089	3213	3646
North Carolina	10152	9083	7718	8182	9588	10161	8560	6351	7324	7206	6650	6370	5813	7069	7903	7960	7482	5163	5995	6426
North Dakota	277	411	345	354	413	298	360	327	413	445	303	413	422	604	634	294	167	223	550	160
Ohio	2397	1041	1441	2039	2813	1848	1683	1514	1592	2049	2009	1336	1348	1686	2030	2071	1770	1360	2012	2015
Oklahoma	6925	6125	6296	6439	6785	7056	6726	5659	5768	6261	6349	6330	6679	6923	5800	6543	6793	5956	6703	6076
Pennsylvania	4216	3632	2679	4092	5415	3631	3468	1843	1737	2533	3844	3203	2597	2834	3354	3853	3025	2294	3348	3958
Rhode Island	118	91	58	115	137	134	114	96	44	62	114	127	128	75	90	123	107	79	101	108
South Carolina	6799	6624	6014	6112	6991	7538	6372	5047	5774	5686	5343	4489	5326	6213	6033	5568	5051	5055	4934	4899
South Dakota	851	1185	1391	1216	1204	1009	1024	961	1182	1256	961	1128	1078	1674	1777	982	626	891	1663	877

	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Tennessee	7749	4551	4741	7165	7819	7457	7038	4529	5441	6214	4753	4300	4799	6001	6461	6437	7077	5410	6798	6731
Texas	15655	14817	14122	14035	13840	14766	14244	14127	13631	12986	11692	12942	14428	14836	12378	13904	14242	12984	13186	10813
Vermont	576	493	345	526	663	493	499	453	250	306	538	637	664	534	441	553	401	340	524	588
Virginia	8946	7891	5840	7016	9124	8142	7275	4766	4656	5544	5687	5417	3419	5353	6330	7138	6775	3892	4380	5626
West Virginia	3172	2171	1595	2742	3351	2739	2592	1609	1644	2218	2501	1961	1533	1980	2133	2438	2329	1714	2363	2528
Wisconsin	2639	3642	3588	5316	3833	1988	2719	3847	3810	2709	2421	3575	4955	6014	6581	4623	3827	2839	4286	4811
Ontario Prov	4533	5228	6121	5089	6095	5626	5899	5074	5471	6430	6674	7165	6681	6917	8223	7394	5171	4775	6265	6663
CO																				
Alabama	1233	1152	965	1108	1166	1213	1151	1076	1077	1063	1067	964	959	1075	1101	1056	1139	1026	1027	992
Arkansas	992	794	755	821	921	1014	981	810	791	861	794	769	855	914	911	864	882	859	886	839
Connecticut	82	76	59	69	87	80	67	59	45	48	67	74	74	68	73	74	63	48	59	66
Delaware	28	26	23	23	28	26	24	21	20	19	22	22	22	22	23	23	22	18	20	21
Florida	1525	1456	1414	1438	1402	1427	1403	1360	1386	1331	1309	1356	1363	1464	1440	1386	1446	1392	1321	1311
Georgia	1291	1271	1161	1208	1240	1350	1244	1136	1134	1120	1084	1031	1077	1180	1172	1091	1139	1107	1026	970
Illinois	231	175	190	232	256	203	199	191	193	214	210	180	188	229	244	238	223	168	198	233
Indiana	232	148	170	201	231	191	176	162	174	188	213	160	153	183	215	213	194	142	189	214
Iowa	103	112	130	167	167	126	114	123	134	134	127	112	139	158	177	169	146	117	146	151
Kansas	146	161	197	235	223	204	169	152	181	179	186	162	183	208	214	195	198	188	222	218
Kentucky	475	319	312	406	485	433	404	320	334	375	409	333	332	378	419	409	408	302	390	406
Louisiana	950	914	763	811	864	919	930	909	840	848	852	869	903	914	794	831	861	809	795	714
Maine	21	20	15	18	22	20	17	17	13	14	18	20	21	21	19	20	16	14	18	19
Maryland	131	123	100	109	129	119	110	86	82	80	98	96	90	94	101	105	96	72	79	92
Massachusetts	118	110	84	99	124	111	96	89	70	73	98	109	110	103	103	107	91	75	90	99
Michigan	583	536	581	646	603	511	536	570	592	615	578	639	620	682	750	664	549	472	585	640
Minnesota	349	386	414	477	438	378	356	426	442	443	416	447	495	570	607	443	389	326	511	489
Mississippi	1194	1043	900	1007	1072	1138	1190	1054	1007	1043	1032	930	971	1036	995	981	1016	969	953	922
Missouri	612	522	578	702	765	752	616	560	599	629	574	534	581	671	716	672	688	587	650	686
Nebraska	97	126	163	156	155	138	119	133	141	133	127	117	129	164	182	151	139	155	184	174
New Hampshire	102	96	68	84	109	91	80	77	55	58	85	98	102	95	89	94	73	61	81	90
New Jersey	126	122	105	108	124	117	106	93	87	88	103	106	106	108	112	109	96	82	92	101
New York	542	490	426	482	591	447	455	398	345	378	485	533	545	551	520	516	399	331	456	508
North Carolina	1018	968	835	857	942	971	888	804	778	748	733	752	729	806	845	823	808	623	656	691
North Dakota	37	49	50	46	50	41	45	49	52	54	43	51	56	70	72	46	38	40	68	38
Ohio	345	247	233	277	355	272	274	238	240	276	291	269	249	270	297	290	255	202	265	268
Oklahoma	576	511	524	536	551	571	538	465	493	538	563	533	552	592	579	553	560	510	552	518
Pennsylvania	552	501	390	456	574	450	432	349	324	352	437	447	425	449	449	447	370	293	383	434

	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Rhode Island	12	11	9	10	12	11	10	9	8	8	10	11	11	10	11	11	10	8	9	9
South Carolina	674	660	607	619	670	696	633	566	574	559	550	541	555	617	610	564	582	503	479	482
South Dakota	88	116	145	122	121	107	103	112	126	131	104	112	122	161	177	134	104	111	164	124
Tennessee	659	479	457	600	648	619	595	476	477	516	496	462	468	531	561	547	586	466	540	555
Texas	1548	1476	1381	1349	1340	1415	1385	1356	1324	1307	1235	1288	1370	1417	1333	1342	1365	1262	1290	1148
Vermont	101	94	70	86	109	86	82	78	56	59	86	98	103	96	89	93	71	59	82	92
Virginia	766	725	580	626	742	681	634	512	483	511	540	538	494	551	578	602	588	420	457	530
West Virginia	344	294	235	294	343	300	291	223	213	247	275	262	241	255	267	267	249	197	245	257
Wisconsin	388	410	446	573	456	373	377	447	454	441	442	469	538	612	663	509	433	364	479	527
Ontario Prov	802	735	770	771	834	742	765	749	751	813	834	889	866	932	981	894	727	639	767	812

DATA SOURCES FOR 2002

For all states outside the 12 km modeling grid the basis of the emissions inventory is the 2002 Preliminary National Emissions Inventory. This data set includes point sources, mobile onroad and non-road sources, and non-point (area) sources. The dated was posted by EPA at http://www.epa.gov/ttn/chief/net/2002inventory.html in March 2004. The following sections describe sources for the states within the 12 km grid below.

Point Sources

For all states other than Texas the 2002 point source inventory is identical to the 1999 point source inventory with the exception of electric generating unit NOx estimates. The Acid Rain program 2002 3rd quarter NOx was used to model the EGU point sources. For Oklahoma, Texas, Louisiana and Arkansas the reported 2002 3rd quarter NOx for each facility are modeled. For all other states in the modeling domain the 1999 NOx emissions for EGUs are adjusted by a "growth" factor estimated from the 1999 3rd quarter NOx state totals and the 2002 3rd quarter NOx state totals. The Acid Rain data is located at http://www.epa.gov/airmarkets/emissions/prelimarp/index.html .

The Oklahoma point source inventory was enhanced by ODEQ. Through correspondence with Leon Ashford (email 24 October 2003) a spreadsheet was provided which detailed newly permitted sources to add to the inventory and sources that were shut down and removed from the 1999 inventory. Table 3-11 summarizes newly permitted sources in Oklahoma and whether the new sources were added to the 2002 and 2007 emissions databases. There were also two sources in Oklahoma that had shut down since 1999 so were eliminated from the 2002 and 2007 emissions:

- Wil-Gro Fertilizer (FIPS# 40097; Plant # 2736)
- Quebecor (FIPS#40109; Plant # 2214)

The TCEQ provided their 2000 v12a PSDB for both EGU and non-EGU point sources in AFS format. The files *afs.tx_negu.000822-000901.REv12a_lcp.3pols.gz* and *afs.tx_egu.000822-000901.REv12a.latlong.3pols.gz* where downloaded from TCEQ FTP site ftp://ftp.TCEQ.state.tx.us/pub/OEPPA/TAD/Modeling/file_transfer/HGPoints/2000/latlongv12.

Mobile Sources

Processing of the Oklahoma on-road mobile inventory was similar to 1999. The link-level activity was estimated from the 1995 and 2025 estimates. The county level HPMS based VMT was estimated data from 1995 and 2000 Oklahoma HPMS data. MOBILE6.2 emission factors were used in both applications. For link-based data, the M6LINC system was used to combine the MOBILE6.2 emission factors with the link-level VMT and speeds. For counties or portions of counties not covered under the INCOG or ACOG networks, county-level HPMS VMT data were used. Where appropriate, the VMT from the INCOG or ACOG networks (including intrazonal trips) must first be taken out. Emissions were spatially allocated using road mileage data from the USGS, or in the case of the link-based emissions, directly into grid cells via M6LINC.

The 1999 Texas on-road inventory developed by TTI is the basis for the 2002 on-road inventory. The 1999 inventory is adjusted to reflect VMT county level growth and emission factor changes between 1999 and 2002.

For all states other than Oklahoma and Texas Mobile6.2 was run to generate emission factors by road type and vehicle class. These data are combined with VMT estimates at the county/vehicle class level based on data from EPA's Tier 2 analysis. (EPA, 1999. Data Summaries of Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking - Detailed Report. Office of Air and Radiation. EPA420-R-99-033. September.) The resulting 2002 on-road emission inventory is formatted to the EPS2x AMS input file format and processed through EPS2x.

Area Sources

The 1999 inventory is adjusted to 2002 estimates using growth factors developed from the Economic Growth Analysis System version 4.0 (EGAS).

Off-Road Sources

For all states in the modeling domain the NonRoad Model v2.1d released in March of 2002 is used to generate all off-road sources with the exception of aircraft, railroad and commercial marine. The NonRoad Model output, generated in AMS format, is processed through EPS2x.

The 1999 base case off-road inventory is the source for the aircraft, railroad, and commercial marine categories of off-road sources for all states. These data are adjusted to 2002 estimates using EGAS growth factors.

Biogenic Sources

Biogenic emissions were developed for the 1999 base case modeling and are identical for the 2002 modeling inventory.

EMISSIONS SUMMARIES FOR 2002

All emission estimates in the following tables reflect gridded, model ready emissions in tons per day (tpd). This means that for partial counties and/or states at the edge of a modeling domain, only the portion of emissions that is within the modeling domain is reported.

Tables 3-12 to 3-14 are Oklahoma county emission summaries by major source type for those counties within the Oklahoma City and Tulsa metropolitan areas. For those data that have day-specific emissions August 21 – August 23 are used to represent a typical Saturday, Sunday and Weekday respectively.

Table 3-15 is the Oklahoma City and Tulsa transportation network link based on-road mobile tpd emissions.

Table 3-16 to 3-18 summarize the day specific Oklahoma on-road mobile HPMS based emissions by county.

Table 3-19 summarizes the gridded emissions by major source type for all states in the modeling domain.

Table 3-11. Summary of new permitted sources in Oklahoma and whether they are operational in 2002 and 2007.

Company	FIPS County	SIC	SCC	Plant-ID	Operational? 2002	2007
New Permitted Sources						
IC of Oklahoma	143	3711	40200110	00184	yes	yes
Quad	109	2754	40500421	00171	no	yes
Calpine Oneta	145	4911	20100201	00016	yes	yes
Redbud	109	4911	20100201	00167	no	yes
Thunderbird	27	4911	20100201	00012	no	yes
Webber's Falls	101	4911	20100201	00033	no	yes
Smith Pocola	79	4911	20100201	00014	no	yes
Michelin	19	3011	30800199	00003	yes	yes
GoodYear	31	3011	30800199	00003	yes	yes
Oneok	83	4911	20100201	00016	yes	yes
energetix Lawton	31	4911	20100201	00027	no	yes
genova	51	4911	20100201	00059	no	yes
glass plant	13	3211	30501401	00017	no	yes
duke stephens	137	4911	20100201	00025	no	yes
kiowa kiamichi	121	4911	20100201	00025	no	yes
Sources whose emissions will be in Acid Rain Database						
western farmers	15	4911	20100201	00002		yes
aec	97	4911	20100201	00017		yes
green country	143	4911	20100201	00138		yes
nrg	87	4911	20100201	00026		yes
oge mustang	109	4911	20100201	00049		yes
aep northeastern	131	4911	10100601	00001		yes
panda	145	4911	20100201	00016		yes
oneok	83	4911	20100201	00016		yes

Table 3-12. Oklahoma City and Tulsa 2002 NOx tpd emissions by major source type.

	NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.63	0.58	0.56	6.59	6.36	6.08	5.73	5.89	5.85	2.80	2.80	2.80	13.91	14.15	14.15
	Cleveland	40027	2.40	2.21	2.12	3.50	3.42	3.11	3.94	4.06	4.07	0.14	0.07	0.07	0.69	0.67	0.67
	Logan	40083	0.13	0.12	0.12	4.07	4.03	3.96	1.48	1.54	1.55	0.83	0.83	0.83	2.80	2.80	2.80
	McClain	40087	0.08	0.07	0.07	2.08	2.01	1.84	4.56	4.70	4.79	0.40	0.40	0.40	0.99	0.99	0.99
	Oklahoma	40109	16.98	15.63	14.96	20.80	19.38	17.38	101.43	95.51	77.24	1.91	1.81	1.81	12.22	11.98	11.98
	Pottawatomie	40125	1.12	1.03	0.99	3.39	3.35	3.25	7.00	6.99	6.88	0.02	0.02	0.02	0.39	0.39	0.39
	Subtotal		**21.33**	**19.65**	**18.81**	**40.43**	**38.56**	**35.62**	**124.15**	**118.70**	**100.37**	**6.10**	**5.93**	**5.93**	**31.01**	**30.98**	**30.98**
Tulsa MSA	Creek	40037	0.97	0.90	0.86	4.11	4.06	3.87	4.66	4.75	4.73	1.08	1.08	1.08	3.43	3.43	3.43
	Osage	40113	0.15	0.15	0.14	4.58	4.89	4.75	2.56	2.58	2.55	1.52	1.52	1.52	0.07	0.07	0.07
	Rogers	40131	0.62	0.58	0.56	6.61	6.73	6.52	5.47	5.58	5.55	0.16	0.12	0.12	65.21	65.21	65.21
	Tulsa	40143	21.44	19.73	18.88	21.28	19.92	17.94	72.46	66.16	52.50	0.55	0.53	0.53	29.24	28.89	28.89
	Wagoner	40145	1.44	1.33	1.28	4.38	4.56	4.49	3.14	3.20	3.19	0.02	0.02	0.02	0.04	0.04	0.04
	Subtotal		**24.61**	**22.68**	**21.72**	**40.95**	**40.15**	**37.57**	**88.28**	**82.28**	**68.52**	**3.33**	**3.26**	**3.26**	**97.98**	**97.62**	**97.62**

Table 3-13. Oklahoma City and Tulsa 2002 VOC tpd emissions by major source type.

	VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	7.24	7.23	7.23	1.17	1.54	1.49	6.42	6.16	6.36	0.82	0.70	0.70	0.50	0.49	0.49
	Cleveland	40027	9.33	9.33	9.32	5.02	7.19	7.14	6.08	5.82	6.26	0.35	0.25	0.25	0.10	0.10	0.10
	Logan	40083	3.06	3.06	3.06	0.65	1.13	1.12	2.00	1.94	2.05	0.51	0.51	0.51	0.20	0.20	0.20
	McClain	40087	3.58	3.58	3.58	0.49	1.25	1.22	4.49	4.32	4.59	0.47	0.47	0.47	1.68	1.68	1.68
	Oklahoma	40109	39.34	39.32	39.31	13.41	16.46	16.09	149.85	131.71	116.81	4.56	2.73	2.73	2.73	0.38	0.38
	Pottawatomie	40125	5.12	5.12	5.12	0.78	1.19	1.17	7.62	7.23	7.27	0.31	0.30	0.30	0.49	0.49	0.49
	Subtotal		**67.67**	**67.64**	**67.63**	**21.52**	**28.77**	**28.23**	**176.45**	**157.19**	**143.34**	**7.02**	**4.97**	**4.97**	**5.69**	**3.32**	**3.32**
Tulsa MSA	Creek	40037	6.90	6.90	6.90	0.84	1.89	1.86	5.28	5.07	5.22	0.78	0.74	0.74	0.20	0.20	0.20
	Osage	40113	2.68	2.68	2.68	2.20	6.78	6.75	3.13	3.02	3.08	1.38	1.38	1.38	0.01	0.01	0.01
	Rogers	40131	4.63	4.63	4.63	1.55	4.45	4.41	6.49	6.24	6.43	0.24	0.17	0.17	0.67	0.67	0.67
	Tulsa	40143	32.22	32.20	32.19	13.13	16.29	15.93	54.69	47.77	42.34	6.26	5.64	5.64	1.88	1.68	1.68
	Wagoner	40145	3.54	3.54	3.54	1.03	3.12	3.11	3.88	3.73	3.85	0.03	0.01	0.01	0.00	0.00	0.00
	Subtotal		**49.98**	**49.95**	**49.94**	**18.74**	**32.54**	**32.07**	**73.47**	**65.83**	**60.92**	**8.70**	**7.95**	**7.95**	**2.76**	**2.55**	**2.55**

Table 3-14. Oklahoma City and Tulsa 2002 CO tpd emissions by major source type.

	CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.37	0.37	0.36	15.25	19.43	18.93	45.33	43.41	44.39	2.50	2.50	2.50	2.25	2.31	2.31
	Cleveland	40027	4.95	4.92	4.91	79.61	92.51	91.90	31.04	29.95	31.03	0.05	0.05	0.05	0.35	0.30	0.30
	Logan	40083	0.59	0.59	0.59	6.05	8.92	8.78	11.85	11.49	11.79	0.83	0.83	0.83	2.38	2.38	2.38
	McClain	40087	0.65	0.65	0.65	4.23	7.03	6.76	36.37	34.74	35.92	0.33	0.33	0.33	0.73	0.73	0.73
	Oklahoma	40109	16.17	15.97	15.87	211.80	294.45	290.26	617.03	537.30	473.93	2.17	2.15	2.15	1.42	1.39	1.39
	Pottawatomie	40125	1.93	1.92	1.91	10.27	13.33	13.07	53.31	51.82	52.13	1.18	0.94	0.94	2.62	1.34	1.34
	Subtotal		**24.66**	**24.41**	**24.28**	**327.21**	**435.66**	**429.70**	**794.93**	**708.71**	**649.19**	**7.05**	**6.79**	**6.79**	**9.75**	**8.44**	**8.44**
Tulsa MSA	Creek	40037	1.96	1.95	1.95	9.05	14.75	14.35	36.54	35.29	35.93	0.81	0.81	0.81	0.47	0.46	0.46
	Osage	40113	1.12	1.12	1.11	11.54	25.70	25.46	19.91	19.50	19.74	1.11	1.11	1.11	0.02	0.02	0.02
	Rogers	40131	4.11	4.10	4.10	12.52	24.53	24.08	43.29	41.86	42.61	0.07	0.05	0.05	6.57	6.57	6.57
	Tulsa	40143	19.06	18.80	18.67	217.05	297.85	293.74	499.68	436.04	372.13	0.58	0.52	0.52	10.50	10.30	10.30
	Wagoner	40145	3.24	3.22	3.22	9.00	17.43	17.28	25.05	24.23	24.66	0.15	0.15	0.15	0.01	0.01	0.01
	Subtotal		**29.48**	**29.19**	**29.05**	**259.17**	**380.26**	**374.90**	**624.47**	**556.92**	**495.08**	**2.73**	**2.63**	**2.63**	**17.56**	**17.36**	**17.36**

Table 3-15. Oklahoma 2002 episode day on-road mobile link based tpd emissions.

NOX	Oklahoma City Area	Tulsa Area		VOC	Oklahoma City Area	Tulsa Area		CO	Oklahoma City Area	Tulsa Area
Fri., 8/13	95.75	68.70		Sum of VOC-13	131.49	37.33		Sum of CO-13	528.29	437.01
Sat., 8/14	78.63	53.42		Sum of VOC-14	105.42	27.94		Sum of CO-14	413.95	343.10
Sun., 8/15	60.54	40.01		Sum of VOC-15	86.62	21.63		Sum of CO-15	341.34	273.83
Mon., 8/16	89.27	62.80		Sum of VOC-16	124.08	34.05		Sum of CO-16	487.66	402.62
Tues., 8/17	95.59	67.53		Sum of VOC-17	131.27	36.18		Sum of CO-17	511.58	420.08
Wed., 8/18	95.84	67.51		Sum of VOC-18	136.23	37.15		Sum of CO-18	525.37	430.18
Thurs., 8/19	93.50	66.28		Sum of VOC-19	126.75	35.33		Sum of CO-19	500.92	413.73
Fri., 8/-20	98.51	71.19		Sum of VOC-20	127.66	36.42		Sum of CO-20	513.86	428.97
Sat., 8/21	78.70	53.42		Sum of VOC-21	105.49	27.94		Sum of CO-21	414.03	342.44
Sun., 8/22	60.58	39.88		Sum of VOC-22	88.49	21.97		Sum of CO-22	345.89	277.60
Mon., 8/23	85.08	59.93		Sum of VOC-23	122.36	33.74		Sum of CO-23	489.52	403.39
Tues., 8/24	93.17	66.10		Sum of VOC-24	124.69	34.81		Sum of CO-24	493.23	409.28
Wed., 8/25	93.52	66.49		Sum of VOC-25	124.24	34.80		Sum of CO-25	497.94	413.68
Thurs., 8/26	92.77	65.23		Sum of NOx-26	92.77	65.23		Sum of CO-26	535.29	437.03
Fri., 8/27	94.88	67.60		Sum of VOC-27	138.06	38.94		Sum of CO-27	558.05	457.46
Sat., 8/28	73.76	49.88		Sum of VOC-28	104.99	27.94		Sum of CO-28	419.84	350.37
Sun., 8/29	59.91	39.50		Sum of VOC-29	87.09	21.69		Sum of CO-29	342.79	274.76
Mon., 8/30	86.88	61.39		Sum of VOC-30	119.21	33.00		Sum of CO-30	474.45	393.91
Tues.,8/31	94.13	66.49		Sum of VOC-31	129.06	35.77		Sum of CO-31	508.54	417.46
Mon. 9/01	92.80	65.80		Sum of VOC-01	126.06	35.23		Sum of CO-01	501.88	414.77

Table 3-16. Oklahoma gridded 2002 episode day on-road mobile NOx tpd emissions.

NOx	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Adair	40001	1.66	1.70	1.70	1.69	1.69	1.69	1.68	1.70	1.68	1.69	1.66	1.69	1.70	1.64	1.62	1.66	1.66	1.67	1.66	1.69
Alfalfa	40003	0.97	0.98	0.96	0.95	0.96	0.97	0.97	0.98	0.97	0.96	0.95	0.97	0.97	0.95	0.95	0.96	0.94	0.95	0.95	0.96
Atoka	40005	2.47	2.52	2.52	2.55	2.52	2.51	2.51	2.56	2.53	2.50	2.45	2.58	2.54	2.47	2.47	2.48	2.51	2.51	2.48	2.52
Beaver	40007	1.29	1.30	1.28	1.26	1.27	1.30	1.29	1.30	1.29	1.28	1.28	1.29	1.29	1.26	1.31	1.28	1.28	1.26	1.28	1.29
Beckham	40009	3.78	3.81	3.77	3.85	3.77	3.85	3.79	3.84	3.81	3.79	3.78	3.81	3.79	3.77	3.85	3.79	3.79	3.81	3.78	3.83
Blaine	40011	1.38	1.41	1.38	1.37	1.38	1.41	1.39	1.41	1.39	1.38	1.35	1.39	1.40	1.36	1.36	1.37	1.35	1.37	1.37	1.39
Bryan	40013	4.23	4.31	4.31	4.33	4.31	4.29	4.24	4.35	4.33	4.38	4.19	4.19	4.28	4.23	4.19	4.24	4.24	4.29	4.24	4.28
Caddo	40015	4.62	4.77	4.71	4.84	4.72	4.82	4.71	4.80	4.76	4.84	4.62	4.74	4.74	4.66	4.66	4.67	4.62	4.67	4.67	4.74
Canadian	40017	5.73	5.94	5.87	5.85	5.87	5.96	5.87	5.94	5.89	5.85	5.73	5.87	5.87	5.77	5.73	5.79	5.73	5.92	5.79	5.83
Carter	40019	5.69	5.78	5.76	5.78	5.81	5.78	5.70	5.85	5.81	5.85	5.85	5.64	5.75	5.75	5.64	5.64	5.64	5.85	5.70	5.75
Cherokee	40021	3.58	3.67	3.67	3.65	3.65	3.65	3.63	3.67	3.63	3.65	3.59	3.65	3.67	3.55	3.51	3.59	3.59	3.61	3.59	3.65
Choctaw	40023	1.64	1.67	1.67	1.69	1.69	1.66	1.64	1.69	1.68	1.69	1.62	1.62	1.66	1.64	1.62	1.66	1.64	1.66	1.64	1.66
Cleveland	40027	3.94	4.08	4.04	4.04	4.04	4.10	4.03	4.08	4.06	4.07	3.94	4.07	4.04	3.98	3.94	3.94	3.94	4.03	3.99	4.02
Coal	40029	0.64	0.66	0.66	0.66	0.66	0.66	0.65	0.66	0.66	0.65	0.64	0.67	0.66	0.64	0.64	0.65	0.65	0.65	0.65	0.66
Comanche	40031	9.03	9.17	9.13	9.13	9.17	9.30	9.13	9.26	9.21	9.20	8.94	9.20	9.11	9.03	9.03	9.04	8.94	9.04	8.94	9.17
Cotton	40033	1.30	1.32	1.31	1.31	1.32	1.34	1.30	1.33	1.33	1.35	1.29	1.29	1.31	1.31	1.30	1.30	1.29	1.30	1.29	1.32
Craig	40035	2.83	2.86	2.86	2.85	2.84	2.84	2.83	2.86	2.83	2.84	2.80	2.85	2.86	2.77	2.74	2.79	2.80	2.79	2.86	2.84
Creek	40037	4.70	4.78	4.75	4.75	4.75	4.77	4.70	4.80	4.75	4.73	4.66	4.77	4.78	4.61	4.65	4.66	4.82	4.70	4.82	4.75
Custer	40039	4.25	4.28	4.26	4.31	4.25	4.33	4.26	4.33	4.28	4.26	4.26	4.28	4.30	4.24	4.19	4.26	4.26	4.28	4.25	4.30
Delaware	40041	3.57	3.61	3.61	3.60	3.59	3.59	3.57	3.61	3.57	3.59	3.54	3.60	3.61	3.50	3.46	3.53	3.54	3.56	3.54	3.59
Dewey	40043	0.86	0.88	0.86	0.85	0.86	0.88	0.86	0.88	0.87	0.86	0.86	0.87	0.87	0.86	0.85	0.86	0.86	0.87	0.86	0.87
Ellis	40045	0.62	0.63	0.62	0.61	0.61	0.63	0.62	0.63	0.62	0.62	0.62	0.62	0.62	0.61	0.63	0.62	0.62	0.62	0.61	0.62
Garfield	40047	5.11	5.16	5.11	5.07	5.09	5.11	5.09	5.16	5.14	5.07	5.02	5.11	5.14	5.01	4.96	5.02	5.11	5.11	5.02	5.14
Garvin	40049	4.99	5.10	5.07	5.07	5.10	5.15	5.05	5.14	5.10	5.17	5.17	5.17	5.04	5.04	4.95	4.95	4.95	5.17	5.00	5.04
Grady	40051	3.90	4.02	3.97	3.98	4.00	4.06	3.97	4.05	4.02	4.07	3.90	4.00	4.00	3.93	3.90	3.90	3.90	4.07	3.94	3.97
Grant	40053	0.81	0.82	0.81	0.79	0.80	0.81	0.81	0.82	0.81	0.80	0.79	0.81	0.81	0.79	0.78	0.80	0.82	0.82	0.82	0.80
Greer	40055	0.50	0.51	0.50	0.52	0.50	0.51	0.50	0.51	0.51	0.50	0.50	0.51	0.50	0.50	0.52	0.50	0.49	0.51	0.50	0.50
Harmon	40057	0.28	0.28	0.28	0.29	0.28	0.29	0.28	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.28	0.27	0.28	0.28	0.28
Harper	40059	0.70	0.71	0.70	0.69	0.69	0.71	0.70	0.71	0.70	0.70	0.70	0.70	0.70	0.68	0.71	0.70	0.70	0.69	0.69	0.70
Haskell	40061	1.14	1.19	1.19	1.19	1.17	1.17	1.17	1.19	1.18	1.17	1.14	1.17	1.18	1.14	1.14	1.16	1.16	1.17	1.16	1.17
Hughes	40063	1.30	1.34	1.35	1.35	1.34	1.33	1.32	1.35	1.34	1.33	1.37	1.32	1.34	1.31	1.31	1.31	1.37	1.32	1.31	1.33
Jackson	40065	2.06	2.07	2.06	2.09	2.06	2.10	2.06	2.09	2.08	2.09	2.06	2.07	2.07	2.06	2.09	2.04	2.02	2.08	2.04	2.07
Jefferson	40067	0.72	0.73	0.73	0.73	0.73	0.73	0.72	0.74	0.73	0.75	0.71	0.71	0.73	0.72	0.72	0.72	0.71	0.75	0.71	0.73
Johnston	40069	1.33	1.35	1.35	1.36	1.35	1.35	1.33	1.37	1.36	1.38	1.38	1.38	1.34	1.33	1.31	1.33	1.33	1.34	1.33	1.35
Kay	40071	5.21	5.23	5.18	5.16	5.18	5.21	5.18	5.23	5.18	5.12	5.14	5.21	5.21	5.03	5.03	5.12	5.21	5.12	5.21	5.21

NOx	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Kingfisher	40073	1.61	1.65	1.63	1.62	1.63	1.63	1.61	1.65	1.63	1.62	1.58	1.63	1.64	1.60	1.58	1.60	1.58	1.67	1.60	1.61
Kiowa	40075	1.30	1.31	1.30	1.34	1.30	1.33	1.30	1.32	1.31	1.34	1.30	1.31	1.31	1.30	1.28	1.31	1.27	1.31	1.28	1.31
Latimer	40077	1.09	1.14	1.14	1.14	1.14	1.12	1.13	1.14	1.13	1.14	1.09	1.12	1.13	1.09	1.09	1.12	1.12	1.12	1.12	1.13
LeFlore	40079	5.33	5.54	5.57	5.55	5.54	5.46	5.51	5.55	5.51	5.54	5.46	5.44	5.51	5.40	5.33	5.46	5.46	5.48	5.46	5.51
Lincoln	40081	5.00	5.09	5.08	5.03	5.06	5.08	5.00	5.11	5.08	5.00	4.96	5.08	5.08	4.94	4.94	4.90	4.96	5.00	4.96	5.03
Logan	40083	1.51	1.54	1.53	1.52	1.53	1.53	1.51	1.54	1.54	1.55	1.48	1.53	1.54	1.50	1.48	1.48	1.48	1.52	1.50	1.51
Love	40085	3.13	3.18	3.17	3.17	3.18	3.18	3.14	3.21	3.20	3.25	3.11	3.11	3.16	3.13	3.13	3.14	3.11	3.25	3.11	3.16
McClain	40087	4.56	4.74	4.68	4.68	4.68	4.76	4.66	4.74	4.70	4.79	4.56	4.79	4.68	4.60	4.56	4.56	4.56	4.66	4.61	4.65
McCurtain	40089	3.87	3.94	3.98	3.99	3.98	3.92	3.88	3.98	3.96	3.98	3.92	3.83	3.91	3.88	3.83	3.92	3.92	3.94	3.92	3.96
McIntosh	40091	3.78	3.92	3.92	3.90	3.88	3.88	3.85	3.93	3.90	3.88	3.78	3.85	3.90	3.81	3.81	3.78	3.82	3.85	3.82	3.88
Major	40093	1.40	1.41	1.38	1.37	1.38	1.40	1.39	1.41	1.40	1.38	1.37	1.39	1.40	1.36	1.36	1.38	1.35	1.37	1.37	1.39
Marshall	40095	1.38	1.40	1.40	1.40	1.40	1.40	1.38	1.42	1.41	1.44	1.44	1.36	1.39	1.38	1.38	1.36	1.36	1.40	1.36	1.39
Mayes	40097	5.28	5.41	5.41	5.39	5.38	5.38	5.35	5.41	5.35	5.32	5.24	5.39	5.41	5.24	5.18	5.28	5.30	5.28	5.44	5.38
Murray	40099	1.88	1.91	1.91	1.92	1.92	1.94	1.89	1.94	1.92	1.96	1.96	1.96	1.90	1.88	1.88	1.87	1.87	1.96	1.89	1.90
Muskogee	40101	7.49	7.78	7.73	7.77	7.77	7.69	7.64	7.78	7.73	7.69	7.49	7.64	7.81	7.49	7.56	7.58	7.58	7.64	7.58	7.73
Noble	40103	3.25	3.29	3.25	3.23	3.25	3.26	3.23	3.29	3.26	3.21	3.19	3.27	3.27	3.18	3.15	3.21	3.30	3.21	3.30	3.26
Nowata	40105	0.90	0.91	0.91	0.91	0.91	0.91	0.90	0.91	0.90	0.91	0.89	0.91	0.91	0.88	0.87	0.89	0.89	0.89	0.92	0.91
Okfuskee	40107	2.00	2.07	2.07	2.06	2.06	2.07	2.03	2.08	2.06	2.05	2.09	2.03	2.07	2.01	2.01	2.02	2.09	2.03	2.09	2.05
Oklahoma	40109	16.35	16.90	16.76	16.70	16.76	16.91	16.65	16.90	16.82	16.66	16.35	16.91	16.91	16.54	16.35	16.35	16.35	16.70	16.53	16.65
Okmulgee	40111	4.30	4.46	4.43	4.46	4.43	4.46	4.38	4.48	4.43	4.41	4.35	4.38	4.46	4.34	4.34	4.35	4.35	4.38	4.47	4.43
Osage	40113	2.58	2.61	2.58	2.57	2.60	2.60	2.57	2.61	2.58	2.55	2.56	2.60	2.60	2.50	2.50	2.55	2.56	2.55	2.63	2.60
Ottawa	40115	4.60	4.65	4.65	4.63	4.62	4.62	4.60	4.65	4.60	4.62	4.56	4.63	4.65	4.51	4.46	4.55	4.56	4.55	4.56	4.62
Pawnee	40117	1.74	1.77	1.75	1.74	1.75	1.75	1.74	1.77	1.74	1.72	1.71	1.76	1.76	1.70	1.69	1.72	1.78	1.72	1.71	1.74
Payne	40119	5.22	5.28	5.22	5.20	5.22	5.25	5.20	5.28	5.25	5.17	5.13	5.26	5.26	5.12	5.07	5.13	5.25	5.17	5.13	5.25
Pittsburg	40121	4.91	5.10	5.05	5.10	5.05	5.03	5.03	5.11	5.07	5.01	4.91	5.01	5.07	4.96	4.96	4.97	4.97	5.05	4.97	5.05
Pontotoc	40123	3.04	3.11	3.09	3.11	3.11	3.09	3.08	3.14	3.12	3.07	3.13	3.07	3.12	3.04	3.01	3.05	3.05	3.08	3.05	3.09
Pottawatomie	40125	6.75	7.00	6.99	6.95	6.95	6.99	6.88	7.03	6.99	6.88	7.00	6.88	6.99	6.81	6.81	6.82	6.82	6.89	6.82	6.92
Pushmataha	40127	1.33	1.38	1.38	1.38	1.38	1.36	1.36	1.38	1.37	1.38	1.36	1.36	1.37	1.33	1.33	1.36	1.36	1.37	1.36	1.37
RogerMills	40129	0.62	0.64	0.63	0.62	0.62	0.64	0.63	0.64	0.63	0.63	0.63	0.63	0.63	0.62	0.64	0.63	0.63	0.63	0.62	0.63
Rogers	40131	5.52	5.64	5.64	5.61	5.61	5.61	5.58	5.64	5.58	5.55	5.47	5.62	5.64	5.47	5.41	5.52	5.53	5.52	5.65	5.61
Seminole	40133	3.68	3.82	3.82	3.80	3.80	3.82	3.76	3.84	3.82	3.75	3.85	3.75	3.80	3.72	3.72	3.72	3.72	3.76	3.72	3.78
Sequoyah	40135	5.74	5.96	5.98	5.96	5.94	5.89	5.91	5.96	5.91	5.94	5.86	5.85	5.91	5.80	5.74	5.86	5.86	5.89	5.86	5.94
Stephens	40137	3.13	3.19	3.17	3.19	3.20	3.24	3.17	3.22	3.20	3.23	3.10	3.23	3.17	3.17	3.10	3.10	3.10	3.23	3.14	3.17
Texas	40139	0.81	0.81	0.80	0.79	0.80	0.81	0.81	0.81	0.81	0.80	0.80	0.81	0.81	0.79	0.82	0.80	0.80	0.79	0.80	0.81
Tillman	40141	0.87	0.89	0.88	0.90	0.89	0.90	0.88	0.90	0.89	0.90	0.86	0.90	0.88	0.88	0.87	0.87	0.86	0.87	0.86	0.89
Tulsa	40143	12.62	12.81	12.74	12.75	12.75	12.82	12.75	12.86	12.75	12.62	12.53	12.82	12.86	12.39	12.39	12.62	12.53	12.62	12.64	12.75

NOx	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Wagoner	40145	3.17	3.23	3.24	3.22	3.22	3.22	3.20	3.24	3.20	3.19	3.14	3.22	3.24	3.11	3.11	3.14	3.14	3.17	3.25	3.22
Washington	40147	3.46	3.49	3.49	3.48	3.48	3.48	3.46	3.49	3.46	3.44	3.43	3.48	3.49	3.35	3.35	3.42	3.43	3.42	3.47	3.48
Washita	40149	2.48	2.50	2.47	2.54	2.48	2.53	2.49	2.52	2.50	2.49	2.48	2.50	2.49	2.47	2.54	2.49	2.49	2.50	2.48	2.51
Woods	40151	0.88	0.88	0.87	0.86	0.87	0.87	0.87	0.88	0.87	0.87	0.87	0.87	0.88	0.86	0.86	0.86	0.87	0.86	0.87	0.87
Woodward	40153	2.05	2.06	2.03	2.00	2.02	2.06	2.04	2.06	2.04	2.02	2.03	2.04	2.05	2.01	2.05	2.03	2.03	2.04	2.02	2.05

Table 3-17. Oklahoma gridded 2002 episode day on-road mobile VOC tpd emissions.

VOC	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Adair	40001	1.75	1.70	1.70	1.68	1.75	1.75	1.73	1.70	1.73	1.75	1.78	1.68	1.70	1.79	1.79	1.78	1.78	1.78	1.78	1.75
Alfalfa	40003	1.06	1.02	1.08	1.09	1.08	1.05	1.05	1.03	1.05	1.08	1.09	1.05	1.06	1.15	1.15	1.07	1.09	1.09	1.09	1.08
Atoka	40005	2.77	2.61	2.61	2.57	2.61	2.62	2.62	2.47	2.54	2.58	2.63	2.69	2.53	2.77	2.77	2.63	2.61	2.62	2.63	2.61
Beaver	40007	1.34	1.31	1.36	1.37	1.35	1.31	1.33	1.31	1.33	1.36	1.36	1.33	1.34	1.45	1.41	1.36	1.36	1.37	1.37	1.34
Beckham	40009	3.40	3.29	3.35	3.50	3.35	3.24	3.39	3.20	3.29	3.39	3.40	3.29	3.39	3.35	3.50	3.39	3.39	3.30	3.40	3.34
Blaine	40011	1.52	1.45	1.52	1.55	1.55	1.47	1.54	1.45	1.50	1.55	1.56	1.54	1.52	1.65	1.65	1.55	1.56	1.55	1.55	1.54
Bryan	40013	5.13	4.79	4.79	4.66	4.79	4.81	4.83	4.71	4.66	4.96	4.85	4.85	4.74	5.13	4.85	4.83	4.83	4.81	4.83	4.74
Caddo	40015	4.80	4.61	4.69	4.91	4.76	4.53	4.69	4.48	4.61	4.91	4.80	4.75	4.75	5.07	5.07	4.78	4.80	4.78	4.78	4.75
Canadian	40017	6.35	5.90	6.27	6.30	6.27	5.97	6.27	5.90	6.09	6.30	6.35	6.27	6.27	6.75	6.35	6.33	6.35	6.51	6.33	6.20
Carter	40019	6.72	6.26	6.29	6.26	6.08	6.26	6.32	5.89	6.08	6.49	6.49	6.34	6.19	6.19	6.34	6.34	6.34	6.49	6.32	6.19
Cherokee	40021	4.26	4.10	4.10	4.05	4.24	4.24	4.18	4.10	4.18	4.24	4.33	4.24	4.10	4.35	4.36	4.33	4.33	4.31	4.33	4.24
Choctaw	40023	2.01	1.88	1.88	1.85	1.85	1.89	1.90	1.85	1.83	1.85	1.90	1.90	1.86	2.01	1.90	1.89	1.90	1.89	1.90	1.86
Cleveland	40027	5.87	5.39	5.77	5.77	5.77	5.45	5.81	5.39	5.59	6.03	5.87	6.03	5.77	6.30	5.87	5.87	5.87	5.81	5.85	5.70
Coal	40029	0.75	0.70	0.71	0.69	0.71	0.71	0.71	0.67	0.69	0.70	0.71	0.73	0.70	0.75	0.75	0.71	0.71	0.71	0.71	0.71
Comanche	40031	11.97	11.09	11.14	11.14	11.09	10.54	11.14	10.90	10.76	11.53	11.24	11.53	10.96	11.97	11.97	11.20	11.24	11.20	11.24	11.09
Cotton	40033	1.35	1.26	1.27	1.27	1.26	1.21	1.27	1.24	1.23	1.31	1.28	1.28	1.25	1.25	1.35	1.27	1.28	1.27	1.28	1.26
Craig	40035	2.66	2.62	2.62	2.58	2.69	2.69	2.66	2.62	2.66	2.69	2.74	2.58	2.62	2.76	2.76	2.70	2.74	2.70	2.83	2.69
Creek	40037	5.12	4.87	5.02	5.03	5.03	5.10	5.12	4.94	5.03	5.18	5.23	5.10	4.87	5.24	5.56	5.23	5.37	5.12	5.37	5.03
Custer	40039	4.13	3.99	4.11	4.25	4.13	3.93	4.11	3.93	3.99	4.11	4.11	3.99	4.05	4.06	4.39	4.11	4.11	4.00	4.13	4.05
Delaware	40041	3.89	3.82	3.82	3.77	3.93	3.93	3.89	3.82	3.88	3.93	4.01	3.77	3.82	4.03	4.04	3.95	4.01	4.00	4.01	3.93
Dewey	40043	0.93	0.89	0.93	0.93	0.93	0.89	0.93	0.89	0.90	0.93	0.93	0.90	0.91	0.92	0.99	0.93	0.93	0.90	0.93	0.91
Ellis	40045	0.67	0.65	0.68	0.68	0.67	0.65	0.66	0.65	0.66	0.68	0.68	0.66	0.67	0.67	0.70	0.68	0.68	0.66	0.68	0.67
Garfield	40047	6.14	6.02	6.13	6.36	6.33	6.14	6.33	6.02	6.22	6.36	6.39	6.13	5.94	6.83	6.41	6.39	6.58	6.58	6.39	6.22
Garvin	40049	5.15	4.70	4.84	4.84	4.70	4.62	4.85	4.57	4.70	5.00	5.00	5.00	4.78	4.78	4.89	4.89	4.89	5.00	4.87	4.78
Grady	40051	4.41	4.23	4.31	4.38	4.36	4.16	4.31	4.10	4.23	4.52	4.41	4.36	4.36	4.68	4.41	4.41	4.41	4.52	4.40	4.31
Grant	40053	0.87	0.85	0.86	0.89	0.89	0.86	0.86	0.85	0.86	0.89	0.89	0.84	0.84	0.94	0.89	0.87	0.92	0.92	0.92	0.89
Greer	40055	0.60	0.58	0.59	0.62	0.59	0.57	0.59	0.56	0.58	0.60	0.60	0.58	0.60	0.59	0.62	0.60	0.60	0.58	0.60	0.60

VOC	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Harmon	40057	0.33	0.32	0.32	0.34	0.33	0.31	0.32	0.31	0.32	0.33	0.33	0.33	0.33	0.32	0.34	0.33	0.33	0.32	0.33	0.33
Harper	40059	0.75	0.73	0.76	0.76	0.75	0.73	0.74	0.73	0.74	0.76	0.76	0.74	0.75	0.81	0.78	0.76	0.76	0.76	0.76	0.75
Haskell	40061	1.36	1.32	1.32	1.32	1.34	1.35	1.33	1.27	1.30	1.34	1.36	1.33	1.30	1.36	1.36	1.35	1.35	1.34	1.35	1.34
Hughes	40063	1.57	1.50	1.52	1.52	1.50	1.55	1.53	1.46	1.50	1.55	1.60	1.53	1.50	1.66	1.66	1.56	1.60	1.53	1.56	1.55
Jackson	40065	2.60	2.59	2.60	2.69	2.60	2.46	2.60	2.55	2.51	2.69	2.60	2.59	2.59	2.56	2.69	2.62	2.62	2.51	2.62	2.59
Jefferson	40067	0.88	0.82	0.82	0.82	0.82	0.82	0.83	0.81	0.80	0.85	0.83	0.83	0.81	0.88	0.88	0.83	0.83	0.85	0.83	0.81
Johnston	40069	1.67	1.56	1.56	1.51	1.56	1.56	1.57	1.47	1.51	1.61	1.61	1.61	1.54	1.67	1.57	1.57	1.57	1.56	1.57	1.56
Kay	40071	5.56	5.38	5.48	5.65	5.49	5.56	5.48	5.38	5.49	5.59	5.67	5.32	5.32	5.72	5.72	5.59	5.86	5.59	5.86	5.56
Kingfisher	40073	1.78	1.70	1.80	1.81	1.80	1.75	1.78	1.70	1.75	1.81	1.82	1.80	1.77	1.93	1.82	1.82	1.82	1.86	1.82	1.78
Kiowa	40075	1.48	1.43	1.47	1.52	1.48	1.40	1.45	1.39	1.43	1.52	1.48	1.47	1.47	1.45	1.57	1.47	1.49	1.43	1.48	1.47
Latimer	40077	1.29	1.26	1.26	1.20	1.26	1.28	1.24	1.20	1.24	1.26	1.29	1.26	1.24	1.29	1.29	1.28	1.28	1.28	1.28	1.24
LeFlore	40079	6.40	6.22	6.03	5.96	6.22	6.35	6.15	5.96	6.13	6.22	6.35	6.25	6.13	6.38	6.40	6.35	6.35	6.33	6.35	6.15
Lincoln	40081	4.83	4.61	4.81	4.88	4.75	4.81	4.83	4.67	4.81	4.83	4.92	4.81	4.81	5.21	5.21	4.93	4.92	4.83	4.92	4.88
Logan	40083	1.90	1.81	1.93	1.93	1.93	1.87	1.90	1.81	1.89	2.00	1.95	1.93	1.89	2.08	1.95	1.95	1.95	1.93	1.94	1.90
Love	40085	2.74	2.59	2.59	2.59	2.59	2.59	2.60	2.55	2.52	2.66	2.61	2.61	2.56	2.74	2.74	2.60	2.61	2.66	2.61	2.56
McClain	40087	4.46	4.18	4.42	4.42	4.42	4.23	4.43	4.18	4.30	4.57	4.46	4.57	4.42	4.71	4.46	4.46	4.46	4.43	4.45	4.37
McCurtain	40089	4.85	4.52	4.44	4.25	4.44	4.53	4.56	4.44	4.38	4.44	4.53	4.57	4.47	4.56	4.57	4.53	4.53	4.52	4.53	4.39
McIntosh	40091	3.77	3.67	3.67	3.63	3.73	3.73	3.69	3.53	3.63	3.73	3.77	3.69	3.62	3.97	3.97	3.77	3.76	3.69	3.76	3.73
Major	40093	1.49	1.43	1.49	1.52	1.52	1.47	1.51	1.43	1.47	1.52	1.52	1.51	1.49	1.61	1.61	1.49	1.53	1.52	1.52	1.51
Marshall	40095	1.68	1.57	1.58	1.58	1.57	1.57	1.59	1.55	1.53	1.63	1.63	1.59	1.55	1.68	1.68	1.59	1.59	1.58	1.59	1.55
Mayes	40097	5.62	5.43	5.43	5.37	5.60	5.60	5.53	5.43	5.53	5.69	5.73	5.37	5.43	5.73	5.75	5.62	5.70	5.62	5.88	5.60
Murray	40099	2.07	1.93	1.93	1.88	1.88	1.84	1.95	1.82	1.88	2.00	2.00	2.00	1.91	2.07	2.07	1.95	1.95	2.00	1.95	1.91
Muskogee	40101	8.95	8.32	8.57	8.70	8.70	8.85	8.74	8.32	8.59	8.85	8.95	8.74	8.43	8.95	9.50	8.93	8.93	8.74	8.93	8.59
Noble	40103	2.85	2.81	2.85	2.93	2.85	2.89	2.93	2.81	2.89	2.90	2.95	2.78	2.78	3.12	2.96	2.90	3.03	2.90	3.03	2.89
Nowata	40105	0.97	0.95	0.95	0.98	0.98	0.98	0.97	0.95	0.97	0.98	1.00	0.94	0.95	1.01	1.01	0.99	1.00	0.99	1.03	0.98
Okfuskee	40107	1.90	1.77	1.85	1.83	1.83	1.85	1.86	1.80	1.83	1.88	1.94	1.86	1.77	2.00	2.00	1.89	1.94	1.86	1.94	1.88
Oklahoma	40109	26.57	24.25	26.10	26.26	26.10	25.57	25.78	24.25	25.23	27.33	26.57	25.57	25.57	28.64	26.57	26.57	26.57	26.26	26.46	25.78
Okmulgee	40111	4.96	4.62	4.76	4.82	4.76	4.82	4.85	4.68	4.76	4.90	4.95	4.85	4.62	5.26	5.26	4.95	4.95	4.85	5.08	4.76
Osage	40113	3.01	2.95	3.01	3.11	3.05	3.05	3.11	2.95	3.01	3.07	3.12	2.92	2.92	3.14	3.14	3.07	3.12	3.07	3.22	3.05
Ottawa	40115	4.53	4.45	4.45	4.40	4.59	4.59	4.53	4.45	4.52	4.59	4.68	4.40	4.45	4.70	4.71	4.61	4.68	4.61	4.68	4.59
Pawnee	40117	1.84	1.81	1.83	1.89	1.86	1.86	1.89	1.81	1.84	1.87	1.90	1.78	1.78	2.02	1.91	1.87	1.95	1.87	1.90	1.84
Payne	40119	5.92	5.80	5.91	6.10	5.92	6.00	6.10	5.80	6.00	6.03	6.16	5.73	5.73	6.57	6.18	6.16	6.34	6.03	6.16	6.00
Pittsburg	40121	5.70	5.54	5.63	5.54	5.63	5.65	5.65	5.31	5.47	5.57	5.70	5.57	5.47	6.03	6.03	5.68	5.68	5.63	5.68	5.63
Pontotoc	40123	3.96	3.57	3.68	3.58	3.58	3.68	3.70	3.51	3.62	3.64	3.82	3.64	3.62	3.96	3.73	3.72	3.72	3.70	3.72	3.68
Pottawatomie	40125	7.44	6.92	7.23	7.14	7.14	7.23	7.26	7.01	7.23	7.26	7.62	7.26	7.23	7.88	7.88	7.41	7.41	7.38	7.41	7.35
Pushmataha	40127	1.52	1.48	1.48	1.41	1.48	1.50	1.50	1.41	1.46	1.48	1.50	1.48	1.46	1.52	1.52	1.50	1.50	1.50	1.50	1.46

VOC	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
RogerMills	40129	0.71	0.68	0.71	0.72	0.70	0.68	0.71	0.68	0.69	0.71	0.71	0.69	0.71	0.70	0.74	0.71	0.71	0.69	0.71	0.70
Rogers	40131	6.32	6.10	6.10	6.29	6.29	6.29	6.21	6.10	6.21	6.40	6.45	6.02	6.10	6.45	6.47	6.32	6.42	6.32	6.63	6.29
Seminole	40133	4.00	3.73	3.90	3.85	3.85	3.90	3.97	3.78	3.90	3.91	4.10	3.91	3.84	4.24	4.24	3.99	3.99	3.97	3.99	3.96
Sequoyah	40135	5.89	5.50	5.57	5.50	5.74	5.83	5.66	5.50	5.66	5.74	5.85	5.76	5.66	5.87	5.89	5.85	5.85	5.83	5.85	5.74
Stephens	40137	4.18	3.88	3.90	3.88	3.77	3.69	3.90	3.65	3.77	4.03	3.93	4.03	3.84	3.84	3.93	3.93	3.93	4.03	3.92	3.84
Texas	40139	0.87	0.84	0.88	0.89	0.87	0.84	0.85	0.84	0.85	0.88	0.88	0.85	0.87	0.94	0.91	0.88	0.88	0.89	0.88	0.87
Tillman	40141	1.12	1.04	1.05	1.08	1.04	1.00	1.05	1.03	1.01	1.08	1.06	1.08	1.03	1.03	1.12	1.05	1.06	1.05	1.06	1.04
Tulsa	40143	19.75	18.57	19.25	19.33	19.33	19.59	19.33	18.80	19.33	19.75	20.28	19.59	18.80	20.37	20.37	19.75	20.28	19.75	20.96	19.33
Wagoner	40145	3.78	3.59	3.64	3.76	3.76	3.76	3.71	3.64	3.71	3.82	3.86	3.76	3.64	3.87	3.87	3.86	3.86	3.78	3.97	3.76
Washington	40147	4.12	4.04	4.04	4.17	4.17	4.17	4.12	4.04	4.12	4.25	4.27	3.99	4.04	4.31	4.31	4.20	4.27	4.20	4.41	4.17
Washita	40149	2.32	2.25	2.28	2.38	2.32	2.21	2.31	2.19	2.25	2.31	2.32	2.25	2.31	2.28	2.38	2.31	2.31	2.25	2.32	2.28
Woods	40151	1.02	0.99	1.04	1.05	1.04	1.01	1.01	0.99	1.01	1.04	1.04	1.01	1.02	1.12	1.12	1.03	1.04	1.05	1.04	1.04
Woodward	40153	2.36	2.29	2.41	2.43	2.41	2.29	2.33	2.29	2.33	2.41	2.41	2.33	2.36	2.38	2.50	2.41	2.41	2.33	2.41	2.36

Table 3-18. Oklahoma gridded 2002 episode day on-road mobile CO tpd emissions.

CO	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Adair	40001	13.05	12.87	12.87	12.72	12.97	12.97	12.87	12.87	12.92	12.97	13.16	12.72	12.87	13.34	13.44	13.16	13.16	13.11	13.16	12.97
Alfalfa	40003	7.38	7.25	7.46	7.58	7.48	7.32	7.36	7.33	7.32	7.48	7.58	7.36	7.38	7.90	7.90	7.42	7.64	7.58	7.58	7.46
Atoka	40005	21.39	20.13	20.13	19.91	20.13	20.22	20.22	19.51	19.76	20.04	20.67	20.42	19.83	21.39	21.39	20.50	20.22	20.22	20.50	20.13
Beaver	40007	9.99	9.91	10.10	10.27	10.05	9.91	9.95	9.91	9.95	10.10	10.10	9.95	9.99	10.71	10.24	10.10	10.10	10.27	10.14	9.99
Beckham	40009	28.55	27.95	28.29	28.87	28.29	27.75	28.41	27.46	27.95	28.41	28.55	27.95	28.41	28.29	28.87	28.41	28.41	27.87	28.55	28.06
Blaine	40011	10.82	10.56	10.82	11.06	10.92	10.68	10.87	10.56	10.68	10.92	11.14	10.87	10.76	11.53	11.53	11.06	11.14	11.06	11.06	10.87
Bryan	40013	35.71	33.69	33.69	33.09	33.69	33.82	34.26	33.34	33.09	34.25	34.52	34.52	33.53	35.71	34.52	34.26	34.26	33.82	34.26	33.53
Caddo	40015	36.95	35.45	35.84	36.54	36.16	35.26	35.84	34.88	35.33	36.54	36.95	36.00	36.00	38.23	38.23	36.64	36.94	36.64	36.64	36.00
Canadian	40017	45.33	42.87	44.21	44.39	44.21	43.35	44.21	42.87	43.41	44.39	45.33	44.21	44.21	46.90	45.33	44.97	45.33	45.05	44.97	44.00
Carter	40019	46.50	43.87	44.04	43.87	43.09	43.87	44.61	42.59	43.09	44.66	44.66	44.96	43.66	43.66	44.96	44.96	44.96	44.66	44.61	43.66
Cherokee	40021	27.61	27.33	27.33	27.01	27.49	27.49	27.27	27.33	27.39	27.49	27.85	27.49	27.33	28.18	28.39	27.85	27.85	27.75	27.85	27.49
Choctaw	40023	13.91	13.12	13.12	12.98	12.98	13.17	13.34	12.98	12.88	12.98	13.44	13.44	13.06	13.91	13.44	13.17	13.34	13.17	13.34	13.06
Cleveland	40027	31.04	29.73	30.45	30.45	30.45	30.11	30.52	29.73	29.95	31.03	31.04	31.03	30.45	32.09	31.04	31.04	31.04	30.52	30.85	30.27
Coal	40029	5.48	5.11	5.17	5.07	5.17	5.17	5.19	5.02	5.07	5.14	5.30	5.24	5.11	5.48	5.48	5.26	5.26	5.19	5.26	5.17
Comanche	40031	73.20	69.30	69.51	69.51	69.30	68.28	69.51	68.66	68.12	70.69	70.83	70.69	68.93	73.20	73.20	70.33	70.83	70.33	70.83	69.30
Cotton	40033	10.63	10.00	10.05	10.05	10.00	9.79	10.18	9.89	9.81	10.15	10.27	10.27	9.96	9.96	10.63	10.18	10.27	10.18	10.27	10.00
Craig	40035	21.09	21.03	21.03	20.81	21.24	21.24	21.09	21.03	21.16	21.24	21.59	20.81	21.03	21.88	22.07	21.40	21.59	21.40	21.83	21.24
Creek	40037	35.76	34.88	35.42	35.29	35.29	35.56	35.76	35.27	35.29	35.93	36.54	35.56	34.88	36.83	38.09	36.54	36.49	35.76	36.49	35.29
Custer	40039	32.31	31.67	32.17	32.74	32.31	31.48	32.17	31.48	31.67	32.17	32.17	31.67	31.79	32.02	34.17	32.17	32.17	31.57	32.31	31.79

CO	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Delaware	40041	27.25	27.27	27.27	26.96	27.47	27.47	27.25	27.27	27.36	27.47	27.86	26.96	27.27	28.21	28.43	27.62	27.86	27.75	27.86	27.47
Dewey	40043	6.83	6.68	6.81	6.92	6.83	6.68	6.81	6.68	6.71	6.81	6.81	6.71	6.73	6.77	7.22	6.81	6.81	6.68	6.83	6.73
Ellis	40045	4.78	4.74	4.83	4.91	4.81	4.74	4.76	4.74	4.76	4.83	4.83	4.76	4.78	4.81	4.90	4.83	4.83	4.74	4.85	4.78
Garfield	40047	38.03	38.16	38.20	38.78	38.67	38.03	38.67	38.16	38.33	38.78	39.22	38.20	37.70	40.81	39.49	39.22	39.44	39.44	39.22	38.33
Garvin	40049	40.79	37.79	38.38	38.38	37.67	37.55	38.56	37.15	37.67	38.98	38.98	38.98	38.22	38.22	39.42	39.42	39.42	38.98	39.09	38.22
Grady	40051	31.26	30.06	30.35	30.62	30.50	29.94	30.35	29.60	29.95	30.99	31.26	30.50	30.50	32.33	31.26	31.26	31.26	30.99	31.01	30.35
Grant	40053	6.22	6.17	6.19	6.39	6.28	6.17	6.19	6.17	6.17	6.31	6.39	6.10	6.10	6.66	6.44	6.25	6.37	6.37	6.37	6.28
Greer	40055	3.91	3.85	3.88	3.96	3.88	3.84	3.88	3.79	3.85	3.90	3.91	3.85	3.90	3.88	3.96	3.90	3.99	3.83	3.91	3.90
Harmon	40057	2.21	2.17	2.19	2.23	2.21	2.16	2.19	2.14	2.17	2.20	2.21	2.20	2.20	2.19	2.23	2.20	2.25	2.16	2.24	2.20
Harper	40059	5.42	5.38	5.48	5.57	5.45	5.38	5.40	5.38	5.40	5.48	5.48	5.40	5.42	5.81	5.56	5.48	5.48	5.57	5.50	5.42
Haskell	40061	9.38	9.06	9.06	9.06	9.15	9.19	9.11	8.89	8.99	9.15	9.38	9.11	9.03	9.38	9.38	9.30	9.30	9.15	9.30	9.15
Hughes	40063	10.59	10.20	10.24	10.24	10.16	10.34	10.29	10.05	10.16	10.34	10.49	10.29	10.20	10.95	10.95	10.51	10.49	10.29	10.51	10.34
Jackson	40065	15.92	15.87	15.92	16.17	15.92	15.65	15.92	15.73	15.60	16.17	15.92	15.88	15.88	15.79	16.17	16.11	16.22	15.60	16.11	15.88
Jefferson	40067	6.08	5.73	5.76	5.76	5.73	5.73	5.83	5.67	5.63	5.82	5.88	5.88	5.71	6.08	6.08	5.83	5.88	5.82	5.88	5.71
Johnston	40069	11.04	10.43	10.43	10.24	10.43	10.43	10.59	10.14	10.24	10.58	10.58	10.58	10.38	11.04	10.67	10.59	10.59	10.46	10.59	10.43
Kay	40071	38.67	38.37	38.52	39.07	38.38	38.67	38.52	38.37	38.38	38.88	39.22	37.94	37.94	40.03	40.03	38.88	39.77	38.88	39.77	38.67
Kingfisher	40073	12.73	12.41	12.79	12.84	12.79	12.56	12.73	12.41	12.56	12.84	13.11	12.79	12.66	13.56	13.11	13.01	13.11	12.98	13.01	12.73
Kiowa	40075	10.24	10.06	10.24	10.35	10.24	10.03	10.16	9.91	10.06	10.35	10.24	10.21	10.21	10.16	10.82	10.20	10.46	10.02	10.38	10.21
Latimer	40077	8.98	8.68	8.68	8.52	8.68	8.80	8.61	8.52	8.65	8.68	8.98	8.73	8.65	8.98	8.98	8.80	8.80	8.77	8.80	8.61
LeFlore	40079	43.57	42.13	41.85	41.37	42.13	42.71	41.80	41.37	41.98	42.13	42.71	42.34	41.98	43.24	43.57	42.71	42.71	42.56	42.71	41.80
Lincoln	40081	38.05	37.01	37.78	38.22	37.51	37.78	38.05	37.41	37.78	38.05	38.92	37.78	37.78	40.61	40.61	39.25	38.92	38.05	38.92	38.22
Logan	40083	11.53	11.30	11.60	11.63	11.60	11.40	11.53	11.30	11.49	11.79	11.85	11.60	11.49	12.24	11.85	11.85	11.85	11.63	11.76	11.53
Love	40085	25.37	23.80	23.93	23.93	23.80	23.80	24.28	23.50	23.34	24.15	24.50	24.50	23.71	25.37	25.37	24.28	24.50	24.15	24.50	23.71
McClain	40087	36.37	34.27	35.41	35.41	35.41	34.64	35.57	34.27	34.74	35.92	36.37	35.92	35.41	37.64	36.37	36.37	36.37	35.57	36.06	35.25
McCurtain	40089	32.65	30.81	30.50	29.93	30.50	30.93	31.32	30.50	30.38	30.50	30.93	31.56	30.66	31.32	31.56	30.93	30.93	30.81	30.93	30.26
McIntosh	40091	30.72	29.56	29.56	29.34	29.91	29.91	29.78	28.94	29.34	29.91	30.72	29.78	29.44	31.79	31.79	30.72	30.46	29.78	30.46	29.91
Major	40093	10.78	10.57	10.84	11.08	10.94	10.70	10.89	10.57	10.70	10.94	11.08	10.89	10.78	11.55	11.55	10.84	11.17	11.08	11.08	10.89
Marshall	40095	11.63	10.98	11.02	11.02	10.98	10.98	11.16	10.86	10.78	11.13	11.13	11.25	10.92	11.63	11.63	11.25	11.25	11.02	11.25	10.92
Mayes	40097	41.17	40.58	40.58	40.13	40.92	40.92	40.61	40.58	40.61	41.37	42.08	40.13	40.58	42.08	42.42	41.17	41.53	41.17	41.99	40.92
Murray	40099	15.51	14.60	14.60	14.33	14.33	14.29	14.86	14.14	14.33	14.81	14.81	14.81	14.53	15.51	15.51	14.98	14.98	14.81	14.86	14.53
Muskogee	40101	60.25	57.25	58.09	58.30	58.30	58.88	58.58	57.25	57.85	58.88	60.25	58.58	57.92	60.25	62.29	59.80	59.80	58.58	59.80	57.85
Noble	40103	24.19	24.09	24.26	24.66	24.19	24.36	24.66	24.09	24.36	24.56	25.14	23.84	23.84	26.24	25.36	24.56	25.02	24.56	25.02	24.36
Nowata	40105	6.96	6.95	6.95	7.01	7.01	7.01	6.96	6.95	6.98	7.01	7.11	6.87	6.95	7.21	7.26	7.05	7.11	7.05	7.19	7.01
Okfuskee	40107	15.85	14.92	15.24	15.13	15.13	15.24	15.36	15.08	15.13	15.42	15.65	15.36	14.92	16.40	16.40	15.72	15.65	15.36	15.65	15.42
Oklahoma	40109	127.52	122.47	125.29	125.51	125.29	124.35	124.47	122.47	123.26	128.03	127.52	124.35	124.35	131.80	127.52	127.52	127.52	125.51	126.78	124.47
Okmulgee	40111	34.77	32.97	33.47	33.60	33.34	33.60	33.78	33.35	33.34	33.94	34.50	33.78	32.97	35.96	35.96	34.50	34.50	33.78	34.53	33.34

CO	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Tues. 8/24	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/*31	Wed. 9/01
Osage	40113	19.50	19.54	19.58	19.84	19.65	19.65	19.84	19.54	19.50	19.74	19.91	19.30	19.30	20.30	20.30	19.74	19.91	19.74	20.14	19.65
Ottawa	40115	34.13	34.08	34.08	33.70	34.38	34.38	34.13	34.08	34.25	34.38	34.92	33.70	34.08	35.38	35.67	34.61	34.92	34.61	34.92	34.38
Pawnee	40117	13.50	13.49	13.55	13.75	13.60	13.60	13.75	13.49	13.50	13.68	13.99	13.33	13.33	14.59	14.10	13.68	13.95	13.68	13.99	13.50
Payne	40119	39.00	39.05	39.16	39.69	39.00	39.30	39.69	39.05	39.31	39.49	40.32	38.60	38.60	42.00	40.62	40.32	40.41	39.49	40.32	39.30
Pittsburg	40121	40.51	39.12	39.53	39.12	39.53	39.68	39.68	38.38	38.82	39.34	40.51	39.34	38.97	41.89	41.89	40.19	40.19	39.53	40.19	39.53
Pontotoc	40123	25.26	23.57	23.89	23.47	23.47	23.89	23.97	23.51	23.66	23.76	24.30	23.76	23.66	25.26	24.44	24.26	24.26	23.97	24.26	23.89
Pottawatomie	40125	53.68	50.83	51.82	51.43	51.43	51.82	52.13	51.40	51.82	52.13	53.31	52.13	51.82	55.51	55.51	53.26	53.26	52.58	53.26	52.38
Pushmataha	40127	11.04	10.66	10.66	10.45	10.66	10.81	10.81	10.45	10.57	10.66	10.81	10.72	10.61	11.04	11.04	10.81	10.81	10.77	10.81	10.57
RogerMills	40129	4.86	4.77	4.85	4.92	4.82	4.77	4.85	4.77	4.78	4.85	4.85	4.78	4.85	4.82	4.92	4.85	4.85	4.76	4.86	4.80
Rogers	40131	42.40	41.92	41.92	42.19	42.19	42.19	41.86	41.92	41.86	42.61	43.29	41.43	41.92	43.29	43.62	42.40	42.76	42.40	43.31	42.19
Seminole	40133	29.51	27.92	28.47	28.26	28.26	28.47	28.90	28.23	28.47	28.65	29.24	28.65	28.36	30.53	30.53	29.28	29.28	28.90	29.28	28.78
Sequoyah	40135	45.77	43.20	43.67	43.20	44.09	44.60	43.77	43.20	43.92	44.09	44.79	44.40	43.92	45.40	45.77	44.79	44.79	44.60	44.79	44.09
Stephens	40137	26.00	24.59	24.67	24.59	24.17	24.21	24.67	23.93	24.17	25.02	25.15	25.02	24.46	24.46	25.15	25.15	25.15	25.02	24.97	24.46
Texas	40139	6.23	6.18	6.30	6.40	6.27	6.18	6.21	6.18	6.21	6.30	6.30	6.21	6.23	6.68	6.40	6.30	6.30	6.40	6.32	6.23
Tillman	40141	7.27	6.86	6.89	6.97	6.86	6.76	6.89	6.80	6.74	6.97	7.03	6.97	6.83	6.83	7.27	6.97	7.03	6.97	7.03	6.86
Tulsa	40143	94.53	92.99	94.09	93.60	93.60	94.43	93.60	94.21	93.60	94.53	96.29	94.43	94.21	96.86	96.86	94.53	96.29	94.53	97.21	93.60
Wagoner	40145	24.54	23.99	24.27	24.43	24.43	24.43	24.23	24.27	24.23	24.66	25.05	24.43	24.27	25.23	25.23	25.05	25.05	24.54	25.06	24.43
Washington	40147	26.05	26.10	26.10	26.25	26.25	26.25	26.05	26.10	26.05	26.50	26.58	25.80	26.10	27.09	27.09	26.36	26.58	26.36	27.00	26.25
Washita	40149	18.98	18.59	18.81	19.16	18.98	18.47	18.89	18.27	18.59	18.89	18.98	18.59	18.89	18.81	19.16	18.89	18.89	18.53	18.98	18.66
Woods	40151	6.66	6.62	6.73	6.83	6.75	6.61	6.64	6.62	6.64	6.73	6.73	6.64	6.66	7.12	7.12	6.70	6.73	6.83	6.75	6.73
Woodward	40153	15.59	15.49	15.74	15.99	15.79	15.49	15.53	15.49	15.53	15.79	15.74	15.53	15.59	15.66	16.02	15.74	15.74	15.46	15.79	15.59

Table 3-19. State summary of gridded 2002 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 2002 Preliminary NEI.

NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	22	21	21	198	186	186	448	362	315	32	29	29	793	747	726
Arkansas	5	92	85	82	200	178	178	271	225	204	1	1	1	151	139	133
Connecticut	9	14	13	13	85	80	80	234	184	156	3	1	1	16	15	15
Delaware	10	8	7	7	39	37	37	69	56	49	1	1	1	50	47	45
District of Columbia	11	3	3	3	10	10	10	27	20	16	1	1	1	4	3	3
Florida	12	70	66	64	456	423	423	1316	1036	874	13	12	10	986	930	889
Georgia	13	68	65	63	278	258	258	905	736	648	6	6	5	798	756	734
Illinois	17	42	39	38	736	627	627	837	665	568	119	118	118	819	771	744
Indiana	18	91	84	81	422	364	364	645	527	467	202	190	181	997	922	884
Iowa	19	65	60	58	398	300	300	276	229	207	0	0	0	333	312	302
Kansas	20	26	25	24	300	239	239	249	204	181	62	59	59	502	446	428
Kentucky	21	193	178	171	268	253	253	421	347	311	108	103	100	652	602	577
Louisiana	22	253	233	223	660	645	645	371	304	270	85	85	84	816	786	773
Maine	23	3	3	3	15	13	13	42	35	32	0	0	0	0	0	0
Maryland	24	13	12	12	155	142	142	412	328	281	1	1	1	308	288	277
Massachusetts	25	35	33	32	277	266	266	397	306	250	6	5	4	131	124	117
Michigan	26	76	72	70	413	372	372	862	691	598	78	80	70	603	567	545
Minnesota	27	37	35	34	445	370	370	449	365	322	137	131	131	289	266	255
Mississippi	28	10	10	10	213	198	198	344	286	259	39	39	39	380	367	360
Missouri	29	82	76	73	436	379	379	575	468	412	29	28	28	549	512	491
Nebraska	31	29	27	26	249	201	201	150	123	111	27	24	24	148	136	130
New Hampshire	33	7	7	7	34	32	32	106	87	78	4	4	4	21	20	19
New Jersey	34	54	51	49	202	187	187	524	410	342	59	59	59	96	89	86
New York	36	90	84	81	573	535	535	1027	814	694	78	76	75	336	316	305
North Carolina	37	34	33	33	273	248	248	792	646	571	25	19	15	617	575	554
North Dakota	38	33	31	29	154	110	110	44	36	33	0	0	0	233	215	206
Ohio	39	102	95	92	620	561	561	909	732	636	190	187	180	1149	1058	1013
Oklahoma	40	74	68	65	311	312	302	393	384	352	52	52	52	477	495	495
Pennsylvania	42	49	48	47	405	378	378	878	712	625	37	33	30	886	829	738
Rhode Island	44	4	4	4	24	23	23	59	46	38	5	5	5	1	1	1
South Carolina	45	48	45	43	137	127	127	434	360	325	20	18	17	375	351	340
South Dakota	46	12	11	10	113	76	76	65	55	51	0	0	0	44	41	39
Tennessee	47	52	49	47	279	262	262	589	479	422	15	15	15	657	617	595
Texas	48	636	621	606	978	955	887	1304	891	682	612	613	613	1589	1588	1588
Vermont	50	6	5	5	12	10	10	72	61	56	0	0	0	1	1	1
Virginia	51	115	107	103	281	264	264	551	442	382	17	15	15	452	426	407
West Virginia	54	28	26	26	159	155	155	159	133	121	18	18	17	901	838	806
Wisconsin	55	49	45	44	234	202	202	500	411	367	85	85	85	323	300	288
Ontario Prov *	99	1497	1402	1367												

Table 3-19. (Cont.) State summary of gridded 2002 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 2002 Preliminary NEI.

VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	**FIPS**	**wkday**	**sat**	**sun**	**wkday**	**sat**	**sun**	**wkday**	**sat**	**sun**	**wkday**	**sat**	**sun**	**wkday**	**sat**	**sun**
Alabama	1	356	356	356	190	173	173	295	237	205	114	81	77	69	61	56
Arkansas	5	246	246	246	123	113	113	151	124	111	915	902	901	24	21	21
Connecticut	9	185	184	184	130	113	113	131	102	85	3	1	1	1	0	0
Delaware	10	33	33	33	50	45	45	38	30	25	13	10	10	6	2	2
District of Columbia	11	22	22	22	5	5	5	18	13	10	0	0	0	0	0	0
Florida	12	759	759	759	793	695	695	920	714	591	76	56	49	44	40	35
Georgia	13	513	513	513	264	225	225	524	420	363	42	36	32	70	54	53
Illinois	17	710	710	710	429	355	355	504	397	334	196	195	185	76	75	73
Indiana	18	543	543	543	233	194	194	414	333	289	228	127	107	13	13	11
Iowa	19	310	310	310	162	135	135	165	135	120	7	7	7	25	25	25

VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
Kansas	20	206	206	206	101	80	80	160	128	112	69	49	48	17	13	13
Kentucky	21	258	258	258	141	128	128	251	204	181	149	120	103	49	48	37
Louisiana	22	250	249	249	229	215	215	219	177	154	162	162	160	69	69	66
Maine	23	52	52	52	24	21	21	24	20	18	3	3	2	2	2	1
Maryland	24	187	187	187	203	171	171	224	176	149	13	8	5	12	10	6
Massachusetts	25	363	363	363	258	226	226	232	178	145	24	11	8	10	7	6
Michigan	26	676	676	676	524	468	468	567	448	380	78	36	28	69	41	33
Minnesota	27	350	350	350	320	291	291	294	235	203	75	43	41	6	6	5
Mississippi	28	261	261	261	129	120	120	177	145	130	142	140	137	45	45	45
Missouri	29	414	414	414	300	266	266	343	275	238	75	47	45	35	20	19
Nebraska	31	168	167	167	70	56	56	95	77	67	22	13	12	3	2	2
New Hampshire	33	80	80	80	71	64	64	56	45	40	8	4	2	0	0	0
New Jersey	34	338	338	338	311	269	269	315	244	201	58	58	58	1	1	1
New York	36	811	811	811	614	543	543	613	481	404	15	15	14	9	9	9
North Carolina	37	553	553	553	338	295	295	476	382	331	144	77	68	84	60	57
North Dakota	38	82	82	82	34	26	26	26	21	19	0	0	0	3	3	3
Ohio	39	676	676	675	506	433	433	620	492	418	138	80	66	10	7	7
Oklahoma	40	331	331	331	98	202	200	450	415	403	74	68	68	36	33	33
Pennsylvania	42	943	943	943	352	299	299	504	403	348	100	65	53	38	32	26
Rhode Island	44	112	112	112	30	26	26	36	27	22	7	7	7	0	0	0
South Carolina	45	363	363	363	142	123	123	250	205	182	79	51	43	21	19	18
South Dakota	46	83	83	83	35	28	28	37	31	28	0	0	0	3	3	3
Tennessee	47	446	446	446	168	147	147	348	278	240	159	99	79	103	98	94
Texas	48	1817	1441	1225	448	824	812	731	609	525	516	495	495	179	174	174
Vermont	50	37	37	37	24	21	21	40	33	30	3	1	1	0	0	0
Virginia	51	492	492	492	186	154	154	395	315	271	121	64	54	104	71	51
West Virginia	54	127	127	127	55	50	50	99	82	74	30	29	27	31	24	20
Wisconsin	55	493	493	493	278	253	253	293	238	208	100	100	100	9	9	9
Ontario Prov	99	1842	1786	1704												

Table 3-19. (Cont.) State summary of gridded 2002 tpd emissions by major source type. OK and TX reflect local data sources while all other states represent the 2002 Preliminary NEI.

CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	251	251	251	1425	1116	1116	3392	2750	2412	209	207	204	363	326	320
Arkansas	5	124	123	123	853	681	681	1891	1559	1397	39	37	36	143	135	133
Connecticut	9	98	98	98	1201	890	890	1619	1265	1055	1	0	0	6	5	5
Delaware	10	28	27	27	336	262	262	432	345	296	1	1	1	35	17	14
District of Columbia	11	12	12	12	58	46	46	188	142	112	0	0	0	0	0	0
Florida	12	518	517	516	6911	5094	5094	10354	8108	6780	141	139	138	270	255	245
Georgia	13	617	616	615	2718	1993	1993	6034	4875	4257	6	6	6	584	581	579
Illinois	17	160	159	159	4324	3155	3155	5380	4264	3628	209	209	208	160	156	153
Indiana	18	214	212	210	2505	1859	1859	4521	3669	3223	786	705	635	655	651	491
Iowa	19	70	70	69	1494	1104	1104	1843	1519	1361	0	0	0	36	34	34
Kansas	20	62	60	59	1147	826	826	1843	1495	1313	182	180	179	80	67	64
Kentucky	21	195	193	191	1073	843	843	2898	2379	2122	259	251	248	47	43	42
Louisiana	22	172	169	167	1512	1251	1251	2652	2155	1896	49	48	48	354	348	343
Maine	23	10	10	10	223	170	170	313	262	240	0	0	0	6	6	6
Maryland	24	78	78	78	1911	1374	1374	2774	2195	1863	1	1	1	348	347	346
Massachusetts	25	266	263	262	2437	1861	1861	2665	2060	1691	4	4	3	26	24	23
Michigan	26	301	299	298	4562	3527	3527	6585	5240	4484	81	71	61	190	145	141
Minnesota	27	138	138	137	2045	1614	1614	3006	2423	2109	50	48	48	22	20	20
Mississippi	28	158	158	158	821	666	666	2045	1694	1529	52	52	52	160	157	156
Missouri	29	211	210	209	2518	1917	1917	4069	3288	2872	67	63	63	278	271	268
Nebraska	31	22	22	22	713	517	517	1058	867	770	18	16	16	27	25	24
New Hampshire	33	69	69	69	534	418	418	705	577	513	2	2	2	2	2	2
New Jersey	34	183	182	182	2878	2109	2109	3605	2800	2314	27	27	27	8	8	8
New York	36	400	398	397	5743	4353	4353	7238	5711	4828	123	122	121	50	48	46
North Carolina	37	469	469	468	3178	2401	2401	5356	4340	3805	24	16	13	191	186	185
North Dakota	38	11	11	10	307	216	216	309	256	231	0	0	0	24	22	21

CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
Ohio	39	329	327	327	4938	3690	3690	6764	5400	4640	740	685	683	54	50	49
Oklahoma	40	85	84	83	1011	1563	1542	2839	2643	2546	41	40	40	151	151	151
Pennsylvania	42	527	526	525	3876	2886	2886	6050	4875	4243	42	38	34	300	289	254
Rhode Island	44	4	4	4	303	226	226	427	328	267	4	4	4	2	2	2
South Carolina	45	253	252	252	1311	993	993	3082	2540	2277	40	39	38	119	117	116
South Dakota	46	12	12	11	280	202	202	439	369	340	0	0	0	0	0	0
Tennessee	47	290	288	288	1609	1227	1227	4072	3289	2872	16	14	14	325	322	318
Texas	48	950	814	680	5712	8259	8129	9818	8597	7530	188	187	187	860	857	857
Vermont	50	29	29	29	184	143	143	493	411	372	0	0	0	2	2	2
Virginia	51	433	427	424	1807	1315	1315	4787	3847	3336	21	42	42	231	205	202
West Virginia	54	119	118	117	435	342	342	1215	1015	925	60	60	59	262	259	257
Wisconsin	55	168	165	164	1921	1543	1543	3358	2749	2442	88	88	88	64	62	61
Ontario Prov	99	8310	7710	7510												

* Canadian emissions estimates all processed as area sources

DATA SOURCES FOR 2007

Point Sources

For all states other than Oklahoma and Texas, the U.S. EPA 2007 national inventories developed to assist future modeling of the Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel, henceforth referred to as 2007 HDD inventory, were downloaded from EPA's FTP site ftp://ftp.epa.gov/EmisInventory/HDD_Rule/2007BaseCase . The files *Egu/egu07ms2h.zip* and *NonEGUPoint/pt07ms2h.zip* represent the national EGU point sources and non-EGU point sources respectively. The compressed files (*.zip*) contain a Dbase/FoxPro formatted file (*.dbf*) which were converted to Ascii text (*.dat*) for processing. The data is processed to (1) extract peak ozone season data for those states within the regional modeling domain other than Texas, (2) reformatted to EPS2x AFS input file format and (3) processed through EPS2x. The 2007 HDD inventories are described in detail in *Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel (HDD) Rulemaking* (ftp://ftp.epa.gov/EmisInventory/HDD_Rule/ProceduresDocument/ProcRptFinal.wpd).

The Oklahoma point source inventory was based on the 2002 point sources and enhanced by ODEQ. Through correspondence with Leon Ashford a spreadsheet was provided which detailed newly permitted sources to add to the inventory and sources that were shut down and removed from the inventory as shown in Table 3-11.

A point source inventory for the state of Texas was used that was recently developed by ENVIRON under contract to East Texas COG for modeling purposes. The details for this inventory can be found in *"Ozone Modeling For the Northeast Texas Early Action Compact"*.

The plume-in-grid criteria is 2 tons NOx on any episode day within the 4-km modeling domain and 25 tons per day NOx on any episode day in the regional emissions grid.

Mobile Sources

Processing of the Oklahoma on-road mobile inventory for 2007 was similar to 1999 and 2002. The link-level activity was estimated from the 1995 and 2025 estimates. The county level HPMS based VMT was estimated from 1995 and 2000 Oklahoma HPMS data. MOBILE6.2 emission factors were used in both applications. For link-based data, the M6LINC system was used to combine the MOBILE6.2 emission factors with the link-level VMT and speeds. For counties or portions of counties not covered under the INCOG or ACOG networks, county-level HPMS VMT data were used. Where appropriate, the VMT from the INCOG or ACOG networks (including intrazonal trips) must first be taken out. Emissions were spatially allocated using road mileage data from the USGS, or in the case of the link-based emissions, directly into grid cells via M6LINC.

The 2007 Texas on-road inventory was processed similarly to the 1999 modeling. TTI prepared 2007 mobile source emissions for all Texas counties under contract to the TCEQ. Emission factors are from the EPA's MOBILE6 model. Refer to the section Data Sources for 1999 Mobile Sources of this document for a detailed description of the data and references.

For all states other than Oklahoma and Texas Mobile6.2 was run to generate emission factors by road type and vehicle class for each county. These data are combined with VMT estimates based on data from EPA's Tier 2 analysis. (EPA, 1999. Data Summaries of Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking - Detailed Report. Office of Air and Radiation. EPA420-R-99-033. September.) The resulting 2007 on-road emission inventory is formatted to the EPS2x AMS input file format and processed through EPS2x.

Area Sources

For all states other than Oklahoma and Texas, EPA's 2007 HDD inventory is the basis for the area emissions inventory. The file ar07ms2h.zip was downloaded from the EPA FTP site ftp://ftp.epa.gov/EmisInventory/HDD_Rule/2007BaseCase/Area_Nonroad . The HDD 2007 area data are (1) processed to extract the typical peak ozone season day data, (2) reformatted to the EPS2x AMS input file format and (3) processed through EPS2x.

The 1999 NEI version 2 is the basis for the Oklahoma 2007 area inventory. The area source data were projected to 2007 estimates with factors by source classification code generated using EGAS 4.0.

The 1999 TCEQ area source emissions were the basis for the Texas 2007 area inventory. The area source data were grown to 2007 estimates with factors by source classification code generated using EGAS 4.0. In the recent work by ENVIRON for East Texas COG it was determined that the EGAS projection for oil and gas production in Texas was too high. Based on the analysis of data from the Railroad Commission we replaced the EGAS4 growth assumption for gas production with the trend based on Railroad Commission production data. The inventory was further adjusted with control factors applied by county based on the documented SIP rules in Coulter-Burke, et al., (2002).

Off-Road Sources

For all states in the modeling domain the NonRoad Model v2.1d released in March of 2002 was used to generate all off-road sources with the exception of aircraft, railroad and commercial marine. The NonRoad Model output, generated in AMS format, was processed through EPS2x.

EPA's 2007 HDD off-road inventory is the source for the aircraft, railroad, and commercial marine categories of off-road sources for all states other than Oklahoma and Texas. The file n7ms1hc.zip was downloaded from the EPA FTP site ftp://ftp.epa.gov/EmisInventory/HDD_Rule/2007BaseCase/Area_Nonroad . The HDD 2007 off-road data are (1) reviewed and processed to extract the appropriate sources, (2) processed to extract the typical peak ozone season day data, (3) reformatted to the EPS2x AMS input file format and (4) processed through EPS2x.

The 2007 non-NonRoad data for Oklahoma was taken from the 1999 inventory and projected to 2007 estimates using factors generated with EGAS4.0. The 2007 non-NonRoad categories for Texas were taken from the TCEQ 1990-2010 Emission Inventory Trends and Projections.

Biogenic Sources

Biogenic emissions were developed for the 1999 base case modeling and are identical for the 2007 modeling inventory.

EMISSIONS SUMMARIES FOR 2007

All emission estimates in the following tables reflect gridded, model ready emissions in tons per day (tpd). This means that for partial counties and/or states at the edge of a modeling domain, only the portion of emissions that is within the modeling domain is reported.

Tables 3-20 to 3-22 are Oklahoma county emission summaries by major source type for those counties within the Oklahoma City and Tulsa metropolitan areas. For those data that have day-specific emissions August 21 – August 23 are used to represent a typical Saturday, Sunday and Weekday respectively.

Table 3-23 is the Oklahoma City and Tulsa transportation network link based on-road mobile tpd emissions.

Table 3-24 to 3-26 summarize the day specific Oklahoma on-road mobile HPMS based emissions by county.

Table 3-27 summarizes the gridded emissions by major source type for all states in the modeling domain.

Table 3-20. Oklahoma City and Tulsa 2007 NOx tpd emissions by major source type.

	NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.66	0.61	0.58	5.64	5.45	5.19	4.08	4.20	4.16	2.80	2.80	2.80	13.91	14.15	14.15
	Cleveland	40027	2.51	2.32	2.22	3.23	3.21	2.93	2.88	2.97	2.98	0.14	0.07	0.07	4.40	4.38	4.38
	Logan	40083	0.13	0.12	0.12	3.40	3.38	3.31	1.07	1.11	1.12	0.83	0.83	0.83	4.79	4.79	4.79
	McClain	40087	0.08	0.08	0.07	1.79	1.75	1.60	3.23	3.33	3.39	0.40	0.40	0.40	0.99	0.99	0.99
	Oklahoma	40109	17.82	16.40	15.69	19.00	17.79	16.01	76.22	70.05	56.36	1.91	1.81	1.81	14.08	13.84	13.84
	Pottawatomie	40125	1.17	1.08	1.04	2.89	2.86	2.77	4.99	4.97	4.89	0.02	0.02	0.02	0.39	0.39	0.39
	Subtotal		**22.37**	**20.61**	**19.73**	**35.94**	**34.44**	**31.82**	**92.47**	**86.62**	**72.91**	**6.10**	**5.93**	**5.93**	**38.56**	**38.54**	**38.54**
Tulsa MSA	Creek	40037	1.01	0.94	0.90	3.48	3.47	3.30	3.33	3.39	3.38	1.08	1.08	1.08	3.43	3.43	3.43
	Osage	40113	0.16	0.15	0.15	3.86	4.27	4.14	1.84	1.86	1.84	1.52	1.52	1.52	0.07	0.07	0.07
	Rogers	40131	0.64	0.60	0.58	5.60	5.79	5.61	3.91	3.99	3.97	0.16	0.12	0.12	65.21	65.21	65.21
	Tulsa	40143	22.49	20.70	19.80	19.28	18.13	16.37	50.23	46.00	36.66	0.55	0.53	0.53	29.24	28.89	28.89
	Wagoner	40145	1.51	1.39	1.34	3.71	3.94	3.88	2.26	2.30	2.30	0.02	0.02	0.02	4.37	4.37	4.37
	Subtotal		**25.81**	**23.79**	**22.77**	**35.93**	**35.60**	**33.30**	**61.57**	**57.54**	**48.14**	**3.33**	**3.26**	**3.26**	**102.31**	**101.95**	**101.95**

Table 3-21. Oklahoma City and Tulsa 2007 VOC tpd emissions by major source type.

	VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	7.62	7.62	7.62	0.89	1.21	1.17	4.57	4.43	4.55	0.82	0.70	0.70	0.50	0.49	0.49
	Cleveland	40027	9.73	9.72	9.72	3.82	5.86	5.82	4.32	4.18	4.45	0.35	0.25	0.25	0.45	0.45	0.45
	Logan	40083	3.22	3.22	3.22	0.61	1.09	1.08	1.43	1.40	1.47	0.51	0.51	0.51	0.33	0.33	0.33
	McClain	40087	3.83	3.83	3.83	0.38	1.00	0.98	3.21	3.12	3.29	0.47	0.47	0.47	1.68	1.68	1.68
	Oklahoma	40109	41.60	41.57	41.56	11.24	14.41	14.15	118.43	104.67	92.01	4.56	2.73	2.73	11.64	9.29	9.29
	Pottawatomie	40125	5.44	5.44	5.44	0.64	0.98	0.96	5.44	5.21	5.21	0.31	0.30	0.30	0.49	0.49	0.49
	Subtotal		**71.43**	**71.40**	**71.39**	**17.58**	**24.54**	**24.15**	**137.41**	**123.01**	**110.98**	**7.02**	**4.97**	**4.97**	**15.08**	**12.71**	**12.71**
Tulsa MSA	Creek	40037	7.37	7.37	7.37	0.67	1.54	1.51	3.79	3.66	3.77	0.78	0.74	0.74	0.20	0.20	0.20
	Osage	40113	2.76	2.76	2.76	2.13	6.18	6.16	2.25	2.18	2.21	1.38	1.38	1.38	0.01	0.01	0.01
	Rogers	40131	4.92	4.92	4.92	1.34	3.77	3.75	4.66	4.51	4.64	0.24	0.17	0.17	0.67	0.67	0.67
	Tulsa	40143	34.43	34.40	34.39	10.49	13.47	13.21	39.26	34.29	30.46	6.26	5.64	5.64	1.88	1.68	1.68
	Wagoner	40145	3.73	3.72	3.72	0.82	2.51	2.50	2.79	2.69	2.77	0.03	0.01	0.01	0.46	0.46	0.46
	Subtotal		**53.21**	**53.18**	**53.16**	**15.45**	**27.47**	**27.13**	**52.74**	**47.33**	**43.84**	**8.70**	**7.95**	**7.95**	**3.22**	**3.01**	**3.01**

Table 3-22. Oklahoma City and Tulsa 2007 CO tpd emissions by major source type.

	CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.38	0.37	0.37	16.41	21.37	20.91	29.53	28.88	29.15	2.50	2.50	2.50	2.25	2.31	2.31
	Cleveland	40027	4.97	4.94	4.92	88.40	103.39	102.84	21.01	20.63	20.98	0.05	0.05	0.05	3.55	3.49	3.49
	Logan	40083	0.60	0.60	0.60	6.56	9.87	9.75	7.85	7.76	7.82	0.83	0.83	0.83	5.01	5.01	5.01
	McClain	40087	0.66	0.66	0.66	4.44	7.44	7.19	23.35	22.82	23.15	0.33	0.33	0.33	0.73	0.73	0.73
	Oklahoma	40109	16.30	16.09	15.98	234.29	335.05	331.34	448.67	399.97	349.63	2.17	2.15	2.15	6.30	6.27	6.27
	Pottawatomie	40125	1.95	1.94	1.93	11.13	14.73	14.51	34.72	34.40	34.33	1.18	0.94	0.94	2.62	1.34	1.34
	Subtotal		**24.86**	**24.59**	**24.46**	**361.23**	**491.87**	**486.54**	**565.14**	**514.46**	**465.05**	**7.05**	**6.79**	**6.79**	**20.45**	**19.14**	**19.14**
Tulsa MSA	Creek	40037	1.99	1.98	1.97	9.76	16.18	15.83	23.89	23.50	23.72	0.81	0.81	0.81	0.47	0.46	0.46
	Osage	40113	1.13	1.13	1.13	12.64	27.70	27.47	13.20	13.10	13.15	1.11	1.11	1.11	0.02	0.02	0.02
	Rogers	40131	4.14	4.13	4.13	13.42	26.36	25.97	28.41	27.98	28.22	0.07	0.05	0.05	6.57	6.57	6.57
	Tulsa	40143	19.22	18.95	18.82	240.13	337.90	334.25	350.11	305.26	256.01	0.58	0.52	0.52	10.50	10.30	10.30
	Wagoner	40145	3.27	3.25	3.24	9.59	18.44	18.31	16.52	16.27	16.41	0.15	0.15	0.15	3.12	3.12	3.12
	Subtotal		**29.74**	**29.44**	**29.29**	**285.53**	**426.58**	**421.83**	**432.14**	**386.11**	**337.51**	**2.73**	**2.63**	**2.63**	**20.67**	**20.47**	**20.47**

Table 3-23. Oklahoma gridded 2007 episode day on-road mobile link based tpd emissions.

	Oklahoma City Area	Tulsa Area			Oklahoma City Area	Tulsa Area			Oklahoma City Area	Tulsa Area
Data	40109	40143		Data	40109	40143		Data	40109	40143
Fri., 8/13	72.86	46.97		Fri., 8/13	106.26	26.73		Fri., 8/13	392.48	312.13
Sat., 8/14	57.56	36.55		Sat., 8/14	85.92	20.04		Sat., 8/14	314.35	240.46
Sun., 8/15	44.00	27.39		Sun., 8/15	70.40	15.53		Sun., 8/15	260.06	188.77
Mon., 8/16	67.39	43.00		Mon., 8/16	100.23	24.47		Mon., 8/16	361.95	283.87
Tues., 8/17	72.37	46.30		Tues., 8/17	106.04	26.16		Tues., 8/17	377.53	297.25
Wed., 8/18	72.55	46.30		Wed., 8/18	110.25	27.09		Wed., 8/18	383.85	303.45
Thurs., 8/19	70.65	45.35		Thurs., 8/19	102.27	25.35		Thurs., 8/19	373.01	293.70
Fri., 8/-20	74.88	48.66		Fri., 8/-20	103.31	26.03		Fri., 8/-20	390.06	309.51
Sat., 8/21	57.63	36.56		Sat., 8/21	85.94	20.04		Sat., 8/21	313.80	239.72
Sun., 8/22	44.05	27.32		Sun., 8/22	72.00	15.80		Sun., 8/22	261.77	190.22
Mon., 8/23	64.13	40.95		Mon., 8/23	98.98	24.23		Mon., 8/23	360.92	283.62
Tues., 8/24	70.34	45.22		Tues., 8/24	100.87	24.96		Tues., 8/24	369.00	290.76
Wed., 8/25	70.58	45.48		Wed., 8/25	100.71	24.92		Wed., 8/25	374.64	296.22
Thurs., 8/26	70.29	44.70		Thurs., 8/26	108.43	26.87		Thurs., 8/26	389.62	308.96
Fri., 8/27	72.28	46.24		Fri., 8/27	111.13	27.93		Fri., 8/27	406.86	325.05
Sat., 8/28	53.76	34.02		Sat., 8/28	85.24	19.94		Sat., 8/28	316.52	242.94
Sun., 8/29	43.51	27.03		Sun., 8/29	70.69	15.57		Sun., 8/29	260.21	188.75
Mon., 8/30	65.47	41.95		Mon., 8/30	96.49	23.65		Mon., 8/30	355.63	278.11
Tues.,8/31	71.25	45.56		Tues.,8/31	104.24	25.73		Tues.,8/31	375.94	295.97
Mon. 9/01	70.10	45.01		Mon. 9/01	101.96	25.27		Mon. 9/01	373.82	294.86

Table 3-24. Oklahoma gridded 2007 episode day on-road mobile NOx tpd emissions.

NOX	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	1.18	1.21	1.21	1.20	1.20	1.20	1.19	1.21	1.19	1.20	1.18	1.20	1.21	1.17	1.16	1.18	1.18	1.19	1.18	1.20
Alfalfa	40003	0.69	0.70	0.69	0.68	0.68	0.69	0.69	0.70	0.69	0.68	0.68	0.69	0.69	0.67	0.67	0.68	0.67	0.68	0.68	0.69
Atoka	40005	1.77	1.80	1.80	1.82	1.80	1.79	1.79	1.82	1.81	1.79	1.75	1.85	1.81	1.77	1.77	1.77	1.79	1.79	1.77	1.80
Beaver	40007	0.92	0.93	0.91	0.90	0.91	0.93	0.92	0.93	0.92	0.91	0.91	0.92	0.92	0.90	0.94	0.91	0.91	0.90	0.91	0.92
Beckham	40009	2.67	2.69	2.66	2.72	2.66	2.72	2.68	2.71	2.69	2.68	2.67	2.69	2.68	2.66	2.72	2.68	2.68	2.69	2.67	2.70
Blaine	40011	0.99	1.01	0.99	0.98	0.99	1.01	0.99	1.01	1.00	0.99	0.97	0.99	1.00	0.98	0.98	0.98	0.97	0.98	0.98	0.99
Bryan	40013	3.03	3.08	3.08	3.09	3.08	3.07	3.03	3.11	3.09	3.14	3.00	3.00	3.06	3.03	3.00	3.03	3.03	3.07	3.03	3.06
Caddo	40015	3.28	3.39	3.35	3.44	3.36	3.42	3.35	3.41	3.39	3.44	3.28	3.37	3.37	3.32	3.32	3.32	3.28	3.32	3.32	3.37
Canadian	40017	4.08	4.23	4.18	4.16	4.18	4.24	4.18	4.23	4.20	4.16	4.08	4.18	4.18	4.12	4.08	4.12	4.08	4.22	4.12	4.15
Carter	40019	4.06	4.12	4.10	4.12	4.14	4.12	4.06	4.17	4.14	4.17	4.17	4.01	4.09	4.09	4.01	4.01	4.01	4.17	4.06	4.09
Cherokee	40021	2.57	2.63	2.63	2.62	2.61	2.61	2.60	2.63	2.60	2.61	2.58	2.61	2.63	2.55	2.52	2.58	2.58	2.59	2.58	2.61
Choctaw	40023	1.18	1.20	1.20	1.21	1.21	1.19	1.18	1.21	1.20	1.21	1.17	1.17	1.19	1.18	1.17	1.19	1.18	1.19	1.18	1.19
Cleveland	40027	2.88	2.98	2.96	2.96	2.96	2.99	2.94	2.98	2.97	2.98	2.88	2.98	2.96	2.91	2.88	2.88	2.88	2.94	2.91	2.93
Coal	40029	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.48	0.47	0.46	0.46	0.46	0.46	0.47	0.46	0.47
Comanche	40031	6.48	6.58	6.55	6.55	6.58	6.67	6.55	6.64	6.60	6.60	6.41	6.60	6.53	6.48	6.48	6.49	6.41	6.49	6.41	6.58
Cotton	40033	0.92	0.93	0.93	0.93	0.93	0.95	0.92	0.94	0.94	0.96	0.91	0.91	0.93	0.93	0.92	0.92	0.91	0.92	0.91	0.93
Craig	40035	2.00	2.03	2.03	2.02	2.02	2.02	2.00	2.03	2.01	2.02	1.99	2.02	2.03	1.97	1.94	1.98	1.99	1.98	2.03	2.02
Creek	40037	3.35	3.42	3.39	3.39	3.39	3.41	3.35	3.43	3.39	3.38	3.33	3.41	3.42	3.29	3.32	3.33	3.45	3.35	3.45	3.39
Custer	40039	3.00	3.03	3.02	3.05	3.00	3.06	3.02	3.06	3.03	3.02	3.02	3.03	3.04	2.99	2.97	3.02	3.02	3.03	3.00	3.04
Delaware	40041	2.55	2.58	2.58	2.57	2.57	2.57	2.55	2.58	2.55	2.57	2.53	2.57	2.58	2.50	2.47	2.52	2.53	2.54	2.53	2.57
Dewey	40043	0.61	0.63	0.62	0.61	0.61	0.63	0.62	0.63	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.62	0.62	0.62	0.61	0.62
Ellis	40045	0.44	0.45	0.44	0.43	0.44	0.45	0.44	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.44	0.44	0.44	0.44	0.44
Garfield	40047	3.68	3.71	3.68	3.65	3.66	3.68	3.66	3.71	3.70	3.65	3.61	3.68	3.70	3.61	3.57	3.61	3.68	3.68	3.61	3.70
Garvin	40049	3.53	3.61	3.59	3.59	3.61	3.65	3.58	3.64	3.61	3.67	3.67	3.67	3.57	3.57	3.50	3.50	3.50	3.67	3.54	3.57
Grady	40051	2.78	2.87	2.84	2.85	2.86	2.90	2.84	2.89	2.87	2.91	2.78	2.86	2.86	2.81	2.78	2.78	2.78	2.91	2.82	2.84
Grant	40053	0.58	0.58	0.58	0.56	0.57	0.58	0.58	0.58	0.58	0.57	0.56	0.58	0.58	0.56	0.56	0.57	0.59	0.59	0.59	0.57
Greer	40055	0.36	0.36	0.36	0.37	0.36	0.37	0.36	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.36	0.35	0.36	0.36	0.36
Harmon	40057	0.20	0.20	0.20	0.21	0.20	0.21	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.20	0.20	0.20	0.20	0.20
Harper	40059	0.50	0.51	0.50	0.49	0.49	0.51	0.50	0.51	0.50	0.50	0.50	0.50	0.50	0.49	0.51	0.50	0.50	0.49	0.50	0.50
Haskell	40061	0.82	0.85	0.85	0.85	0.84	0.84	0.83	0.85	0.84	0.84	0.82	0.83	0.84	0.82	0.82	0.83	0.83	0.84	0.83	0.84
Hughes	40063	0.93	0.96	0.96	0.96	0.96	0.95	0.95	0.97	0.96	0.95	0.98	0.95	0.96	0.94	0.94	0.94	0.98	0.95	0.94	0.95
Jackson	40065	1.49	1.50	1.49	1.51	1.49	1.52	1.49	1.51	1.50	1.51	1.49	1.50	1.50	1.48	1.51	1.47	1.46	1.50	1.47	1.50
Jefferson	40067	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53	0.54	0.51	0.51	0.52	0.51	0.51	0.52	0.51	0.54	0.51	0.52
Johnston	40069	0.95	0.97	0.97	0.97	0.97	0.97	0.95	0.98	0.97	0.99	0.99	0.99	0.96	0.95	0.94	0.95	0.95	0.96	0.95	0.97
Kay	40071	3.72	3.74	3.70	3.69	3.70	3.72	3.70	3.74	3.70	3.66	3.67	3.73	3.73	3.59	3.59	3.66	3.73	3.66	3.73	3.72
Kingfisher	40073	1.16	1.18	1.17	1.16	1.17	1.17	1.16	1.18	1.17	1.16	1.13	1.17	1.18	1.14	1.13	1.15	1.13	1.20	1.15	1.16
Kiowa	40075	0.93	0.94	0.93	0.96	0.93	0.95	0.93	0.95	0.94	0.96	0.93	0.93	0.93	0.93	0.92	0.93	0.91	0.94	0.92	0.93
Latimer	40077	0.78	0.81	0.81	0.81	0.81	0.80	0.81	0.81	0.81	0.81	0.78	0.80	0.81	0.78	0.78	0.80	0.80	0.80	0.80	0.81
LeFlore	40079	3.82	3.97	3.99	3.97	3.97	3.91	3.95	3.97	3.95	3.97	3.91	3.90	3.95	3.87	3.82	3.91	3.91	3.93	3.91	3.95

NOX	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Lincoln	40081	3.55	3.61	3.61	3.57	3.59	3.61	3.55	3.63	3.61	3.55	3.52	3.61	3.61	3.51	3.51	3.48	3.52	3.55	3.52	3.57
Logan	40083	1.09	1.11	1.10	1.09	1.10	1.10	1.09	1.11	1.11	1.12	1.07	1.10	1.11	1.08	1.07	1.07	1.07	1.09	1.08	1.09
Love	40085	2.20	2.24	2.23	2.23	2.24	2.24	2.21	2.26	2.25	2.29	2.19	2.19	2.23	2.20	2.20	2.21	2.19	2.29	2.19	2.23
McClain	40087	3.23	3.35	3.32	3.32	3.32	3.37	3.30	3.35	3.33	3.39	3.23	3.39	3.32	3.26	3.23	3.23	3.23	3.30	3.27	3.29
McCurtain	40089	2.78	2.83	2.86	2.86	2.86	2.82	2.79	2.86	2.84	2.86	2.82	2.75	2.81	2.79	2.75	2.82	2.82	2.83	2.82	2.84
McIntosh	40091	2.68	2.78	2.78	2.77	2.76	2.76	2.74	2.79	2.77	2.76	2.68	2.74	2.77	2.71	2.71	2.68	2.71	2.74	2.71	2.76
Major	40093	1.00	1.00	0.98	0.98	0.99	1.00	0.99	1.00	1.00	0.99	0.98	0.99	1.00	0.97	0.97	0.98	0.96	0.98	0.98	0.99
Marshall	40095	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.01	1.01	1.03	1.03	0.98	1.00	0.99	0.99	0.98	0.98	1.00	0.98	1.00
Mayes	40097	3.77	3.86	3.86	3.85	3.84	3.84	3.82	3.86	3.82	3.80	3.74	3.85	3.86	3.74	3.70	3.77	3.78	3.77	3.89	3.84
Murray	40099	1.34	1.36	1.36	1.37	1.37	1.38	1.34	1.38	1.37	1.40	1.40	1.40	1.35	1.34	1.34	1.33	1.33	1.40	1.34	1.35
Muskogee	40101	5.36	5.56	5.53	5.56	5.56	5.51	5.47	5.56	5.53	5.51	5.36	5.47	5.59	5.36	5.42	5.42	5.42	5.47	5.42	5.53
Noble	40103	2.30	2.33	2.30	2.29	2.30	2.31	2.29	2.33	2.31	2.27	2.26	2.32	2.32	2.25	2.23	2.27	2.34	2.27	2.34	2.31
Nowata	40105	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64	0.65	0.65	0.63	0.63	0.64	0.64	0.64	0.66	0.65
Okfuskee	40107	1.41	1.46	1.46	1.45	1.45	1.46	1.44	1.47	1.45	1.45	1.48	1.44	1.46	1.42	1.42	1.43	1.48	1.44	1.48	1.45
Oklahoma	40109	12.09	12.49	12.39	12.35	12.39	12.49	12.30	12.49	12.43	12.32	12.09	12.49	12.49	12.23	12.09	12.09	12.09	12.35	12.22	12.30
Okmulgee	40111	3.07	3.19	3.17	3.19	3.17	3.19	3.13	3.20	3.17	3.16	3.11	3.13	3.19	3.11	3.11	3.11	3.11	3.13	3.20	3.17
Osage	40113	1.86	1.88	1.86	1.85	1.87	1.87	1.85	1.88	1.86	1.84	1.84	1.87	1.87	1.80	1.80	1.84	1.84	1.84	1.89	1.87
Ottawa	40115	3.27	3.31	3.31	3.29	3.29	3.29	3.27	3.31	3.27	3.29	3.24	3.29	3.31	3.21	3.17	3.23	3.24	3.23	3.24	3.29
Pawnee	40117	1.25	1.26	1.25	1.24	1.26	1.26	1.24	1.26	1.25	1.23	1.22	1.26	1.26	1.22	1.21	1.23	1.28	1.23	1.22	1.25
Payne	40119	3.75	3.79	3.75	3.74	3.75	3.77	3.74	3.79	3.77	3.71	3.68	3.78	3.78	3.68	3.64	3.68	3.77	3.71	3.68	3.77
Pittsburg	40121	3.52	3.65	3.61	3.65	3.61	3.60	3.60	3.65	3.63	3.59	3.52	3.59	3.63	3.55	3.55	3.56	3.56	3.61	3.56	3.61
Pontotoc	40123	2.19	2.23	2.22	2.23	2.23	2.22	2.21	2.25	2.24	2.20	2.25	2.20	2.24	2.19	2.16	2.19	2.19	2.21	2.19	2.22
Pottawatomie	40125	4.80	4.98	4.97	4.94	4.94	4.97	4.89	5.00	4.97	4.89	4.99	4.89	4.97	4.85	4.85	4.85	4.85	4.90	4.85	4.93
Pushmataha	40127	0.95	0.99	0.99	0.99	0.99	0.97	0.97	0.99	0.98	0.99	0.97	0.97	0.98	0.95	0.95	0.97	0.97	0.98	0.97	0.98
RogerMills	40129	0.45	0.45	0.45	0.44	0.44	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.46	0.45	0.45	0.45	0.45	0.45
Rogers	40131	3.94	4.03	4.03	4.01	4.01	4.01	3.99	4.03	3.99	3.97	3.91	4.02	4.03	3.91	3.87	3.94	3.96	3.94	4.05	4.01
Seminole	40133	2.62	2.72	2.72	2.70	2.70	2.72	2.68	2.73	2.72	2.67	2.75	2.67	2.70	2.65	2.65	2.65	2.65	2.68	2.65	2.69
Sequoyah	40135	4.07	4.22	4.24	4.22	4.22	4.17	4.19	4.22	4.19	4.22	4.16	4.15	4.19	4.11	4.07	4.16	4.16	4.17	4.16	4.22
Stephens	40137	2.26	2.30	2.29	2.30	2.31	2.33	2.29	2.32	2.31	2.33	2.24	2.33	2.28	2.28	2.24	2.24	2.24	2.33	2.26	2.28
Texas	40139	0.58	0.58	0.57	0.56	0.57	0.58	0.58	0.58	0.58	0.57	0.57	0.58	0.58	0.56	0.59	0.57	0.57	0.56	0.57	0.58
Tillman	40141	0.63	0.64	0.63	0.65	0.64	0.65	0.63	0.64	0.64	0.65	0.62	0.65	0.63	0.63	0.63	0.63	0.62	0.63	0.62	0.64
Tulsa	40143	9.34	9.48	9.44	9.44	9.44	9.49	9.44	9.52	9.44	9.34	9.29	9.49	9.52	9.18	9.18	9.34	9.29	9.34	9.37	9.44
Wagoner	40145	2.28	2.32	2.33	2.32	2.32	2.32	2.30	2.33	2.30	2.30	2.26	2.32	2.33	2.23	2.23	2.26	2.26	2.28	2.34	2.32
Washington	40147	2.49	2.52	2.52	2.51	2.51	2.51	2.49	2.52	2.49	2.48	2.47	2.51	2.52	2.42	2.42	2.47	2.47	2.47	2.50	2.51
Washita	40149	1.75	1.77	1.75	1.80	1.75	1.79	1.76	1.78	1.77	1.76	1.75	1.77	1.76	1.75	1.80	1.76	1.76	1.77	1.75	1.78
Woods	40151	0.63	0.63	0.63	0.62	0.62	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	0.62	0.63	0.62	0.62	0.63
Woodward	40153	1.47	1.48	1.46	1.44	1.45	1.48	1.47	1.48	1.47	1.45	1.46	1.47	1.47	1.45	1.48	1.46	1.46	1.47	1.45	1.47

Table 3-25. Oklahoma gridded 2007 episode day on-road mobile VOC tpd emissions.

VOC	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	1.27	1.24	1.24	1.22	1.27	1.27	1.25	1.24	1.25	1.27	1.29	1.22	1.24	1.29	1.29	1.29	1.29	1.28	1.29	1.27
Alfalfa	40003	0.77	0.74	0.78	0.78	0.78	0.76	0.76	0.75	0.76	0.78	0.78	0.76	0.77	0.82	0.82	0.77	0.78	0.78	0.78	0.78
Atoka	40005	1.98	1.89	1.89	1.86	1.89	1.89	1.89	1.80	1.84	1.86	1.89	1.94	1.84	1.98	1.98	1.89	1.89	1.89	1.89	1.89
Beaver	40007	0.98	0.95	0.99	0.99	0.98	0.95	0.96	0.95	0.96	0.99	0.99	0.96	0.98	1.04	1.02	0.99	0.99	0.99	0.99	0.98
Beckham	40009	2.44	2.38	2.41	2.50	2.41	2.35	2.44	2.32	2.38	2.44	2.44	2.38	2.44	2.41	2.50	2.44	2.44	2.38	2.44	2.41
Blaine	40011	1.10	1.06	1.10	1.12	1.11	1.07	1.11	1.06	1.08	1.11	1.12	1.11	1.10	1.17	1.17	1.12	1.12	1.12	1.12	1.11
Bryan	40013	3.65	3.45	3.45	3.36	3.45	3.46	3.46	3.40	3.36	3.55	3.47	3.47	3.41	3.65	3.47	3.46	3.46	3.46	3.46	3.41
Caddo	40015	3.43	3.33	3.37	3.51	3.42	3.29	3.37	3.25	3.33	3.51	3.43	3.41	3.41	3.61	3.61	3.43	3.43	3.43	3.43	3.41
Canadian	40017	4.52	4.26	4.49	4.50	4.49	4.31	4.49	4.26	4.37	4.50	4.52	4.49	4.49	4.77	4.52	4.51	4.52	4.63	4.51	4.44
Carter	40019	4.77	4.49	4.50	4.49	4.38	4.49	4.51	4.27	4.38	4.63	4.63	4.52	4.44	4.44	4.52	4.52	4.52	4.63	4.51	4.44
Cherokee	40021	3.06	2.97	2.97	2.94	3.05	3.05	3.02	2.97	3.01	3.05	3.10	3.05	2.97	3.11	3.12	3.10	3.10	3.10	3.10	3.05
Choctaw	40023	1.43	1.35	1.35	1.34	1.34	1.36	1.36	1.34	1.32	1.34	1.36	1.36	1.34	1.43	1.36	1.36	1.36	1.36	1.36	1.34
Cleveland	40027	4.15	3.87	4.10	4.10	4.10	3.91	4.12	3.87	3.99	4.26	4.15	4.26	4.10	4.42	4.15	4.15	4.15	4.12	4.14	4.06
Coal	40029	0.54	0.50	0.51	0.50	0.51	0.51	0.51	0.49	0.50	0.50	0.51	0.52	0.50	0.54	0.54	0.51	0.51	0.51	0.51	0.51
Comanche	40031	8.46	7.93	7.95	7.95	7.93	7.60	7.95	7.82	7.72	8.20	8.00	8.20	7.84	8.46	8.46	7.98	8.00	7.98	8.00	7.93
Cotton	40033	0.96	0.91	0.91	0.91	0.91	0.88	0.91	0.90	0.89	0.94	0.91	0.91	0.90	0.90	0.96	0.91	0.91	0.91	0.91	0.91
Craig	40035	1.92	1.90	1.90	1.88	1.94	1.94	1.92	1.90	1.92	1.94	1.97	1.88	1.90	1.98	1.98	1.95	1.97	1.95	2.03	1.94
Creek	40037	3.67	3.53	3.62	3.62	3.62	3.67	3.67	3.57	3.62	3.72	3.74	3.67	3.53	3.74	3.95	3.74	3.84	3.67	3.84	3.62
Custer	40039	2.96	2.88	2.95	3.04	2.96	2.85	2.95	2.85	2.88	2.95	2.95	2.88	2.92	2.92	3.12	2.95	2.95	2.88	2.96	2.92
Delaware	40041	2.81	2.78	2.78	2.74	2.84	2.84	2.81	2.78	2.81	2.84	2.89	2.74	2.78	2.89	2.90	2.85	2.89	2.88	2.89	2.84
Dewey	40043	0.67	0.65	0.67	0.67	0.67	0.65	0.67	0.65	0.65	0.67	0.67	0.65	0.66	0.66	0.71	0.67	0.67	0.65	0.67	0.66
Ellis	40045	0.48	0.47	0.49	0.49	0.48	0.47	0.48	0.47	0.48	0.49	0.49	0.48	0.48	0.48	0.50	0.49	0.49	0.48	0.49	0.48
Garfield	40047	4.41	4.34	4.41	4.54	4.53	4.41	4.53	4.34	4.47	4.54	4.56	4.41	4.29	4.83	4.57	4.56	4.69	4.69	4.56	4.47
Garvin	40049	3.67	3.40	3.48	3.48	3.39	3.36	3.48	3.32	3.39	3.58	3.58	3.58	3.44	3.44	3.50	3.50	3.50	3.58	3.49	3.44
Grady	40051	3.15	3.05	3.09	3.14	3.13	3.01	3.09	2.97	3.05	3.23	3.15	3.13	3.13	3.32	3.15	3.15	3.15	3.23	3.15	3.09
Grant	40053	0.63	0.62	0.62	0.64	0.64	0.62	0.62	0.62	0.62	0.64	0.64	0.61	0.61	0.67	0.64	0.63	0.66	0.66	0.66	0.64
Greer	40055	0.43	0.42	0.42	0.44	0.42	0.41	0.42	0.41	0.42	0.43	0.43	0.42	0.43	0.42	0.44	0.43	0.43	0.42	0.43	0.43
Harmon	40057	0.24	0.23	0.23	0.24	0.24	0.23	0.23	0.22	0.23	0.24	0.24	0.24	0.24	0.23	0.24	0.24	0.24	0.23	0.24	0.24
Harper	40059	0.54	0.53	0.55	0.55	0.54	0.53	0.53	0.53	0.53	0.55	0.55	0.53	0.54	0.58	0.56	0.55	0.55	0.55	0.55	0.54
Haskell	40061	0.97	0.95	0.95	0.95	0.97	0.97	0.96	0.92	0.94	0.97	0.97	0.96	0.94	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hughes	40063	1.12	1.09	1.10	1.10	1.09	1.11	1.10	1.06	1.09	1.11	1.15	1.10	1.09	1.18	1.18	1.12	1.15	1.10	1.12	1.11
Jackson	40065	1.86	1.85	1.86	1.92	1.86	1.78	1.86	1.83	1.80	1.92	1.86	1.85	1.85	1.83	1.92	1.87	1.87	1.80	1.87	1.85
Jefferson	40067	0.63	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.61	0.59	0.59	0.58	0.63	0.63	0.59	0.59	0.61	0.59	0.58
Johnston	40069	1.19	1.12	1.12	1.09	1.12	1.12	1.13	1.07	1.09	1.16	1.16	1.16	1.11	1.19	1.13	1.13	1.13	1.12	1.13	1.12
Kay	40071	4.00	3.89	3.95	4.05	3.95	4.00	3.95	3.89	3.95	4.00	4.06	3.85	3.85	4.08	4.08	4.00	4.18	4.00	4.18	4.00
Kingfisher	40073	1.28	1.24	1.30	1.30	1.30	1.27	1.28	1.24	1.27	1.30	1.31	1.30	1.28	1.37	1.31	1.30	1.31	1.34	1.30	1.28
Kiowa	40075	1.06	1.03	1.06	1.09	1.06	1.02	1.05	1.01	1.03	1.09	1.06	1.06	1.06	1.05	1.12	1.06	1.07	1.03	1.06	1.06
Latimer	40077	0.93	0.91	0.91	0.88	0.91	0.92	0.90	0.88	0.90	0.91	0.93	0.91	0.90	0.93	0.93	0.92	0.92	0.92	0.92	0.90
LeFlore	40079	4.58	4.49	4.38	4.32	4.49	4.56	4.44	4.32	4.44	4.49	4.56	4.50	4.44	4.57	4.58	4.56	4.56	4.55	4.56	4.44

VOC	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Lincoln	40081	3.47	3.35	3.47	3.52	3.43	3.47	3.47	3.39	3.47	3.47	3.53	3.47	3.47	3.71	3.71	3.53	3.53	3.47	3.53	3.52
Logan	40083	1.36	1.31	1.38	1.38	1.38	1.34	1.36	1.31	1.36	1.43	1.39	1.38	1.36	1.47	1.39	1.39	1.39	1.38	1.39	1.36
Love	40085	1.95	1.86	1.86	1.86	1.86	1.86	1.87	1.84	1.82	1.91	1.87	1.87	1.84	1.95	1.95	1.87	1.87	1.91	1.87	1.84
McClain	40087	3.20	3.04	3.18	3.18	3.18	3.07	3.19	3.04	3.11	3.27	3.20	3.27	3.18	3.35	3.20	3.20	3.20	3.19	3.19	3.15
McCurtain	40089	3.44	3.25	3.21	3.09	3.21	3.25	3.26	3.21	3.17	3.21	3.25	3.27	3.21	3.26	3.27	3.25	3.25	3.25	3.25	3.17
McIntosh	40091	2.70	2.66	2.66	2.63	2.69	2.69	2.66	2.57	2.63	2.69	2.70	2.66	2.63	2.83	2.83	2.70	2.70	2.66	2.70	2.69
Major	40093	1.08	1.04	1.08	1.10	1.09	1.07	1.09	1.04	1.07	1.09	1.10	1.09	1.08	1.15	1.15	1.08	1.10	1.10	1.10	1.09
Marshall	40095	1.20	1.13	1.14	1.14	1.13	1.13	1.14	1.12	1.11	1.17	1.17	1.14	1.12	1.20	1.20	1.14	1.14	1.14	1.14	1.12
Mayes	40097	4.05	3.95	3.95	3.90	4.04	4.04	4.00	3.95	4.00	4.10	4.11	3.90	3.95	4.11	4.12	4.05	4.10	4.05	4.22	4.04
Murray	40099	1.47	1.39	1.39	1.35	1.35	1.34	1.39	1.32	1.35	1.43	1.43	1.43	1.37	1.47	1.47	1.40	1.40	1.43	1.39	1.37
Muskogee	40101	6.39	6.03	6.18	6.26	6.26	6.35	6.27	6.03	6.19	6.35	6.39	6.27	6.10	6.39	6.74	6.38	6.38	6.27	6.38	6.19
Noble	40103	2.06	2.04	2.07	2.11	2.06	2.09	2.11	2.04	2.09	2.09	2.12	2.02	2.02	2.22	2.12	2.09	2.17	2.09	2.17	2.09
Nowata	40105	0.70	0.69	0.69	0.71	0.71	0.71	0.70	0.69	0.70	0.71	0.72	0.68	0.69	0.72	0.72	0.71	0.72	0.71	0.74	0.71
Okfuskee	40107	1.36	1.29	1.34	1.32	1.32	1.34	1.34	1.31	1.32	1.35	1.39	1.34	1.29	1.42	1.42	1.36	1.39	1.34	1.39	1.35
Oklahoma	40109	18.69	17.34	18.46	18.54	18.46	18.14	18.24	17.34	17.92	19.21	18.69	18.14	18.14	19.99	18.69	18.69	18.69	18.54	18.64	18.24
Okmulgee	40111	3.55	3.35	3.43	3.48	3.43	3.48	3.48	3.39	3.43	3.52	3.54	3.48	3.35	3.74	3.74	3.54	3.54	3.48	3.63	3.43
Osage	40113	2.17	2.14	2.17	2.23	2.20	2.20	2.23	2.14	2.17	2.20	2.23	2.11	2.11	2.25	2.25	2.20	2.23	2.20	2.30	2.20
Ottawa	40115	3.27	3.23	3.23	3.19	3.31	3.31	3.27	3.23	3.27	3.31	3.36	3.19	3.23	3.36	3.37	3.31	3.36	3.31	3.36	3.31
Pawnee	40117	1.33	1.31	1.33	1.36	1.35	1.35	1.36	1.31	1.33	1.35	1.37	1.30	1.30	1.44	1.37	1.35	1.40	1.35	1.37	1.33
Payne	40119	4.26	4.19	4.25	4.37	4.26	4.31	4.37	4.19	4.31	4.32	4.40	4.14	4.14	4.65	4.40	4.40	4.51	4.32	4.40	4.31
Pittsburg	40121	4.08	4.00	4.06	4.00	4.06	4.06	4.06	3.86	3.95	4.01	4.08	4.01	3.95	4.29	4.29	4.07	4.07	4.06	4.07	4.06
Pontotoc	40123	2.81	2.57	2.64	2.57	2.57	2.64	2.65	2.54	2.61	2.61	2.73	2.61	2.61	2.81	2.66	2.66	2.66	2.65	2.66	2.64
Pottawatomie	40125	5.31	5.01	5.20	5.14	5.14	5.20	5.21	5.07	5.20	5.21	5.44	5.21	5.20	5.59	5.59	5.30	5.30	5.28	5.30	5.27
Pushmataha	40127	1.09	1.07	1.07	1.03	1.07	1.08	1.08	1.03	1.05	1.07	1.08	1.07	1.06	1.09	1.09	1.08	1.08	1.08	1.08	1.05
RogerMills	40129	0.51	0.49	0.51	0.51	0.51	0.49	0.51	0.49	0.50	0.51	0.51	0.50	0.51	0.51	0.53	0.51	0.51	0.50	0.51	0.51
Rogers	40131	4.54	4.42	4.42	4.53	4.53	4.53	4.48	4.42	4.48	4.60	4.62	4.37	4.42	4.62	4.63	4.54	4.61	4.54	4.74	4.53
Seminole	40133	2.86	2.71	2.81	2.78	2.78	2.81	2.85	2.74	2.81	2.81	2.93	2.81	2.78	3.01	3.01	2.86	2.86	2.85	2.86	2.85
Sequoyah	40135	4.21	3.99	4.04	3.99	4.14	4.19	4.09	3.99	4.09	4.14	4.20	4.14	4.09	4.21	4.21	4.20	4.20	4.19	4.20	4.14
Stephens	40137	2.96	2.78	2.79	2.78	2.71	2.67	2.79	2.64	2.71	2.87	2.80	2.87	2.75	2.75	2.80	2.80	2.80	2.87	2.80	2.75
Texas	40139	0.63	0.61	0.63	0.64	0.63	0.61	0.62	0.61	0.62	0.63	0.63	0.62	0.63	0.67	0.65	0.63	0.63	0.64	0.64	0.63
Tillman	40141	0.80	0.75	0.75	0.78	0.75	0.72	0.75	0.74	0.73	0.78	0.76	0.78	0.74	0.74	0.80	0.76	0.76	0.76	0.76	0.75
Tulsa	40143	13.97	13.28	13.69	13.73	13.73	13.90	13.73	13.43	13.73	13.97	14.28	13.90	13.43	14.32	14.32	13.97	14.28	13.97	14.72	13.73
Wagoner	40145	2.71	2.60	2.63	2.70	2.70	2.70	2.67	2.63	2.67	2.74	2.76	2.70	2.63	2.76	2.76	2.76	2.76	2.71	2.83	2.70
Washington	40147	2.96	2.91	2.91	3.00	3.00	3.00	2.96	2.91	2.96	3.04	3.05	2.88	2.91	3.06	3.06	3.00	3.05	3.00	3.14	3.00
Washita	40149	1.67	1.63	1.65	1.71	1.67	1.61	1.67	1.59	1.63	1.67	1.67	1.63	1.67	1.65	1.71	1.67	1.67	1.63	1.67	1.65
Woods	40151	0.74	0.72	0.75	0.75	0.75	0.73	0.73	0.72	0.73	0.75	0.75	0.73	0.74	0.79	0.79	0.74	0.75	0.75	0.75	0.75
Woodward	40153	1.70	1.66	1.73	1.73	1.73	1.66	1.68	1.66	1.68	1.73	1.73	1.68	1.70	1.71	1.78	1.73	1.73	1.68	1.73	1.70

Table 3-26. Oklahoma gridded 2007 episode day on-road mobile CO tpd emissions.

CO	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Adair	40001	8.55	8.66	8.66	8.55	8.57	8.57	8.51	8.66	8.58	8.57	8.58	8.55	8.66	8.65	8.69	8.58	8.58	8.59	8.58	8.57
Alfalfa	40003	4.90	4.89	4.91	4.94	4.91	4.87	4.91	4.96	4.87	4.91	4.94	4.91	4.90	5.06	5.06	4.89	4.97	4.94	4.94	4.91
Atoka	40005	13.59	13.16	13.16	13.14	13.16	13.16	13.16	13.09	13.04	13.11	13.34	13.23	13.14	13.59	13.59	13.27	13.16	13.16	13.27	13.16
Beaver	40007	6.60	6.67	6.61	6.66	6.59	6.67	6.61	6.67	6.61	6.61	6.61	6.61	6.60	6.82	6.64	6.61	6.61	6.66	6.61	6.60
Beckham	40009	18.44	18.37	18.36	18.55	18.36	18.49	18.43	18.28	18.37	18.43	18.44	18.37	18.43	18.36	18.55	18.43	18.43	18.25	18.44	18.37
Blaine	40011	7.13	7.13	7.13	7.21	7.16	7.22	7.16	7.13	7.10	7.16	7.25	7.16	7.15	7.39	7.39	7.21	7.25	7.21	7.21	7.16
Bryan	40013	22.92	22.21	22.21	22.02	22.21	22.21	22.38	22.18	22.02	22.36	22.49	22.49	22.12	22.92	22.49	22.38	22.38	22.21	22.38	22.12
Caddo	40015	23.86	23.50	23.45	23.68	23.55	23.69	23.45	23.40	23.33	23.68	23.86	23.55	23.55	24.33	24.33	23.74	23.86	23.74	23.74	23.55
Canadian	40017	29.53	28.96	29.15	29.15	29.15	29.32	29.15	28.96	28.88	29.15	29.53	29.15	29.15	30.12	29.53	29.38	29.53	29.40	29.38	29.03
Carter	40019	29.86	28.93	28.92	28.93	28.67	28.93	29.14	28.77	28.67	29.14	29.14	29.28	28.80	28.80	29.28	29.28	29.28	29.14	29.14	28.80
Cherokee	40021	18.36	18.62	18.62	18.38	18.42	18.42	18.29	18.62	18.44	18.42	18.43	18.42	18.62	18.56	18.65	18.43	18.43	18.44	18.43	18.42
Choctaw	40023	8.94	8.66	8.66	8.65	8.65	8.66	8.73	8.65	8.59	8.65	8.77	8.77	8.63	8.94	8.77	8.66	8.73	8.66	8.73	8.63
Cleveland	40027	21.01	20.73	20.80	20.80	20.80	21.01	20.79	20.73	20.63	20.98	21.01	20.98	20.80	21.42	21.01	21.01	21.01	20.79	20.93	20.71
Coal	40029	3.50	3.39	3.39	3.36	3.39	3.39	3.39	3.38	3.36	3.38	3.43	3.41	3.39	3.50	3.50	3.42	3.42	3.39	3.42	3.39
Comanche	40031	47.70	46.28	46.26	46.26	46.28	46.69	46.26	46.22	45.90	46.70	46.79	46.70	46.08	47.70	47.70	46.59	46.79	46.59	46.79	46.28
Cotton	40033	6.73	6.51	6.51	6.51	6.51	6.55	6.57	6.50	6.45	6.55	6.60	6.60	6.49	6.49	6.73	6.57	6.60	6.57	6.60	6.51
Craig	40035	13.89	14.09	14.09	13.92	13.98	13.98	13.89	14.09	13.99	13.98	14.02	13.92	14.09	14.13	14.20	13.96	14.02	13.96	14.10	13.98
Creek	40037	23.62	23.59	23.68	23.50	23.50	23.67	23.62	23.88	23.50	23.72	23.89	23.67	23.59	24.01	24.48	23.89	23.85	23.62	23.85	23.50
Custer	40039	20.99	20.93	20.98	21.14	20.99	21.08	20.98	21.08	20.93	20.98	20.98	20.93	20.93	20.90	21.69	20.98	20.98	20.78	20.99	20.93
Delaware	40041	18.14	18.45	18.45	18.22	18.27	18.27	18.14	18.45	18.28	18.27	18.29	18.22	18.45	18.42	18.51	18.22	18.29	18.29	18.29	18.27
Dewey	40043	4.46	4.50	4.46	4.50	4.46	4.50	4.46	4.50	4.46	4.46	4.46	4.46	4.46	4.44	4.61	4.46	4.46	4.42	4.46	4.46
Ellis	40045	3.17	3.20	3.17	3.20	3.16	3.20	3.17	3.20	3.17	3.17	3.17	3.17	3.17	3.16	3.19	3.17	3.17	3.15	3.17	3.17
Garfield	40047	25.69	26.15	25.89	25.87	25.89	25.69	25.89	26.15	25.87	25.87	26.05	25.89	25.81	26.66	26.16	26.05	26.12	26.12	26.05	25.87
Garvin	40049	25.85	24.94	25.00	25.00	24.77	25.13	25.01	24.83	24.77	25.15	25.15	25.15	24.90	24.90	25.34	25.34	25.34	25.15	25.21	24.90
Grady	40051	20.36	20.08	20.03	20.11	20.11	20.26	20.03	20.01	19.94	20.24	20.36	20.11	20.11	20.76	20.36	20.36	20.36	20.24	20.26	20.03
Grant	40053	4.12	4.17	4.13	4.16	4.13	4.09	4.13	4.17	4.09	4.13	4.16	4.11	4.11	4.26	4.18	4.11	4.15	4.15	4.15	4.13
Greer	40055	2.59	2.59	2.58	2.60	2.58	2.61	2.58	2.58	2.59	2.59	2.59	2.59	2.59	2.58	2.60	2.59	2.62	2.57	2.59	2.59
Harmon	40057	1.46	1.46	1.45	1.46	1.46	1.47	1.45	1.45	1.46	1.46	1.46	1.46	1.46	1.45	1.46	1.46	1.48	1.45	1.47	1.46
Harper	40059	3.59	3.63	3.60	3.62	3.58	3.63	3.59	3.63	3.59	3.60	3.60	3.59	3.59	3.71	3.61	3.60	3.60	3.62	3.60	3.59
Haskell	40061	6.12	6.04	6.04	6.04	6.05	6.04	6.02	6.02	5.99	6.05	6.12	6.02	6.04	6.12	6.12	6.09	6.09	6.05	6.09	6.05
Hughes	40063	6.92	6.84	6.83	6.83	6.78	6.84	6.81	6.82	6.78	6.84	6.87	6.81	6.84	7.05	7.05	6.89	6.87	6.81	6.89	6.84
Jackson	40065	10.62	10.63	10.62	10.72	10.62	10.73	10.62	10.62	10.54	10.71	10.62	10.63	10.63	10.58	10.72	10.70	10.75	10.54	10.70	10.63
Jefferson	40067	3.90	3.78	3.78	3.78	3.78	3.78	3.81	3.78	3.75	3.80	3.83	3.83	3.77	3.90	3.90	3.81	3.83	3.80	3.83	3.77
Johnston	40069	7.10	6.89	6.89	6.83	6.89	6.89	6.94	6.87	6.83	6.92	6.92	6.92	6.86	7.10	6.97	6.94	6.94	6.89	6.94	6.89
Kay	40071	25.77	26.00	25.78	25.82	25.59	25.77	25.78	26.00	25.59	25.71	25.82	25.68	25.68	26.14	26.14	25.71	26.01	25.71	26.01	25.77
Kingfisher	40073	8.39	8.38	8.42	8.42	8.42	8.35	8.39	8.38	8.35	8.42	8.53	8.42	8.41	8.69	8.53	8.49	8.53	8.46	8.49	8.39
Kiowa	40075	6.73	6.73	6.73	6.76	6.73	6.79	6.70	6.70	6.73	6.76	6.73	6.73	6.73	6.70	6.94	6.73	6.81	6.67	6.78	6.73
Latimer	40077	5.85	5.78	5.78	5.76	5.78	5.78	5.74	5.76	5.78	5.78	5.85	5.76	5.78	5.85	5.85	5.78	5.78	5.79	5.78	5.74
LeFlore	40079	28.50	28.13	28.42	28.06	28.13	28.16	27.93	28.06	28.15	28.13	28.16	28.05	28.15	28.36	28.50	28.16	28.16	28.17	28.16	27.93

CO	FIPS	Fri. 8/13	Sat. 8/14	Sun. 8/15	Mon. 8/16	Tues. 8/17	Wed. 8/18	Thurs. 8/19	Fri. 8/20	Sat. 8/21	Sun. 8/22	Mon. 8/23	Fri. 8/13	Wed. 8/25	Thurs. 8/26	Fri. 8/27	Sat. 8/28	Sun. 8/29	Mon. 8/30	Tues. 8/31	Wed. 9/01
Lincoln	40081	24.82	24.76	24.86	24.92	24.69	24.86	24.82	25.06	24.86	24.82	25.13	24.86	24.86	25.76	25.76	25.26	25.13	24.82	25.13	24.92
Logan	40083	7.73	7.74	7.77	7.76	7.77	7.70	7.73	7.74	7.76	7.82	7.85	7.77	7.76	8.00	7.85	7.85	7.85	7.76	7.82	7.73
Love	40085	15.87	15.32	15.33	15.33	15.32	15.32	15.46	15.26	15.16	15.40	15.55	15.55	15.26	15.87	15.87	15.46	15.55	15.40	15.55	15.26
McClain	40087	23.35	22.88	23.03	23.03	23.03	23.15	23.04	22.88	22.82	23.15	23.35	23.15	23.03	23.82	23.35	23.35	23.35	23.04	23.23	22.94
McCurtain	40089	21.03	20.39	20.36	20.30	20.36	20.38	20.53	20.36	20.37	20.36	20.38	20.64	20.30	20.53	20.64	20.38	20.38	20.39	20.38	20.21
McIntosh	40091	19.74	19.43	19.43	19.29	19.47	19.47	19.40	19.34	19.29	19.47	19.74	19.40	19.43	20.13	20.13	19.74	19.64	19.40	19.64	19.47
Major	40093	7.14	7.12	7.12	7.21	7.15	7.09	7.16	7.12	7.09	7.15	7.21	7.16	7.14	7.38	7.38	7.12	7.24	7.21	7.21	7.16
Marshall	40095	7.46	7.23	7.23	7.23	7.24	7.24	7.29	7.22	7.17	7.27	7.27	7.32	7.20	7.46	7.46	7.32	7.32	7.23	7.32	7.20
Mayes	40097	27.06	27.37	27.37	27.03	27.12	27.12	26.93	27.37	26.93	27.17	27.38	27.03	27.37	27.38	27.52	27.06	27.17	27.06	27.32	27.12
Murray	40099	9.88	9.56	9.56	9.47	9.47	9.61	9.64	9.50	9.47	9.61	9.61	9.61	9.52	9.88	9.88	9.69	9.69	9.61	9.64	9.52
Muskogee	40101	39.48	38.86	39.00	38.97	38.97	39.03	38.86	38.86	38.70	39.03	39.48	38.86	39.36	39.48	40.24	39.30	39.30	38.86	39.30	38.70
Noble	40103	15.84	16.06	15.95	15.99	15.84	15.95	15.99	16.06	15.95	15.93	16.13	15.87	15.87	16.55	16.22	15.93	16.08	15.93	16.08	15.95
Nowata	40105	4.63	4.71	4.71	4.66	4.66	4.66	4.63	4.71	4.67	4.66	4.67	4.65	4.71	4.71	4.73	4.65	4.67	4.65	4.70	4.66
Okfuskee	40107	10.15	9.94	9.99	9.92	9.92	9.99	9.98	10.06	9.92	10.01	10.07	9.98	9.94	10.36	10.36	10.10	10.07	9.98	10.07	10.01
Oklahoma	40109	87.75	86.58	86.90	86.82	86.90	86.80	86.49	86.58	86.17	87.85	87.75	86.80	86.80	89.49	87.75	87.75	87.75	86.82	87.40	86.49
Okmulgee	40111	22.69	22.31	22.40	22.38	22.23	22.38	22.33	22.59	22.23	22.42	22.58	22.33	22.31	23.13	23.13	22.58	22.58	22.33	22.58	22.23
Osage	40113	13.10	13.33	13.20	13.21	13.19	13.19	13.21	13.33	13.10	13.15	13.20	13.16	13.16	13.36	13.36	13.15	13.20	13.15	13.28	13.19
Ottawa	40115	22.57	22.92	22.92	22.64	22.73	22.73	22.57	22.92	22.74	22.73	22.78	22.64	22.92	22.96	23.08	22.69	22.78	22.69	22.78	22.73
Pawnee	40117	8.95	9.10	9.02	9.03	9.02	9.02	9.03	9.10	8.95	9.00	9.10	8.99	8.99	9.33	9.15	9.00	9.08	9.00	9.10	8.95
Payne	40119	26.18	26.62	26.38	26.41	26.18	26.36	26.41	26.62	26.36	26.30	26.59	26.28	26.28	27.24	26.71	26.59	26.61	26.29	26.59	26.36
Pittsburg	40121	26.39	26.02	26.07	26.02	26.07	26.06	26.06	25.95	25.84	25.96	26.39	25.96	26.04	26.90	26.90	26.26	26.26	26.07	26.26	26.07
Pontotoc	40123	16.37	15.87	15.88	15.75	15.75	15.88	15.88	16.02	15.86	15.82	16.00	15.82	15.86	16.37	16.07	15.99	15.99	15.88	15.99	15.88
Pottawatomie	40125	34.90	34.28	34.40	34.16	34.16	34.40	34.33	34.70	34.40	34.33	34.72	34.33	34.40	35.59	35.59	34.73	34.73	34.47	34.73	34.47
Pushmataha	40127	7.17	7.07	7.07	7.05	7.07	7.08	7.08	7.05	7.02	7.07	7.08	7.05	7.08	7.17	7.17	7.08	7.08	7.08	7.08	7.02
RogerMills	40129	3.19	3.23	3.20	3.22	3.18	3.23	3.20	3.23	3.20	3.20	3.20	3.20	3.20	3.18	3.21	3.20	3.20	3.17	3.19	3.19
Rogers	40131	28.09	28.46	28.46	28.18	28.18	28.18	27.98	28.46	27.98	28.22	28.41	28.10	28.46	28.41	28.55	28.09	28.20	28.09	28.39	28.18
Seminole	40133	19.14	18.80	18.86	18.73	18.73	18.86	18.90	19.03	18.86	18.82	19.01	18.82	18.87	19.52	19.52	19.05	19.05	18.90	19.05	18.90
Sequoyah	40135	29.53	28.95	29.31	28.95	29.07	29.14	28.88	28.95	29.08	29.07	29.15	29.03	29.08	29.38	29.53	29.15	29.15	29.14	29.15	29.07
Stephens	40137	16.91	16.41	16.40	16.41	16.27	16.55	16.40	16.34	16.27	16.53	16.59	16.53	16.34	16.34	16.59	16.59	16.59	16.53	16.52	16.34
Texas	40139	4.14	4.18	4.15	4.18	4.13	4.18	4.14	4.18	4.14	4.15	4.15	4.14	4.14	4.28	4.17	4.15	4.15	4.18	4.14	4.14
Tillman	40141	4.69	4.55	4.55	4.58	4.55	4.60	4.55	4.55	4.52	4.58	4.61	4.58	4.53	4.53	4.69	4.58	4.61	4.58	4.61	4.55
Tulsa	40143	65.79	65.85	66.05	65.54	65.54	66.02	65.54	66.71	65.54	65.79	66.49	66.02	66.71	66.76	66.76	65.79	66.49	65.79	66.82	65.54
Wagoner	40145	16.34	16.35	16.56	16.39	16.39	16.39	16.27	16.56	16.27	16.41	16.52	16.39	16.56	16.60	16.60	16.52	16.52	16.34	16.51	16.39
Washington	40147	17.58	17.88	17.88	17.70	17.70	17.70	17.58	17.88	17.58	17.72	17.72	17.65	17.88	17.92	17.92	17.65	17.72	17.65	17.87	17.70
Washita	40149	12.27	12.24	12.22	12.33	12.27	12.33	12.27	12.18	12.24	12.27	12.27	12.24	12.27	12.22	12.33	12.27	12.27	12.15	12.27	12.24
Woods	40151	4.47	4.51	4.47	4.50	4.47	4.44	4.47	4.51	4.47	4.47	4.47	4.47	4.47	4.61	4.61	4.45	4.47	4.50	4.47	4.47
Woodward	40153	10.45	10.55	10.47	10.54	10.46	10.55	10.46	10.55	10.46	10.46	10.47	10.46	10.45	10.42	10.54	10.47	10.47	10.38	10.46	10.45

Table 3-27. State summary of gridded 2007 tpd emissions by major source type.

NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	187	175	168	195	184	184	316	267	233	72	50	48	399	376	365
Arkansas	5	160	150	145	140	118	118	196	170	154	15	15	15	228	213	205
Connecticut	9	9	8	8	73	69	69	163	135	114	12	5	4	132	111	110
Delaware	10	11	11	10	56	54	54	53	45	39	2	1	1	57	53	52
District of Columbia	11	5	5	5	20	19	19	18	15	11	0	0	0	2	2	2
Florida	12	106	100	97	513	484	484	891	736	624	47	41	39	1015	937	887
Georgia	13	133	128	126	249	231	231	641	543	475	27	22	21	366	343	329
Illinois	17	59	56	55	686	584	584	586	487	417	103	60	50	557	516	495
Indiana	18	112	104	100	415	361	361	434	371	330	28	23	22	402	374	359
Iowa	19	84	78	75	345	250	250	186	162	147	21	21	21	334	311	299
Kansas	20	242	223	213	329	270	270	174	149	132	242	185	185	380	346	333
Kentucky	21	260	240	229	246	231	231	306	264	237	17	14	13	351	322	309
Louisiana	22	364	335	321	625	611	611	265	227	203	435	431	431	634	610	597
Maine	23	8	7	7	17	16	16	30	26	24	0	0	0	30	29	28
Maryland	24	46	46	46	147	136	136	293	244	209	12	6	5	145	132	122
Massachusetts	25	61	58	57	315	308	308	289	233	191	11	7	6	121	112	103
Michigan	26	121	113	109	310	272	272	558	470	408	107	107	107	508	492	485
Minnesota	27	44	41	39	334	262	262	314	268	236	94	91	90	397	373	360
Mississippi	28	177	164	158	158	143	143	222	193	175	90	90	90	346	327	318
Missouri	29	39	36	34	311	257	257	413	350	308	33	29	28	214	198	191
Nebraska	31	40	36	35	224	178	178	105	91	82	15	14	14	218	201	193
New Hampshire	33	35	32	30	29	27	27	77	66	60	4	3	3	40	37	35
New Jersey	34	66	62	59	302	290	290	371	303	253	88	88	88	128	122	119
New York	36	98	91	88	430	397	397	693	575	490	83	79	75	193	177	166
North Carolina	37	72	70	69	258	235	235	569	485	430	52	41	38	374	348	335
North Dakota	38	52	48	46	142	100	100	30	27	24	1	1	1	268	246	236
Ohio	39	118	110	106	527	473	473	615	518	451	77	50	49	513	477	461
Oklahoma	40	77	71	68	267	271	262	283	275	252	52	52	52	513	531	531
Pennsylvania	42	88	86	86	321	297	297	622	528	464	145	64	51	711	586	472
Rhode Island	44	2	2	2	21	20	20	46	37	30	1	0	0	12	11	10
South Carolina	45	64	60	58	114	105	105	302	262	237	21	20	20	210	200	195
South Dakota	46	17	16	15	149	98	98	46	40	37	1	1	1	69	63	60
Tennessee	47	78	74	72	446	431	431	411	349	307	77	86	82	270	253	240
Texas	48	700	685	670	898	889	828	865	596	464	652	651	651	1960	1956	1956
Vermont	50	6	6	6	15	13	13	40	34	31	1	1	1	3	3	2
Virginia	51	135	126	121	286	270	270	452	383	335	45	31	29	314	292	282
West Virginia	54	34	31	30	177	175	175	124	109	100	69	67	67	287	265	256
Wisconsin	55	64	60	57	259	218	218	351	302	270	60	18	16	221	204	198
Ontario Prov *	99	1689	1590	1550												

Table 3-27. (Cont.) State summary of gridded 2007 tpd emissions by major source type.

VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	420	420	420	130	119	119	226	191	166	120	73	68	61	60	60
Arkansas	5	384	384	384	89	83	83	120	103	92	26	18	12	13	12	12
Connecticut	9	167	167	167	76	65	65	86	70	58	20	9	6	14	12	12
Delaware	10	69	69	69	27	24	24	27	22	19	12	6	6	8	3	3
District of Columbia	11	29	29	29	7	7	7	11	9	7	1	0	0	0	0	0
Florida	12	1059	1059	1059	472	413	413	607	496	414	42	28	23	18	17	16
Georgia	13	743	743	743	184	160	160	393	330	285	73	31	26	47	32	31
Illinois	17	876	876	876	309	260	260	345	284	240	383	179	127	110	64	63
Indiana	18	705	705	705	166	141	141	266	224	196	102	51	44	34	26	26
Iowa	19	431	431	431	108	89	89	108	93	83	20	20	20	2	2	2
Kansas	20	368	368	368	79	65	65	107	90	79	44	23	23	8	5	5
Kentucky	21	385	384	384	100	92	92	182	155	138	117	70	60	86	64	52
Louisiana	22	332	332	331	153	144	144	160	136	120	128	118	114	118	115	114
Maine	23	48	48	48	18	16	16	18	15	14	3	2	2	2	2	2
Maryland	24	186	186	186	132	112	112	156	129	109	20	12	9	8	2	2
Massachusetts	25	407	407	407	160	140	140	152	122	100	27	13	9	4	3	3
Michigan	26	809	809	809	303	270	270	348	289	247	112	112	112	79	79	79
Minnesota	27	574	574	574	188	168	168	200	168	145	87	58	53	8	7	7
Mississippi	28	392	392	392	90	84	84	130	112	101	138	138	138	14	13	13
Missouri	29	424	424	424	183	161	161	252	212	184	152	128	106	18	11	8
Nebraska	31	243	243	243	55	45	45	64	54	48	20	16	15	10	10	10
New Hampshire	33	95	95	95	41	37	37	39	33	30	13	1	1	1	1	0
New Jersey	34	454	454	454	187	160	160	199	161	133	204	204	204	14	14	14
New York	36	1024	1024	1024	362	317	317	407	335	283	150	93	80	19	13	11
North Carolina	37	1069	1069	1068	214	188	188	353	298	259	272	112	86	16	15	14
North Dakota	38	110	110	110	27	21	21	18	15	14	0	0	0	3	2	2
Ohio	39	912	912	912	336	290	290	381	318	272	172	91	68	54	36	35
Oklahoma	40	351	351	351	84	174	173	333	309	297	74	68	68	48	45	45
Pennsylvania	42	775	775	775	261	229	229	357	300	260	146	41	35	47	16	15
Rhode Island	44	61	61	61	18	15	15	25	20	16	11	5	3	1	0	0
South Carolina	45	453	453	453	99	87	87	185	158	141	51	46	45	28	28	28
South Dakota	46	114	114	114	31	24	24	26	23	21	1	1	1	6	0	0
Tennessee	47	715	715	714	149	136	136	254	213	184	249	141	127	70	65	65
Texas	48	1970	1555	1321	378	706	697	477	410	350	675	652	652	213	207	207
Vermont	50	54	54	54	16	14	14	23	19	17	2	1	1	0	0	0
Virginia	51	582	581	581	173	149	149	261	218	189	181	101	62	43	36	33
West Virginia	54	153	153	153	57	54	54	69	60	55	37	31	30	27	23	22
Wisconsin	55	558	558	558	169	149	149	202	172	151	122	47	32	35	21	20
Ontario Prov	99	1850	1811	1727												

Table 3-27. (Cont.) State summary of gridded 2007 tpd emissions by major source type.

CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
State Name	FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
Alabama	1	879	877	876	1361	1045	1045	2269	1923	1688	307	249	247	325	320	319
Arkansas	5	1014	1013	1012	844	674	674	1304	1125	1010	20	19	19	315	306	297
Connecticut	9	30	30	30	1263	903	903	1051	859	717	4	2	1	66	58	58
Delaware	10	42	42	42	335	249	249	306	256	220	1	0	0	48	47	47
District of Columbia	11	2	2	2	72	59	59	115	91	72	0	0	0	1	1	1
Florida	12	749	748	748	6642	4742	4742	6146	5051	4252	16	11	10	260	247	233
Georgia	13	1965	1964	1964	2717	1964	1964	4342	3646	3162	40	22	22	537	518	516
Illinois	17	76	75	75	5027	3597	3597	3923	3249	2764	48	32	28	378	320	309
Indiana	18	132	129	127	2747	2026	2026	3005	2550	2241	161	117	100	944	365	356
Iowa	19	152	151	151	1531	1120	1120	1256	1083	972	1	1	1	45	43	43
Kansas	20	149	146	145	1166	847	847	1205	1022	899	72	52	52	187	183	181
Kentucky	21	283	280	278	1043	801	801	1993	1709	1522	114	103	102	126	120	118
Louisiana	22	345	341	339	1374	1114	1114	1764	1503	1328	254	218	217	2195	2184	2180
Maine	23	12	11	11	239	178	178	224	195	177	0	0	0	13	13	12
Maryland	24	189	189	189	2102	1484	1484	1914	1581	1341	6	4	3	143	140	136
Massachusetts	25	60	56	54	2599	1930	1930	1741	1406	1155	13	6	6	34	32	30
Michigan	26	100	97	95	4219	3152	3152	4048	3373	2894	120	120	120	290	285	283
Minnesota	27	196	195	195	2216	1688	1688	2346	1975	1718	14	11	10	281	279	259
Mississippi	28	679	677	676	795	642	642	1256	1089	984	51	51	51	313	310	309
Missouri	29	160	160	160	2380	1761	1761	2766	2334	2038	120	113	112	199	197	196
Nebraska	31	98	97	97	750	551	551	723	619	551	5	5	5	49	47	31
New Hampshire	33	22	21	20	544	411	411	515	441	393	3	1	1	20	18	17
New Jersey	34	61	60	60	3091	2193	2193	2245	1821	1506	43	43	43	58	55	53
New York	36	79	76	75	5786	4245	4245	4533	3738	3162	84	79	76	61	57	54
North Carolina	37	1763	1762	1762	3076	2268	2268	3785	3205	2809	109	101	97	170	164	161
North Dakota	38	28	27	27	314	226	226	211	183	165	0	0	0	32	30	28
Ohio	39	190	188	187	5335	3914	3914	4313	3602	3101	131	35	32	2160	1900	1890
Oklahoma	40	86	85	84	1100	1721	1703	1924	1817	1725	41	40	40	187	186	186
Pennsylvania	42	278	278	278	3952	2902	2902	4058	3422	2984	145	37	29	1491	252	211
Rhode Island	44	3	3	3	329	241	241	295	237	194	1	0	0	11	11	5
South Carolina	45	536	535	535	1379	1029	1029	2007	1728	1549	17	17	16	195	194	193
South Dakota	46	39	38	38	365	261	261	307	270	248	0	0	0	8	7	7
Tennessee	47	477	475	474	1676	1277	1277	2755	2324	2026	40	85	84	276	272	271
Texas	48	1015	869	727	6291	9219	9102	6202	5742	4977	195	194	194	1214	1206	1206
Vermont	50	6	6	6	221	164	164	284	245	219	1	1	0	5	4	4
Virginia	51	576	567	563	2602	1867	1867	2976	2504	2177	43	24	23	204	200	197
West Virginia	54	59	58	57	513	414	414	840	732	666	74	70	70	281	258	250
Wisconsin	55	180	175	173	2276	1717	1717	2316	1977	1751	46	10	8	201	138	135
Ontario Prov	99	7371	6957	6819												

* Canadian emissions estimates all processed as area sources

DATA SOURCES FOR 2012

In order to demonstrate future year emission reductions for the EAC, emission estimates were developed for the Oklahoma City and Tulsa areas for 2012.

The point source inventory was assumed constant from 2007. The 1999 NEI version 2 is the basis for the Oklahoma 2012 area estimates. The area source data were projected to 2012 estimates with factors by source classification code generated using EGAS 4.0. The nonroad Model v2.1d released in March of 2002 was used to generate all off-road sources with the exception of aircraft, railroad and commercial marine. The nonroad model output, generated in AMS format, was processed through EPS2x. The 2012 non-nonroad data for Oklahoma was based on the 1999 inventory and projected to 2012 estimates using factors generated with EGAS4.0.

Oklahoma City and Tulsa areas on-road mobile estimates are based on link-level activity estimated from the 1995 and 2025 activity estimates. The M6LINC system was used to combine MOBILE6.2 emission factors with the link-level VMT and speeds to calculate the estimated emissions.

Tables 3-28 to 3-30 are county emission summaries by major source type for those counties within the Oklahoma City and Tulsa metropolitan areas. For those data that have day-specific emissions August 21 – August 23 are used to represent a typical Saturday, Sunday and Weekday respectively.

Comparison of 2007 and 2012 Emissions

One of the requirements of an EAC SIP is to show that 8-hour ozone attainment after 2007 would not be jeopardized. This is done by projecting local area emissions to 2012 and demonstrating that ozone precursor emissions between 2007 and 2012 are projected to be reduced. For the Oklahoma EACs this analysis is shown in Tables 3-31 and 3-32.

Total anthropogenic NOx, VOC and CO emissions in the Oklahoma City MSA are projected to be reduced, respectively –19%, -34%, and –7% between 2007 and 2012. Similar reductions for the Tulsa MSA are –9%, -4%, and –11%. As all ozone precursors in both urban areas are being reduced between 2007 and 2012, then attainment of 8-hour ozone standard would be maintained in the Tulsa and Oklahoma City MSAs after 2007.

Table 3-28. Oklahoma City and Tulsa 2012 NOx tpd emissions by major source type.

	NOX		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.68	0.63	0.60	5.21	5.07	4.85	0.00	0.00	0.00	2.80	2.80	2.80	13.91	14.15	14.15
	Cleveland	40027	2.59	2.39	2.29	3.05	3.11	2.88	0.00	0.00	0.00	0.14	0.07	0.07	4.40	4.38	4.38
	Logan	40083	0.14	0.13	0.12	3.19	3.19	3.13	0.00	0.00	0.00	0.83	0.83	0.83	4.79	4.79	4.79
	McClain	40087	0.08	0.08	0.08	1.65	1.64	1.52	0.00	0.00	0.00	0.40	0.40	0.40	0.99	0.99	0.99
	Oklahoma	40109	18.43	16.96	16.23	17.73	16.82	15.32	34.03	36.27	35.72	1.91	1.81	1.81	14.08	13.84	13.84
	Pottawatomie	40125	1.21	1.12	1.07	2.73	2.73	2.65	0.00	0.00	0.00	0.02	0.02	0.02	0.39	0.39	0.39
	Subtotal		**23.13**	**21.31**	**20.40**	**33.55**	**32.56**	**30.35**	**34.03**	**36.27**	**35.72**	**6.10**	**5.93**	**5.93**	**38.56**	**38.54**	**38.54**
Tulsa MSA	Creek	40037	1.05	0.97	0.93	3.30	3.34	3.19	0.00	0.00	0.00	1.08	1.08	1.08	3.43	3.43	3.43
	Osage	40113	0.16	0.16	0.15	3.64	4.15	4.04	0.00	0.00	0.00	1.52	1.52	1.52	0.07	0.07	0.07
	Rogers	40131	0.66	0.62	0.60	5.32	5.59	5.44	0.00	0.00	0.00	0.16	0.12	0.12	65.21	65.21	65.21
	Tulsa	40143	23.27	21.41	20.49	18.06	17.23	15.75	23.20	24.78	24.39	0.55	0.53	0.53	29.24	28.89	28.89
	Wagoner	40145	1.56	1.44	1.38	3.52	3.80	3.75	0.00	0.00	0.00	0.02	0.02	0.02	4.37	4.37	4.37
	Subtotal		**26.70**	**24.60**	**23.55**	**33.85**	**34.11**	**32.17**	**23.20**	**24.78**	**24.39**	**3.33**	**3.26**	**3.26**	**102.31**	**101.95**	**101.95**

Table 3-29. Oklahoma City and Tulsa 2012 VOC tpd emissions by major source type.

	VOC		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	7.99	7.98	7.98	0.76	1.02	0.99	0.00	0.00	0.00	0.82	0.70	0.70	0.50	0.49	0.49
	Cleveland	40027	10.22	10.22	10.22	3.50	5.41	5.38	0.00	0.00	0.00	0.35	0.25	0.25	0.45	0.45	0.45
	Logan	40083	3.37	3.37	3.37	0.59	1.06	1.05	0.00	0.00	0.00	0.51	0.51	0.51	0.33	0.33	0.33
	McClain	40087	4.08	4.08	4.08	0.32	0.83	0.81	0.00	0.00	0.00	0.47	0.47	0.47	1.68	1.68	1.68
	Oklahoma	40109	44.54	44.52	44.51	10.56	13.78	13.57	23.62	23.19	23.98	4.56	2.73	2.73	11.64	9.29	9.29
	Pottawatomie	40125	5.80	5.79	5.79	0.57	0.85	0.84	0.00	0.00	0.00	0.31	0.30	0.30	0.49	0.49	0.49
	Subtotal		**75.99**	**75.97**	**75.95**	**16.30**	**22.95**	**22.65**	**23.62**	**23.19**	**23.98**	**7.02**	**4.97**	**4.97**	**15.08**	**12.71**	**12.71**
Tulsa MSA	Creek	40037	7.87	7.87	7.87	0.58	1.29	1.27	0.00	0.00	0.00	0.78	0.74	0.74	0.20	0.20	0.20
	Osage	40113	2.85	2.85	2.85	2.08	5.69	5.68	0.00	0.00	0.00	1.38	1.38	1.38	0.01	0.01	0.01
	Rogers	40131	5.24	5.24	5.24	1.21	3.29	3.26	0.00	0.00	0.00	0.24	0.17	0.17	0.67	0.67	0.67
	Tulsa	40143	37.29	37.26	37.25	9.64	12.46	12.25	17.16	16.83	17.42	6.26	5.64	5.64	1.88	1.68	1.68
	Wagoner	40145	3.93	3.93	3.93	0.69	2.08	2.07	0.00	0.00	0.00	0.03	0.01	0.01	0.46	0.46	0.46
	Subtotal		**57.18**	**57.15**	**57.14**	**14.21**	**24.81**	**24.54**	**17.16**	**16.83**	**17.42**	**8.70**	**7.95**	**7.95**	**3.22**	**3.01**	**3.01**

Table 3-?. Oklahoma City and Tulsa 2012 CO tpd emissions by major source type.

Table 3-30. Oklahoma City and Tulsa 2012 CO tpd emissions by major source type.

	CO		Area			Off-road			Onroad			Low Pts			Elev Pts		
		FIPS	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun	wkday	sat	sun
OKC MSA	Canadian	40017	0.38	0.37	0.37	17.62	23.31	22.86	0.00	0.00	0.00	2.50	2.50	2.50	2.25	2.31	2.31
	Cleveland	40027	4.98	4.95	4.94	96.28	113.10	112.59	0.00	0.00	0.00	0.05	0.05	0.05	3.55	3.49	3.49
	Logan	40083	0.61	0.61	0.61	6.93	10.58	10.45	0.00	0.00	0.00	0.83	0.83	0.83	5.01	5.01	5.01
	McClain	40087	0.67	0.67	0.67	4.69	7.87	7.62	0.00	0.00	0.00	0.33	0.33	0.33	0.73	0.73	0.73
	Oklahoma	40109	16.39	16.17	16.06	253.77	371.24	367.89	276.47	273.29	278.92	2.17	2.15	2.15	6.30	6.27	6.27
	Pottawatomie	40125	1.97	1.96	1.95	11.80	15.90	15.72	0.00	0.00	0.00	1.18	0.94	0.94	2.62	1.34	1.34
	Subtotal		**25.01**	**24.73**	**24.60**	**391.10**	**542.00**	**537.13**	**276.47**	**273.29**	**278.92**	**7.05**	**6.79**	**6.79**	**20.45**	**19.14**	**19.14**
Tulsa MSA	Creek	40037	2.02	2.00	2.00	10.46	17.55	17.23	0.00	0.00	0.00	0.81	0.81	0.81	0.47	0.46	0.46
	Osage	40113	1.15	1.15	1.15	13.45	29.17	28.94	0.00	0.00	0.00	1.11	1.11	1.11	0.02	0.02	0.02
	Rogers	40131	4.17	4.17	4.16	14.26	27.96	27.61	0.00	0.00	0.00	0.07	0.05	0.05	6.57	6.57	6.57
	Tulsa	40143	19.33	19.05	18.92	259.93	373.54	370.23	190.15	188.13	191.87	0.58	0.52	0.52	10.50	10.30	10.30
	Wagoner	40145	3.29	3.27	3.27	10.15	19.34	19.23	0.00	0.00	0.00	0.15	0.15	0.15	3.12	3.12	3.12
	Subtotal		**29.96**	**29.65**	**29.49**	**308.25**	**467.55**	**463.24**	**190.15**	**188.13**	**191.87**	**2.73**	**2.63**	**2.63**	**20.67**	**20.47**	**20.47**

Table 3-31. Summary of typical weekday emissions in the Tulsa and Oklahoma City MSAs for 1999, 2002, 2007 and 2012.

	NOX		Area				Off-road				Onroad-LINK based *				Low Pts				Elev Pts			
			1999	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**
OKC MSA	Canadian	40017	0.61	0.63	0.66	0.68	6.90	6.59	5.64	5.21					2.80	2.80	2.80	2.80	10.34	13.91	13.91	13.91
	Cleveland	40027	2.32	2.40	2.51	2.59	3.50	3.50	3.23	3.05					0.14	0.14	0.14	0.14	0.69	0.69	4.40	4.40
	Logan	40083	0.12	0.13	0.13	0.14	4.30	4.07	3.40	3.19					0.83	0.83	0.83	0.83	2.80	2.80	4.79	4.79
	McClain	40087	0.07	0.08	0.08	0.08	2.16	2.08	1.79	1.65					0.40	0.40	0.40	0.40	0.99	0.99	0.99	0.99
	Oklahoma	40109	16.40	16.98	17.82	18.43	21.25	20.80	19.00	17.73	88.1	85.1	64.1	34.03	1.91	1.91	1.91	1.91	19.55	12.22	14.08	14.08
	Pottawatomie	40125	1.08	1.12	1.17	1.21	3.54	3.39	2.89	2.73					0.02	0.02	0.02	0.02	0.39	0.39	0.39	0.39
	Subtotal		**20.6**	**21.3**	**22.4**	**23.1**	**41.7**	**40.4**	**35.9**	**33.5**	**88.1**	**85.1**	**64.1**	**34.0**	**6.1**	**6.1**	**6.1**	**6.1**	**34.8**	**31.0**	**38.6**	**38.6**
Tulsa MSA	Creek	40037	0.93	0.97	1.01	1.05	4.35	4.11	3.48	3.30					1.08	1.08	1.08	1.08	3.43	3.43	3.43	3.43
	Osage	40113	0.15	0.15	0.16	0.16	4.85	4.58	3.86	3.64					1.52	1.52	1.52	1.52	0.07	0.07	0.07	0.07
	Rogers	40131	0.60	0.62	0.64	0.66	7.01	6.61	5.60	5.32					0.16	0.16	0.16	0.16	79.16	65.21	65.21	65.21
	Tulsa	40143	20.71	21.44	22.49	23.27	23.78	21.28	19.28	18.06	66.03	59.93	40.95	23.20	0.55	0.55	0.55	0.55	46.45	29.24	29.24	29.24
	Wagoner	40145	1.39	1.44	1.51	1.56	4.63	4.38	3.71	3.52					0.02	0.02	0.02	0.02	0.04	0.04	4.37	4.37
	Subtotal		**23.8**	**24.6**	**25.8**	**26.7**	**44.6**	**41.0**	**35.9**	**33.8**	**66.0**	**59.9**	**40.9**	**23.2**	**3.3**	**3.3**	**3.3**	**3.3**	**129.1**	**98.0**	**102.3**	**102.3**
	VOC		**Area**				**Off-road**				**Onroad-LINK based**				**Low Pts**				**Elev Pts**			
			1999	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**
OKC MSA	Canadian	40017	6.83	7.24	7.62	7.99	1.20	1.17	0.89	0.76					0.82	0.82	0.82	0.82	0.50	0.50	0.50	0.50
	Cleveland	40027	8.99	9.33	9.73	10.22	5.50	5.02	3.82	3.50					0.35	0.35	0.35	0.35	0.10	0.10	0.45	0.45
	Logan	40083	2.90	3.06	3.22	3.37	0.65	0.65	0.61	0.59					0.51	0.51	0.51	0.51	0.20	0.20	0.33	0.33
	McClain	40087	3.31	3.58	3.83	4.08	0.50	0.49	0.38	0.32					0.47	0.47	0.47	0.47	1.68	1.68	1.68	1.68
	Oklahoma	40109	37.41	39.34	41.60	44.54	11.97	13.41	11.24	10.56	117.9	122.4	99.0	23.62	4.56	4.56	4.56	4.56	2.76	2.73	11.64	11.64
	Pottawatomie	40125	4.83	5.12	5.44	5.80	0.67	0.78	0.64	0.57					0.31	0.31	0.31	0.31	0.49	0.49	0.49	0.49
	Subtotal		**64.3**	**67.7**	**71.4**	**76.0**	**20.5**	**21.5**	**17.6**	**16.3**	**117.9**	**122.4**	**99.0**	**23.6**	**7.0**	**7.0**	**7.0**	**7.0**	**5.7**	**5.7**	**15.1**	**15.1**
Tulsa MSA	Creek	40037	6.45	6.90	7.37	7.87	0.84	0.84	0.67	0.58					0.78	0.78	0.78	0.78	0.20	0.20	0.20	0.20
	Osage	40113	2.60	2.68	2.76	2.85	2.25	2.20	2.13	2.08					1.38	1.38	1.38	1.38	0.01	0.01	0.01	0.01
	Rogers	40131	4.41	4.63	4.92	5.24	1.61	1.55	1.34	1.21					0.24	0.24	0.24	0.24	0.67	0.67	0.67	0.67
	Tulsa	40143	30.38	32.22	34.43	37.29	12.44	13.13	10.49	9.64	39.42	33.74	24.23	17.16	6.26	6.26	6.26	6.26	1.14	1.88	1.88	1.88
	Wagoner	40145	3.40	3.54	3.73	3.93	1.11	1.03	0.82	0.69					0.03	0.03	0.03	0.03	0.00	0.00	0.46	0.46
	Subtotal		**47.2**	**50.0**	**53.2**	**57.2**	**18.3**	**18.7**	**15.4**	**14.2**	**39.4**	**33.7**	**24.2**	**17.2**	**8.7**	**8.7**	**8.7**	**8.7**	**2.0**	**2.8**	**3.2**	**3.2**
	CO		**Area**				**Off-road**				**Onroad-LINK based**				**Low Pts**				**Elev Pts**			
			1999	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**	**1999**	**2002**	**2007**	**2012**
OKC MSA	Canadian	40017	0.37	0.37	0.38	0.38	14.81	15.25	16.41	17.62					2.50	2.50	2.50	2.50	2.25	2.25	2.25	2.25
	Cleveland	40027	4.94	4.95	4.97	4.98	74.64	79.61	88.40	96.28					0.05	0.05	0.05	0.05	0.35	0.35	3.55	3.55
	Logan	40083	0.58	0.59	0.60	0.61	5.77	6.05	6.56	6.93					0.83	0.83	0.83	0.83	2.38	2.38	5.01	5.01
	McClain	40087	0.65	0.65	0.66	0.67	4.13	4.23	4.44	4.69					0.33	0.33	0.33	0.33	0.73	0.73	0.73	0.73
	Oklahoma	40109	16.08	16.17	16.30	16.39	200.0	211.8	234.3	253.8	497.3	489.5	360.9	276.5	2.17	2.17	2.17	2.17	1.54	1.42	6.30	6.30
	Pottawatomie	40125	1.92	1.93	1.95	1.97	9.87	10.27	11.13	11.80					1.18	1.18	1.18	1.18	2.62	2.62	2.62	2.62
	Subtotal		**24.5**	**24.7**	**24.9**	**25.0**	**309.2**	**327.2**	**361.2**	**391.1**	**497.3**	**489.5**	**360.9**	**276.5**	**7.1**	**7.1**	**7.1**	**7.1**	**9.9**	**9.8**	**20.5**	**20.5**
Tulsa MSA	Creek	40037	1.95	1.96	1.99	2.02	8.82	9.05	9.76	10.46					0.81	0.81	0.81	0.81	0.47	0.47	0.47	0.47
	Osage	40113	1.11	1.12	1.13	1.15	10.94	11.54	12.64	13.45					1.11	1.11	1.11	1.11	0.02	0.02	0.02	0.02
	Rogers	40131	4.09	4.11	4.14	4.17	12.16	12.52	13.42	14.26					0.07	0.07	0.07	0.07	6.57	6.57	6.57	6.57
	Tulsa	40143	18.95	19.06	19.22	19.33	204.9	217.1	240.1	259.9	427.1	403.4	283.6	190.2	0.58	0.58	0.58	0.58	8.29	10.50	10.50	10.50
	Wagoner	40145	3.22	3.24	3.27	3.29	8.73	9.00	9.59	10.15					0.15	0.15	0.15	0.15	0.01	0.01	3.12	3.12
	Subtotal		**29.3**	**29.5**	**29.7**	**30.0**	**245.5**	**259.2**	**285.5**	**308.3**	**427.1**	**403.4**	**283.6**	**190.2**	**2.7**	**2.7**	**2.7**	**2.7**	**15.4**	**17.6**	**20.7**	**20.7**

* Link based emissions processed with single county ID code

Tons Per Day

Table 3-32. Summary of total anthropogenic emissions in the Tulsa and Oklahoma MSAs (on-road mobile limited to the link-based network) for 1999, 2002, 2007 and 2012.

		1999	2002	2007	2012
OKC MSA	NOX	191.2	183.9	167.1	135.4
Tulsa MSA	NOX	266.9	226.8	208.3	189.4
OKC MSA	VOC	215.4	224.3	210.1	138.0
Tulsa MSA	VOC	115.6	113.9	104.8	100.5
OKC MSA	CO	848.0	858.2	774.5	720.1
Tulsa MSA	CO	720.0	712.3	622.3	551.8

QUALITY ASSURANCE AND QUALITY CONTROL

The development of the Oklahoma EAC SIP 1999, 2002, 2007 and 2012 emissions inventories included step-by-step quality assurance (QA) and quality control (QC). The EPS2x emissions modeling system provides summary reports to assure no emissions are gained or lost in each step of the modeling of county-level emissions to the gridded hourly speciated inventory needed by the photochemical model.

Once the gridded hourly speciated emissions files have been generated for the episode and each major source category, the PAVE visualization program is used to animate the emissions to identify any anomalies. Although such PAVE animations of the spatial distribution of the emissions are not saved so cannot be included in this report, Figure 3-1 and 3-2 provide example spatial maps of NOx and VOC emissions that give an indication of the types of graphics used in the QA/QC process.

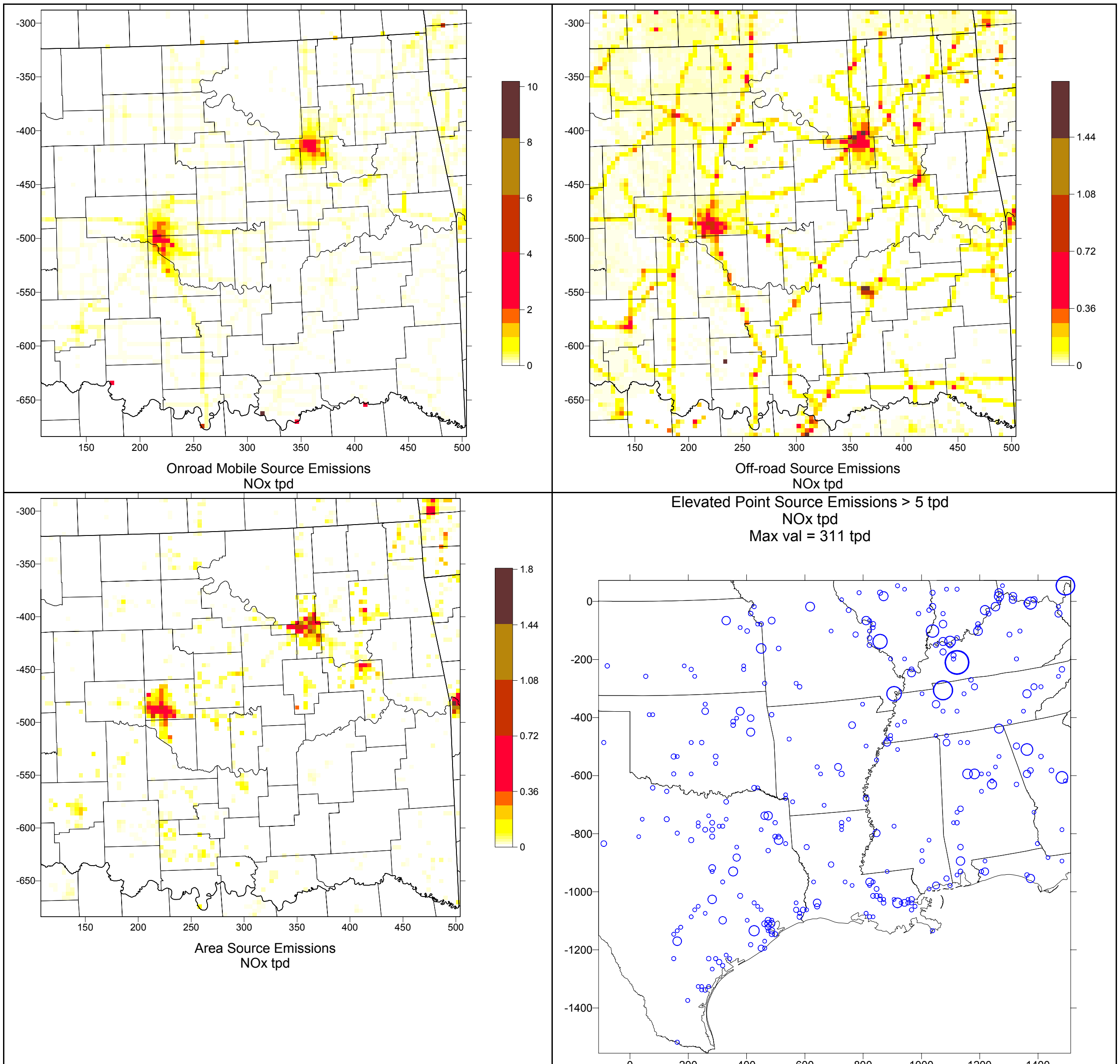


Figure 3-1. Example spatial distribution of NOx emissions for on-road mobile (top left), off-road mobile (top right), area (bottom left) and elevate point (bottom right) sources.

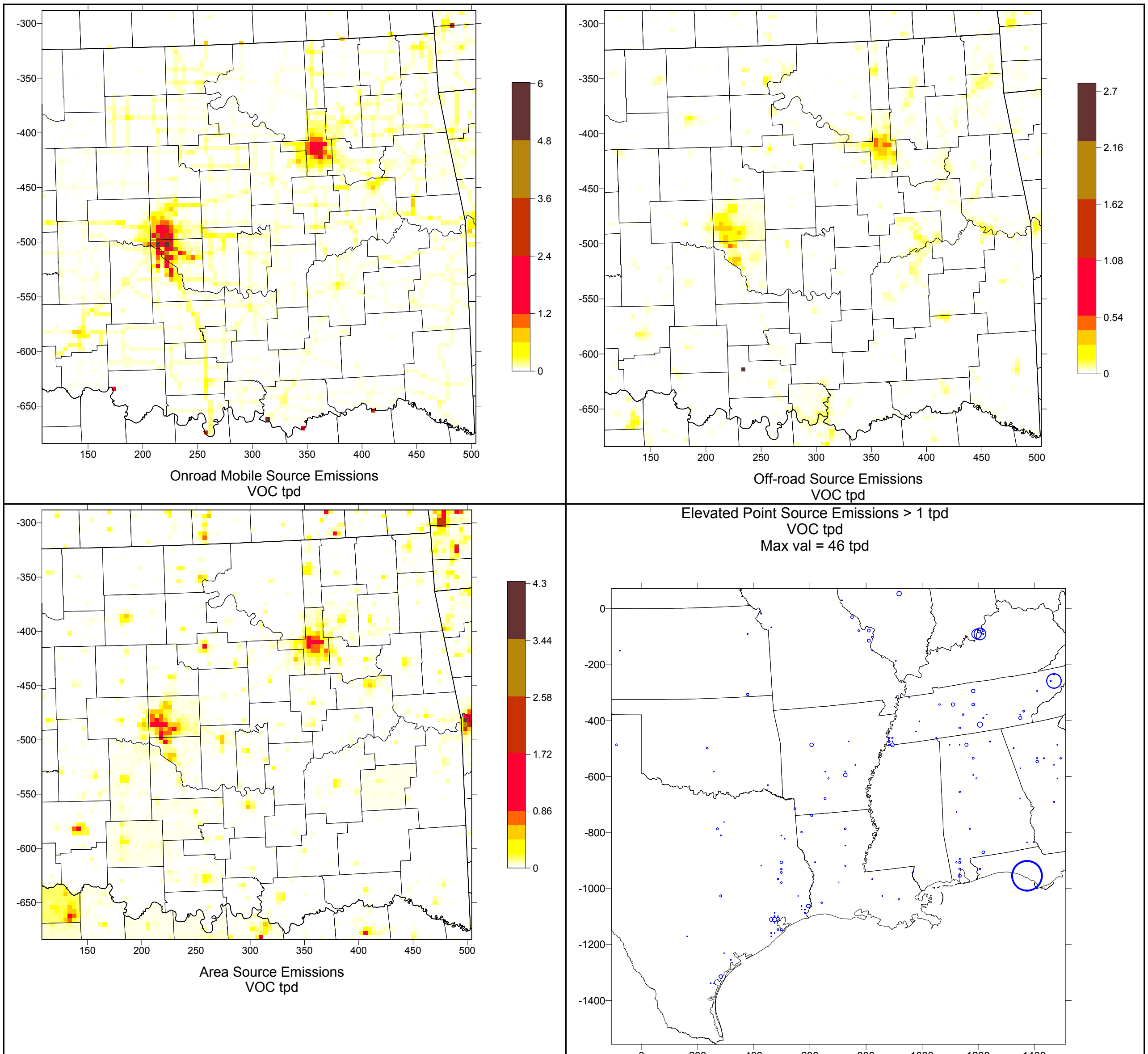


Figure 3-2. Example spatial distribution of VOC emissions for on-road mobile (top left), off-road mobile (top right), area (bottom left) and elevate point (bottom right) sources.

4. MODEL PERFORMANCE EVALUATION FOR THE UPDATED BASE CASE

MODEL PERFORMANCE EVALUATION APPROACH

EPA has published draft 8-hour ozone modeling guidelines (EPA, 1999) that is used as a basis, in part, for judging the adequacy of the Oklahoma August 1999 base case simulation. The EPA 8-hour ozone performance procedures and goals represent an update and refinement of those in the 1-hour ozone modeling guidance (EPA, 1991). As discussed in the Oklahoma 8-hour ozone EAC Modeling Protocol (ENVIRON, 2002), model performance evaluation for a photochemical grid model consists of a series of tests that become more stringent as one moves through the model performance process. We are using the EPA draft 8-hour modeling guidelines performance evaluation procedures (EPA, 1999), metrics and goals to evaluate model performance. These tests focus primarily on ozone model performance in the Oklahoma area.

There are two main components in EPA's draft 8-hour ozone guidance operational ozone model performance: (1) Big Picture Assessment Using Graphics; and (2) Ozone Metrics.

Big Picture Assessment Using Graphics

EPA's draft 8-hour ozone guidance lists four graphic displays that are used to obtain a big picture of model performance:

- Tile plots of observations and predictions: These are used to understand the spatial differences and displacements of the predicted and observed ozone concentrations and to compliment the ozone metrics. For example, an ozone plume that is displaced a little from the ozone monitor may produce very poor ozone metrics but may still be a reliable tool for control strategy evaluation if the correct sources and processes are being simulated to produce accurate peak ozone that is just displaced from the monitor. These plots can be used to assess model performance upwind and downwind of the urban areas to assist in interpreting performance issues due to transport versus local photochemical production.

- Tile plots of differences in observations and predictions: Combined with the tile plots of absolute predicted and observed concentrations above this plot may provide some insight into performance under low and high ozone concentrations. Given the limited ozone network in Oklahoma, the same information from this plot can be obtained by the absolute concentrations plots.

- Scatter plots and quantile-quantile (Q-Q) plots: Scatter plots provide a measure of how well the model is replicating the observed ozone concentrations at or in the vicinity of the monitor. Q-Q plots provide a measure of how well the model is reproducing the frequency distribution of the observed ozone concentrations.

- Time series plots: Time series plots of predicted and observed hourly ozone concentrations provide a stringent test of how well the model replicates the observed hourly ozone at the same time and location as the observed value. Problems with temporal timing in the model are readily apparent in a time series plot.

Ozone Metrics

EPA's draft 8-hour ozone guidance identifies several ozone metrics to be applied to the model along with performance goals that should be met. Table 4-1 lists EPA's performance tests, performance goals and comments on how the model will be tested using these tests in the Oklahoma 8-hour ozone EAC modeling.

Additional Measures of Model Performance

Once the model performance tests listed above are applied, additional performance tests may be applied depending on schedule and resource constraints:

- Comparisons of secondary species (e.g., NO2, NOy, NOx, NOz).
- Comparisons of ozone precursors (NOx , VOC, CO and VOC speciation).
- Comparisons of ratios of co-varying species (VOC or VOC/CO, VOC species/CO, VOC/NOx, etc.).
- Spatially averaged predictions of the above or of primary species.
- Comparison of modeling results with Observation Based Models (OMB) (e.g., CMB, multivariate models, extent parameter, etc.).
- Comparison of weekday versus weekend day effects.
- Ratios of key indicator species (e.g., O3/NOy, O3/NOz, O3/HNO3, H2O2/HNO3).
- Retrospective analysis.

The measurement of precursor species in Oklahoma during the August 1999 episode is extremely limited, so only ozone evaluation is presented.

Table 4-1. EPA's draft 8-hour ozone modeling guidance ozone performance tests and goals and how they are applied (EPA, 1998).

Test(s)	Goals/Objectives	Comment
"bias pred/obs mean 8-hr (& 1-hr) daily maxima near each monitor"[1]	"~20% most monitors (8-hr comparisons only)"[1]	EPA's draft modeling guidance does not define "near each monitor". After discussing this issue with EPA "near" was defined to mean the same block of grid cells near the monitor used in EPA's attachment test (e.g., 7 x 7 for 5 km grid). There are three ways we defined "near" for this metric: (1) Select the <u>maximum</u> predicted daily maximum 8-hr ozone concentrations "near" the monitor; (2) Select the predicted values closest in value to the observed value (<u>best fit</u>) "near" the monitor; and (3) Select the predicted value at the monitor (<u>spatially paired</u>).
"fractional bias pred/obs mean 8-hr (& 1-hr) daily maxima near each monitor"[1]	"~20% most monitors (8-hr comparisons only)"[1]	Define "near" the three ways described above.
"correlation coefficients, all data, temporally paired means, spatially paired means"[1]	"moderate to large positive correlations" [1]	Apply to three data sets described above.
"bias (8-hr daily max and 1-hr obs/pred), all monitors" [1]	"~5-15%"[1]	
"gross error (8-hr daily max and 1-hr obs/pred), all monitors" [1]	"~30-35%"[1]	
Partition data base into upwind, center city and downwind sites and repeat analysis		Get better ideas of level of model agreement based on upwind/downwind stratification and whether there is any obvious pattern of the model performance.
"Scatter plots & Q-Q plots of 8-he and 1-hr metrics"		Applied to three sets of databases listed above.

[1] "Draft Guidance on the use of Models and other Analysis in Attainment Demonstrations of the 8-Hour Ozone NAAQS" (EPA, 1999).

MODEL PERFORMANCE EVALUATION FOR THE REVISED CAMx BASE CASE SIMULATION

As noted above, EPA's draft 8-hour ozone modeling guidance (EPA, 1999) lists several graphical displays of model performance, statistical performance measures and performance goals that should be used in the model performance evaluation. Below we discuss several of these tests of model performance for the Oklahoma Revised Base Case (Run 20) simulation of the August 1999 8-hour ozone episode using the expanded grid (Figure 1-4). These model performance evaluation tests for 1-hour and 8-hour ozone concentrations include the following:

- Spatial maps of estimated ozone concentrations with superimposed observations.
- Scatter plots of predicted and observed ozone concentrations.
- Time series of predicted and observed ozone concentrations.
- Statistical model performance measures compared to performance goals.

Spatial Maps of Estimated and Observed 8-Hour Ozone Concentrations

Attachment A displays the spatial distribution of the predicted and observed daily maximum 8-hour ozone concentrations in the Oklahoma 4 km modeling domain and the August 1999 episode. The spatial maps display colored tile plots of estimated daily maximum 8-hour ozone concentrations along with superimposed observations. Estimated 8-hour ozone concentrations that exceed 84 ppb are indicated by a blue hachured contour. Note that the MM5 model evaluation did suggest some wind direction bias on some days that could affect ozone model performance, thus it is important to examine the spatial plots to help explain the model performance statistics. For example, an error in wind direction may cause in urban ozone plume to impact a monitor that in reality measured background values, whereas the monitor that was in reality impacted by the urban plume is estimated to have background levels. This situation would result in poor model performance statistical measures, but the model may still be correctly simulating urban ozone formation and would provide reasonable control strategy response, just the plume is spatially offset. Spatial maps of ozone concentrations are not displayed for the two initialization days (August 13-14, 1999)

August 15, 1999: Observed elevated ozone of 81-84 ppb occurs at the 3 monitors in Oklahoma City (OKC) and elevated 8-hour ozone values of 78 and 81 ppb are observed at the Tulsa and Skiatook monitors in Tulsa. The estimated 8-hour ozone at the OKC sites are in the 60-70 ppb range and appear to be approximately 10 ppb lower than observed, but do reproduce the observed south-to-north ozone concentration gradient increase. Just north of the OKC monitors is a small cloud of elevated ozone in the 80-85 ppb range suggesting that the elevated ozone may be displayed slightly north from OKC on this day. In Tulsa, the model estimates a sharp south-to-north ozone concentrations gradient that is also reflected in the observed values. The observed 81 ppb peak in Tulsa at the Skiatook monitor is reproduced almost exactly by the model with the model estimated region-wide 8-hour ozone peak of 85 ppb occurring just north of Skiatook.

The observed 8-hour ozone concentrations at two of the southern sites (Burneville and Texoma) on August 15th are reproduced fairly well (~70 ppb), the observed ozone at the Terral (81 ppb) and Lawton (82 ppb) sites immediate south and south-southwest of OKC appear to be underestimated by approximately 10 ppb. This suggests that the OKC ozone underestimation bias is due in part to underestimation of ozone transport from the south.

August 16, 1999: On August 16 the model is estimating areas of high ozone exceeding 80 ppb downwind of OKC, Tulsa and east of Tulsa that is supported by the observations. 8-hour ozone concentrations at the southern OK sites on the Red River are reproduced fairly well. However, the observed 8-hour ozone at the eastern OK site (81 ppb at Tahlequah) is underestimated by the model by approximately 15 ppb. The daily maximum 8-hour ozone performance in Tulsa looks particularly good on this day with the model replicating the south-to-north ozone gradient including the change in 8-hour ozone from below the standard at the Tulsa to above the standard at the Skiatook monitors.

August 17, 1999: On August 17th, 8-hour ozone exceedances are observed in both the OKC and Tulsa areas. The model also estimates 8-hour ozone exceedances that occur in the two urban areas. The southern OK monitoring sites indicates high ozone transport (88-99 ppb) from the south that is underestimated by the model by 10-20 ppb. This underestimation of ozone transport from the south may explain the underestimation of the 8-hour ozone peak at the Goldsby monitor in southern OKC. The observed south-to-north ozone gradient at the three Tulsa sites is replicated very well by the model. The peak observed 8-hour ozone concentration on August 17 was 94 ppb at the Skiatook monitor in Tulsa, whereas the peak estimated 8-hour ozone concentration on this day was also 97 ppb and occurred north of the Skiatook monitor.

August 18, 1999: The estimated winds on August 18 appear to be from the southwest so that the elevated ozone plumes downwind of OKC and Tulsa have a southwest to northeast orientation and miss the monitoring network. Although the estimated 8-hour ozone at the OKC and Tulsa monitoring sites appear to be approximately 10 ppb too low, further downwind (i.e., to the northeast) higher ozone is estimated. Downwind of the Tulsa area to the northeast a peak 8-hour ozone of 109 ppb is estimated that is supported by the 101 ppb observed value at the Tahlequah monitor east of Tulsa. However, in Tulsa and OKC, where high (84-88 ppb) ozone is observed, the modeled ozone is suppressed suggesting that winds may have been too high on this day causing ozone to be formed further downwind, or that there may be more reactivity than estimated (e.g., too little VOCs or too much NOx). As seen for the previous days, ozone upwind of the two Oklahoma areas appears to be underestimated as indicated by the ozone observations at the Lawton and the southern OK monitoring sites.

August 19, 1999: August 19th is a clean out day in Tulsa and OKC where the high observed 8-hour ozone concentrations in the 70-90 ppb range on previous days are replaced by lower observed values of ~55 ppb due to the intrusion of cleaner air under northerly winds. The model reproduces the observed clean ozone conditions of this day quite well. The model estimates values in the 50-60 ppb range in the two urban areas that agree with the observed values. In southern Oklahoma, the relatively higher observed values (63-78 ppb) are also reproduced by the model (60-80 ppb). The estimated elevated 8-hour ozone in excess of 80 ppb in southeastern OK around McAlester cannot be verified due to a lack of monitors in this part of Oklahoma.

August 20, 1999: Although the estimated and observed 8-hour ozone concentrations are slightly higher on August 20th than the previous day, the estimated and observed daily maximum 8-hour ozone (60-70 ppb) are still well below the standard (84 ppb) in the two cities. The model estimates an area of higher (> 80 ppb) ozone between Tulsa and Oklahoma City that can not be verified due to a lack of monitors in this location, but the slightly raised ozone (69 ppb) at the most northern OKC (OSDH) and most southern Tulsa (Glenpool) monitors support the possible presence of such an elevated cloud of ozone.

<u>August 21, 1999</u>: In OKC the observed daily maximum 8-hour ozone is 72-74 ppb, whereas the estimated values at the same location are in the 60-70 range, although higher values (70-80 ppb) occur just north of OKC. Although the model reproduces the south-to-north 8-hour ozone increase in concentration gradient across Tulsa, it is ~ 15 ppb too low at the southern Tulsa monitor and 0-10 ppb too low at the most northerly ozone monitor. The model does a reasonably good job in replicating the observed 8-hour concentration in Tulsa on this day with the peak estimated value (85 ppb) located at the exact same location (Skiatook) as the peak observed value (87 ppb).

<u>August 22, 1999</u>: Both the observations and model estimates exhibit higher ozone in OKC and Tulsa on August 22nd than seen on the previous three days, however the daily maximum 8-hour ozone concentrations appear to be approximately 10 ppb lower than observed at the location of the ozone monitors in the two cities. The model estimates that there is transport from the south that impacts OKC that is verified by the observations at the southern OK monitors, although again the ozone transport appears to be understated. The peak 8-hour ozone in Tulsa (85 ppb) is adjacent to an estimated high ozone area of 80-90 ppb.

<u>August 23, 1999</u>: August 23rd is an important 8-hour ozone day with two monitors each in OKC and Tulsa recording exceedances of the 8-hour ozone NAAQS. The model also estimates that August 23rd is a high 8-hour ozone day in Oklahoma with 8-hour ozone exceedances estimated downwind (north) of both OKC and Tulsa. However, the estimated exceedance areas are displaced north from the monitored exceedance areas. The peak estimated 8-hour ozone concentration on this day is 97 ppb and occurs just north-northeast of the observed peak 8-hour ozone concentration of 99 ppb at the Skiatook monitor. Observed ozone at the southern OK monitors on the Red River are relative lower on this day (57-77 ppb) and the model appears to slightly overstate ozone transport from the south on this date. According to the model, on this day it appears that the OKC urban plume intersects the Tulsa urban plume on August 23rd.

<u>August 24, 1999</u>: August 24th was another "clean out" ozone day for OKC (60-65 ppb) and Tulsa (50-54 ppb) that was reproduced by the model quite well (50-60 ppb and 55-65 ppb). Slightly higher (60-70 ppb) observed and estimated concentrations occurred at the southerly OK monitors, which are also reproduced by the model.

<u>August 25, 1999</u>: On August 25th the highest observed 8-hour ozone concentrations of the episode occurred of 98 ppb at the Glenpool monitor in Tulsa. The model estimates high 8-hour ozone concentrations of 85-90 ppb that occur just south of the Glenpool monitor. The model reproduces the observed 30 ppb north-to-south concentration gradient increase across Tulsa well, but is approximately 10 ppb lower. The OKC 8-hour ozone plume appears to be displaced slightly north of the city center. In general the model is underestimated the observed ozone on this day and appears to take longer to generate high ozone than observed after the previous clean out day.

<u>August 26, 1999</u>: On August 26, 1999 the observed ozone is completely mischaracterized by the model. The observations suggest a low ozone day in the two cities, whereas the model estimates high values. In Tulsa at the Skiatook monitor where a 74 ppb observed 8-hour ozone

concentration occurred, the model estimates values in excess of 95 ppb. The model estimates high ozone transport from the south (>95 ppb) that is not supported by the observations (63-73 ppb). Note that there were also questions concerning the MM5 meteorological model performance on this day that may explain the poorer performance of the air quality model (Jia and Morris, 2003a,b).

August 27, 1999: The model estimates high 8-hour ozone (> 80 ppb) to the north and east of Tulsa on August 27th that cannot be verified or refuted by the observations due to a lack of monitors in these locations. At the three Tulsa ozone monitors, the model is actually reproducing the observed values reasonable well. However, the 8-hour ozone peaks in OKC (49-54 ppb) are overestimated by the model by approximately 10 ppb and ozone at the southern OK monitors is overstated by an even larger amount (20-30 ppb).

August 28, 1999: On August 28th 8-hour ozone exceedances are recorded at the Skiatook (87 ppb) and Tulsa (92 ppb) monitors in Tulsa where the model also estimates 8-hour ozone exceedances. Just west of the Skiatook monitor, a very high estimated 8-hour ozone value of 114 ppb occurs that is likely an overestimation, however there are no monitors in this area to confirm this. At the southerly Tulsa site (Glenpool) the model (60-65 ppb) slightly underestimates the observed value (75 ppb). Over in OKC the model and observations agree that ozone is in the 70-80 ppb range at the monitors, but the model also estimates 8-hour ozone > 80 ppb just north to north-northwest of OKC. Ozone transport from the south, as evident by the southern OK Red River monitors, may be slightly overestimated but is in the "ballpark". The largest model-observed discrepancy on this day occurs at the Tahlequah monitor in eastern OK where the observed 8-hour ozone exceedance of 93 ppb is located next to the model estimated minimum 8-hour ozone concentration of 47 ppb. These reasons for this discrepancy are unclear but if the MM5 southeasterly winds are correct, the high ozone of Tahlequah must be due to out of state transport.

August 29, 1999: Elevated (> 80 ppb) predicted and observed 8-hour ozone concentrations are seen in the Tulsa area on August 29th. Very high (>100 ppb) 8-hour ozone is estimated to occur between the Tulsa and Ponca City monitors that cannot be verified, but the high ozone in Tulsa and Ponca City (80-90 ppb) support the presence of an elevated ozone cloud. The elevated ozone plume from OKC appears to be displaced to the northwest of the city resulting in a substantial (~20 ppb) underestimation bias at the location of the OKC monitors.

August 30, 1999: In the Tulsa area on August 30th the peak 8-hour ozone of 94 ppb at Skiatook is reproduced very well by the model, whereas the maximum 8-hour ozone at Tulsa (91 ppb) and Glenpool (83 ppb) monitors are underestimated by approximately 10 ppb. The modeled 8-hour ozone peak (100 ppb) occurs just northwest of the observed ozone peak (94 ppb) at Skiatook. Again the estimated urban ozone plume for OKC is displaced from the monitors so that even though the model simulates 80-90 ppb ozone in the OKC urban plume, at the location of the monitors in OKC in underestimates by approximately 5-30 ppb.

August 31, 1999: The 15 ppb observed increase in daily maximum 8-hour ozone concentrations from the most southerly to most northerly monitors in Tulsa is reproduced well by the model, but with an approximately 10 ppb underestimation bias. The model underestimates (60-70 ppb) the observed (76-82 ppb) 8-hour ozone at the OKC monitors. The high 8-hour ozone recorded at the Ponca City monitor on this day (90 ppb) is underestimated by approximately 20 ppb. The model estimated 8-hour ozone peak of 91 ppb occurs just north of the observed 8-hour ozone peak of 92 ppb at Skiatook.

<u>September 1, 1999</u>: On the last day of the episode, the state of Oklahoma is estimated to be covered by relatively high (> 70 ppb) 8-hour ozone concentrations with higher values occurring in the south and downwind of the OKC and Tulsa areas. The observations generally agree with the occurrence of the relatively high ozone across Oklahoma along with more elevated values near the two cities. The daily maximum 8-hour ozone values at the Glenpool (79 ppb) and Tulsa (80) monitors are reproduced well, whereas the observed value at the Skiatook monitor (84 ppb) is overestimated by approximately 10 ppb.

EPA 8-HOUR OZONE MODEL PERFORMANCE METRICS AND GOALS

EPA's draft modeling guidance contains 8-hour ozone model performance goals to predict the observed daily maximum 8-hour ozone concentrations near the ozone monitor to within "20% (EPA, 1999). As discussed earlier, near the monitor is defined as the same grid resolution dependent NX by NY array of grid cells centered on the grid cell containing the monitor as used in EPA's 8-hour ozone attainment test (e.g., 7 by 7 array of cells for a 5 km grid). We have defined three approached for selecting the predicted 8-hour ozone concentration "near the monitor" for this performance test:

> <u>Maximum</u> predicted 8-hour ozone concentrations near the monitor (i.e., in the array of cells). This definition is the same as used in EPA's attainment test. However, care must be taken when interpreting the <"20% performance goal; if the modeled 8-hour ozone has an overprediction bias greater than +20% then this may not indicate a poorly performing model. This is because there may be ozone concentration gradients that results in higher ozone away from the monitoring network so a prefect model may not achieve the within 20% performance goal.
>
> <u>Closest</u> predicted 8-hour ozone where the estimated daily maximum 8-hour ozone near the monitors is selected that matches the observed value the best. This performance metric is directly comparable to the <"20% performance goal.
>
> <u>Spatially Paired</u> estimated daily maximum 8-hour ozone at the monitor is compared with the observed value. This is the most stringent definition of "near the monitor" and the <"20% performance goal likely does not apply. But it is a useful and particularly stringent performance metric.

Oklahoma 4 km Domain

We first evaluate the expanded grid revised CAMx Base Case simulation (Run20) ability to reproduce the observed daily maximum 8-hour ozone concentrations during the August 1999 episode near the monitor using the three definitions given above for selecting the predicted concentration to pair with the observation for all Oklahoma monitors in the 4-km Oklahoma grid (see Figure 2-2).

Maximum Predicted 8-Hour Ozone Near the Monitor: Figure 4-1a displays a scatter plot and Quantile-Quantile Plot of predicted and observed daily maximum ozone concentrations for August 13 through September 1, 1999 across all monitors in the Oklahoma 4-km domain using the maximum estimated value near the monitor. Of the 233 valid predicted and observed daily maximum 8-hour ozone pairs, 186 pairs (80%) achieve EPA's <"20% performance goal. Of the 47 predicted/observed daily maximum 8-hour ozone concentrations pairs that fail to achieve the <"20% performance goal, 42 are greater than +20% and 5 are below –20%. Many of the ones greater than +20% occur on August 27, 1999 when the model greatly overestimated the observed ozone concentrations. Note that an overprediction bias (i.e., >+20% bias) using the maximum predicted daily maximum 8-hour ozone concentration near a monitor does not necessarily indicate a misbehaving model as a "perfect" model that exactly agrees with the observations could have a nearby 8-hour ozone concentrations that is 20% or more higher than the observed value. However, the 5 monitor-days that are below –20% using the maximum comparison are a cause of concern. This occurrence, however, is not very frequent (2% of the time) and usually (3 out of 5 monitor days) occurs at the less critical Tahlequah monitor in eastern Oklahoma (see Figure 2-2).

Closest Predicted 8-Hour Ozone Near the Monitor: Using the closest estimated daily maximum 8-hour ozone concentration near the monitor, 97% of the monitor-days achieve EPA's <"20% performance goal (Figure 4-16). Of the 8 monitor-days that do not achieve the <"20% performance goal, 3 overestimate and 5 underestimate the observed value. These occurrences are as follows:

> Tahlequah Monitor -- August 22: The 82 ppb observed 8-hour ozone concentration at the Tahlequah monitor is underestimated by –25% (62 ppb) on August 22, 1999. As seen in Appendix A, the model failed to reproduce a region-wide build up of ozone on this day that led in part to the underestimation tendency.
>
> Tulsa Monitor – August 25: On this day the model is estimating an ozone suppression at the Tulsa monitor (observed value of 65 ppb near the monitor), whereas the monitors records an 84 ppb observed value so a –23% bias value occurs that lies outside of EPA's <"20% performance goal.
>
> Burneville Monitor – August 26: As seen in Appendix A, the model estimates very high ozone transport from the south coming across the Oklahoma/Texas state line around the Burneville monitor on this day. This feature results in the 63 ppb observed daily maximum 8-hour ozone concentration being overestimated by the model by approximately 36%.
>
> Terral and Burneville – August 27: These two southern OK Red River monitors measure low (49 ppb) daily maximum 8-hour ozone concentrations on this day that are overestimated by 66% and 42% (see Appendix A).
>
> Tahlequah – August 28: A very high 93 ppb daily maximum 8-hour ozone concentration is observed at the Tahlequah monitor in eastern Oklahoma that is underestimated by the model by –38% on August 28. The reasons for this underestimation are unclear as the MM5 winds are clearly from the southeast on this day, which if true would mean the high ozone at Tahlequah must be due to transport from out of state.

Tahlequah – August 29: The 76 ppb observed daily maximum 8-hour ozone concentration at Tahlequah on August 29 is underestimated by –27%. Again the MM5 winds are from the southeast suggesting that the high ozone may be due to transport or that the model's inability to reproduce the observed value is due to incorrect wind fields.

Goldsby Monitor – August 30: The 89 ppb observed daily maximum 8-hour ozone concentration at the OKC Goldsby monitor is underestimated by –23% on August 30.

Thus, of the 8 monitor-days (3% of the monitor-days) that do not achieve the <"20% performance goal, only one monitor-day each occurs at any of the key Tulsa or Oklahoma City monitors. With 97% of the monitor-days achieving the <"20% performance goal using the closest estimated ozone near the monitor, it is reasonable to conclude that EPA's within ~20% performance goal is being achieved at most monitors.

Spatially Paired Predicted 8-Hour Ozone Near the Monitor: Figure 4-1c displays a scatter plot of predicted and observed daily maximum 8-hour ozone concentrations using the spatially paired predicted value at the monitor. As noted above, this is a particularly strict definition of EPA's 8-hour ozone guidance "near the monitor". Even with this most stringent test, the 8-hour ozone predictions for the Oklahoma Run20 Base Case simulation for the expanded grid achieves EPA's <"20% performance goal for 75% of the monitor-days. Thus, even with this most strict interpretation of "near the monitor" it can be argued that EPA's performance goal is being met at most monitors.

Tulsa MSA Monitors

Maximum Predicted 8-Hour Ozone Near the Monitor: Figure 4-2a displays the scatter plot and Q-Q plots comparing the predicted and observed daily maximum 8-hour ozone concentration near the monitor using the maximum predicted value. Of the 60 monitor-days in the Tulsa area, 77% agree to within EPA's "20% performance goal. Of the 14 monitor-days in Tulsa that exceeded this goal, 13 were greater than +20%, which, as noted above, is not necessarily a cause for concern. The one monitor-day with the maximum estimated 8-hour ozone near a monitor that was below –20% was –23% and occurred at the Tulsa monitor on August 25, 1999 that is discussed above.

Closest Predicted 8-Hour Ozone Near the Monitor: Using the closest estimated daily maximum 8-hour ozone concentrations near the monitor in the Tulsa MSA, 98% of the monitor-days estimated 8-hour ozone concentrations achieved the within "20% EPA performance goal (Figure 4-2b). The one monitor-day that failed to achieve the performance goal just barely failed at –23% and occurred at the Tulsa monitor on August 25th.

Spatially Paired Predicted 8-Hour Ozone Near the Monitor: Of the 60 monitor-days predicted and observed 8-hour ozone pairs in the Tulsa area during the August 1999 episode, 14 monitor-days (23%) failed to achieve EPA's within "20% performance goal using the most stringent spatially paired test (Figure 4-2c). Of the 14 days that failed the <"20% test, 9 were extremely close, within <"25%. Thus even for the more stringent spatially paired test, a majority (77%) of the monitor-days estimated 8-hour ozone concentrations are within <"20%, and a vast majority (92%) are within <"25%.

Oklahoma City MSA Monitors

Maximum Predicted 8-Hour Ozone Near the Monitor: 76% of the maximum estimated daily maximum 8-hour ozone concentrations near the monitor are within "20% of the observed value with 13 monitor-days overstated and 1 monitor-day understated (Figure 4-3a). The one monitor-day that is understated is August 30th at the Goldbsy monitor where the 89 ppb observed 8-hour ozone value is underestimates by –23%.

Closest Predicted 8-Hour Ozone Near the Monitor: Using the closest estimated 8-hour ozone value near the monitor, 98% of the monitor days are within "20% of the observed value with the one monitor-day exceeding EPA's performance goal being Goldsby on August 30th that is discussed above (Figure 4-3b).

Spatially Paired Predicted 8-Hour Ozone Near the Monitor: Using the spatially paired estimated 8-hour ozone at the monitor, a majority (72%) of the estimated values were within "of the observation (Figure 4-3c).

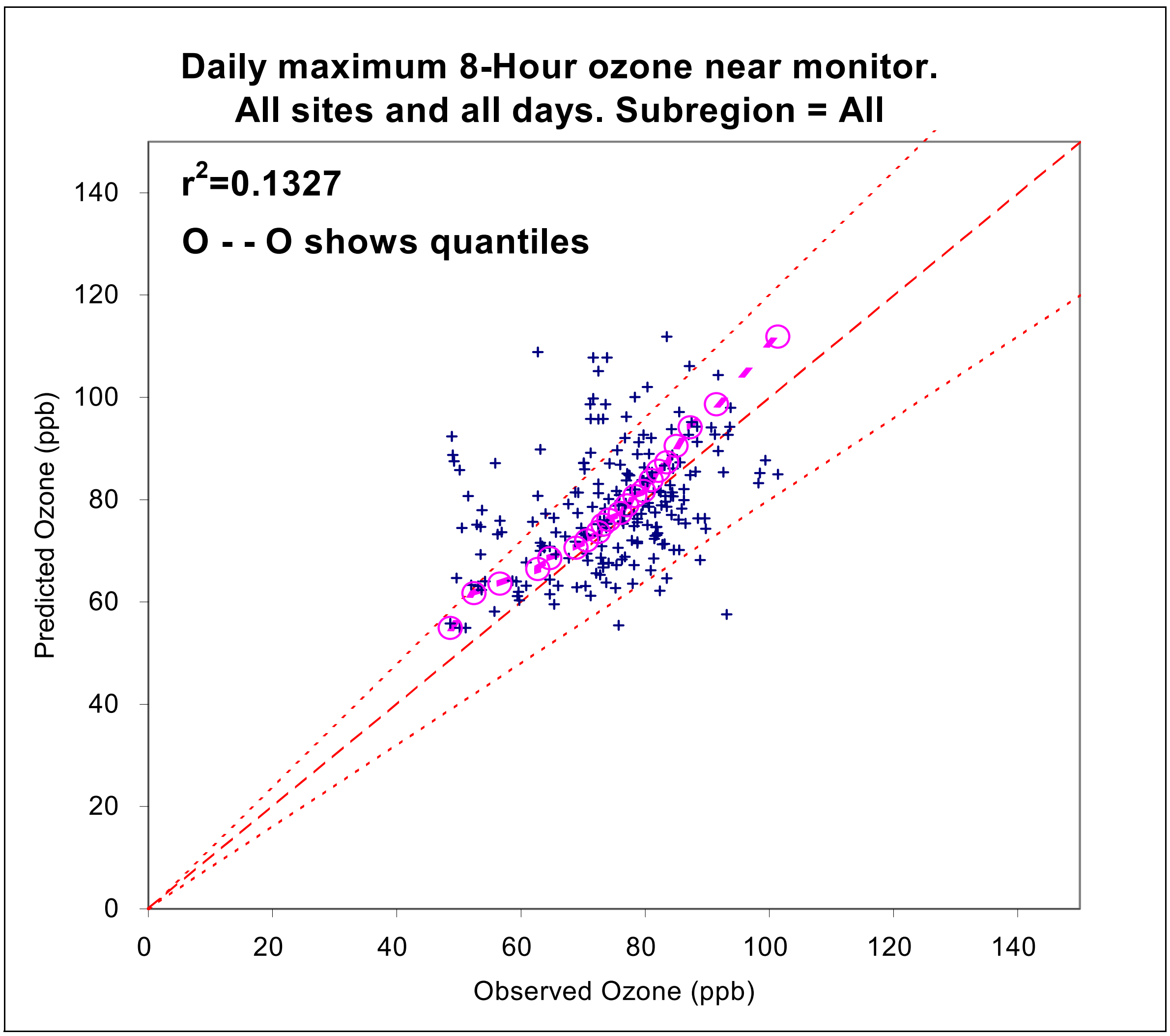


Figure 4-1a. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the maximum estimated value near the monitor (expanded domain Run20 Base Case).

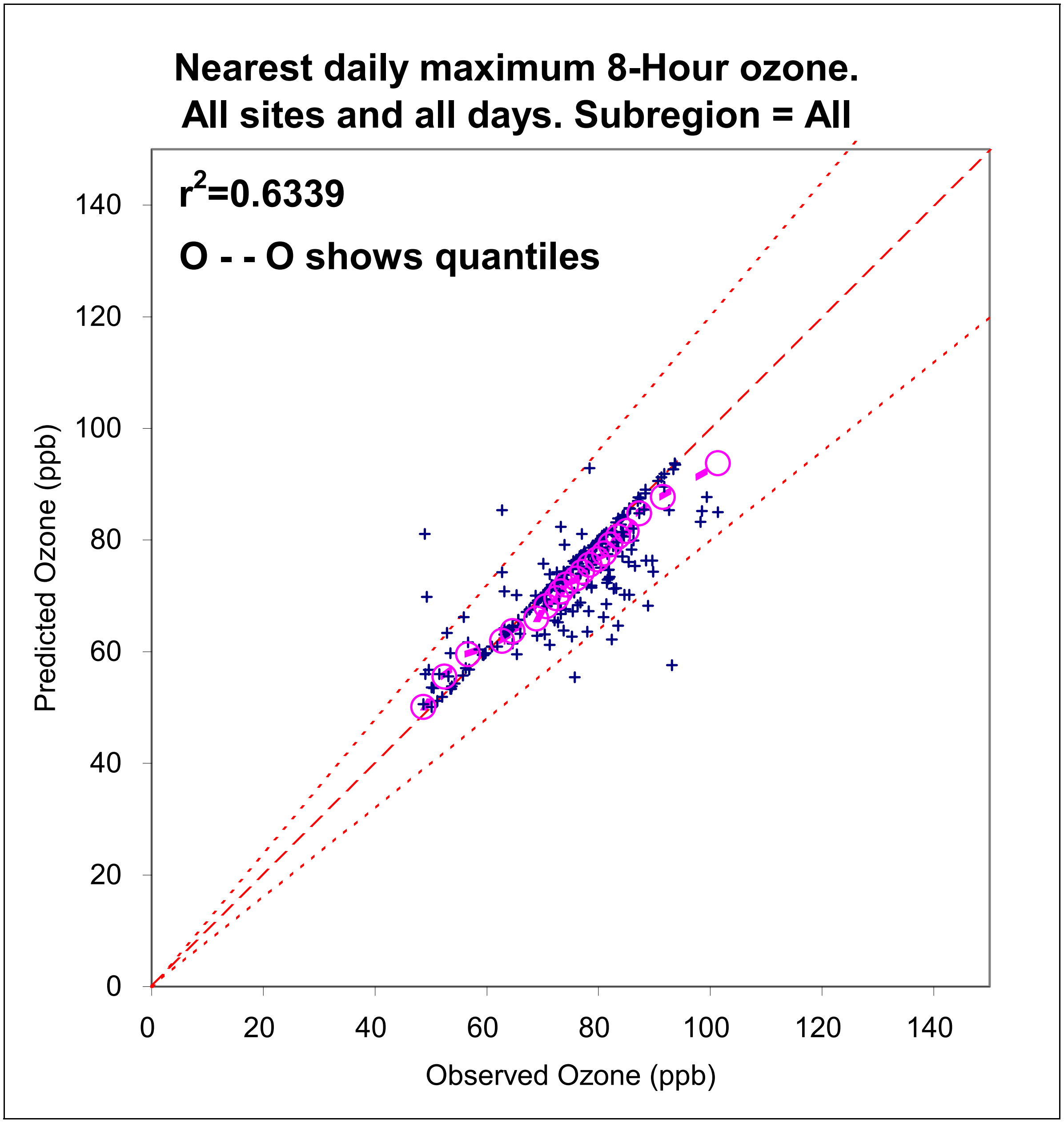


Figure 4-1b. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the closest estimated value near the monitor (expanded domain Run20 Base Case).

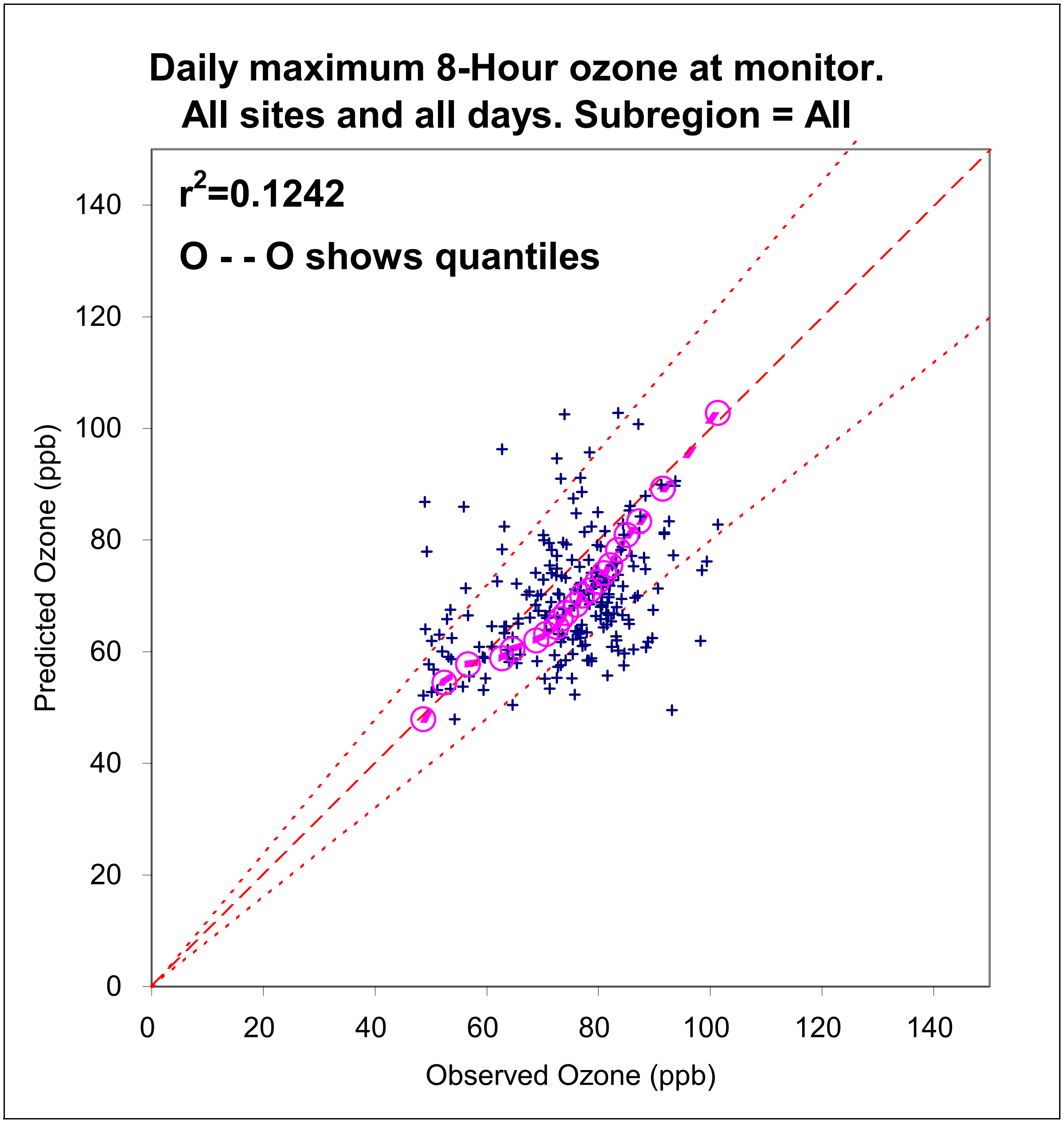


Figure 4-1c. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the spatially paired estimated value near the monitor (expanded domain Run20 Base Case).

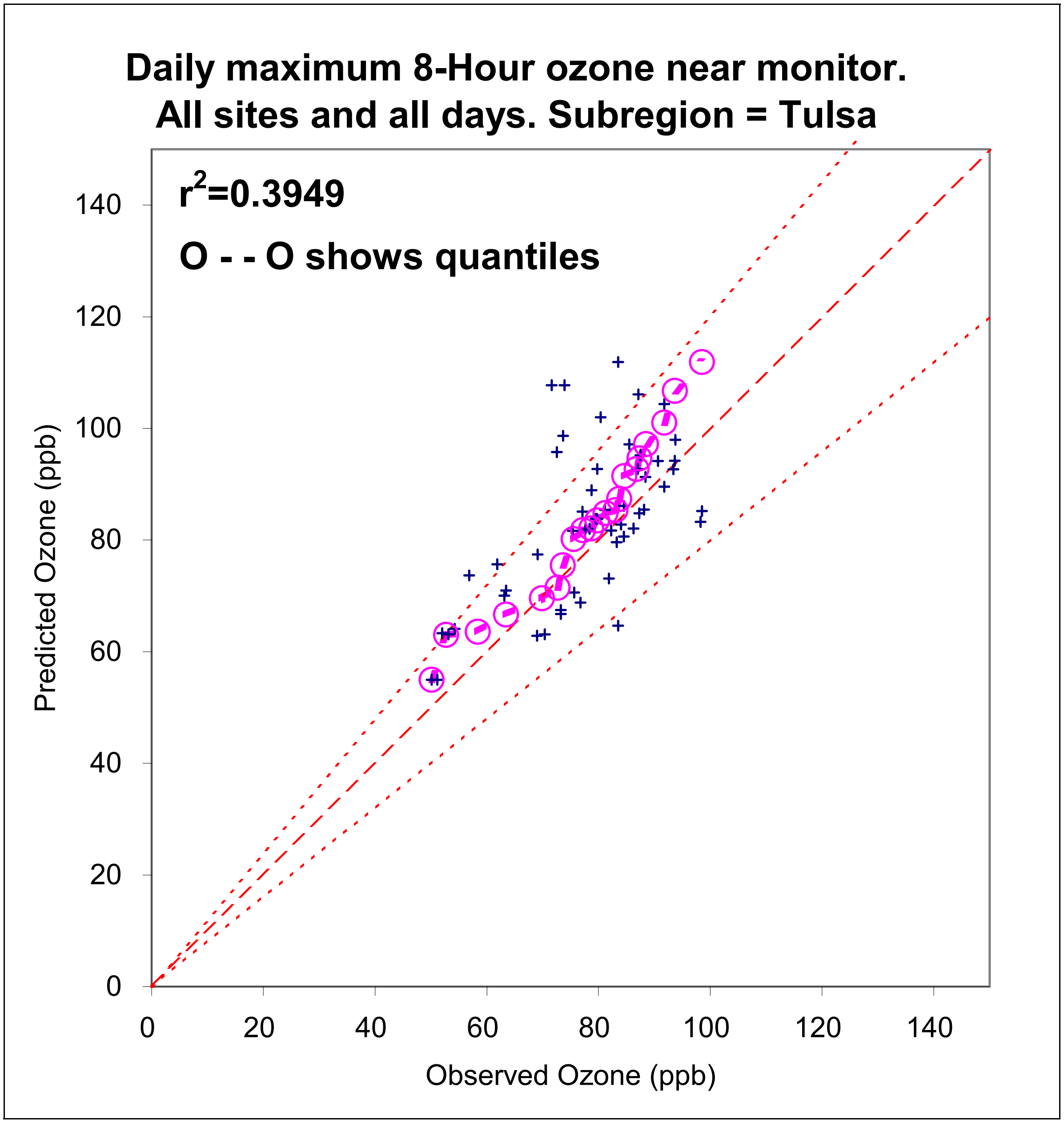


Figure 4-2a. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Tulsa MSA domain using the maximum estimated value near the monitor (expanded domain Run20 Base Case).

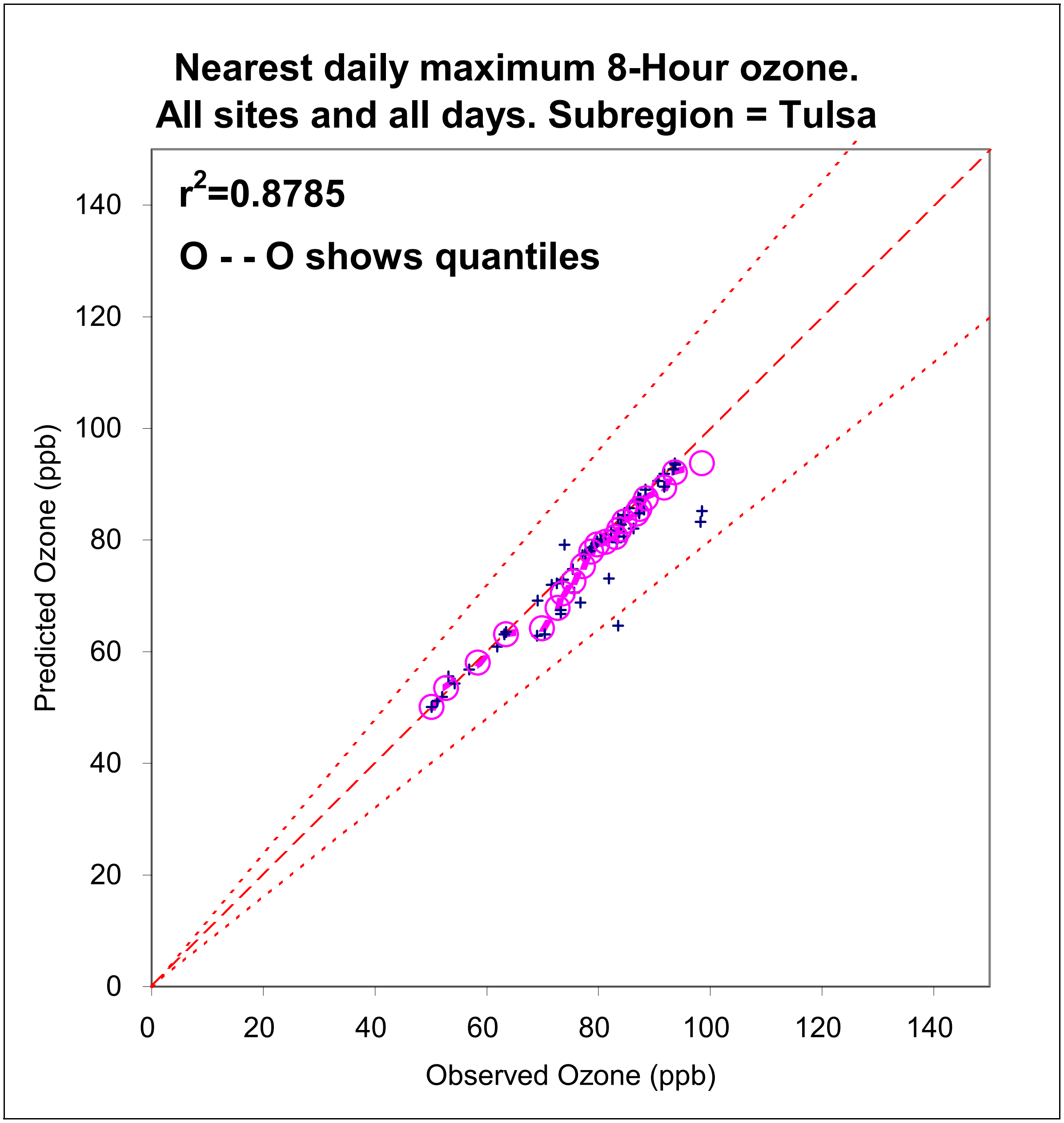


Figure 4-2b. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Tulsa MSA domain using the closest estimated value near the monitor (expanded domain Run20 Base Case).

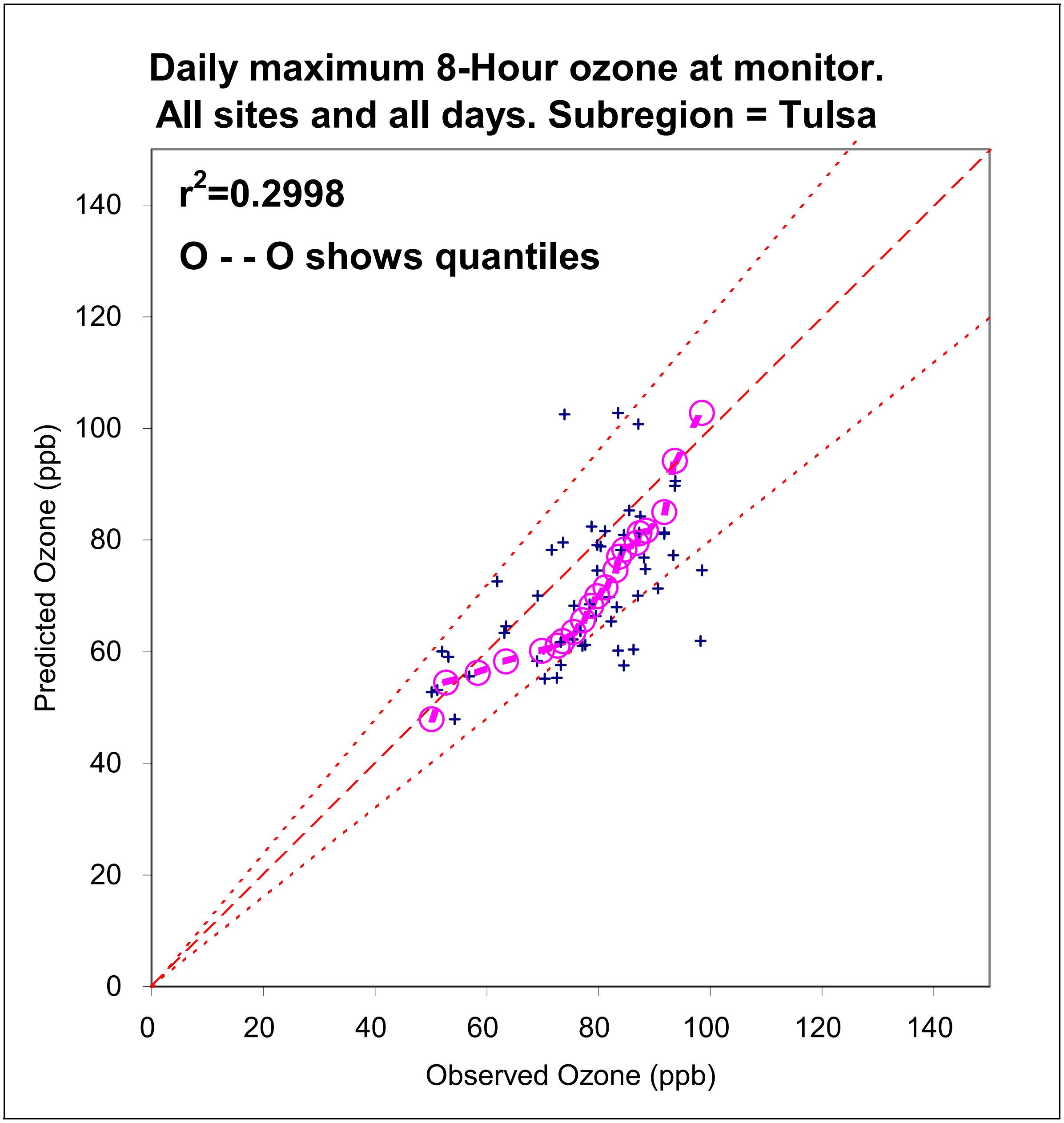


Figure 4-2c. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Tulsa MSA domain using the spatially paired estimated value near the monitor (expanded domain Run20 Base Case).

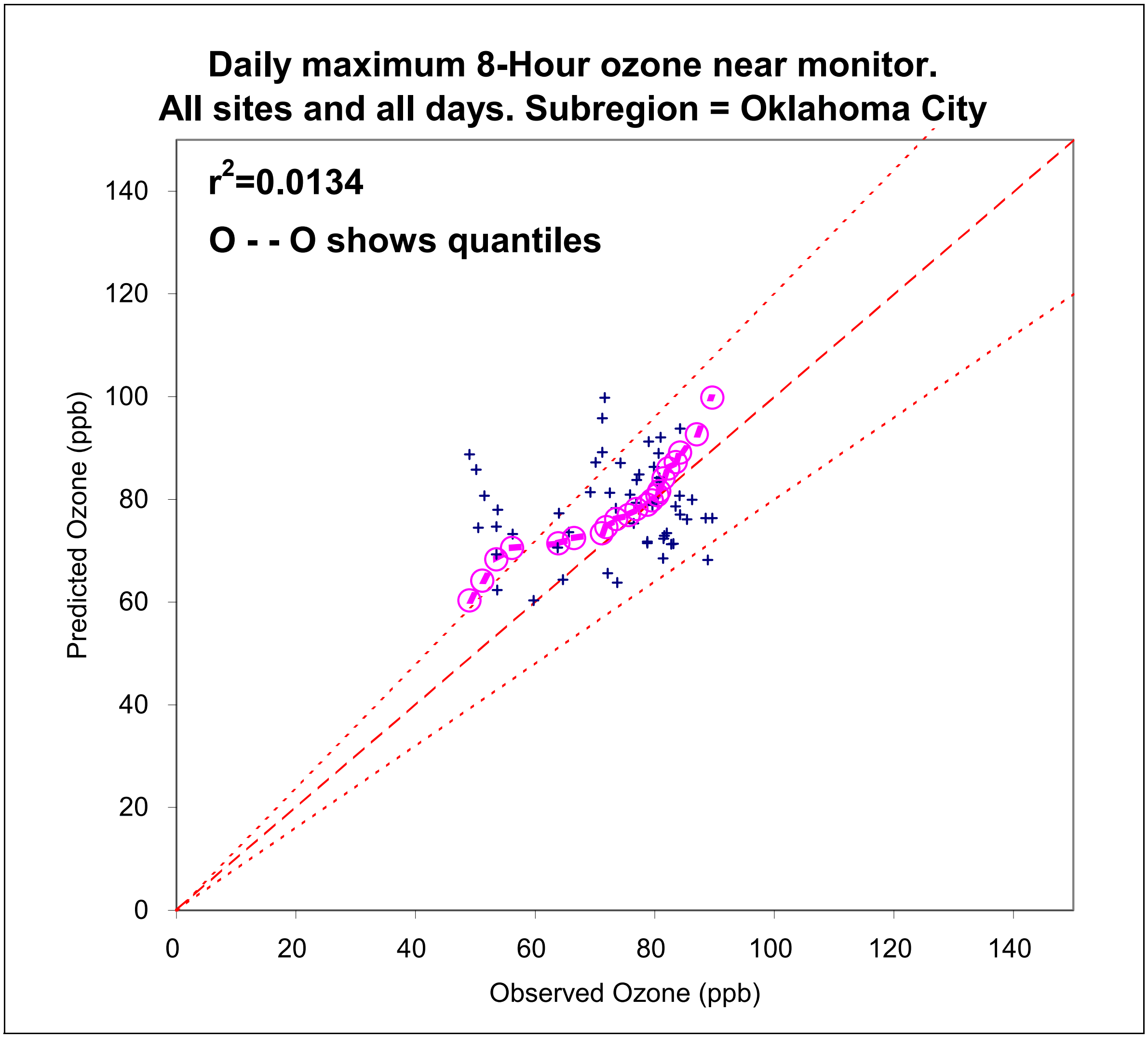


Figure 4-3a. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma City MSA domain using the maximum estimated value near the monitor (expanded domain Run20 Base Case).

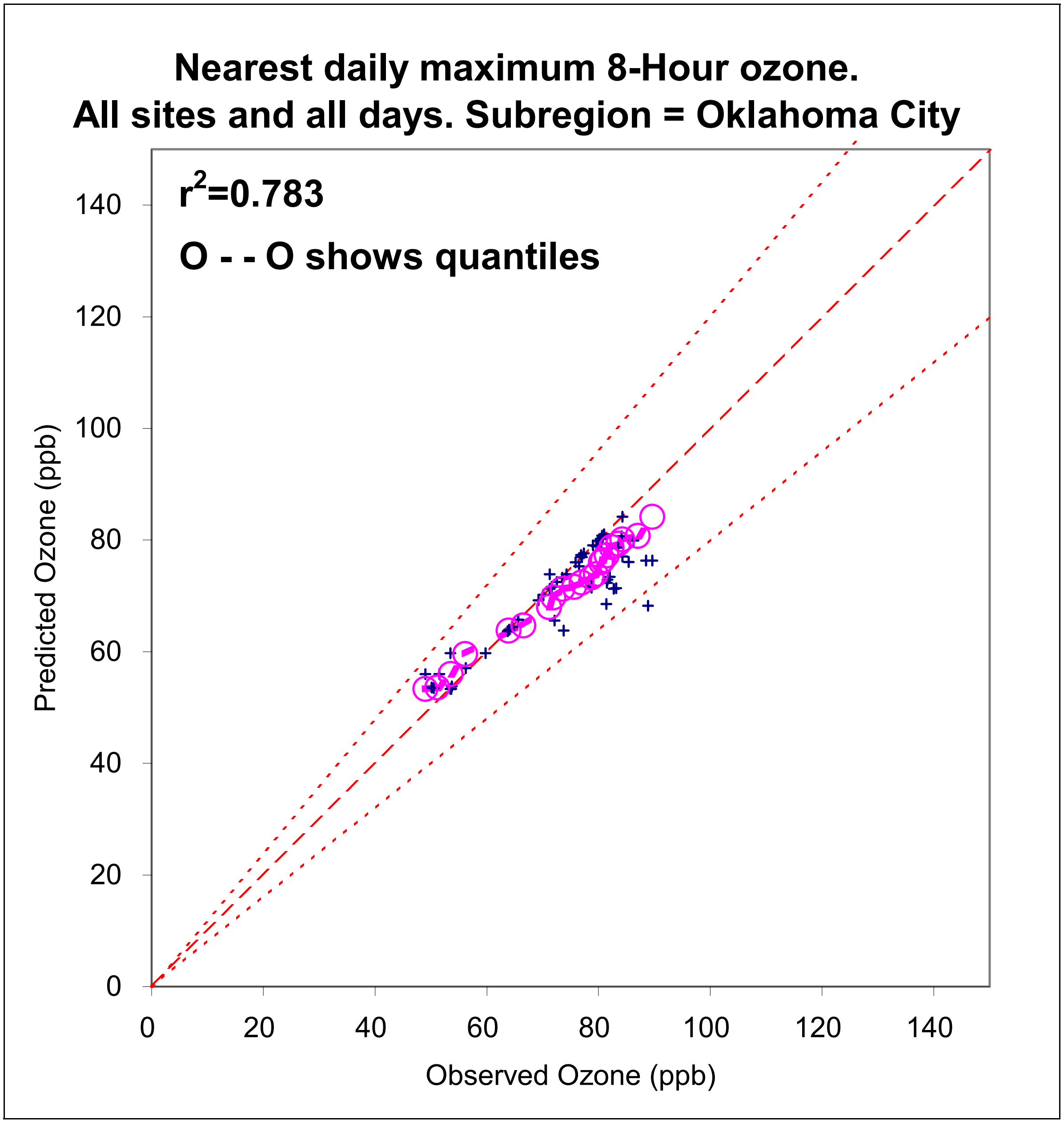


Figure 4-3b. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma City MSA domain using the closest estimated value near the monitor (expanded domain Run20 Base Case).

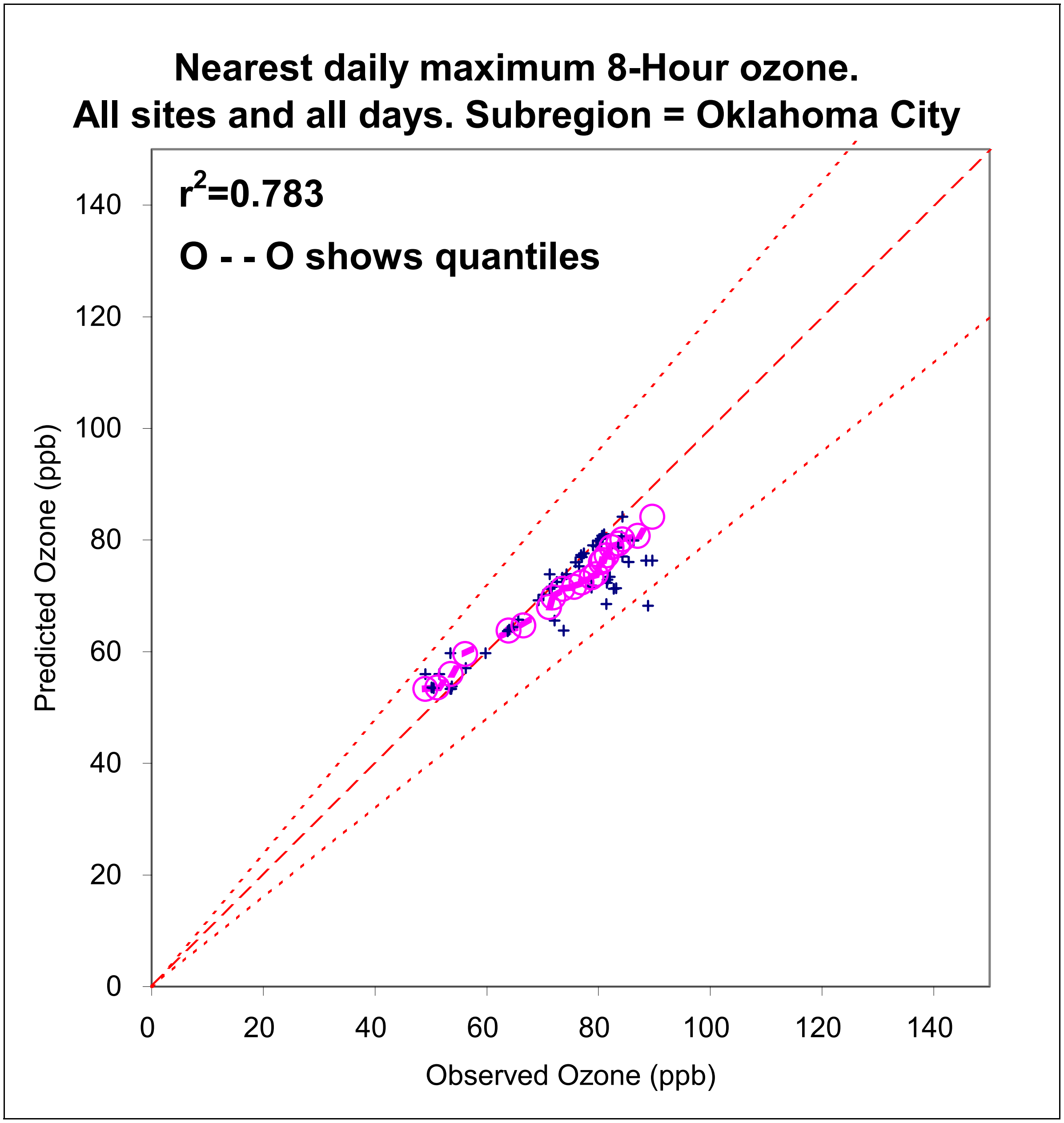


Figure 4-3c. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma City MSA domain using the spatially paired estimated value near the monitor (expanded domain Run20 Base Case).

INDIVIDUAL MONITOR SCATTER AND Q-Q PLOTS

Appendix C displays scatter plots and quantile-quantile plots of observed and predicted daily maximum 8-hour ozone concentrations near the Tulsa and Oklahoma City monitors using the maximum, closest (Nearest) and Spatially Paired Model prediction near the monitor. The individual monitor scatter and Q-Q plots reinforce the finding that the model is performing better in the Tulsa area than the Oklahoma City areas. Model performance at the Skiatook monitor is quite good, even using the most stringent spatially paired comparison. Model performance at the Tulsa and Glenpool monitors is also fairly good. Even the model performance at the Oklahoma City monitors satisfy the <"20% performance goal, although the spatially paired comparisons indicated an underestimation tendency for the highest observed ozone at the monitor.

8-HOUR PERFORMANCE STATISTICS

EPA's draft 8-hour ozone guidance suggests daily maximum 8-hour ozone concentration performance goals of <"15% and <35% for bias and gross error, respectively. Below we list 8-hour ozone performance statistics for each day of the August 1999 episode across the Oklahoma 4 km grid and then in the Tulsa and Oklahoma City subregions using the closest and spatially paired match of estimated 8-hour ozone concentrations with the observed values. Note that we do not present summary model performance measures for the maximum paired data as it can be misleading when overestimations are suggested for the reasons given previously.

Oklahoma 4 km Grid Domain

<u>Closest Daily Maximum 8-Hour Ozone Concentrations</u>: Table 4-2a summarizes daily maximum 8-hour ozone model performance statistics for normalized and fractional bias and gross error across the Oklahoma 4 km domain for each day of the August 1999 episode and the revised base case simulation (Run20) using the closest estimated daily maximum 8-hour ozone value to the observation that is in the vicinity of the monitor. The 8-hour ozone bias and error statistics are compared with EPA's <"15% and <35% performance goals (EPA, 1991; 1999). Using the closest comparison of model estimates with observations, all days of the August 15 to September 1, 1999 episode achieves EPA's performance goals for both normalized and fractional bias and error.

<u>Spatially Paired Daily Maximum 8-Hour Ozone Concentrations</u>: The normalized and fractional error values for daily maximum 8-hour ozone using the spatially paired comparisons meet EPA's performance goals for all episode days (Table 4-2b). Of the 4 of 18 days that the spatially paired bias fails to meet EPA's <"15% (performance measures that fail to meet EPA's goals are shaded in Table 4-2), two days have either a fractional bias (-15.7% on August 25) or normalized bias (+15.2% on August 28) that just barely exceed the <"15% performance goal, with the other bias measure achieving it. However, two of the other days during the episode exhibit bias performance that exceed EPA's goal by a wider margin using both bias measures (August 29 with a 18% and 24% overprediction and September 1 with a –17% and –20% underprediction).

Spatially Paired Running 8-Hour Ozone Concentrations: Figure 4-4 displays 8-hour ozone model performance in the Oklahoma 4 km domain using spatially and hourly paired running 8-hour ozone concentrations for the expanded domain Oklahoma Base Case (Run20) simulation. EPA has a unpaired peak performance measure for 1-hour ozone of within "20%. This performance goal is met by the unpaired 8-hour ozone peak comparisons across the Oklahoma 4 km grid for 18 of the 20 days in Figure 4-4. The estimated 8-hour ozone peaks in Oklahoma on August 26 and 29 exceeded the observed 8-hour ozone maximum by over 20%. EPA's <"15% performance goal for normalized bias and hourly ozone (EPA, 1991) is met in 17 of the 20 days studies for running 8-hour ozone. Days that the "15% bias goal is exceeded are August 25 (-18.1%), August 27 (15.5%) and August 31 (-16.1%).

Table 4-2a. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 8-hour ozone episode, the Oklahoma 4 km domain, and the Run20 base case simulation using the closest estimated value near the monitor and the Oklahoma 4 km domain.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	58.15	56.60	-2.18	-2.30	2.93	3.04
Aug 16	60.74	58.95	-2.68	-2.86	3.07	3.24
Aug 17	76.67	72.37	-5.52	-5.82	5.52	5.82
Aug 18	78.74	76.63	-2.66	-2.85	2.76	2.95
Aug 19	87.57	84.58	-3.29	-3.42	3.31	3.44
Aug 20	80.84	78.84	-2.06	-2.20	2.34	2.48
Aug 21	59.26	60.84	2.64	2.48	3.09	2.92
Aug 22	64.01	63.46	-0.81	-0.86	1.42	1.46
Aug 23	74.74	70.85	-5.18	-5.48	5.49	5.79
Aug 24	82.91	77.30	-6.77	-7.27	6.87	7.37
Aug 25	79.61	72.55	-7.87	-8.64	11.38	11.98
Aug 26	60.76	60.60	-0.22	-0.22	0.54	0.54
Aug 27	76.35	71.12	-6.41	-6.94	6.46	7.00
Aug 28	64.12	66.59	4.59	3.87	7.47	7.00
Aug 29	59.80	66.74	14.14	11.69	16.38	14.02
Aug 30	77.74	75.05	-2.78	-3.56	4.42	5.15
Aug 31	79.76	76.21	-4.54	-5.06	5.52	6.02
Sep 1	81.83	76.52	-6.35	-6.86	6.35	6.87

Table 4-2b. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run5 base case simulation using the spatially paired estimated value near the monitor and the Oklahoma 4 km domain.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	58.15	52.39	-9.08	-10.00	10.90	11.78
Aug 16	60.74	57.32	-4.71	-5.56	11.25	11.66
Aug 17	76.67	67.20	-12.07	-13.28	13.01	14.20
Aug 18	78.74	71.78	-8.83	-9.49	9.12	9.77
Aug 19	87.57	76.86	-12.14	-13.27	12.14	13.27
Aug 20	80.84	72.49	-9.88	-10.52	9.88	10.52
Aug 21	59.26	63.57	7.64	7.06	8.45	7.88
Aug 22	64.01	62.35	-2.52	-2.67	3.79	3.93
Aug 23	74.74	65.48	-12.27	-13.59	13.60	14.87
Aug 24	82.91	72.01	-13.17	-14.59	14.02	15.42
Aug 25	79.61	67.88	-12.47	-15.67	23.59	25.62
Aug 26	60.76	57.64	-4.92	-5.34	6.81	7.19
Aug 27	76.35	63.27	-16.06	-18.18	16.12	18.24
Aug 28	64.12	73.20	15.20	12.30	21.74	19.66
Aug 29	59.80	71.43	23.50	18.10	30.21	25.59
Aug 30	77.74	75.92	-1.28	-3.06	13.32	14.38
Aug 31	79.76	70.50	-11.39	-13.35	16.21	17.86
Sep 1	81.83	67.49	-17.23	-19.54	17.36	19.67

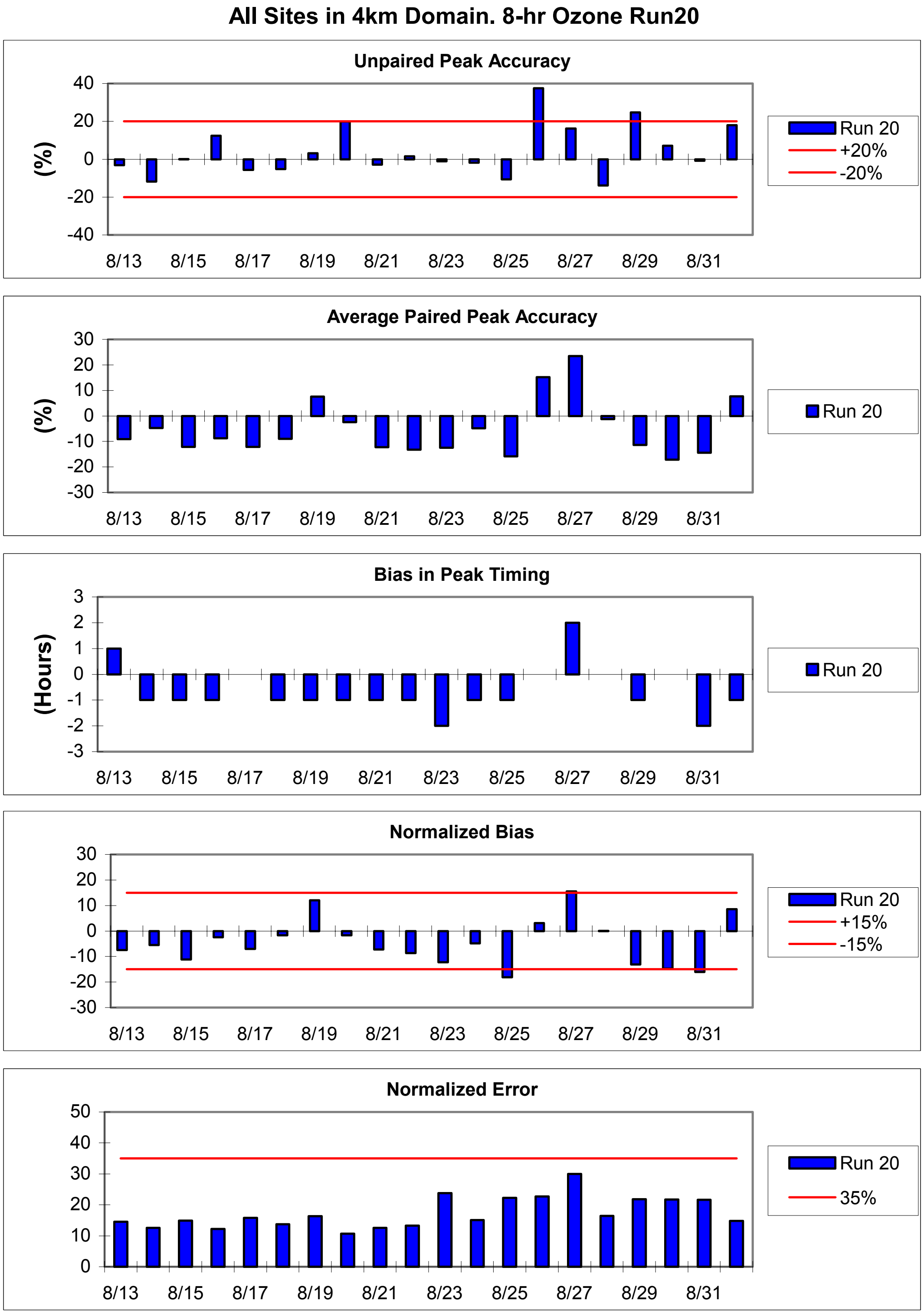


Figure 4-4. Summary of running 8-hour ozone model performance statistical measures for the Oklahoma 4 km modeling domain using spatially paired comparisons.

Tulsa MSA Subregion

Closest Daily Maximum 8-Hour Ozone Concentrations: Table 4-3a displays the daily maximum 8-hour ozone performance statistical measures of bias and error in the Tulsa MSA using the closest estimated ozone to the observed value near the monitor. With the exception of August 27th, that exhibits normalized and fraction bias values of –16% and –17%, respectively, the remaining 17 episode days of the episode achieve EPA's <"15% and <35% performance goals for bias and error.

Spatially Paired Daily Maximum 8-Hour Ozone Concentrations: Using the spatially paired bias and error measures for daily maximum 8-hour ozone in the Tulsa MSA, 3 of the 18 days exhibited bias values that were lower than –15% with all episode days achieving the <35% performance goal for error (Table 4-3b). The September 1st fractional bias (-15.8%) just barely exceeds EPA's <"15% performance, whereas the normalized bias on this day (-14.4%) just barely achieves EPA's bias goal. The other two days that exceed EPA's <"15% bias goal using the spatially paired measures for daily maximum 8-hour ozone were August 25 and 27, 1999; both of these days exhibited an underprediction bias that exceeded EPA's bias performance goal by a fairly wide margin (-23% to –32%).

Spatially Paired Running 8-Hour Ozone Concentrations: Performance measures for spatially paired predicted and observed running 8-hour ozone concentrations are shown in Figure 4-5. Of the 20 modeling days, 5 days exceeded the <"15% goal (August 15, 23, 25, 27 and 31) with each of the five days exhibiting an underprediction bias.

Table 4-3a. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 8-hour ozone episode, the Tulsa MSA subregion and the Run20 base case simulation using the closest estimated value near the monitor and the Oklahoma 4 km domain.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	44.25	44.74	1.18	1.16	1.18	1.16
Aug 16	54.96	55.19	0.49	0.48	0.64	0.64
Aug 17	76.38	73.88	-3.54	-3.73	3.54	3.73
Aug 18	80.09	78.43	-2.18	-2.26	2.31	2.39
Aug 19	88.92	88.69	-0.26	-0.26	0.34	0.34
Aug 20	86.84	85.77	-1.23	-1.25	1.73	1.75
Aug 21	54.00	54.76	1.42	1.39	1.64	1.60
Aug 22	65.23	65.27	0.06	0.06	0.07	0.07
Aug 23	80.00	77.18	-3.66	-3.78	3.66	3.78
Aug 24	82.88	79.77	-3.79	-3.99	3.79	3.99
Aug 25	86.00	78.00	-9.08	-9.59	9.08	9.59
Aug 26	51.84	51.87	0.06	0.06	0.09	0.09
Aug 27	83.58	70.24	-15.60	-17.11	15.60	17.11
Aug 28	74.63	76.38	2.38	2.30	2.70	2.62
Aug 29	69.34	68.67	-1.00	-1.00	1.00	1.00
Aug 30	84.75	84.77	-0.02	-0.02	0.49	0.49
Aug 31	84.08	84.16	0.09	0.09	0.09	0.09
Sep 1	89.21	87.89	-1.57	-1.61	1.57	1.61

Table 4-3b. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run5 base case simulation using the spatially paired estimated value near the monitor and the Tulsa MSA subregion.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	44.25	43.87	-0.48	-0.80	7.16	7.31
Aug 16	54.96	59.85	9.45	8.64	11.84	11.07
Aug 17	76.38	66.00	-14.05	-15.76	14.44	16.14
Aug 18	80.09	71.15	-11.48	-12.48	11.48	12.48
Aug 19	88.92	80.50	-9.33	-9.98	9.33	9.98
Aug 20	86.84	76.61	-11.70	-12.50	11.70	12.50
Aug 21	54.00	58.23	8.11	7.54	9.62	9.07
Aug 22	65.23	65.98	1.14	1.14	1.14	1.14
Aug 23	80.00	68.43	-14.89	-16.32	14.89	16.32
Aug 24	82.88	72.05	-13.15	-14.35	13.15	14.35
Aug 25	86.00	65.57	-23.33	-26.65	23.33	26.65
Aug 26	51.84	51.25	-0.87	-1.18	6.95	7.12
Aug 27	83.58	60.13	-26.81	-31.55	26.81	31.55
Aug 28	74.63	83.09	11.80	9.28	20.20	18.25
Aug 29	69.34	69.18	0.59	-1.03	16.36	16.85
Aug 30	84.75	81.43	-4.40	-5.57	14.82	15.23
Aug 31	84.08	78.15	-6.84	-7.55	6.84	7.55
Sep 1	89.21	76.62	-14.35	-15.83	14.35	15.83

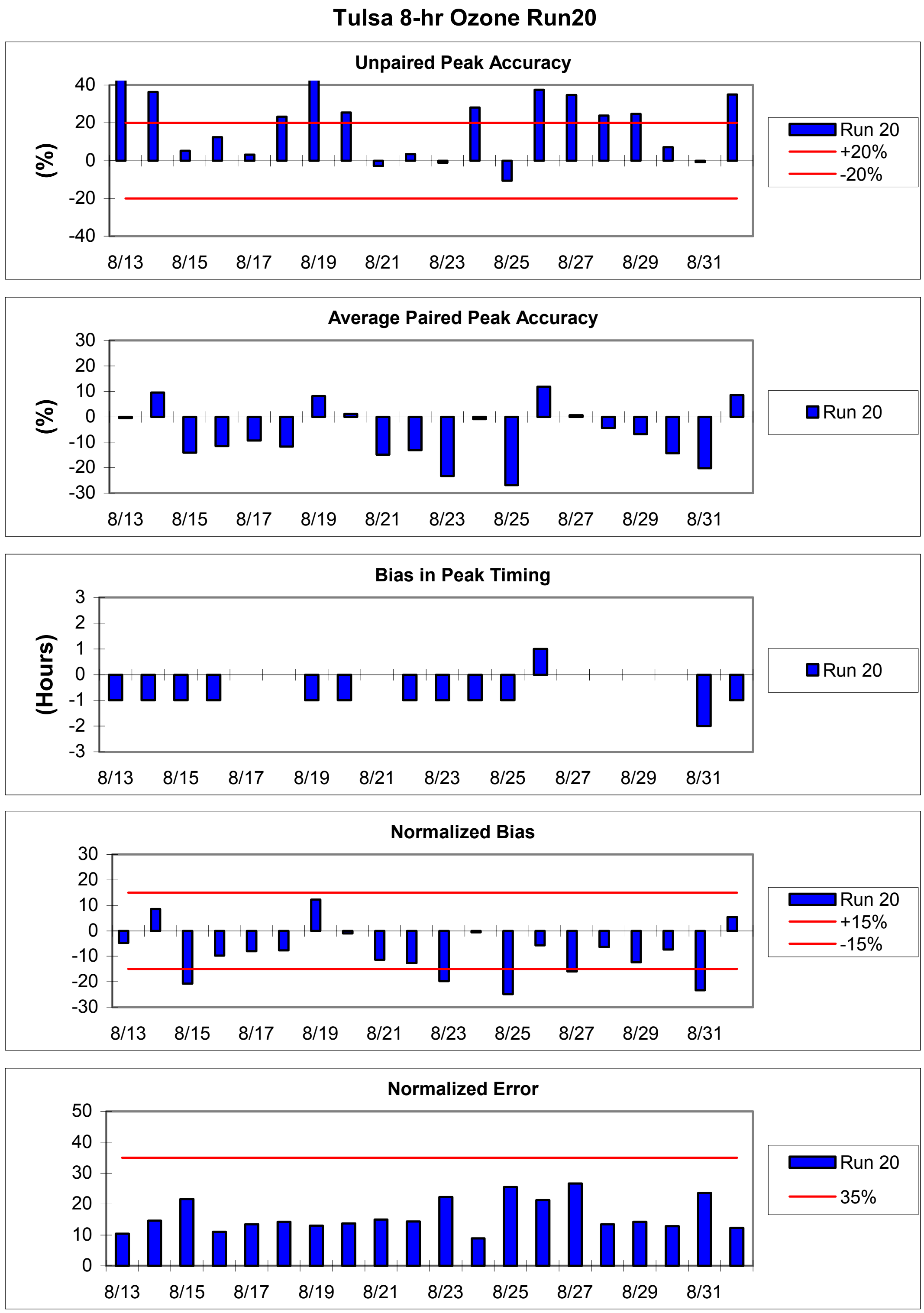


Figure 4-5. Summary of running 8-hour ozone model performance statistical measures for the Tulsa MSA subregion using spatially paired comparisons.

Oklahoma City MSA Subregion

Closest Daily Maximum 8-Hour Ozone Concentrations: Using the closest estimated daily maximum 8-hour ozone value to the observation near the monitor in the Oklahoma City MSA, one day (August 25th) has a fractional bias (-15.3%) that slightly exceeds EPA's bias performance goal, although the normalized bias (-14.2%) just barely achieves it on this day (Table 4-4a). All of the remainder of the days achieves EPA's goals for bias and error using the closest daily maximum 8-hour ozone comparisons.

Spatially Paired Daily Maximum 8-Hour Ozone Concentrations: Using the spatial paired daily maximum 8-hour ozone concentration predicted and observed comparisons, 10 of 18 days have either the normalized bias or fractional bias or both exceeding the <" 15% performance goal; all days achieve the <35% error performance goal (Table 4-4b).

Spatially Paired Running 8-Hour Ozone Concentrations: Looking at running 8-hour ozone performance metrics, the normalized bias for 8 of the 20 modeling days exceed the <" 15% performance goal, whereas only one day exceeded the <35% goal for normalized error (Figure 4-6).

Table 4-4a. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 8-hour ozone episode, the Oklahoma City MSA subregion and the Run20 base case simulation using the closest estimated value near the monitor and the Oklahoma 4 km domain.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	56.42	54.01	-3.89	-4.13	3.92	4.16
Aug 16	61.42	61.43	0.02	0.02	0.26	0.26
Aug 17	82.34	73.85	-10.37	-11.08	10.37	11.08
Aug 18	79.34	79.18	-0.20	-0.20	0.42	0.42
Aug 19	83.75	81.56	-2.54	-2.64	2.54	2.64
Aug 20	75.71	75.87	0.20	0.20	0.20	0.20
Aug 21	53.63	53.47	-0.29	-0.29	0.32	0.32
Aug 22	66.29	66.29	-0.01	-0.01	0.09	0.09
Aug 23	73.13	67.56	-7.62	-8.09	7.62	8.09
Aug 24	84.38	77.24	-8.44	-8.83	8.44	8.83
Aug 25	86.96	74.63	-14.17	-15.25	14.17	15.25
Aug 26	62.71	62.60	-0.17	-0.17	0.17	0.17
Aug 27	79.38	79.03	-0.43	-0.43	0.56	0.56
Aug 28	52.29	54.72	4.77	4.63	4.77	4.63
Aug 29	51.33	57.25	11.57	10.92	11.57	10.92
Aug 30	71.42	71.43	0.01	0.01	0.03	0.03
Aug 31	80.21	71.54	-10.74	-11.39	10.74	11.39
Sep 1	83.63	73.77	-11.39	-12.61	11.39	12.61

Table 4-4b. Daily maximum 8-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run5 base case simulation using the spatially paired estimated value near the monitor and the Tulsa MSA subregion.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	56.42	47.66	-14.82	-16.71	14.82	16.71
Aug 16	61.42	58.27	-4.96	-5.33	7.66	7.98
Aug 17	82.34	67.11	-18.50	-20.40	18.50	20.40
Aug 18	79.34	72.65	-8.44	-8.82	8.44	8.82
Aug 19	83.75	75.23	-10.17	-10.75	10.17	10.75
Aug 20	75.71	69.99	-7.48	-7.81	7.48	7.81
Aug 21	53.63	58.16	8.43	7.89	8.62	8.08
Aug 22	66.29	63.82	-3.80	-3.96	4.11	4.27
Aug 23	73.13	61.69	-15.65	-16.99	15.65	16.99
Aug 24	84.38	68.68	-18.57	-20.63	18.57	20.63
Aug 25	86.96	63.35	-26.97	-31.39	26.97	31.39
Aug 26	62.71	55.35	-11.60	-12.65	11.60	12.65
Aug 27	79.38	67.34	-15.17	-16.42	15.17	16.42
Aug 28	52.29	63.36	20.95	18.82	20.95	18.82
Aug 29	51.33	64.86	26.42	23.30	26.42	23.30
Aug 30	71.42	74.71	4.59	4.48	4.59	4.48
Aug 31	80.21	59.96	-25.26	-28.92	25.26	28.92
Sep 1	89.21	76.62	-14.35	-15.83	14.35	15.83

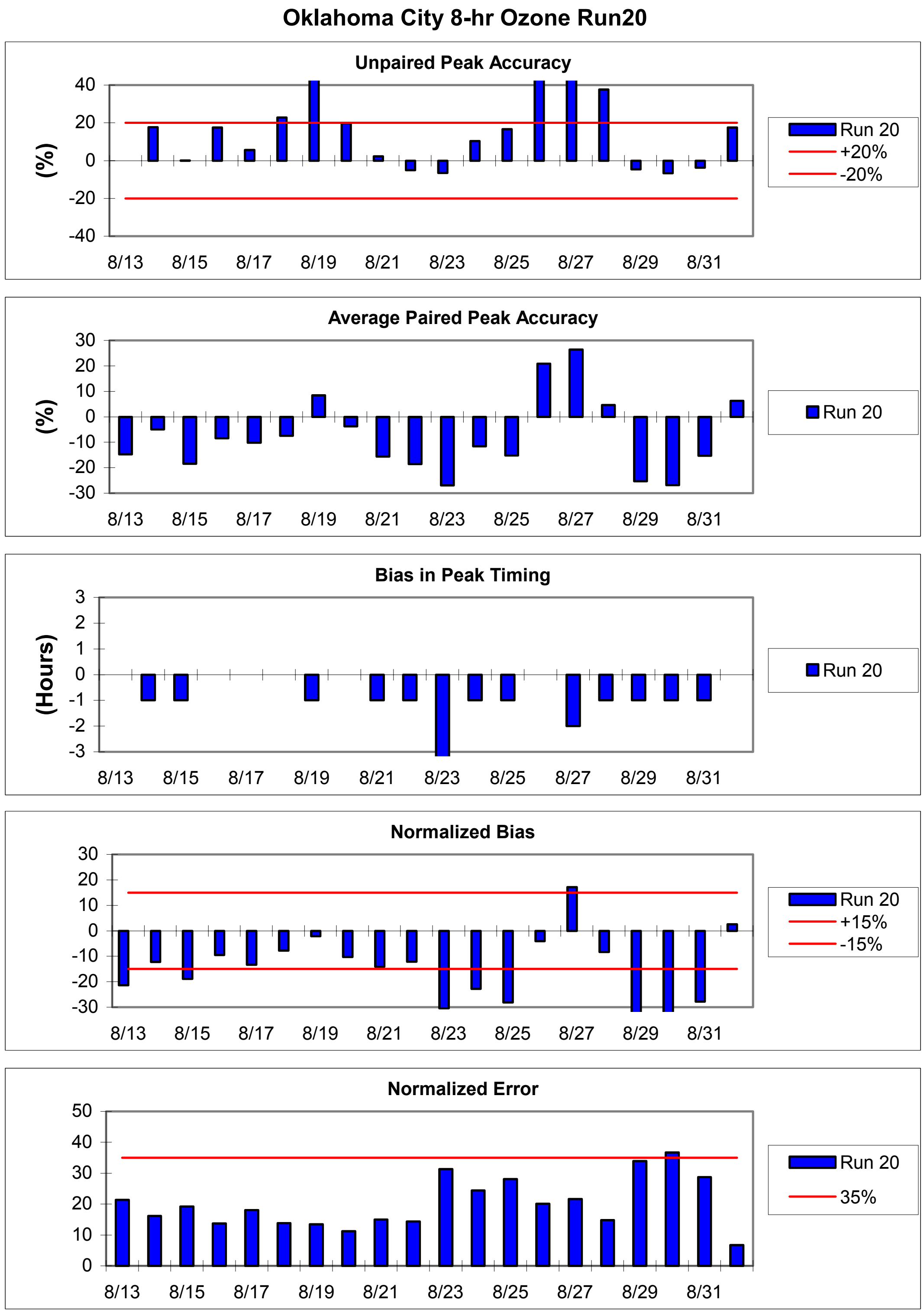


Figure 4-6. Summary of running 8-hour ozone model performance statistical measures for the Oklahoma City MSA subregion using spatially paired comparisons.

8-HOUR OZONE TIME SERIES

Appendix D compares hourly time series of running predicted and observed 8-hour ozone concentrations for sites in Oklahoma. The symbols represent the observations, the line is the model estimate interpolated to the monitor, and the shading represents the maximum and minimum model estimate in a 9-cell block (3X3) centered on the grid cell containing the monitor. With the exceptions of a few days (e.g., August 25) the model reproduces the observed ozone time series reasonably well in the Tulsa area. The model tends to understate the afternoon observed ozone peaks in Oklahoma City.

1-HOUR PERFORMANCE STATISTICS

EPA's 1-hour ozone SIP modeling guidance lists three performance goals as follows (EPA, 1991):

- Unpaired 1-Hour Ozone Peak <"20%
- Normalized Bias for Hourly Ozone <"15%
- Normalized Gross Error for Hourly Ozone <35%

EPA's draft 8-hour ozone modeling guidance also suggests using the bias and gross error performance goals for daily maximum 8-hour ozone performance evaluation as was done above (EPA, 1999). Below we apply the above goals for daily maximum 1-hour and hourly ozone comparisons and fractional and normalized bias and error to the Oklahoma Run 20 Base Case Simulation as was done for 8-hour ozone.

Oklahoma 4 km Domain

<u>Closest Daily Maximum 1-Hour Ozone Concentrations</u>: Table 4-5a displays summary model performance statistics for daily maximum 1-hour ozone concentrations in the Oklahoma 4 km domain using the closest 1-hour value to the observation. The bias and error measures are within EPA's goals on all episode days for the closest daily maximum 1-hour ozone concentrations.

<u>Spatially Paired Daily Maximum 8-Hour Ozone Concentrations</u>: Using the spatial paired daily maximum 1-hour ozone concentration predicted and observed comparisons, 13 of 18 days achieve the <"15% performance goal for bias and all days achieve the <35% error performance goal (Table 4-5b).

<u>Spatially Paired Running Hourly Ozone Concentrations</u>: Figure 4-7 displays hourly ozone model performance measures by day for all sites within the Oklahoma 4 km domain. The within "20% performance goal for unpaired 1-hour ozone peak is met on 16 of 20 of the modeling days. On 4 days the unpaired peak performance goal is exceeded with an overestimation bias; August 26, 27 and 29 and September 1, 1999. The <"15% performance goal for normalized bias and hourly ozone is not met on 5 of the 20 modeling days. One of the days the hourly ozone normalized bias goal is not met an initialization day, whereas on the other 4 days the normalized bias exhibits an underestimation tendency that barely (-15% to –20%) exceeds the normalized bias performance goal. The normalized gross error for hourly ozone concentrations achieves the <35% goal for all 20 modeling days using spatially paired hourly ozone.

Table 4-5a. Daily maximum 1-hour ozone model performance statistics for the August 15 through September 1, 1999 8-hour ozone episode, the Oklahoma 4 km domain and the Run20 base case simulation using the closest estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	65.64	61.17	-5.49	-5.89	6.27	6.65
Aug 16	65.82	64.22	-2.35	-2.50	2.44	2.58
Aug 17	82.55	80.11	-2.88	-2.99	2.93	3.03
Aug 18	86.64	84.33	-2.67	-2.89	2.78	3.00
Aug 19	96.55	94.89	-1.58	-1.65	1.74	1.81
Aug 20	85.00	83.87	-1.02	-1.07	1.08	1.13
Aug 21	63.17	64.70	2.27	2.10	2.37	2.20
Aug 22	67.83	67.17	-0.91	-0.97	1.31	1.37
Aug 23	80.50	77.62	-3.52	-3.70	3.87	4.04
Aug 24	88.00	83.69	-4.95	-5.37	5.54	5.95
Aug 25	90.25	87.14	-3.04	-3.31	6.29	6.46
Aug 26	67.00	66.50	-0.55	-0.59	1.82	1.84
Aug 27	84.55	77.95	-6.88	-7.55	7.10	7.77
Aug 28	73.42	79.47	11.51	8.95	16.91	15.12
Aug 29	69.00	76.57	13.61	11.10	15.60	13.20
Aug 30	82.25	80.36	-1.70	-2.22	3.92	4.37
Aug 31	84.92	81.86	-3.52	-4.12	5.21	5.77
Sep 1	87.50	83.59	-4.23	-4.59	4.31	4.67

Table 4-5b. Daily maximum 1-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run20 base case simulation and the Oklahoma 4 km domain using the spatially paired estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	65.64	56.09	-12.44	-14.02	14.69	16.19
Aug 16	65.82	63.94	-2.09	-2.82	11.08	11.07
Aug 17	82.55	74.82	-8.93	-10.00	13.20	13.99
Aug 18	86.64	80.23	-7.47	-8.08	7.98	8.58
Aug 19	96.55	87.81	-8.82	-9.85	11.03	11.93
Aug 20	85.00	80.23	-5.00	-5.30	6.28	6.55
Aug 21	63.17	68.43	8.67	7.85	9.91	9.11
Aug 22	67.83	67.28	-0.76	-1.04	6.32	6.38
Aug 23	80.50	71.26	-11.06	-12.41	13.56	14.81
Aug 24	88.00	78.47	-10.84	-12.40	14.60	15.94
Aug 25	90.25	77.41	-12.24	-15.01	22.27	24.11
Aug 26	67.00	63.55	-4.40	-5.06	10.10	10.50
Aug 27	84.55	68.31	-17.72	-20.47	18.34	21.08
Aug 28	73.42	85.83	20.97	15.00	31.45	27.54
Aug 29	69.00	82.00	23.37	17.80	28.67	23.57
Aug 30	82.25	85.17	4.71	2.22	16.80	17.25
Aug 31	84.92	75.75	-10.52	-12.42	15.86	17.46
Sep 1	87.50	72.77	-16.66	-18.67	16.66	18.67

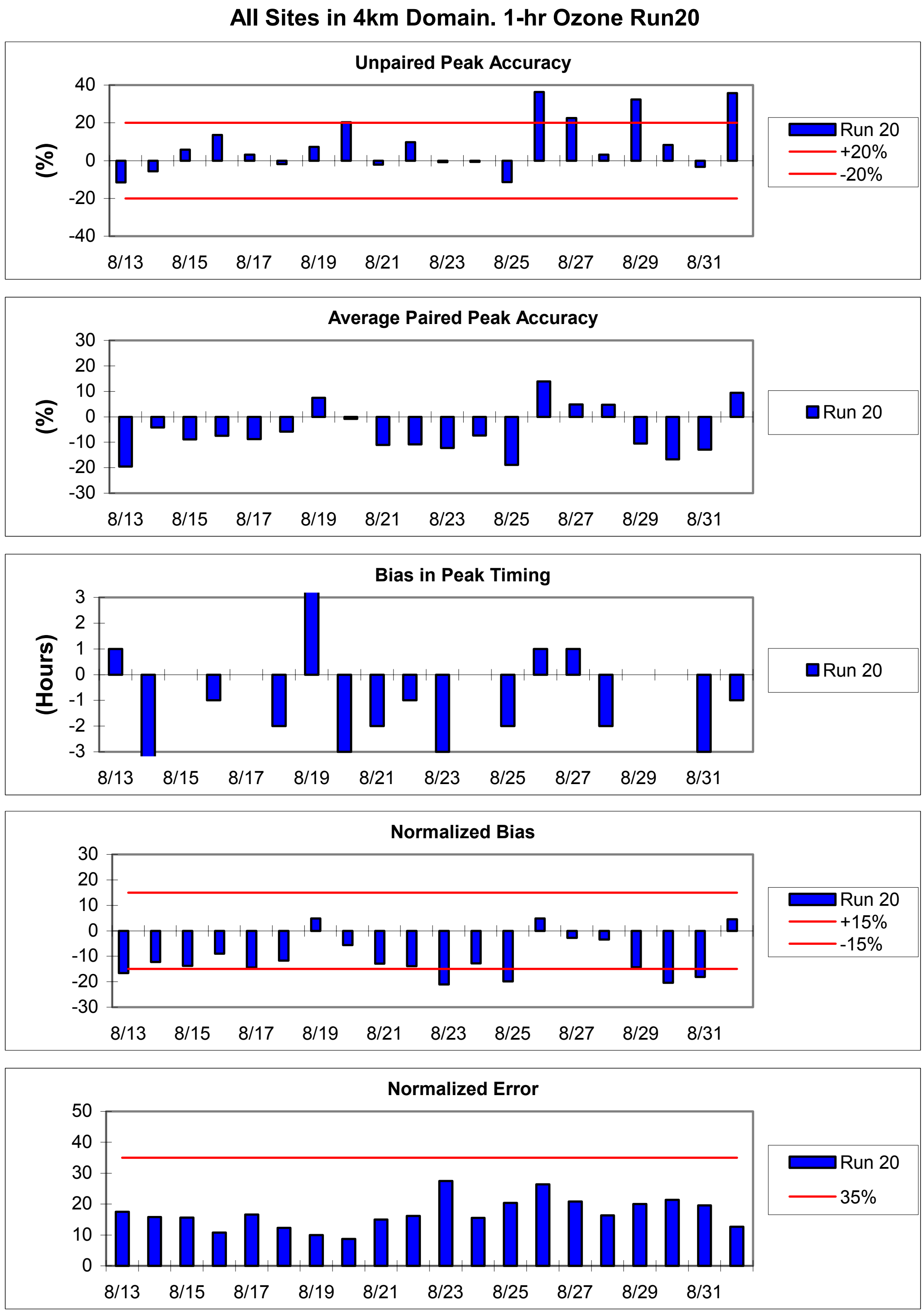


Figure 4-7. Summary of running 1-hour ozone model performance statistical measures for the Oklahoma 4 km domain subregion using spatially paired comparisons.

Tulsa MSA Subdomain

Closest Daily Maximum 1-Hour Ozone Concentrations: Using the closest daily maximum 1-hour ozone concentrations near the monitor the normalized and fractional bias performance measures achieves the <"15% performance goal on 17 of 18 episode days (Table 4-6a). On August 27, 1999, however, both the normalized and fractional bias values exhibit an underestimation tendency that exceeds the goal. The gross error measures achieve the <35% goal on all episode days.

Spatially Paired Daily Maximum 8-Hour Ozone Concentrations: The spatially paired daily maximum 1-hour ozone bias achieves the <"15% performance goal on 15 of 18 episode days (Table 4-6b) with the error measures achieving the <35% on all episode days.

Spatially Paired Running Hourly Ozone Concentrations: The spatially paired hourly ozone performance metrics are shown in Figure 4-8. Although the unpaired 1-hour ozone peak performance metric has several days >20%, this may not indicate a performance problem as in reality the actual ozone peak may have occurred away from the monitoring network. The normalized bias <"15% performance goal is clearly not met on 3 of the episode days, with 6 other days right at the bias performance goal (~ -15%). The normalized gross error achieves the <35% performance goal on all episode days.

Oklahoma City MSA Subdomain

Closest Daily Maximum 1-Hour Ozone Concentrations: In the Oklahoma City subdomain the closest daily maximum 1-hour ozone bias and error values fail to meet the <"15% and 35% performance goals, respectively, on one episode day (August 28) when an overestimation bias is seen (Table 4-7a).

Spatially Paired Daily Maximum 8-Hour Ozone Concentrations: Using the spatially paired daily maximum 1-hour ozone comparisons, half of the episode days fail to meet the <"15% performance goal for bias in the Oklahoma City MSA (Table 4-7b). One day fails to achieve the <35% error performance goal.

Spatially Paired Running Hourly Ozone Concentrations: Figure 4-9 displays the performance measures in the Oklahoma City MSA for spatially paired hourly ozone concentrations. The unpaired peak comparisons suggest the estimated 1-hour ozone peaks in the Oklahoma City MSA are greater than observed on almost all days. However, the normalized bias suggests hourly ozone is underestimated on most days, with the normalized bias not meeting the performance goal on most days. The normalized error for hourly ozone meets the performance goal on all episode days but one. These results, along with the spatial maps in Appendix A, suggest there are some spatial alignment issues with the Oklahoma City urban plume on some days.

Table 4-6a. Daily maximum 1-hour ozone model performance statistics for the August 15 through September 1, 1999 8-hour ozone episode, the Tulsa MSA subdomain and the Run20 base case simulation using the closest estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	46.67	47.24	1.31	1.29	1.31	1.29
Aug 16	59.67	59.75	0.14	0.14	0.14	0.14
Aug 17	81.67	80.69	-1.31	-1.34	1.31	1.34
Aug 18	90.00	88.22	-2.11	-2.18	2.11	2.18
Aug 19	101.00	101.13	0.13	0.13	0.13	0.13
Aug 20	91.33	91.35	0.02	0.02	0.03	0.03
Aug 21	56.67	57.09	0.73	0.72	0.90	0.90
Aug 22	68.33	68.33	0.00	0.00	0.06	0.06
Aug 23	89.67	88.35	-1.45	-1.46	1.45	1.46
Aug 24	88.33	85.23	-3.57	-3.78	3.74	3.95
Aug 25	103.67	99.80	-3.81	-3.90	3.81	3.90
Aug 26	54.67	55.30	1.22	1.20	1.33	1.31
Aug 27	97.00	78.61	-18.11	-20.27	18.11	20.27
Aug 28	89.00	87.75	-1.34	-1.36	1.48	1.51
Aug 29	85.33	85.32	-0.02	-0.02	0.17	0.17
Aug 30	89.67	90.31	0.66	0.66	0.72	0.72
Aug 31	90.67	90.70	0.03	0.03	0.08	0.08
Sep 1	94.67	93.09	-1.81	-1.86	2.00	2.05

Table 4-6b. Daily maximum 1-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run20 base case simulation and the Tulsa MSA subdomain using the spatially paired estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	46.67	47.83	2.84	2.69	5.41	5.30
Aug 16	59.67	66.37	12.02	10.79	14.55	13.37
Aug 17	81.67	75.67	-8.07	-9.07	12.35	13.22
Aug 18	90.00	82.25	-9.07	-9.82	10.06	10.80
Aug 19	101.00	93.22	-7.65	-7.96	7.65	7.96
Aug 20	91.33	83.03	-8.99	-9.47	8.99	9.47
Aug 21	56.67	62.93	11.25	10.56	11.25	10.56
Aug 22	68.33	73.83	7.97	7.63	7.97	7.63
Aug 23	89.67	75.50	-16.24	-17.89	16.24	17.89
Aug 24	88.33	77.55	-12.35	-13.45	12.35	13.45
Aug 25	103.67	79.40	-23.14	-26.25	23.14	26.25
Aug 26	54.67	58.21	6.85	6.50	7.23	6.87
Aug 27	97.00	66.16	-30.53	-36.48	30.53	36.48
Aug 28	89.00	94.00	6.59	3.17	22.41	21.12
Aug 29	85.33	85.01	0.72	0.26	8.34	8.22
Aug 30	89.67	93.90	3.59	2.09	14.98	14.55
Aug 31	90.67	86.77	-4.08	-4.68	7.79	8.29
Sep 1	94.67	82.85	-12.83	-14.03	12.83	14.03

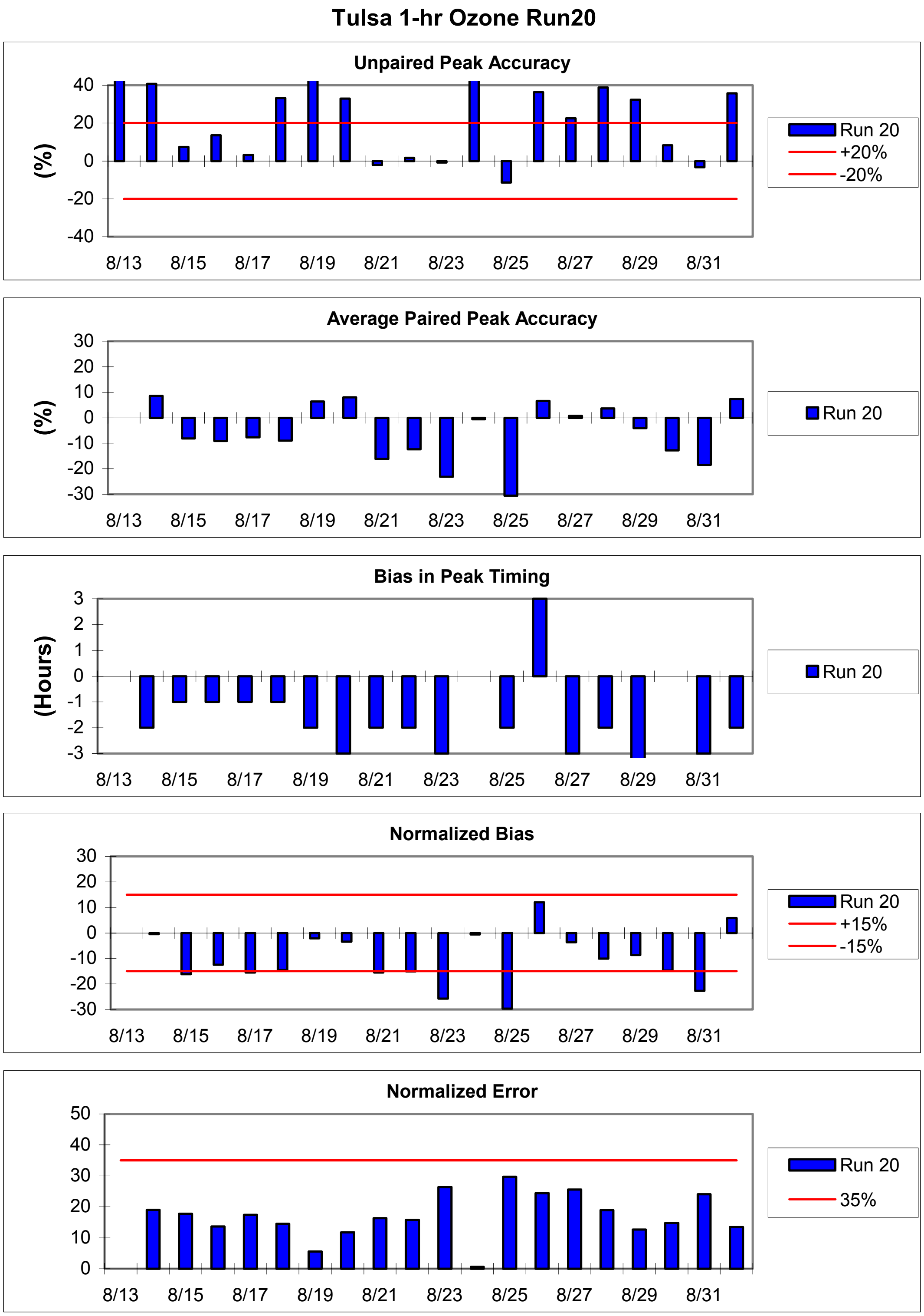


Figure 4-8. Summary of running 1-hour ozone model performance statistical measures for the Tulsa MSA subdomain subregion using spatially paired comparisons.

Table 4-7a. Daily maximum 1-hour ozone model performance statistics for the August 15 through September 1, 1999 8-hour ozone episode, the Oklahoma City MSA subdomain and the Run20 base case simulation using the closest estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			***#"15%***	***#"15%***	***#35%***	***#35%***
Aug 15	64.33	60.29	-5.73	-6.16	5.96	6.40
Aug 16	67.67	67.56	-0.16	-0.16	0.16	0.16
Aug 17	89.67	85.76	-4.47	-4.69	4.55	4.77
Aug 18	87.33	86.33	-1.13	-1.14	1.13	1.14
Aug 19	88.67	87.50	-1.29	-1.31	1.60	1.63
Aug 20	79.00	79.02	0.03	0.02	0.09	0.09
Aug 21	57.67	57.69	0.04	0.04	0.13	0.13
Aug 22	70.33	70.31	-0.03	-0.03	0.10	0.10
Aug 23	78.33	73.65	-6.04	-6.31	6.04	6.31
Aug 24	90.33	86.57	-4.14	-4.28	4.14	4.28
Aug 25	95.33	91.50	-4.06	-4.22	4.06	4.22
Aug 26	69.00	68.64	-0.54	-0.54	0.54	0.54
Aug 27	85.33	85.42	0.09	0.09	0.70	0.70
Aug 28	58.67	80.92	38.10	31.92	38.10	31.92
Aug 29	58.00	63.67	9.79	9.30	9.79	9.30
Aug 30	76.67	76.69	0.03	0.03	0.07	0.07
Aug 31	84.33	78.32	-6.97	-7.35	6.97	7.35
Sep 1	90.67	80.96	-10.21	-11.42	10.21	11.42

Table 4-7b. Daily maximum 1-hour ozone model performance for the August 15 through September 1, 1999 Oklahoma 8-hour ozone episode, the Run20 base case simulation and the Oklahoma City MSA subdomain using the spatially paired estimated value near the monitor.

Date	Average Observed	Average Predicted	Normalized Bias	Fractional Bias	Normalized Error	Fractional Error
EPA Goal			*#"15%*	*#"15%*	*#35%*	*#35%*
Aug 15	64.33	52.82	-17.10	-19.35	17.10	19.35
Aug 16	67.67	66.17	-1.91	-2.27	8.30	8.36
Aug 17	89.67	74.23	-17.25	-18.89	17.25	18.89
Aug 18	87.33	83.02	-4.95	-5.08	4.95	5.08
Aug 19	88.67	88.94	0.27	-0.09	7.84	7.74
Aug 20	79.00	78.47	-0.47	-0.57	3.68	3.70
Aug 21	57.67	63.05	9.56	8.62	12.14	11.25
Aug 22	70.33	69.80	-0.71	-0.85	4.98	4.99
Aug 23	78.33	68.86	-12.11	-12.90	12.11	12.90
Aug 24	90.33	74.91	-16.97	-19.08	16.97	19.08
Aug 25	95.33	75.21	-21.09	-23.61	21.09	23.61
Aug 26	69.00	59.91	-13.18	-14.22	13.18	14.22
Aug 27	85.33	72.41	-15.17	-16.41	15.17	16.41
Aug 28	58.67	89.75	53.05	41.88	53.05	41.88
Aug 29	58.00	68.57	18.23	16.67	18.23	16.67
Aug 30	76.67	83.89	9.50	9.05	9.50	9.05
Aug 31	84.33	63.96	-24.15	-27.49	24.15	27.49
Sep 1	90.67	66.93	-26.04	-30.28	26.04	30.28

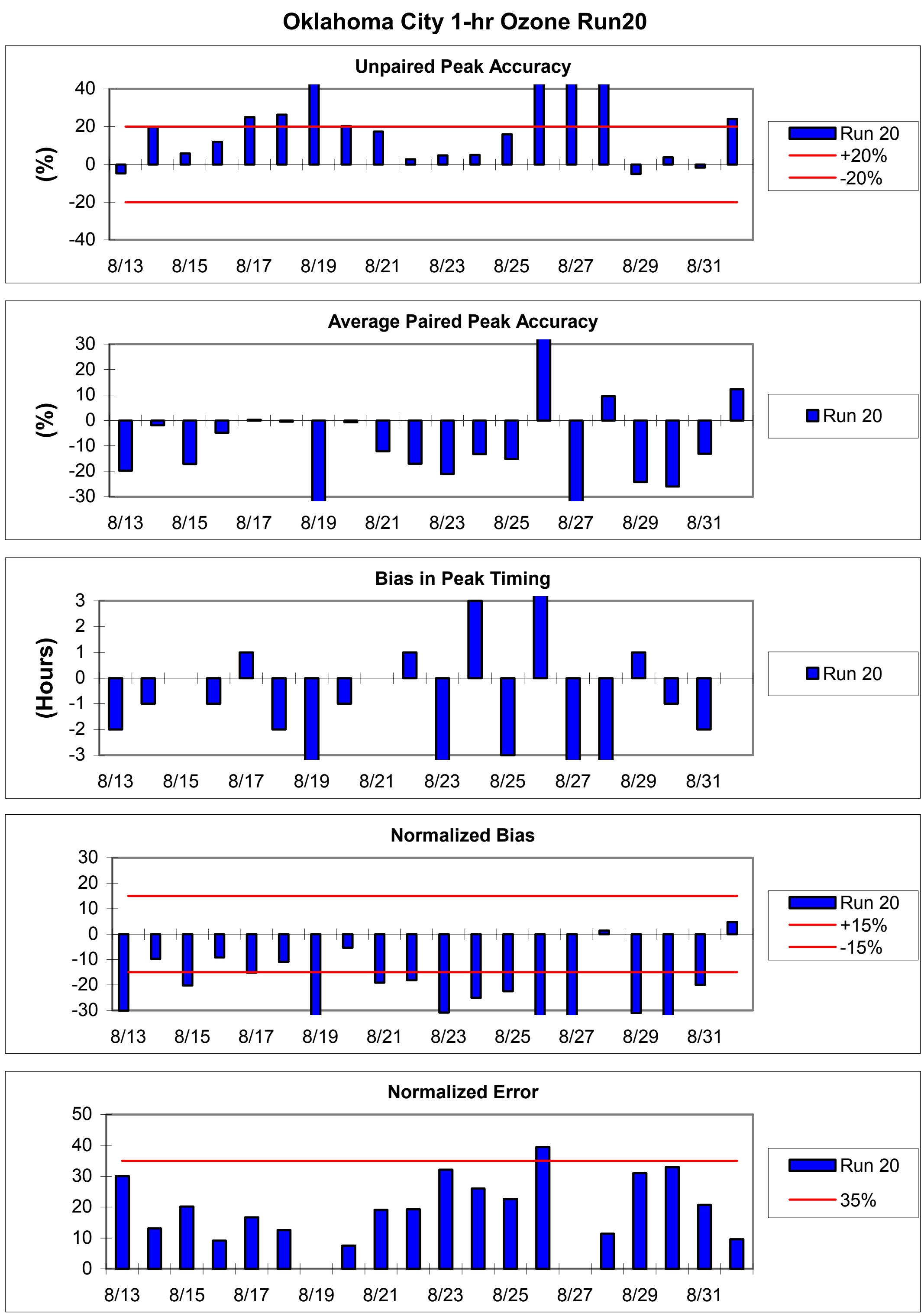


Figure 4-9. Summary of running 1-hour ozone model performance statistical measures for the Oklahoma City MSA subdomain subregion using spatially paired comparisons.

SCATTER AND TIME SERIES PLOTS FOR HOURLY OZONE

Appendix B displays scatter plots and time series plots of predicted and observed hourly ozone concentrations in Oklahoma for the Run20 Base Case simulation and several subregions in Oklahoma. The scatter plots include a correlation coefficient and liner regression equation that fits the hourly predictions to the observations. The time series plots display the hourly observations as symbols and the spatially paired hourly predictions by the line. Also shown in the time series plots is the range of predicted values within the nine 4 km grid cells centered on the monitor that give an indication of whether there are large estimated ozone concentration gradients in the vicinity of the monitor.

Tulsa MSA Subdomain: For the three sites in the Tulsa MSA, the model tends to underestimate the higher and overestimate the lower observed hourly ozone concentrations. The correlation coefficient is fairly high (r^2=0.62). At the Skiatook monitor the model generally matches the afternoon observed hourly ozone concentrations on most days. During the beginning of the episode the model overestimates the nighttime observed low hourly ozone, but after August 25th the model matches the observed low values fairly well. The observed afternoon peak hourly ozone at Skiatook is underestimated on August 23, overestimated on August 26 and matched fairly well on the other days. The afternoon peak observed hourly ozone concentrations are generally underestimated by the model at the Tulsa monitor, however the shaded section of the estimated time series suggests there are large concentrations gradients in the vicinity of the Tulsa monitor. The observed hourly ozone at the Glenpool monitor is reproduced well during the first part of the episode, but the observed afternoon peaks during the latter part of the episode are underestimated.

Oklahoma City MSA Subdomain: Although the hourly ozone correlation coefficient is not as good for Oklahoma City (0.50) as Tulsa (0.62), the regression fit is better with a slope closer to one and intercept closer to zero. The time series comparisons exhibit fairly good agreement, with the exception of an underestimation of the observed values on August 22-25, overestimation on August 26 and underestimation on August 29-31.

Southern (Red River) Oklahoma Sites: The observed nighttime low ozone at the three southern Oklahoma sites is overestimated by the model, suggesting there may be some local ozone titration due to fresh NOx emissions that are not being accounted for in the model. In general, the model reproduces the afternoon observed hourly ozone reasonably well at these sites, with the exception of an overestimation tendency on August 26-27.

Lawton: Hourly observed ozone at the Lawton site is reproduced fairly well, with the exception of overestimating the nighttime low values.

Ponca City: Afternoon ozone at the Ponca City monitor is underestimated on several days. On August 25th there is an isolated hourly observed value that is 20 ppb higher than its surrounding value that suggests subgrid-scale ozone variations that can not be captured by a 2nd model using 4km resolution.

Northeast Oklahoma: The observed diurnal profile of hourly ozone at the Tahlequah site in northeastern Oklahoma is not reproduced by the model, which estimates a fairly constant diurnal variation. There may be some titration of the observed ozone due to local NOx emissions at the Tahlequah monitor that is not captured by the model.

CONCLUSIONS

As with any long episode (20 days) simulation, the Run20 Base Case simulation using the Oklahoma expanded domain performs better on some days than others. On most episode days the Run20 base case simulation achieves most of EPA's model performance evaluation performance goals for 8-hour and 1-hour ozone concentrations. In particular, across the Oklahoma 4 km fine grid domain, the estimated daily maximum 8-hour ozone concentrations near the monitor, which is the key modeled value used in the 8-hour ozone attainment test, achieved the <"20% of the observed value performance goal 80 percent of the time using the maximum and 97 percent of the time using the closest definition of near the monitor. The 1-hour and 8-hour ozone hourly performance statistics do suggest an underestimation tendency that is likely partly due to understated ozone and precursor transport and/or missing or understated emissions. On August 26 and 27 ozone model performance of the Run20 base case simulation was sufficiently poor that the results should be used with caution. However, in general the Oklahoma Run20 base case model simulation is exhibiting sufficient skill and meeting most performance goals so that it may be used to project future-year ozone air quality and 8-hour ozone attainment recognizing the inherent uncertainties in atmospheric modeling process.

5. FUTURE-YEAR MODELING AND PROJECTION OF FUTURE-YEAR 8-HOUR OZONE DESIGN VALUES

In this section we discuss the procedures used for the future-year modeling and the projections of future-year 8-hour ozone Design Values for the 2007 emission scenarios.

FUTURE-YEAR MODELING INPUTS

Development of the 2002 and 2007 future-year base case emission inputs was described in Section 2.

The same August 1999 episode meteorological conditions were used in the future-year 2002 and 2007 modeling as used in the 1999 base case modeling. Thus, effects of climate change, land use variations and other phenomena that may affect meteorological conditions in the future are not accounted for.

The 1999 base case simulation for the expanded Oklahoma domain used constant background concentrations corresponding to oceanic or clean conditions (see Section 3). The same initial and boundary conditions were also used for the 2002 and 2007 future-year modeling.

PROJECTION OF 2007 8-HOUR OZONE DESIGN VALUES

The EPA draft guidance for 8-hour ozone modeling contains specific procedures for using the modeling results in a relative fashion to scale the observed 8-hour ozone Design Values to project future-year 8-hour ozone Design Values for comparisons with the standard (EPA, 1999). These procedures were used to estimate 2007 8-hour ozone Design Values under the various 2007 emission scenarios.

The procedures for projecting future-year 8-hour ozone Design Values starts with a current observed 8-hour ozone Design Value for each monitor. The modeling results are used in a relative fashion to scale the observed 8-hour ozone Design Values. This is done through a model estimated Relative Reduction Factor (RRF) that is the ratio of the estimated 8-hour ozone concentrations from the future-year to current-year emission scenarios. The RRF is used to scale the current year observed Design Value (DVC) to estimate the projected future-year 8-hour ozone Design Value (DVF):

$$DVF = DVC \times RRF$$

The RRF is defined as the ratio of the average of the maximum 8-hour ozone concentrations near each monitor for the future-year emissions scenario to the average for the current year base case emissions scenario. Near the monitor is defined by an array of 9 x 9 grid cells centered on the monitor for the 4 km grid cell resolution used in the Oklahoma application (EPA, 1999). With two minor exceptions (that have to do with keeping more precision in the design value calculations), EPA's draft 8-hour modeling guidance is followed to estimate the future-year 8-hour ozone Design Values for the 2007 emission scenarios.

EPA's draft 8-hour ozone modeling guidance includes the following language for selecting the current-year observed 8-hour ozone Design Values that are used in the modeled attainment demonstration test:

> *States should review monitored data from (a) the 3-year period 'straddling' the year represented by the most recent available emissions inventory (e.g., 1995-1997, for a 1996 inventory), and (b) the 3-year period used to designate an area 'nonattainment'. The current design value used in the modeled attainment and screening tests is the higher estimate from (a) and (b)."* (EPA, 1999).

For the first criteria and the Oklahoma EAC photochemical modeling, we have two current-year base case emissions inventories, 1999 based on 1999 NEI v2 and 2002 based on the 2002 NEI. Clearly 2002 is more recent than 1999. For the second criteria, 8-hour ozone attainment designations are being based on 2001-2003 air quality data. Thus, both criteria (a) and (b) in EPA's guidance indicate that 2001-2003 observed Design Values should be used in the Oklahoma future-year Design Value projections.

EPA Region VI has noted that one interpretation of criteria (a) "most recent available inventory" refers to the period of the episode, which for Oklahoma would be 1999 (i.e., 1998-2000 Design Values). Given these discrepancies, in this section, future-year attainment of the 8-hour ozone standard is calculated using both the 1998-2000 and 2001-2003 observed 8-hour ozone Design Values. We then perform further analysis in the weight of evidence discussions in Section 6 that projects 2007 8-hour ozone Design Values in Tulsa and Oklahoma City using observed 3-year Design Values from 6 years ending 1999 to 2004.

2007 BASE CASE

A 2007 CAMx Base Case simulation was performed using the 2007 Base Case emissions as described in Section 3 and the same constant clean background and oceanic Boundary Conditions (BCs) as used in the Run20 1999 Base Case simulation described in Section 4. The projection of the 8-hour ozone Design Values for the 2007 Base Case and monitoring sites in Oklahoma using the 2001-2003 and 1998-2000 observed 8-hour ozone Design Values (DVs) are shown in Tables 5-1 and 5-2, respectively.

Table 5-1 includes two panels of estimated highest daily maximum 8-hour ozone concentrations near each monitor for each day of the August 15 (Julian day 99227) through September 1 (Julian day 99241), 1999 modeling episode. The top panel lists the maximum values near the monitor for the 2002 Base Case, whereas the bottom panel is for the 2007 Base Case. Below the site names are the observed 2001-2003 8-hour ozone Design Values (DVs) that serve as the starting point for the 2007 Design Value projections. The model estimated relative reduction factors (RRFS) are calculated by first averaging the maximum 8-hour ozone value near each monitor across all days in the 2002 Base Case simulation for which the predicted ozone is 70 ppb or higher. This is shown in the "Avg 2002 Base" row in Table 5-1. For example, for the Skiatook monitor there were 15 days in the 2002 Base Case simulation where the maximum 8-hour ozone near the monitor exceeded 70 ppb and the average estimated 8-hour ozone concentration across these 15 days is 92.9 ppb. In the bottom panel the maximum 8-hour ozone near each monitor for the 2007 Base Case simulation is shown and the average across the same days that were 70 ppb or higher in the 2002 Base Case is shown in the "Avg 2007 Base" row (e.g., 87.1 ppb for

Skiatook). The RRF is then obtained as the ratio of the average for the 2007 Base Case and 2002 Base Case. For example, for Skiatook monitor the average for the 2002 and 2007 Base Case simulations are 92.9 and 87.1 ppb, respectively, so that the RRF is defined as 0.938 = 92.9/87.1. The projected 8-hour ozone Design Values for the 2007 Base Case are then shown in the last row of Table 5-1 that is obtained by multiplying the RRF times the observed Design Value. Again, for Skiatook we get 77.9 = 0.938 x 83.

The maximum projected 8-hour ozone Design Value in 2007 for the 2007 Base Case when starting with the 2001-2003 observed DVs in the Tulsa and Oklahoma City areas occur at the, respectively, Skiatook and Edmond monitors with values of 77.9 ppb and 76.1 ppb. As these maximum projected 8-hour ozone Design Values are both below 85.0 ppb, then the 2007 Base Case demonstrates attainment of the 8-hour ozone standard in Tulsa and Oklahoma City when the 2001-2003 observed DVs are used.

The projected 2007 Design Values (DVs) starting with the 1998-200 observed 8-hour ozone DVs are shown in Table 5-2, which has the same format as Table 5-1. Differences with Table 5-1 include the starting observed Design Values (1998 – 2000 vs. 2001 –2003) and the fact that the 1999 Base Case (top panel) is used instead of the 2002 Base Case. Using the 1998-2000 observed DVs attainment is projected at all sites in Oklahoma City and all but one site (Skiatook) in Tulsa. The projected 2007 DV using the observed 1998-2000 DVs at Skiatook is 87.2 ppb. To demonstrate attainment the maximum projected 8-hour ozone DV must be 84.9 ppb or lower.

There were two areas in the Design Value projections where we deviate slightly from EPA's guidance in order to make a more precise calculation (EPA, 1999). The first is that EPA guidance recommends that the average concentration across all days that are over 70 ppb be truncated prior to calculating the RRF (these are the values in the "Avg 1999 Base" and Avg 2007 Base" rows in Tables 5-1 and 5-2). However, this doesn't make any sense as you loose precision and turns the RRFs into a step function, the benefits of control measures can be lost or overstated in the truncation. The second deviation is that EPA recommends using only two digits to the right of the decimal in the RRF to project future-year DVs. The result of this second issue has essentially no effect on the calculation. However, the truncation of the average concentrations right before calculating the RFF may have an effect on the projected DV and is illogical. For example, the 87.2 ppb projected 2007 Design Values shown in Table 5-2 for Skiatook that was calculated using the more precise RRF would become 87.9 ppb if the truncation were used, a 0.7 ppb difference. Thus in this case the truncated doesn't change the modeled attainment test (i.e. both projections are above 85 ppb), but truncating the average concentration prior to calculating the RRF could lead to artifacts when evaluating 2007 control strategies. For example if control strategy A reduces the average 8-hour ozone at Skiatook by 0.2 ppb the projected change in the 8-hour DV at Skiatook would be –1.0 ppb using truncation. However, if strategy B reduces the average 8-hour ozone at Skiatook 1.0 ppb (more than 3 tons strategy A), the same projected 8-hour ozone DV would be calculated as strategy A.

Table 5-1. Projection of future-year 8-hour ozone Design Values in Tulsa, Oklahoma City and Lawton for the 2007 Base Case simulation using 2002/2007 modeling results and observed 2001-2003 Design Values.

Sites	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby	Lawton
2001-2003 DVs	***80***	***83***	***81***	***79***	***80***	***76***	***78***	***77***
99227	81.9	85.4	63.1	80.7	84.0	72.3	68.5	74.7
99228	85.1	95.2	70.6	92.1	94.5	84.9	78.9	75.8
99229	92.7	94.2	83.7	93.8	94.3	84.2	79.9	77.5
99230	91.3	82.8	85.5	91.2	91.2	89.2	79.3	73.0
99231	63.3	63.1	73.7	62.3	62.3	69.3	78.0	80.8
99232	70.9	70.0	77.4	81.4	81.4	77.3	73.6	70.8
99233	83.8	84.8	67.5	78.3	83.6	65.6	63.8	68.7
99234	81.7	86.1	73.1	77.0	82.5	76.1	78.6	74.9
99235	82.0	85.2	66.7	76.3	76.3	76.3	71.2	67.2
99236	55.0	55.0	64.1	60.3	59.7	64.4	70.6	70.0
99237	64.7	62.8	83.2	89.0	92.9	83.8	79.3	69.4
99238	107.8	107.8	82.0	85.8	96.1	74.5	73.2	64.7
99239	95.7	98.6	75.7	88.8	90.7	80.7	74.7	75.1
99240	104.4	106.1	81.7	99.8	99.8	87.2	81.3	78.9
99241	92.7	97.2	92.7	71.8	71.8	71.5	71.3	81.5
99242	94.1	98.0	79.6	83.5	84.2	72.9	68.2	74.7
99243	80.6	89.5	68.8	80.9	84.7	75.3	73.4	78.9
99244	102.0	111.9	88.9	95.8	97.9	87.1	86.3	88.8
#Days > 70 ppb	15	15	13	16	16	15	15	14
Avg 2002 Base	**89.8**	**92.9**	**80.6**	**85.4**	**87.9**	**79.5**	**76.7**	**76.8**
Sites	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
99227	78.1	80.5	57.9	77.1	79.6	68.6	65.0	70.0
99228	84.3	90.1	65.5	87.2	90.2	80.7	75.4	73.2
99229	90.7	90.7	80.3	88.9	89.1	82.0	77.1	73.1
99230	90.3	81.1	84.6	88.6	88.6	86.7	77.2	71.4
99231	64.0	60.8	73.0	61.1	61.1	69.2	76.3	77.9
99232	68.7	66.1	75.0	77.0	77.0	73.6	71.2	68.2
99233	80.5	80.6	62.8	75.6	80.1	62.0	61.1	64.8
99234	76.5	79.9	68.9	73.7	78.5	71.0	72.6	73.0
99235	77.7	79.0	63.6	74.8	74.8	74.8	69.9	67.2
99236	54.6	54.4	64.5	58.8	58.3	64.8	69.2	67.4
99237	65.9	61.5	84.5	86.0	89.2	81.1	77.2	66.3
99238	102.3	102.3	77.9	83.3	92.2	71.8	70.3	62.8
99239	90.4	92.3	71.8	84.7	86.6	77.4	72.6	70.7
99240	98.8	100.3	74.4	94.3	94.3	81.2	75.9	74.8
99241	88.7	89.6	85.4	70.5	70.5	69.6	65.7	75.4
99242	88.9	91.5	73.5	79.2	79.9	68.7	62.8	68.3
99243	77.5	83.1	64.4	73.7	77.6	68.3	66.6	70.6
99244	92.7	99.5	78.7	88.2	90.0	79.8	79.1	80.5
Avg 2007 Base	**85.7**	**87.1**	**76.4**	**81.4**	**83.6**	**75.7**	**73.1**	**72.5**
RRF	0.955	0.938	0.948	0.954	0.952	0.952	0.953	0.944
2007 Base DV	**76.4**	**77.9**	**76.8**	**75.3**	**76.1**	**72.3**	**74.4**	**72.7**

Table 5-2. Projection of future-year 8-hour ozone Design Values in Tulsa, Oklahoma City and Lawton for the 2007 Base Case simulation using 1999/2007 modeling results for the expanded Oklahoma domain and observed 1998-2000 Design Values.

Sites	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby	Lawton
1998-2000 DVs	**88**	**93**	**82**	**84**	**82**	**84**	**83**	**84**
99227	81.9	85.4	63.1	80.7	84.0	72.3	68.5	74.7
99228	85.1	95.2	70.6	92.1	94.5	84.9	78.9	75.8
99229	92.7	94.2	83.7	93.8	94.3	84.2	79.9	77.5
99230	91.3	82.8	85.5	91.2	91.2	89.2	79.3	73.0
99231	63.3	63.1	73.7	62.3	62.3	69.3	78.0	80.8
99232	70.9	70.0	77.4	81.4	81.4	77.3	73.6	70.8
99233	83.8	84.8	67.5	78.3	83.6	65.6	63.8	68.7
99234	81.7	86.1	73.1	77.0	82.5	76.1	78.6	74.9
99235	82.0	85.2	66.7	76.3	76.3	76.3	71.2	67.2
99236	55.0	55.0	64.1	60.3	59.7	64.4	70.6	70.0
99237	64.7	62.8	83.2	89.0	92.9	83.8	79.3	69.4
99238	107.8	107.8	82.0	85.8	96.1	74.5	73.2	64.7
99239	95.7	98.6	75.7	88.8	90.7	80.7	74.7	75.1
99240	104.4	106.1	81.7	99.8	99.8	87.2	81.3	78.9
99241	92.7	97.2	92.7	71.8	71.8	71.5	71.3	81.5
99242	94.1	98.0	79.6	83.5	84.2	72.9	68.2	74.7
99243	80.6	89.5	68.8	80.9	84.7	75.3	73.4	78.9
99244	102.0	111.9	88.9	95.8	97.9	87.1	86.3	88.8
#Days > 70 ppb	15	15	13	16	16	15	15	14
Avg 1999 Base	**89.8**	**92.9**	**80.6**	**85.4**	**87.9**	**79.5**	**76.7**	**76.8**
Sites	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
99227	78.1	80.5	57.9	77.1	79.6	68.6	65.0	70.0
99228	84.3	90.1	65.5	87.2	90.2	80.7	75.4	73.2
99229	90.7	90.7	80.3	88.9	89.1	82.0	77.1	73.1
99230	90.3	81.1	84.6	88.6	88.6	86.7	77.2	71.4
99231	64.0	60.8	73.0	61.1	61.1	69.2	76.3	77.9
99232	68.7	66.1	75.0	77.0	77.0	73.6	71.2	68.2
99233	80.5	80.6	62.8	75.6	80.1	62.0	61.1	64.8
99234	76.5	79.9	68.9	73.7	78.5	71.0	72.6	73.0
99235	77.7	79.0	63.6	74.8	74.8	74.8	69.9	67.2
99236	54.6	54.4	64.5	58.8	58.3	64.8	69.2	67.4
99237	65.9	61.5	84.5	86.0	89.2	81.1	77.2	66.3
99238	102.3	102.3	77.9	83.3	92.2	71.8	70.3	62.8
99239	90.4	92.3	71.8	84.7	86.6	77.4	72.6	70.7
99240	98.8	100.3	74.4	94.3	94.3	81.2	75.9	74.8
99241	88.7	89.6	85.4	70.5	70.5	69.6	65.7	75.4
99242	88.9	91.5	73.5	79.2	79.9	68.7	62.8	68.3
99243	77.5	83.1	64.4	73.7	77.6	68.3	66.6	70.6
99244	92.7	99.5	78.7	88.2	90.0	79.8	79.1	80.5
Avg 2007 Base	**85.7**	**87.1**	**76.4**	**81.4**	**83.6**	**75.7**	**73.1**	**72.5**
RRF	0.955	0.938	0.948	0.954	0.952	0.952	0.953	0.944
2007 Base DV	**84.0**	**87.2**	**77.8**	**80.1**	**78.0**	**79.9**	**79.1**	**79.3**

2007 CONTROL SCENARIOS

In the preliminary Oklahoma 8-hour ozone EAC modeling we modeled 18 2007 emissions control strategies or emissions reduction sensitivity tests that analyzed the following control measures or model sensitivities (Morris et al., 2004a):

- Three emissions reduction sensitivity tests that examined a 5% reduction in anthropogenic VOC alone, NOx alone sand VOC plus NOx in the Tulsa MSA;
- Elimination of permitted sources from 2007 that will not be built because their permits are expiring (this control measure is included with all subsequent control strategies);
- Use of 7.8 psi RVP gasoline in the Tulsa Metropolitan Statistical Area (MSA);
- Stage I controls in the Tulsa MSA;
- 7.8 psi RVP gasoline in the Oklahoma City (OKC) MSA;
- Stage I controls in the OKC MSA;
- TCMs in the OKC Transportation Management Area (TMA);
- 7.8 psi RVP gasoline in Tulsa TMA (TTMA) with 85% market penetration.
- ITS/Transportation Congestion Mitigation in the Tulsa TMA;
- Combined ITS/Transportation Congestion Mitigation and 7.8 RVP in TTMA with 85% penetration;
- Separate and combined implementation of Low NOx Burnet Control technology (LNBCT) on one unit of the AEP-PSO Oolagah, OG&E Muskogee and GRDA Chouteau Electrical Generating Units (EGUs);
- Stage II controls in Tulsa MSA; and
- Basin Inspection and Maintenance (I/M) in Tulsa MSA.

The local transportation agencies in Oklahoma City (ACOG) and Tulsa (INCOG) provided link-based mobile source activity data for, respectively, Oklahoma City and Tulsa MSA for the Oklahoma City MSA TCMs and ITS/Transportation Congestion Mitigation control strategies. For the revised Oklahoma 8-hour ozone modeling, only 8 of the original 18 2007 control strategy/sensitivity tests were rerun using the expanded Oklahoma modeling grid as follows:

- Strategy #2: 5% VOC control in the Tulsa MSA;
- Strategy #3: 5% NOx control in the Tulsa MSA;
- Strategy #4: 5% VOC and NOx control in the Tulsa MSA;
- Strategy #5: Eliminate Expiring Permitted Sources (EEPS) from 2007 Base Case;
- Strategy #10: EEPS plus Transportation Control Measures (TCMs) in the Oklahoma City (OKC) Transportation Management Area (TMA);
- Strategy #11: EEPS plus 7.8 RVP gasoline in the Tulsa Transportation Management Area (TTMA);
- Strategy #12: EEPS plus ITS/Transportation Congestion Mitigation in the TTMA; and
- Strategy #13: EEPS plus 7.8 RVP gasoline and TS/Transportation Congestion Mitigation in the TTMA.

Table 5-3 displays the 2007 projected 8-hour ozone Design Values for the 2007 control strategies starting with the 2001-2003 observed 8-hour ozone Design Values. Ozone attainment is projected at all monitors in the Tulsa and Oklahoma City areas for all of the 2007 emissions scenarios when the 2001-2003 observed DVs are used in the projections.

Table 5-3. Projected 2007 8-hour ozone Design Values (DVs) in Tulsa and Oklahoma City for the 2007 Base Case and 2007 Control Strategies using the 2001-2003 observed DVs.

	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby
2001-2003 DVs	80	83	81	79	80	76	78
2007 Base Case	76.4	77.9	76.8	75.3	76.1	72.3	74.4
2007 Strategy #2	76.3	77.8	76.8	75.3	76.1	72.3	74.4
2007 Strategy #3	76.3	77.5	76.7	75.3	76.1	72.3	74.4
2007 Strategy #4	76.2	77.4	76.7	75.3	76.1	72.3	74.4
2007 Strategy #5	76.2	77.7	76.5	75.2	75.9	72.2	74.3
2007 Strategy #10	76.2	77.6	76.5	71.6	73.5	67.8	72
2007 Strategy #11	76.2	77.6	76.4	75.2	75.9	72.2	74.3
2007 Strategy #12	76.2	77.5	76.4	75.2	75.9	72.2	74.3
2007 Strategy #13	76.1	77.5	76.4	75.1	75.9	72.2	74.3

Table 5-4 displays the 2007 projected 8-hour ozone Design Values in Tulsa and Oklahoma City for the various 2007 emission control strategies using the 1998-2000 observed 8-hour ozone Design Values. The projected 8-hour ozone Design Values in Oklahoma City using the 1998-2000 observed DVs are all below 85.0 ppb thereby demonstrating attainment. However, in Tulsa the projected 8-hour ozone DV at the Skiatook monitor using the observed 1998-2000 DVs are always greater than 85 ppb, thereby projecting a violation of the 8-hour ozone standard for all 2007 emission scenario using the observed 1998-2000 DVs. Some observations on the control runs are as follows:

<u>VOC versus NOx Sensitivity in Tulsa</u>: The 5% VOC control in the Tulsa MSA (Strategy #2) reduces the DV at the Tulsa monitor by 0.1 ppb, but has no effect at the Skiatook and Glenpool monitors to the precision given in Table 5-4 (tenth of a ppb). The 5% NOx control in the Tulsa MSA (Strategy #3) reduces the 2007 projected DVs at the Tulsa, Skiatook and Glenpool monitors by 0.1, 0.4 and 0.1 ppb, respectively. Thus, both VOC and NOx reductions appear to have ozone benefits in Tulsa but the results suggest that, at least for the key Skiatook monitor, on a relative basis local NOx reductions may be more effective at reducing ozone than local VOC reductions.

<u>Remove Expiring Permit Sources (Strategy#5)</u>: The elimination of sources permitted but whose permits are expiring from the 2007 Base Case reduces the projected ozone DVs by 0.2 to 0.3 ppb in Tulsa and has no effect in Oklahoma City.

<u>TCMs in Oklahoma City MSA (Strategy #10)</u>: The implementation of TCMs in Oklahoma City is estimated to reduce the projected 2007 8-hour ozone DVs by 2.4 ppb (Edmond) to 4.9 ppb (Moore).

<u>RVP and TCMs in Tulsa (Strategies #11-13)</u>: The adoption of a 7.8 RVP gasoline is estimated to have no effect on the projected 2007 8-hour ozone DVs in Tulsa. Implementation of the ITS/TCM controls in Tulsa MSA is estimated to reduce the projected 2007 8-hour ozone DV at Skiatook by 0.1 ppb and have no effect (to a tenth of a ppb) at the other two Tulsa monitors.

Table 5-4. Projected 2007 8-hour ozone Design Values (DVs) in Tulsa and Oklahoma City for the 2007 Base Case and 2007 Control Strategies using the 1998-2000 observed DVs.

	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby
1998-2000 DVs	88	93	82	84	82	84	83
2007 Base Case	84.0	87.2	77.8	80.1	78.0	79.9	79.1
2007 Strategy #2	83.9	87.2	77.7	80.1	78.0	79.9	79.1
2007 Strategy #3	83.9	86.8	77.7	80.1	78.0	79.9	79.1
2007 Strategy #4	83.8	86.8	77.6	80.1	78.0	79.9	79.1
2007 Strategy #5	83.8	87.0	77.4	79.9	77.8	79.8	79.1
2007 Strategy #10	83.8	87.0	77.4	76.2	75.4	74.9	76.6
2007 Strategy #11	83.8	87.0	77.4	79.9	77.8	79.8	79.1
2007 Strategy #12	83.8	86.9	77.4	79.9	77.8	79.8	79.1
2007 Strategy #13	83.7	86.8	77.4	79.9	77.8	79.8	79.1

EPA's drafts 8-hour ozone modeling guidance has provisions for performing additional analysis in the case the modeled ozone attainment is inconclusive or close to demonstrating attainment. If the maximum projected future-year 8-hour ozone Design Value is less that 90 ppb, then the area is allowed to demonstrate attainment using a weight of evidence (WOE) arguments, which is discussed in Section 6.

Application of EPA's Screening Test

EPA's draft guidance has a screening test that applies the modeled attainment test for grid cells without a monitor that consistently exhibit high estimated ozone concentrations. Screening cells are those that exceed the estimated ozone at a near by monitor by 5% or more for at least 50 of the days modeled. Using this criteria, 55 screening cells were identified. The results of the attainment demonstration screening test for the 55 screening cells is provided in Appendix E. The screening test used the maximum observed 8-hour ozone Design Value from nearby monitors (e.g., Skiatook, Tulsa and Glenpool for Tulsa). Using the 1999 and 2001 observed Design Values, all screening cells passed the model attainment demonstration test. Using the 2000 Design Values, several screening cells in the Tulsa area failed to satisfy the screening test for attainment.

6. WEIGHT OF EVIDENCE ATTAINMENT DEMONSTRATION

The projected 8-hour ozone Design Values in Tulsa and Oklahoma City for the 2007 emission scenarios are all below 84.9 ppb when the observed 2001-2003 8-hour ozone Design Values (DVs) are used thereby demonstrating attainment. However, when the observed 1998-2000 8-hour ozone DVs are used, attainment is not demonstrated for the 2007 Base Case at the Skiatook (87.2 ppb) monitor in Tulsa, so therefore do not satisfy EPA's deterministic modeled attainment test (EPA, 1999). Thus, the modeled attainment test is inconclusive.

EPA's guidance for demonstrating attainment of the 8-hour ozone has provisions for performing an attainment demonstration based on a Weight of Evidence (WOE) provided the projected 8-hour ozone Design Values using the RRFs are less than 90 ppb, which is satisfied for the Oklahoma EAC modeling. Below we discuss five elements that are part of a WOE attainment demonstration:

- Design Value scaling using alternative years observed 8-hour ozone Design Values;
- Design Value scaling starting with a 5-year observed ozone Design Value centered on the episode year (1999);
- Trends in additional modeled ozone air quality metrics for the 2002 Base Case and 2007 emissions scenarios.
- Additional independent model corroborative analysis demonstrating attainment in Oklahoma.
- Trends in observed 8-hour ozone Design Values and related ozone concentrations.

2007 Projected 8-Hour Ozone Design Values using Six Years of Design Values

Using the observed 2001-2003 8-hour ozone Design Values (DVs) attainment could be demonstrated at all Oklahoma monitors, whereas use of the observed 1998-2000 8-hour ozone DVs, attainment is not demonstrated at the Skiatook (87.2 ppb) monitor in the Tulsa MSA. To determine whether this difference is related to unusual aspects of the 2001-2003 (too clean) or 1998-2000 (too dirty) observed DVs, we performed Design Value projections using 6 years of observed DVs from 1999 to 2003, which is shown in Table 6-1. Using 6 years of observed 3-year DVs, the modeled attainment test is passed in 5 out of the 6 years analyzed, suggesting that the observed 1998-2000 DVs may be are the atypical ones. The only time the projected 2007 8-hour ozone DVs are estimated to exceed 85 ppb is at the Skiatook monitor using just the 1998-2000 observed DVs.

Table 6-1. Projected 2007 8-hour ozone Design Values (DVs) in Oklahoma using the Revised 2007 Base Case emissions (Run20) and six years of observed DVs from 1999 to 2004 (attainment demonstrated when project DV is 84.9 ppb or lower).

Scaled DVs for 2007	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby	Lawton
1997-1999 DVs	**86**	**88**	**83**	**86**	**80**	**84**	**81**	**83**
2007 Base Case	82.1	82.6	78.7	82.0	76.1	79.9	77.2	78.3
2007 Strategy #2	82.0	82.5	78.6	82.0	76.1	79.9	77.2	78.3
2007 Strategy #3	82.0	82.2	78.6	82.0	76.1	79.9	77.2	78.3
2007 Strategy #4	81.9	82.1	78.6	82.0	76.1	79.9	77.2	78.3
2007 Strategy #5	81.9	82.4	78.4	81.8	75.9	79.8	77.2	78.3
2007 Strategy #10	81.9	82.3	78.3	78.0	73.5	74.9	74.7	77.8
2007 Strategy #11	81.9	82.3	78.3	81.8	75.9	79.8	77.2	78.3
2007 Strategy #12	81.9	82.2	78.3	81.8	75.9	79.8	77.2	78.3
2007 Strategy #13	81.8	82.2	78.3	81.8	75.9	79.8	77.2	78.3
Scaled DVs for 2007	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
1998-2000 DVs	**88**	**93**	**82**	**84**	**82**	**84**	**83**	**84**
2007 Base Case	84.0	87.2	77.8	80.1	78.0	79.9	79.1	79.3
2007 Strategy #2	83.9	87.2	77.7	80.1	78.0	79.9	79.1	79.3
2007 Strategy #3	83.9	86.8	77.7	80.1	78.0	79.9	79.1	79.3
2007 Strategy #4	83.8	86.8	77.6	80.1	78.0	79.9	79.1	79.3
2007 Strategy #5	83.8	87.0	77.4	79.9	77.8	79.8	79.1	79.2
2007 Strategy #10	83.8	87.0	77.4	76.2	75.4	74.9	76.6	78.8
2007 Strategy #11	83.8	87.0	77.4	79.9	77.8	79.8	79.1	79.2
2007 Strategy #12	83.8	86.9	77.4	79.9	77.8	79.8	79.1	79.2
2007 Strategy #13	83.7	86.8	77.4	79.9	77.8	79.8	79.1	79.2
Scaled DVs for 2007	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
1999-2001 DVs	**84**	**90**	**80**	**80**	**80**	**79**	**81**	**81**
2007 Base Case	80.2	84.4	75.9	76.3	76.1	75.2	77.2	76.4
2007 Strategy #2	80.1	84.3	75.8	76.3	76.1	75.2	77.2	76.4
2007 Strategy #3	80.1	84.0	75.8	76.2	76.1	75.1	77.2	76.4
2007 Strategy #4	80.0	84.0	75.7	76.2	76.1	75.1	77.2	76.4
2007 Strategy #5	80.0	84.2	75.5	76.1	75.9	75.0	77.2	76.4
2007 Strategy #10	80.0	84.2	75.5	72.5	73.5	70.5	74.7	75.9
2007 Strategy #11	80.0	84.2	75.5	76.1	75.9	75.0	77.2	76.4
2007 Strategy #12	80.0	84.1	75.5	76.1	75.9	75.0	77.2	76.4
2007 Strategy #13	79.9	84.0	75.5	76.1	75.9	75.0	77.2	76.4
Scaled DVs for 2007	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
2000-2002 DVs	**81**	**87**	**80**	**79**	**81**	**77**	**79**	**79**
2007 Base Case	77.3	81.6	75.9	75.3	77.1	73.3	75.3	74.5
2007 Strategy #2	77.2	81.5	75.8	75.3	77.1	73.3	75.3	74.5
2007 Strategy #3	77.3	81.2	75.8	75.3	77.1	73.2	75.3	74.5
2007 Strategy #4	77.2	81.2	75.7	75.3	77.1	73.2	75.3	74.5
2007 Strategy #5	77.2	81.4	75.5	75.2	76.9	73.1	75.3	74.5
2007 Strategy #10	77.1	81.4	75.5	71.6	74.5	68.7	72.9	74.1
2007 Strategy #11	77.1	81.4	75.5	75.2	76.9	73.1	75.3	74.5
2007 Strategy #12	77.1	81.3	75.5	75.2	76.9	73.1	75.3	74.5
2007 Strategy #13	77.0	81.2	75.5	75.1	76.9	73.1	75.3	74.5

Scaled DVs for 2007	Tulsa	Skiatook	Glenpool	OSDH	Edmond	Moore	Goldsby	Lawton
2001-2003 DVs	**80**	**83**	**81**	**79**	**80**	**76**	**78**	**77**
2007 Base Case	76.4	77.9	76.8	75.3	76.1	72.3	74.4	72.7
2007 Strategy #2	76.3	77.8	76.8	75.3	76.1	72.3	74.4	72.7
2007 Strategy #3	76.3	77.5	76.7	75.3	76.1	72.3	74.4	72.7
2007 Strategy #4	76.2	77.4	76.7	75.3	76.1	72.3	74.4	72.7
2007 Strategy #5	76.2	77.7	76.5	75.2	75.9	72.2	74.3	72.6
2007 Strategy #10	76.2	77.6	76.5	71.6	73.5	67.8	72.0	72.2
2007 Strategy #11	76.2	77.6	76.4	75.2	75.9	72.2	74.3	72.6
2007 Strategy #12	76.2	77.5	76.4	75.2	75.9	72.2	74.3	72.6
2007 Strategy #13	76.1	77.5	76.4	75.1	75.9	72.2	74.3	72.6
Scaled DVs for 2007	**Tulsa**	**Skiatook**	**Glenpool**	**OSDH**	**Edmond**	**Moore**	**Goldsby**	**Lawton**
2002-2004 DVs	**76**	**79**	**79**	**78**	**78**	**73**	**74**	**76**
2007 Base Case	72.6	74.1	74.9	74.4	74.2	69.5	70.5	71.7
2007 Strategy #2	72.5	74.0	74.9	74.4	74.2	69.5	70.5	71.7
2007 Strategy #3	72.5	73.8	74.9	74.3	74.2	69.4	70.5	71.7
2007 Strategy #4	72.4	73.7	74.8	74.3	74.2	69.4	70.5	71.7
2007 Strategy #5	72.4	73.9	74.6	74.2	74	69.3	70.5	71.7
2007 Strategy #10	72.4	73.9	74.6	70.7	71.7	65.1	68.3	71.3
2007 Strategy #11	72.3	73.9	74.6	74.2	74	69.3	70.5	71.7
2007 Strategy #12	72.3	73.8	74.5	74.2	74	69.3	70.5	71.7
2007 Strategy #13	72.3	73.8	74.5	74.2	74	69.3	70.5	71.7

Additional Ozone Modeling Metrics

EPA recommends that at least 3 additional model outputs be examined in the weight of evidence (WOE) determination to provide assurance that passing or nearly passing the recommended attainment and screening tests indicates attainment (EPA, 1999, pg. 544-60). These tests measure how much estimated elevated 8-hour ozone concentrations are reduced from the current year base case condition to the future-year control strategy. The three recommended metrics are as follows:

> <u># Grid-Hours > 84 ppb</u>: Compute the relative change in the number of grid cell – hours during the modeling episode in which the estimated 8-hour ozone concentrations are greater than 84 ppb.
>
> <u># Grid-Cells > 84 ppb</u>: Compute the number of grid-cells in which the daily maximum 8-hour ozone concentrations is greater than 84 ppb.
>
> <u>Relative Difference (RD)</u>: The Relative Difference (RD) in 8-Hour ozone concentrations greater than 84 ppb is the ratio of the average of estimated excess 8-hour ozone above 84 ppb of the future-year simulation to the base-year base case.

The first two metrics above represent a type of 8-hour ozone exposure metric. The #Grid-Hours with 8-hour ozone > 84 ppb is the number of grid cell-hours that the model estimated 8-hour ozone concentrations exceeds the health-based standard. The #Grid-cells 8-hour ozone is greater than 84 ppb represents the areal extent of modeled exceedances. The Relative Reduction metric is more of a dosage calculation that is weighted by how much the 8-hour ozone concentration is above 84 ppb.

As part of the WOE, EPA guidance states that "large" reductions in these metrics are desirable (EPA, 1999). EPA suggests an example of "large" would be 80% reduction (EPA, 1999).

Table 6-2 below summarizes these metrics for the 1999 Base Case, 2007 Base Case and the eight 2007 emission control strategies analyzed in the revised modeling using the expanded grid. The reduction in the number of grid-cell hours > 84 ppb and grid-cells > 84% for the 2007 emission scenarios is approximately 60% and 50%, respectively. The Relative Different is reduced from 73% to 76% depending on the 2007 emissions scenario. Although the reductions in the air quality metrics are not as large as the 80% suggested by EPA, substantial reductions are seen and given that the Oklahoma region currently attains the 8-hour ozone standard and has attained it for several years, the further reduction of these metrics suggest 8-hour ozone concentrations will continue to decline and attainment would continue to be achieved.

Table 6-2. Summary of additional modeling metrics recommended by EPA in a WOE determination.

	# Grid-Hours 8-hr > 84 ppb		# Grid-Cell > 84ppb		Relative Difference
	(#)	(%)	(#)	(%)	(%)
1999 Base Case	13995		2945		
2007 Base Case	5736	59.0	1587	46.1	72.8
2007 Strategy #2	5704	59.2	1582	46.3	73.0
2007 Strategy #3	5283	62.3	1486	49.5	75.7
2007 Strategy #4	5247	62.5	1475	49.9	75.9
2007 Strategy #5	5497	60.7	1541	47.7	74.2
2007 Strategy #10	5453	61.0	1529	48.1	74.5
2007 Strategy #11	5472	60.9	1535	47.9	74.4
2007 Strategy #12	5363	61.7	1503	49.0	74.9
2007 Strategy #13	5340	61.8	1497	49.2	75.1

Independent Corroborative Modeling by EPA

EPA has recently projected 8-hour ozone Design Values for Tulsa, Oklahoma as part of their analysis for the Interstate Air Quality Rule (IAQR, EPA, 2004b). EPA made 8-hour ozone DV projections for 2010 and 2015 for a Base Case assuming growth and all currently mandated control programs, and then with the IAQR controls. EPA projects maximum 8-hour ozone Design Value for Tulsa of 76 ppb for 2010 and 74 ppb for 2015 (EPA, 2004, Appendix D) assuming growth and just current controls on the books. Note that these projected 8-hour ozone Design Values for Tulsa are consistent with our 2007 projected maximum 8-hour Design Value of 78 ppb using the 2001-2003 observed 8-hour ozone DVs (see Table 6-1). These results provide independent corroboration that Tulsa will be achieving the 8-hour ozone standard in 2007.

Ozone Air Quality and Emission Trends

We analyzed trends in annual 4th highest 8-hour average ozone concentrations at monitoring sites in Oklahoma City and Tulsa (see Table 6-3). Only sites with valid annual values in each year from 1995 – 2004 were included in the analysis. Four of the six monitoring sites in Oklahoma City met this completeness criterion, the remaining two sites (Yukon and Choctaw) reported in 2002-2004 only. Three of the six sites in Tulsa met the completeness criterion, the remaining three sites (Lynn Lane, Keystone, and Mannford) reported for only four, two, and two years, respectively.[1] Trends for all sites were calculated via linear regression of the annual 4th highest daily maximum 8-hour averages against year. Trends were calculated in the same manner for the maximum and the average of the annual 4th highest daily maximum 8-hour averages over all sites meeting the above completeness criteria in each city (these are referred to as the maximum value trend and the composite trend, respectively). Examination of the composite trend is in keeping with EPA's air quality trend reporting methodology (EPA, 2003). Examination of the maximum value trend is in keeping with the methodology used to determine nonattainment area ozone design values as specified in 40 CFR 50, Appendix I. Statistical significance levels of the maximum value and composite trends were determined via the usual two-sided t-test applied to the regression slope parameters.

Composite trends are illustrated in Figure 6-1. Trend slopes and statistical significance results are shown in Table 6-4. Significance test results indicate a non-zero slope at the 95% probability level. For the 1995 – 2004 period, there is a downward (negative) trend in all cases. Maximum value and composite trends are below –1 ppb/year and are not statistically significant. For the 1998 – 2004 period, all of the trends are negative with values of –1.0 ppb/year or more. In Tulsa and Oklahoma City, both the maximum value and composite trends are statistically significant.

Anthropogenic emission totals are summarized for the 1999, 2000 and 2007 Base Case emission scenarios in Table 6-5. NOx and VOC emissions in 2002 were 14% and 1% lower, respectively, than in 1999, which explains in part the lower 8-hour ozone levels in Oklahoma for the more recent years. By 2007 NOx and VOC emissions are projected to be, respectively, 23% and 14% lower than 1999 levels and 10% and 13% lower than 2002 levels.

Thus, the overall trends in the 4th highest 8-hour ozone concentrations are almost all downward. In particular, the recent trends at the key Skiatook (-2.31 ppb/year) and Tulsa (-2.77 ppb/year) are downward and the composite trend across all Tulsa sites of –2.03 ppb/year was determined to be significant. The general downward trends in ozone at the Tulsa monitors over recent years combined with continued projected downward trends in VOC and NOx emissions in the Tulsa MSA support the finding that ozone levels will continue to drop in Tulsa and it will continue to attain the 8-hour ozone standard in 2007.

[1] For purposes of this analysis, data from the original Tulsa site (AIRS site ID 0127) was combined with data from the new location for this site (AIRS site ID 1127); the site was moved to its current location after the 1999 ozone season.

Table 6-3. Annual 4th highest daily maximum 8-hour ozone concentrations (ppb).

City	AIRSID	Site	Year									
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Oklahoma City	400270049	MOORE	85	75	79	93	81	79	79	75	76	70
	400870073	GOLDSBY	81	75	75	87	83	81	80	78	77	68
	401090033	OSDH	85	81	84	90	84	80	78	80	80	76
	401091037	EDMOND	89	80	80	88	74	86	82	78	82	77
	401090101	YUKON								81	78	71
	401090096	CHOCTAW								78	78	72
		Max Value	89	81	84	93	84	86	82	80	82	77
		Composite Avg	85.0	77.8	79.5	89.5	80.5	81.5	79.8	77.8	78.8	72.8
Tulsa	401431127	TULSA						83	81	80	80	68
	401430127	TULSA	97	87	76	93	90	83	81	80	80	68
	401430137	SKIATOOK	96	88	81	92	91	96	84	83	83	71
	401430174	GLENPOOL	91	82	83	82	84	81	77	82	86	71
	401430177	KEYSTONE							95	82		
	401430178	LYNN LANE							78	80	84	73
	400370144	MANNFORD									81	71
		Max Value	97	88	83	93	91	96	84	83	86	71
		Composite Avg	94.7	85.7	80.0	89.0	88.3	86.7	80.7	81.7	83.0	70.0

Table 6-4. Linear least squares trends in annual 4th highest daily maximum 8-hour ozone concentrations in Oklahoma City and Tulsa.

City	Site	Period			
		1995-2004		1998-2004	
		Linear trend (ppb/year)	Significant?[2]	Linear trend (ppb/year)	Significant?
Oklahoma City					
	MOORE	-1.16	--	-2.96	--
	GOLDSBY	-0.67	--	-2.57	--
	OSDH	-0.90	--	-1.79	--
	EDMOND	-0.67	--	-0.89	--
	YUKON				
	CHOCTAW				
	Max Value	-0.92	NO	-2.07	YES
	Composite	-0.85	NO	-2.05	YES
Tulsa					
	TULSA[3]	-2.02	--	-3.50	--
	SKIATOOK	-1.63	--	-3.29	--
	GLENPOOL	-1.06	--	-1.00	--
	KEYSTONE				
	LYNN LANE				
	MANNFORD				
	Max Value	-1.64	YES	-3.18	YES
	Composite	-1.57	YES	-2.60	YES

[2] Indicates if two-sided t-test applied to regression slope parameter shows slope (i.e., ozone trend) to be non-aero at the 95% probability level.

[3] This site was moved to a nearby location after the 1999 ozone season; data from both locations were combined to calculate the trend.

Table 6-5. Summary of NOx and VOC emissions in tons per day (TPD) in the five county Tulsa MSA for the 1999, 2002 and 2007 Base Case emissions scenario and a typical summer weekday.

Source Category	1999 (TPD)	2002 Base Case (TPD)	2002 Base Case (% 1999)	2007 Base Case (TPD)	2007 Base Case (% 1999)	2007 Base Case (% 2002)
NOx Emissions	296.28	255.15	-14%	228.95	-23%	-10%
VOC Emissions	155.05	153.65	-1%	133.32	-14%	-13%

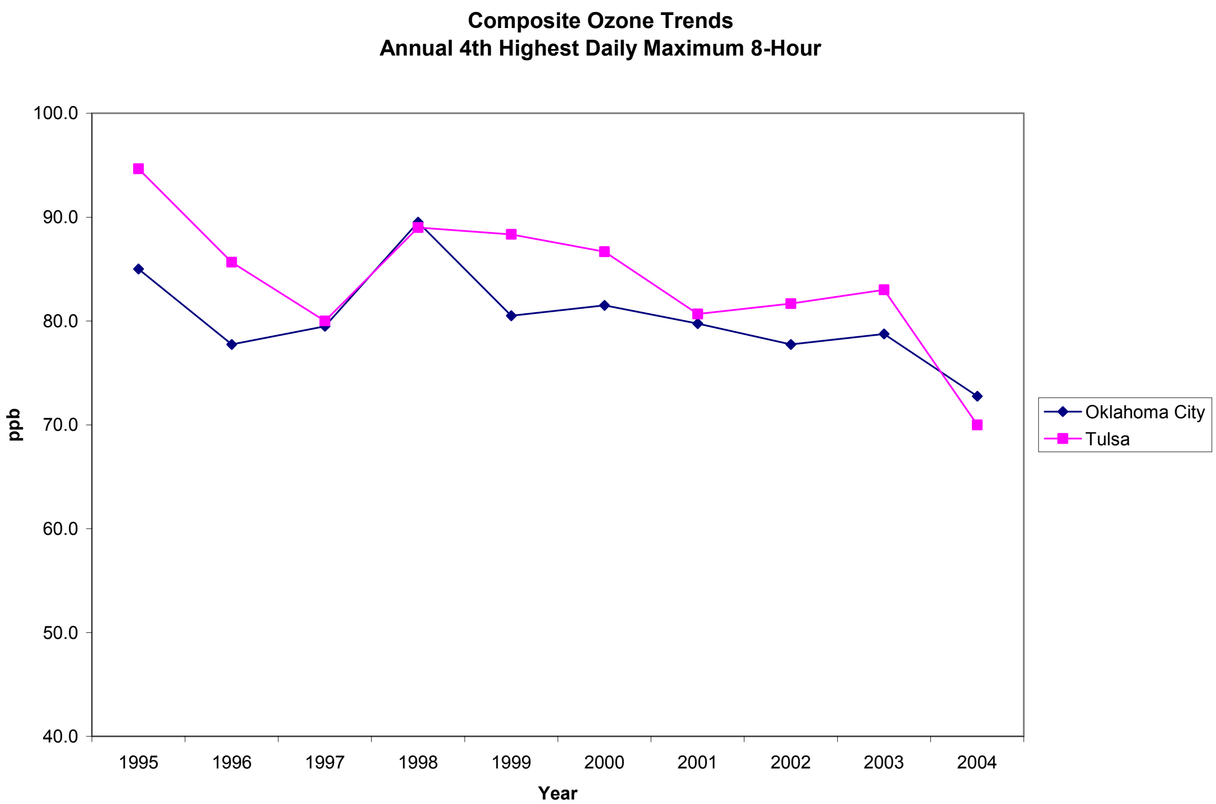


Figure 6-1. Composite trends in annual 4th highest daily maximum 8-hour ozone concentrations in Oklahoma City and Tulsa (based on monitoring sites with valid annual values for 1995 – 2004).

Conclusions of Oklahoma WOE

Current air quality, trends in air quality, emission trends, corroborative modeling analysis, additional modeling metrics, and 2007 8-hour ozone Design Value projects in 5 of 6 periods of observed 8-hour ozone DVs all indicate Tulsa and Oklahoma city will attain the 8-hour ozone standard in 2007. This evidence is overwhelming and conclusive. The continued downward trend in emissions in the Tulsa and Oklahoma City MSAs indicated 8-hour ozone would be maintained after 2007 (see Table 3-31).

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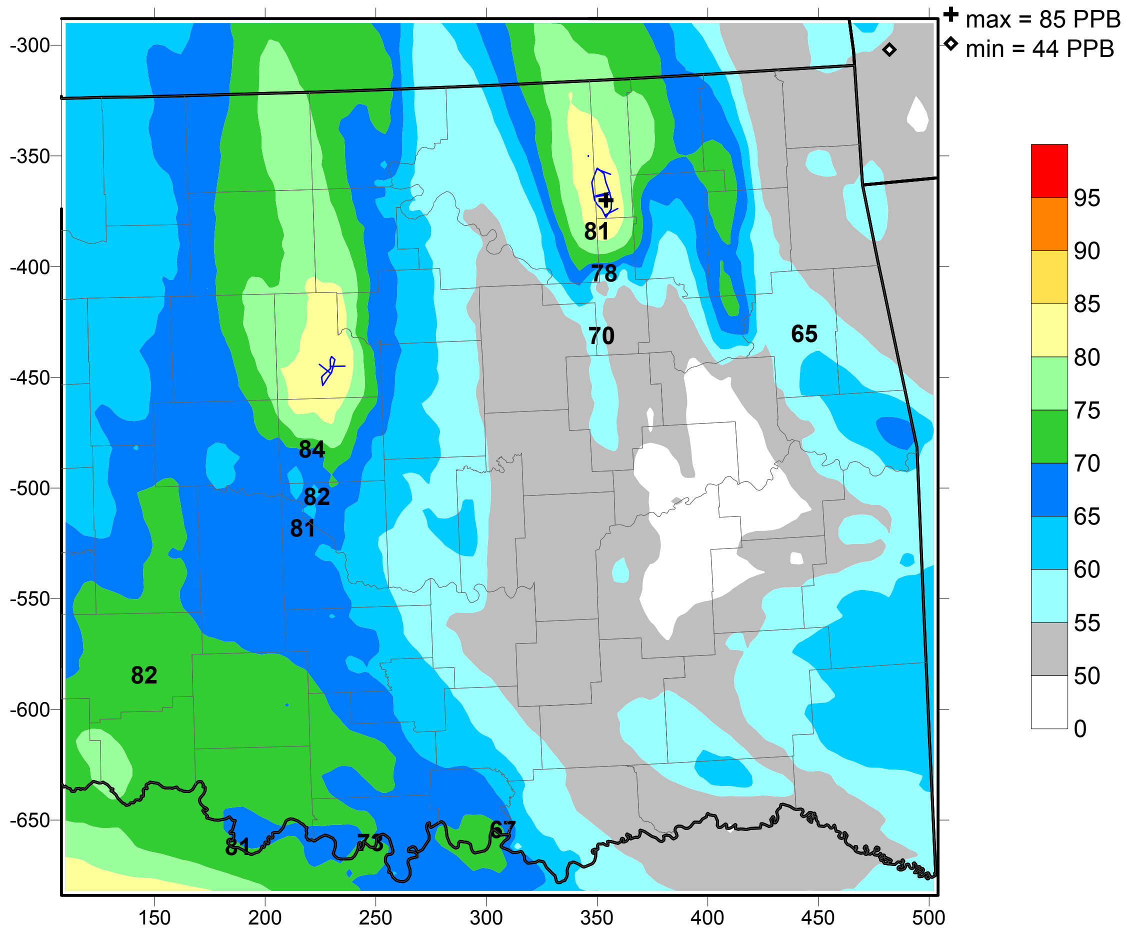
Appendix A

Spatial Maps of Estimated and Observed
Daily Maximum 8-Hour Ozone Concentrations (ppb)
For the Run20 Base Case Simulation using the
Expanded 36 km Domain and the
August 15 – September 1, 1999
Oklahoma Ozone Episode



ODEQ CAMx 4km Domain 8hr O3
August 15, 1999
1999 Base Case run20

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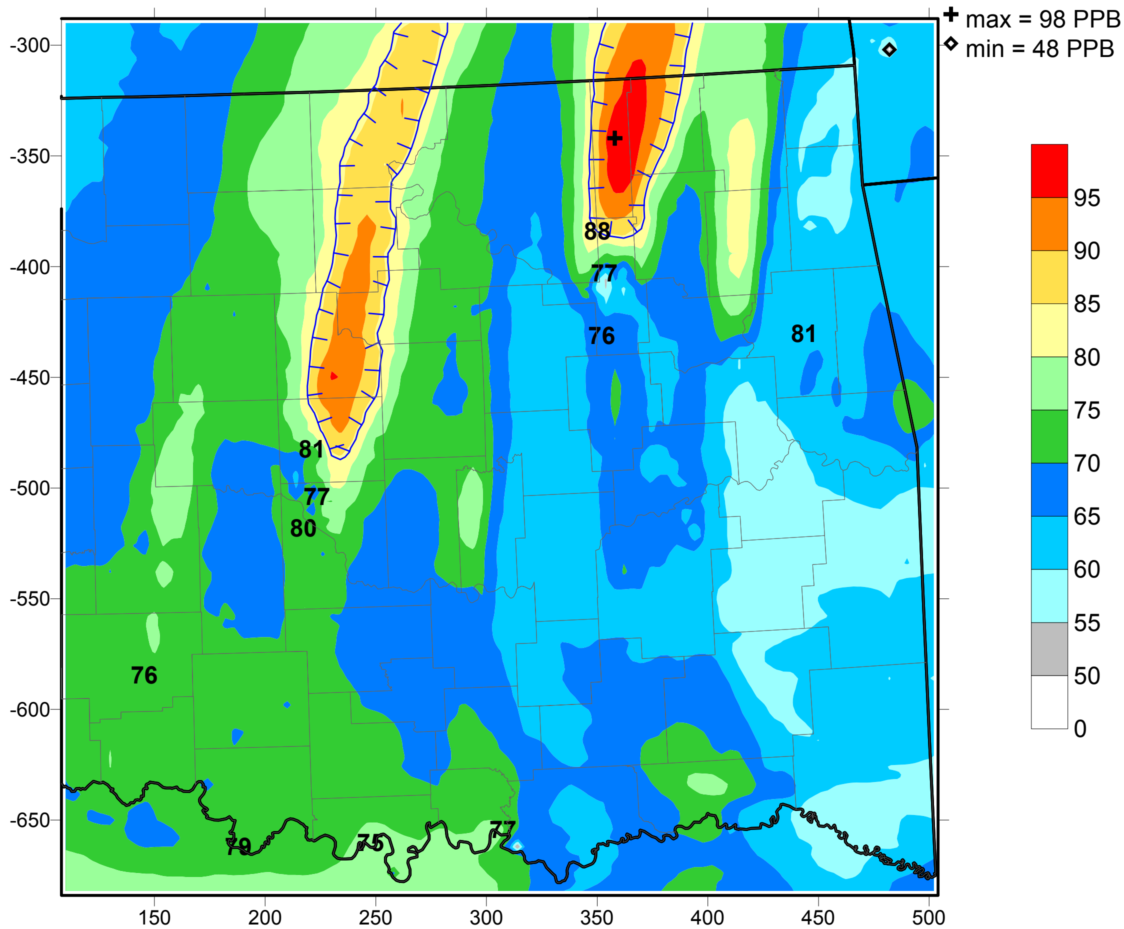

ODEQ CAMx 4km Domain 8hr O3
August 16, 1999
1999 Base Case run20

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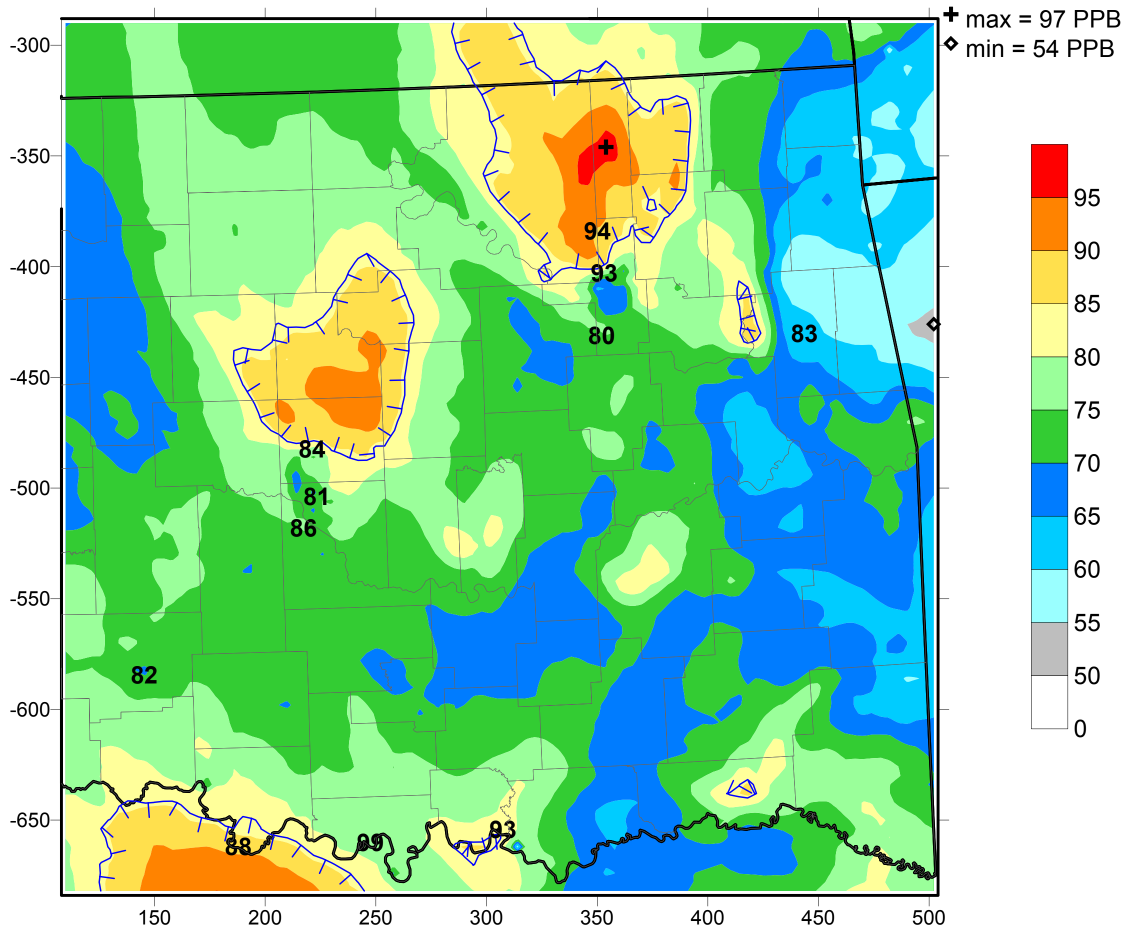

ODEQ CAMx 4km Domain 8hr O3
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1999 Base Case run20

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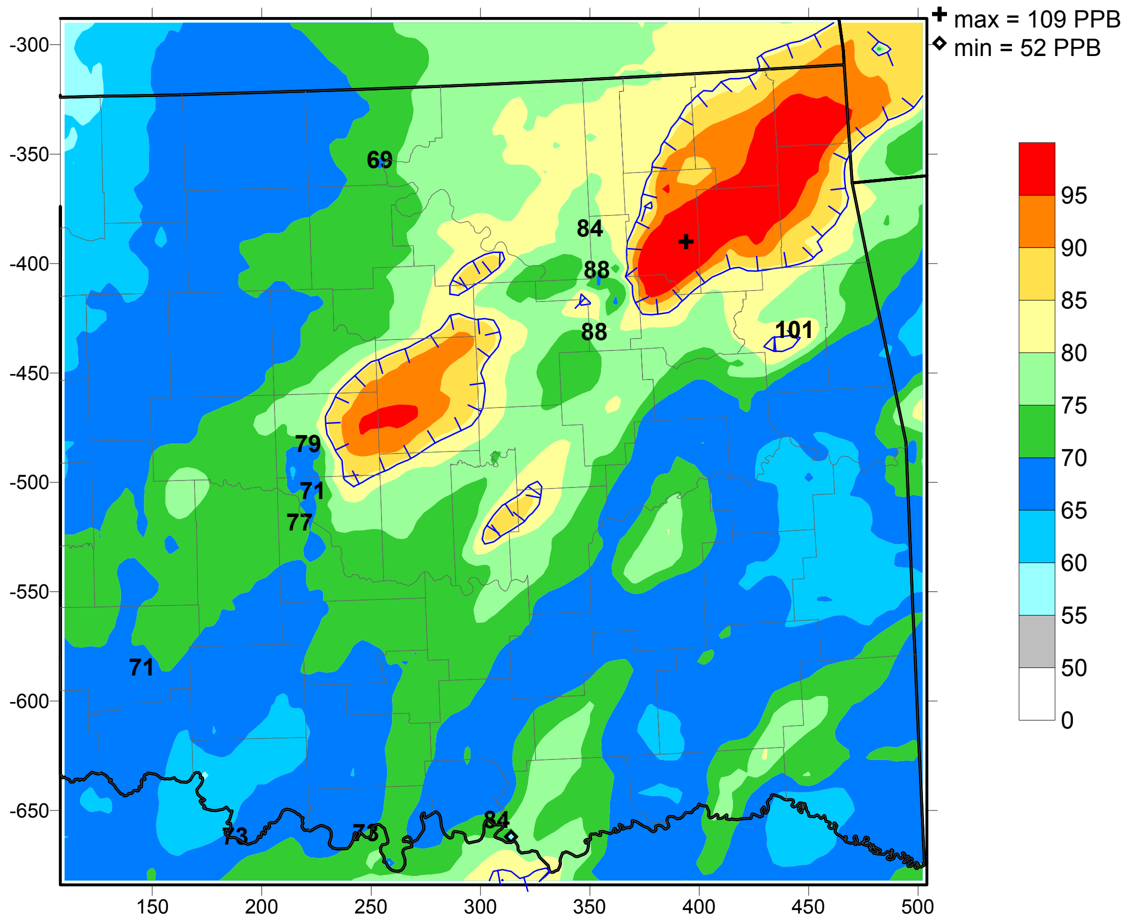

ODEQ CAMx 4km Domain 8hr O3
August 18, 1999
1999 Base Case run20

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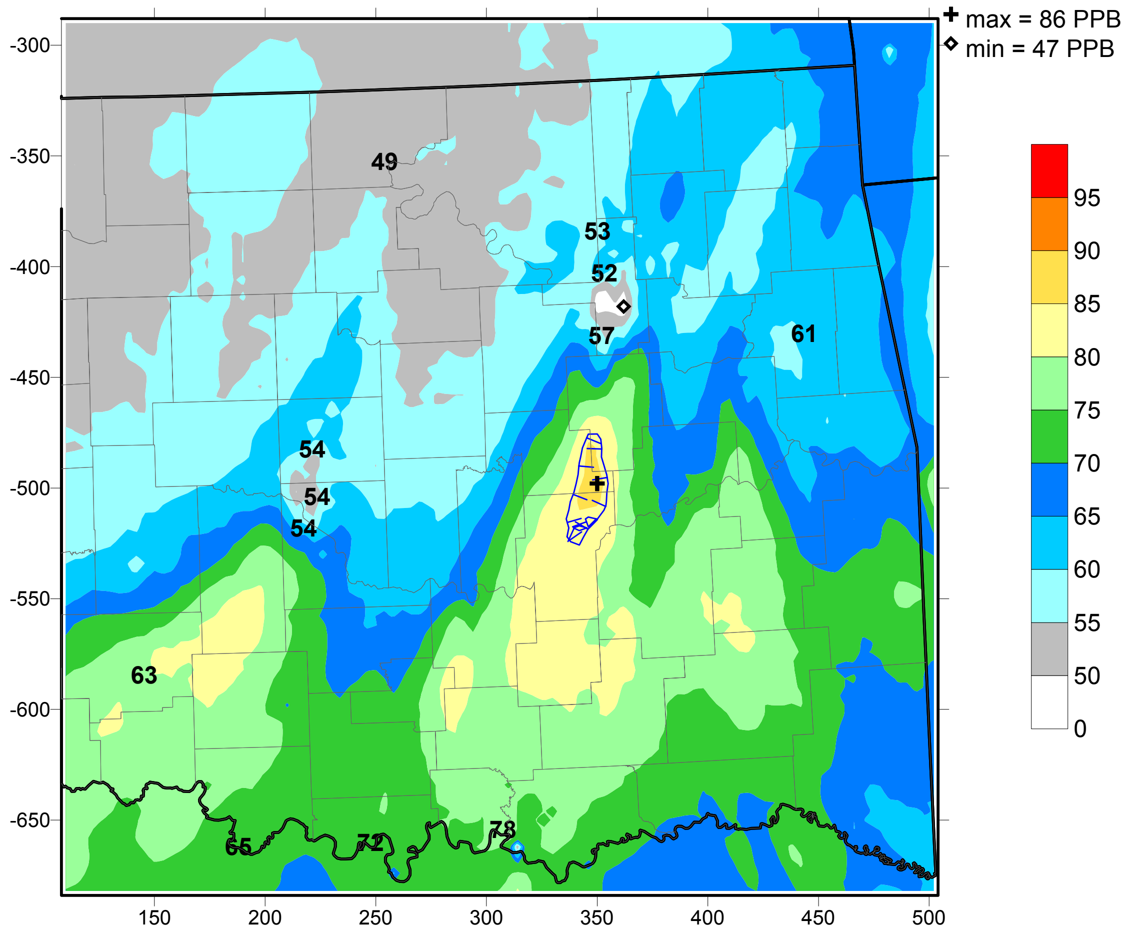

ODEQ CAMx 4km Domain 8hr O3
August 19, 1999
1999 Base Case run20

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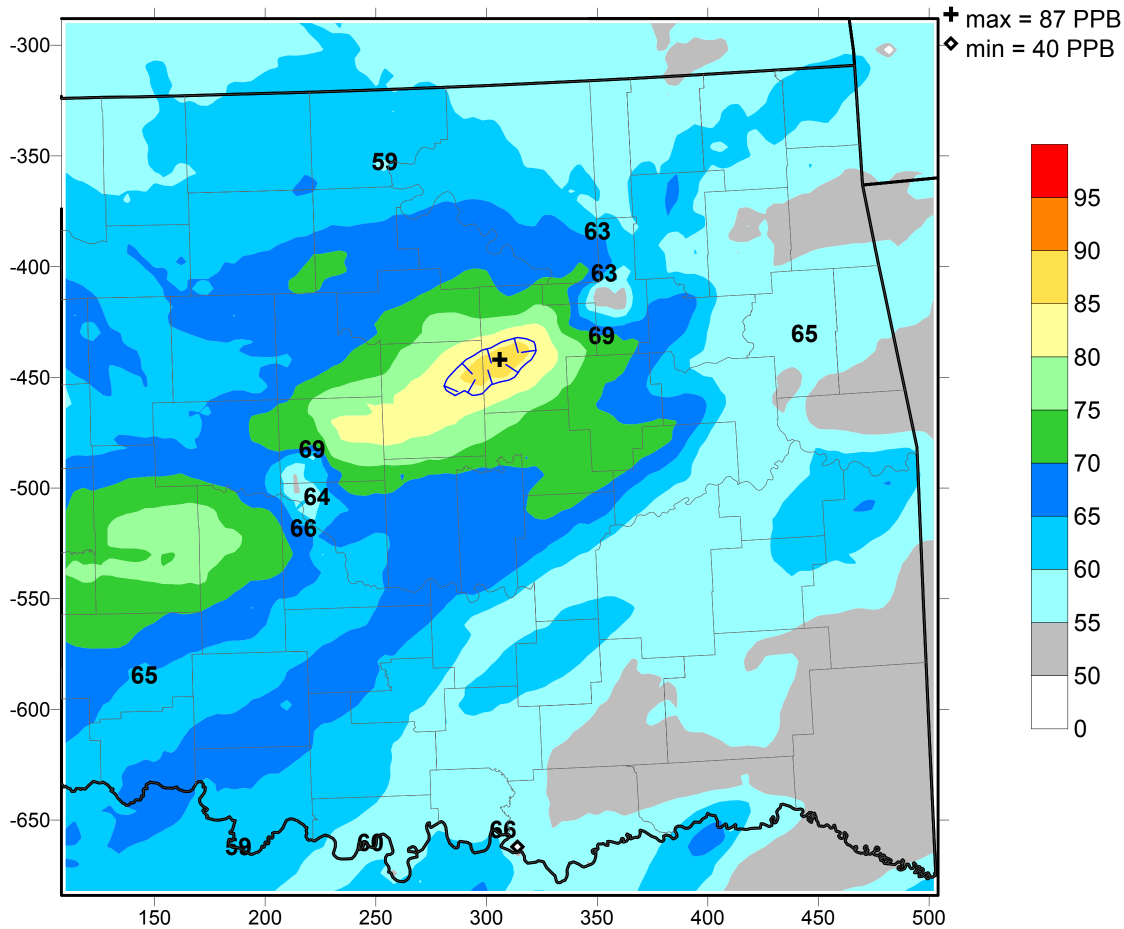

ODEQ CAMx 4km Domain 8hr O3
August 20, 1999
1999 Base Case run20

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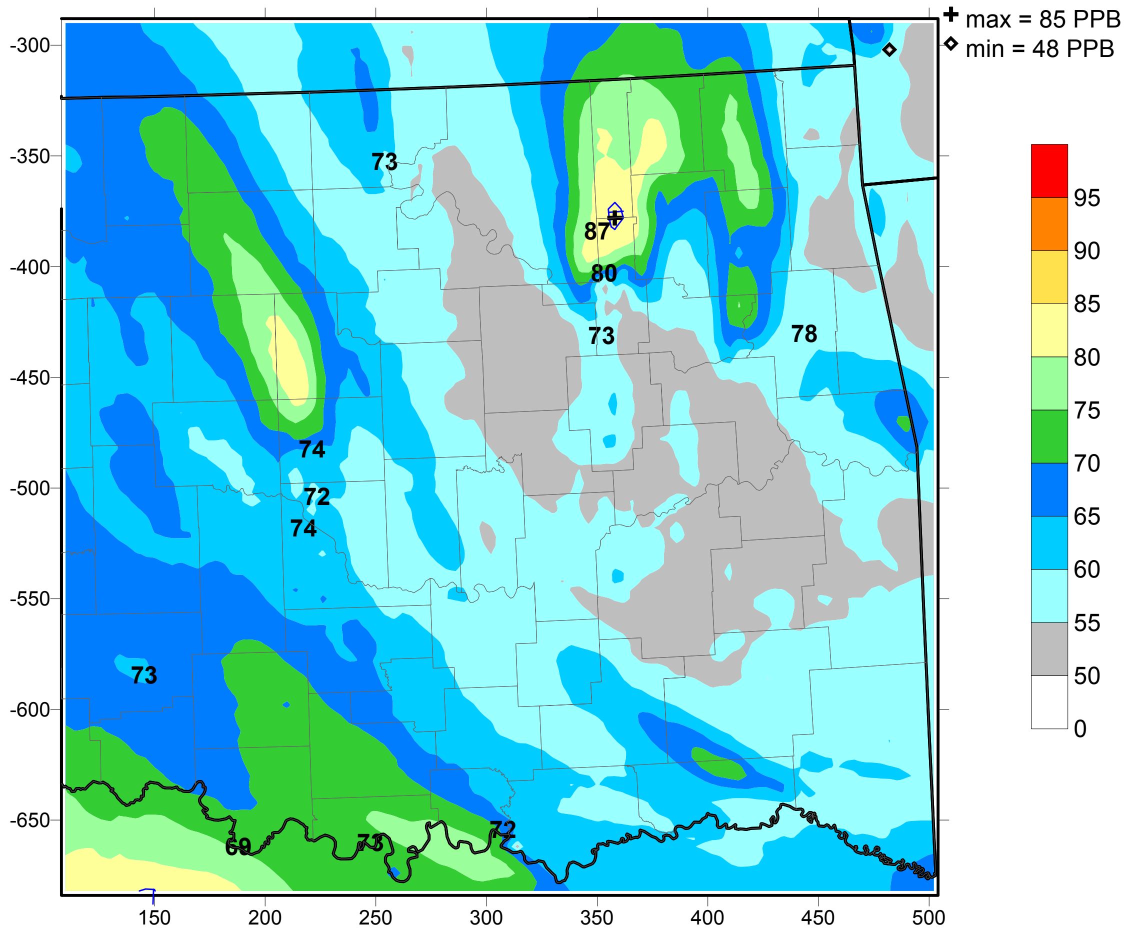

ODEQ CAMx 4km Domain 8hr O3
August 21, 1999
1999 Base Case run20

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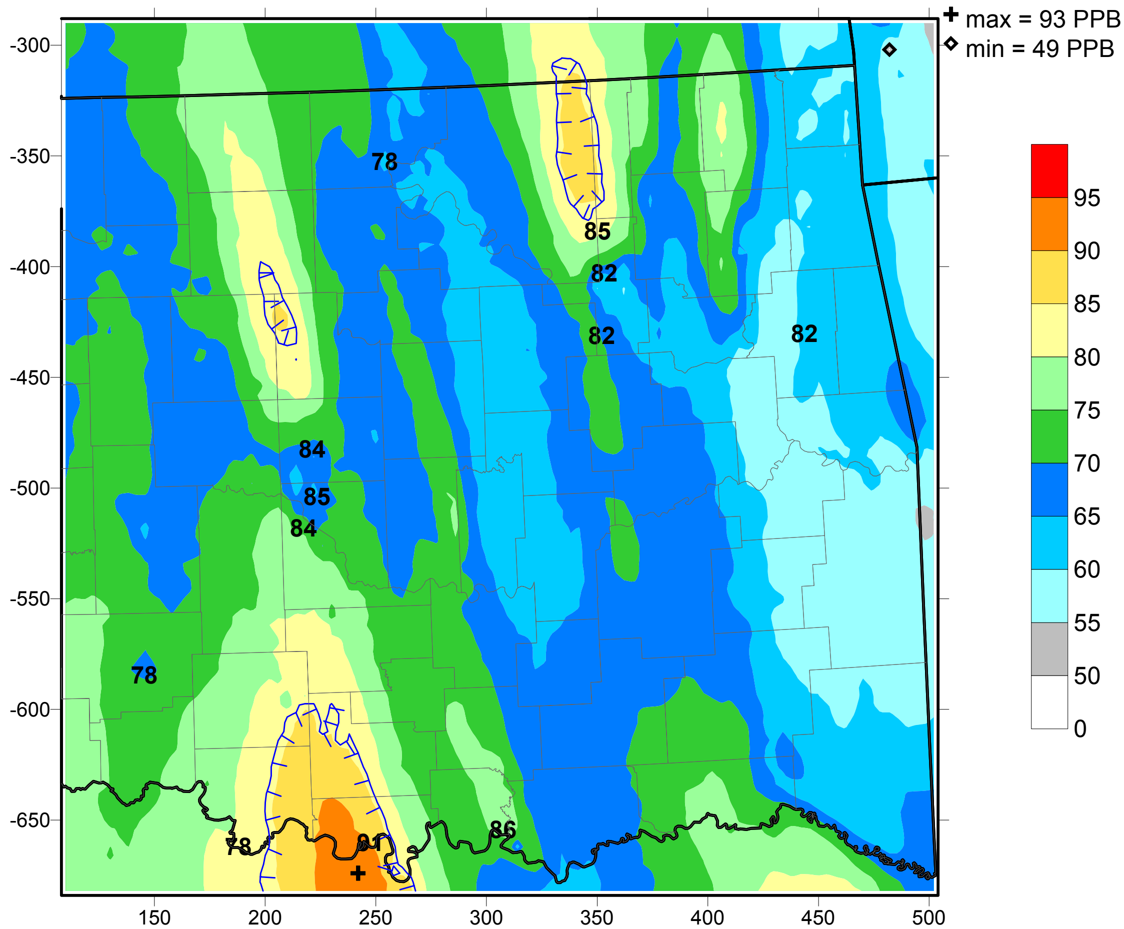

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August 22, 1999
1999 Base Case run20

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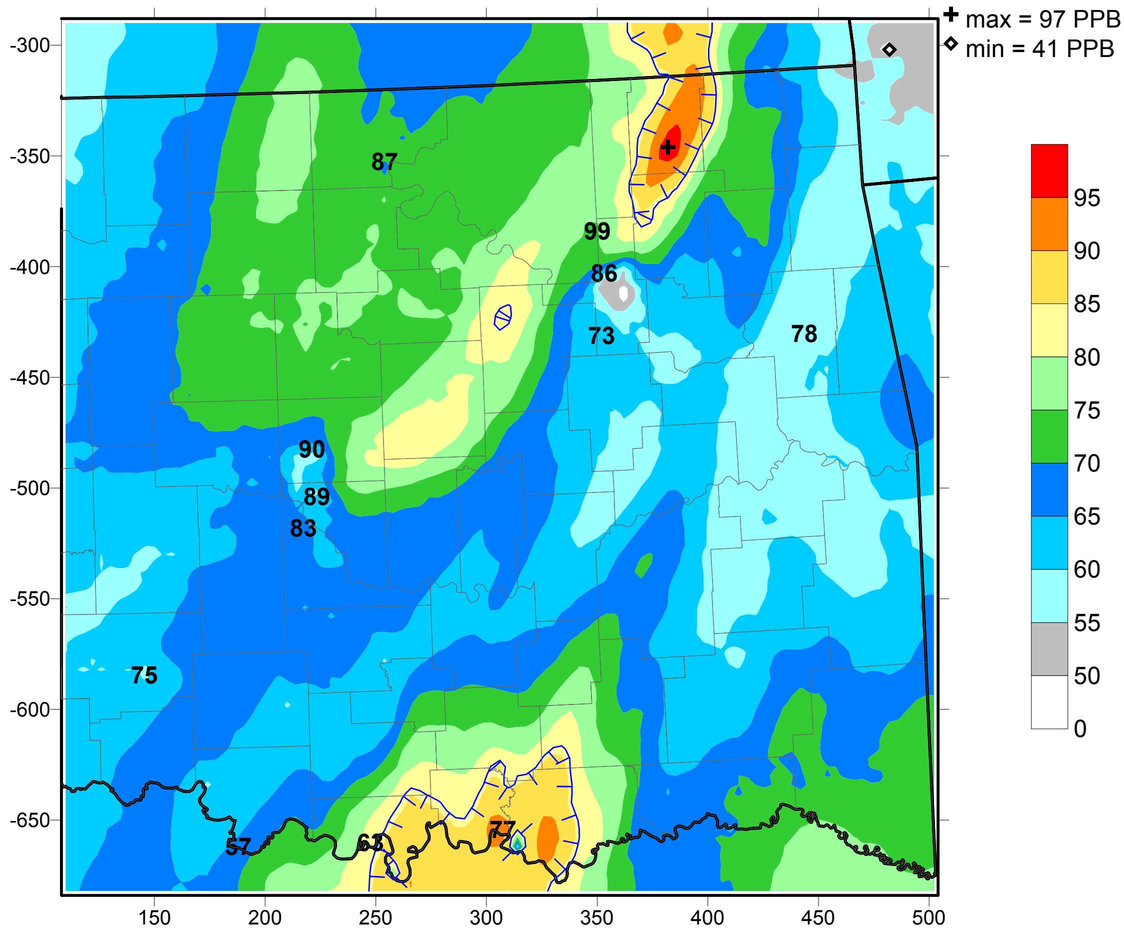

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August 23, 1999
1999 Base Case run20

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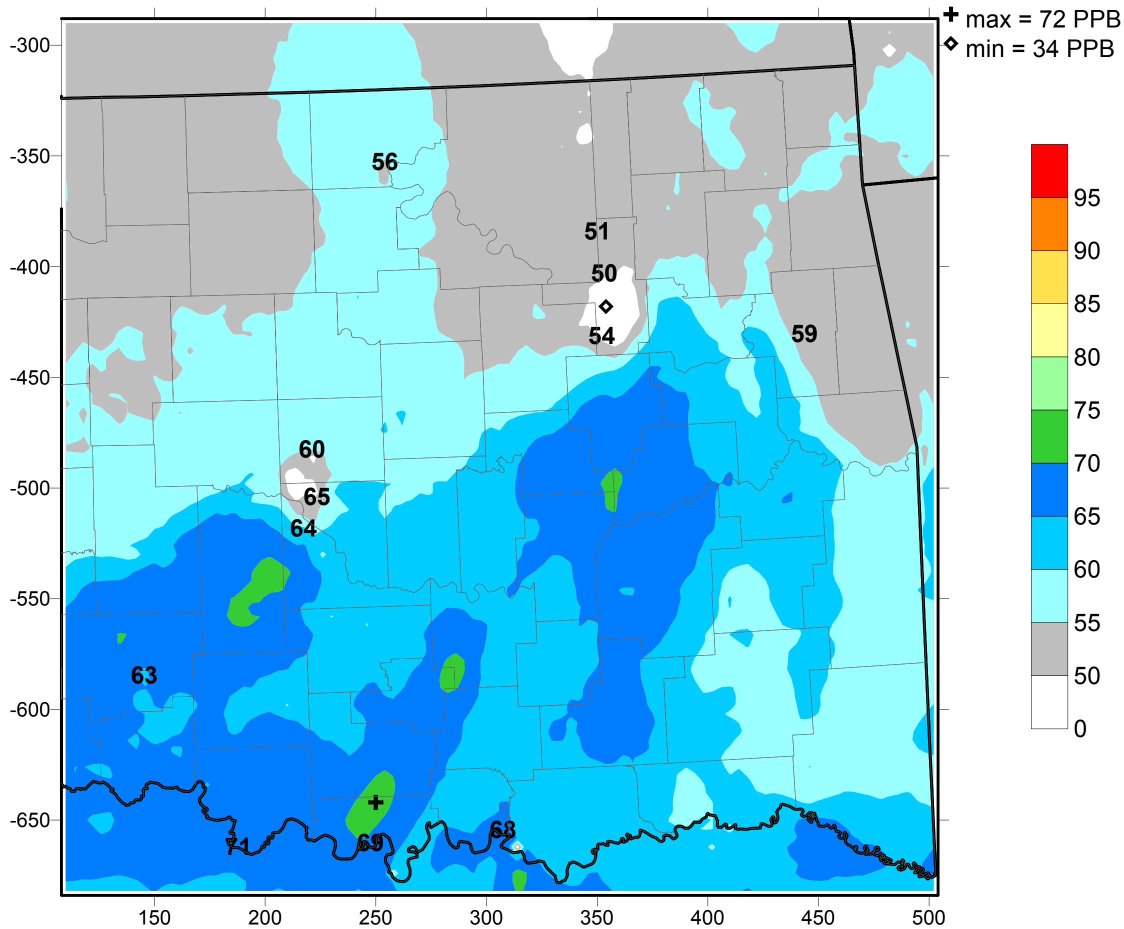

ODEQ CAMx 4km Domain 8hr O3
August 24, 1999
1999 Base Case run20

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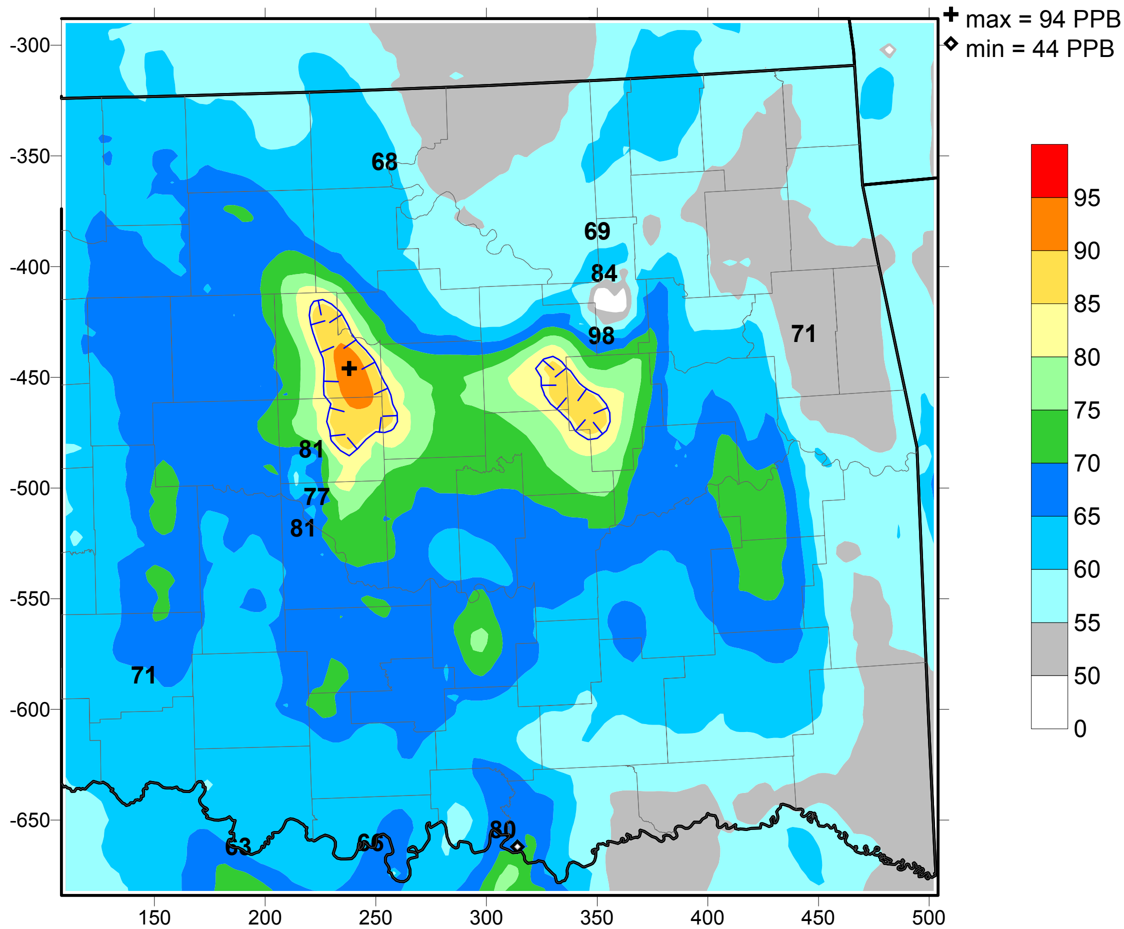

ODEQ CAMx 4km Domain 8hr O3
August 25, 1999
1999 Base Case run20

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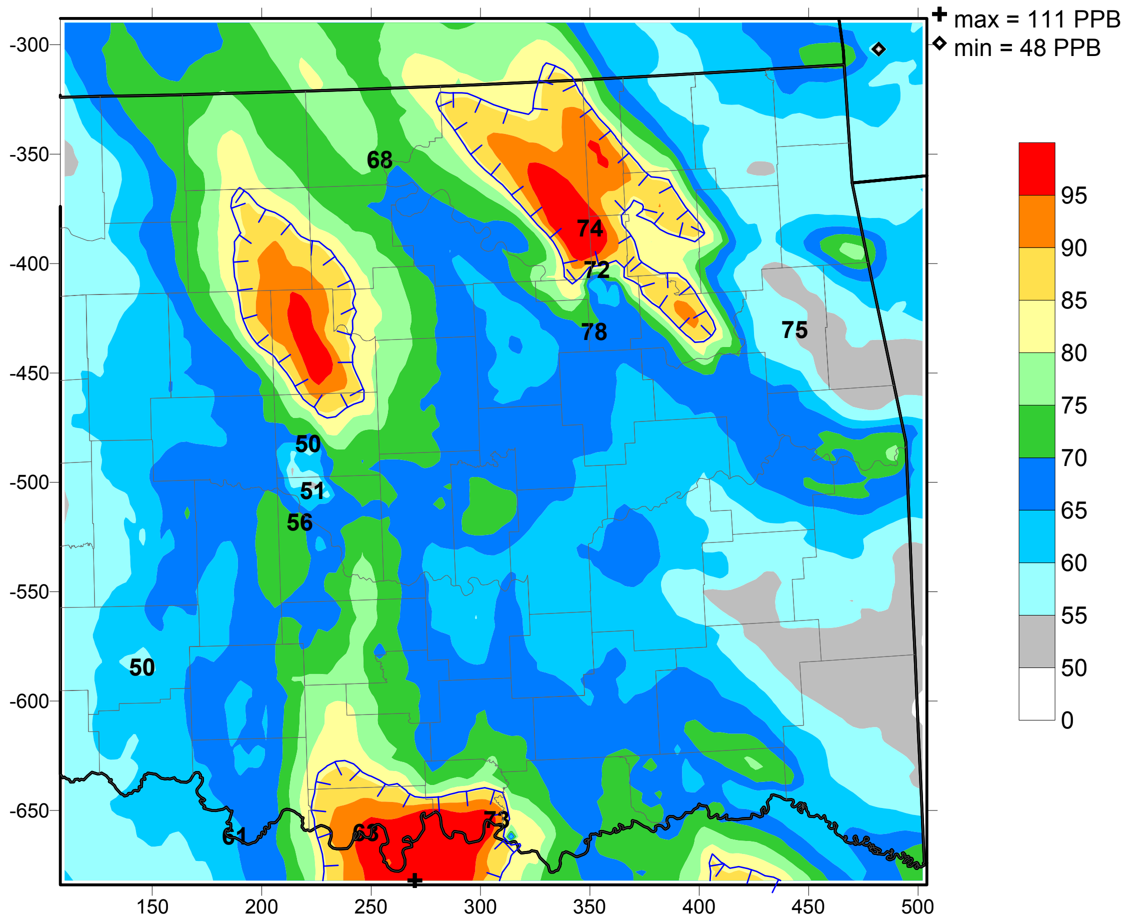

ODEQ CAMx 4km Domain 8hr O3
August 26, 1999
1999 Base Case run20

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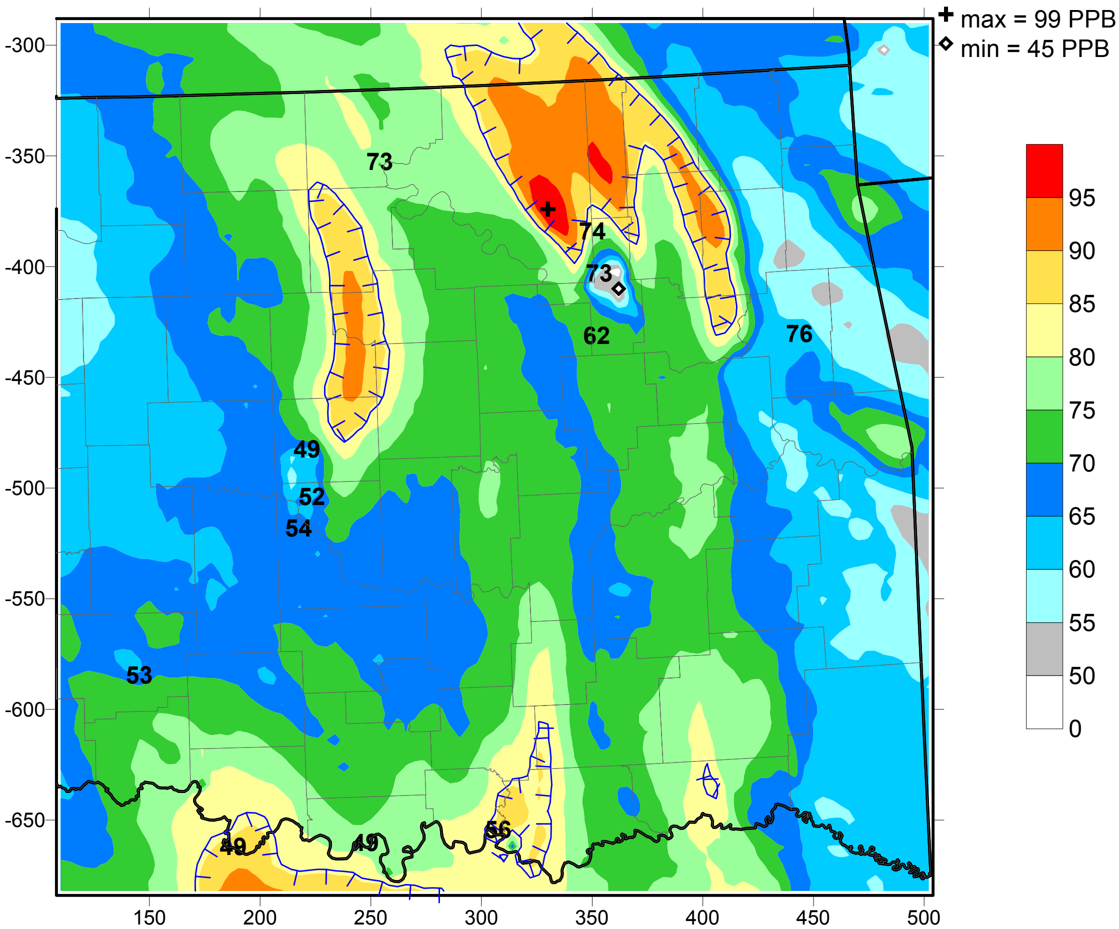

ODEQ CAMx 4km Domain 8hr O3
August 27, 1999
1999 Base Case run20

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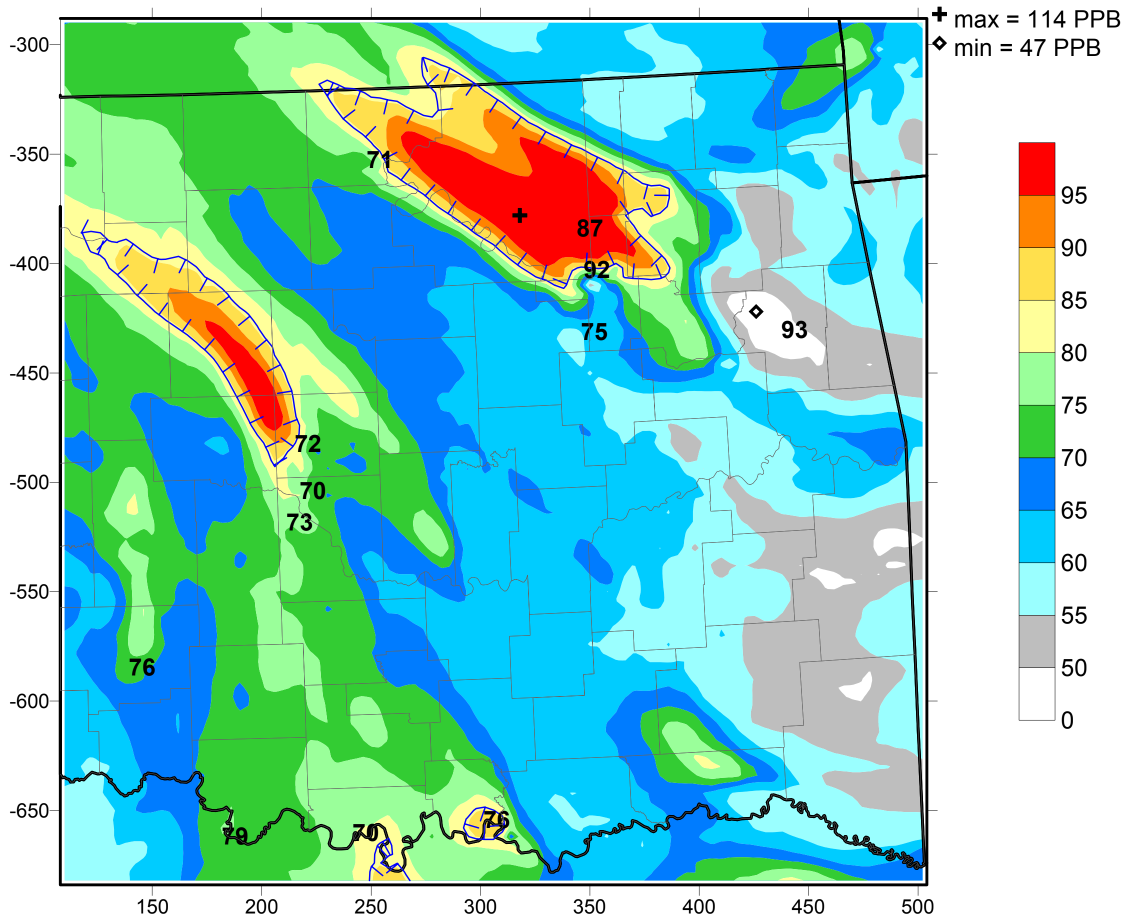

ODEQ CAMx 4km Domain 8hr O3
August 28, 1999
1999 Base Case run20

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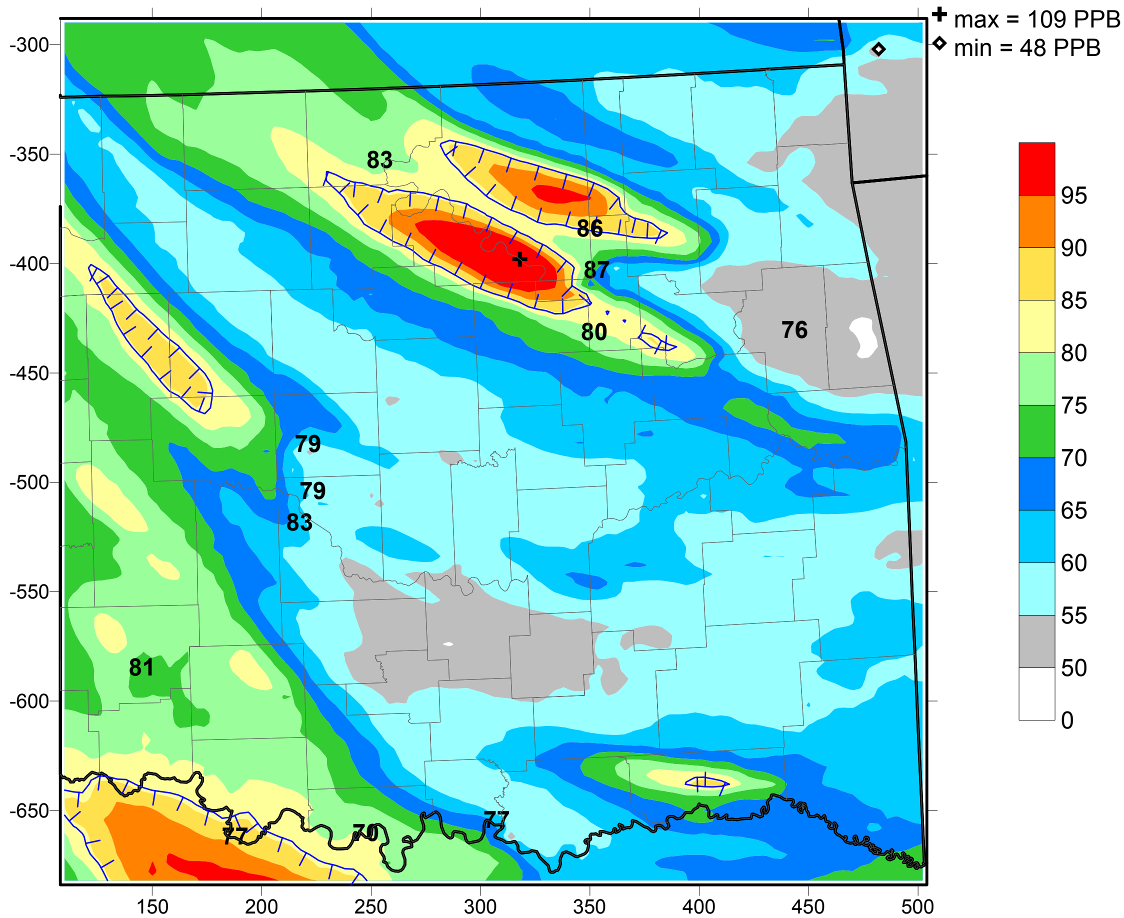

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August 29, 1999
1999 Base Case run20

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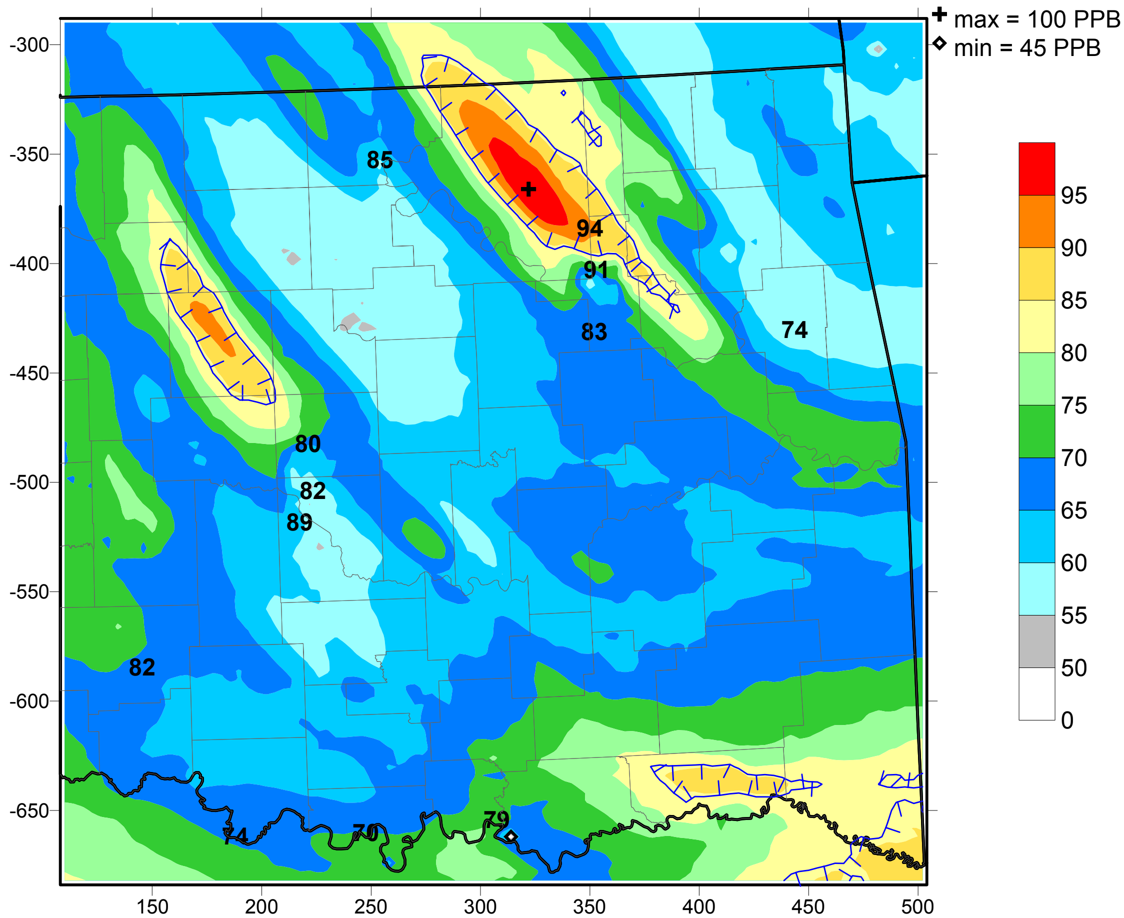

ODEQ CAMx 4km Domain 8hr O3
August 30, 1999
1999 Base Case run20

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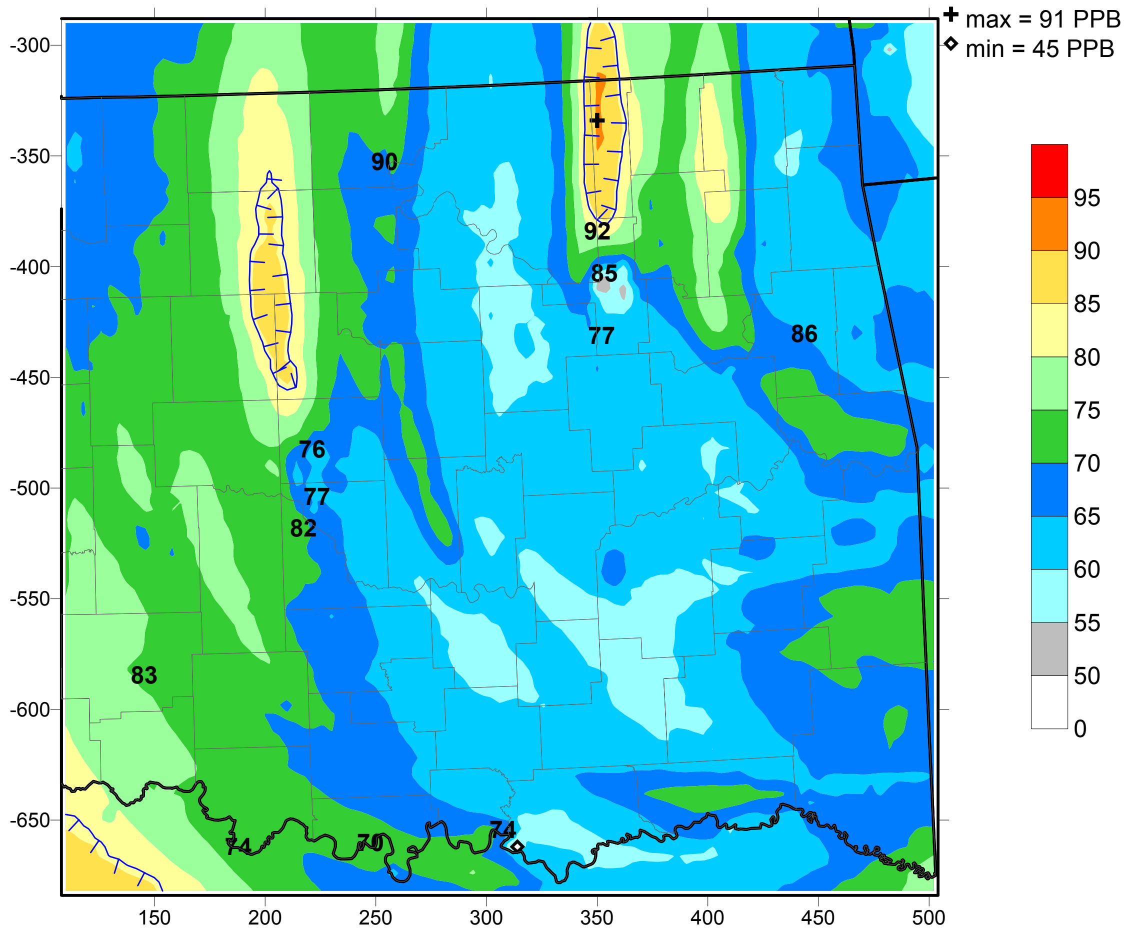

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August 31, 1999
1999 Base Case run20

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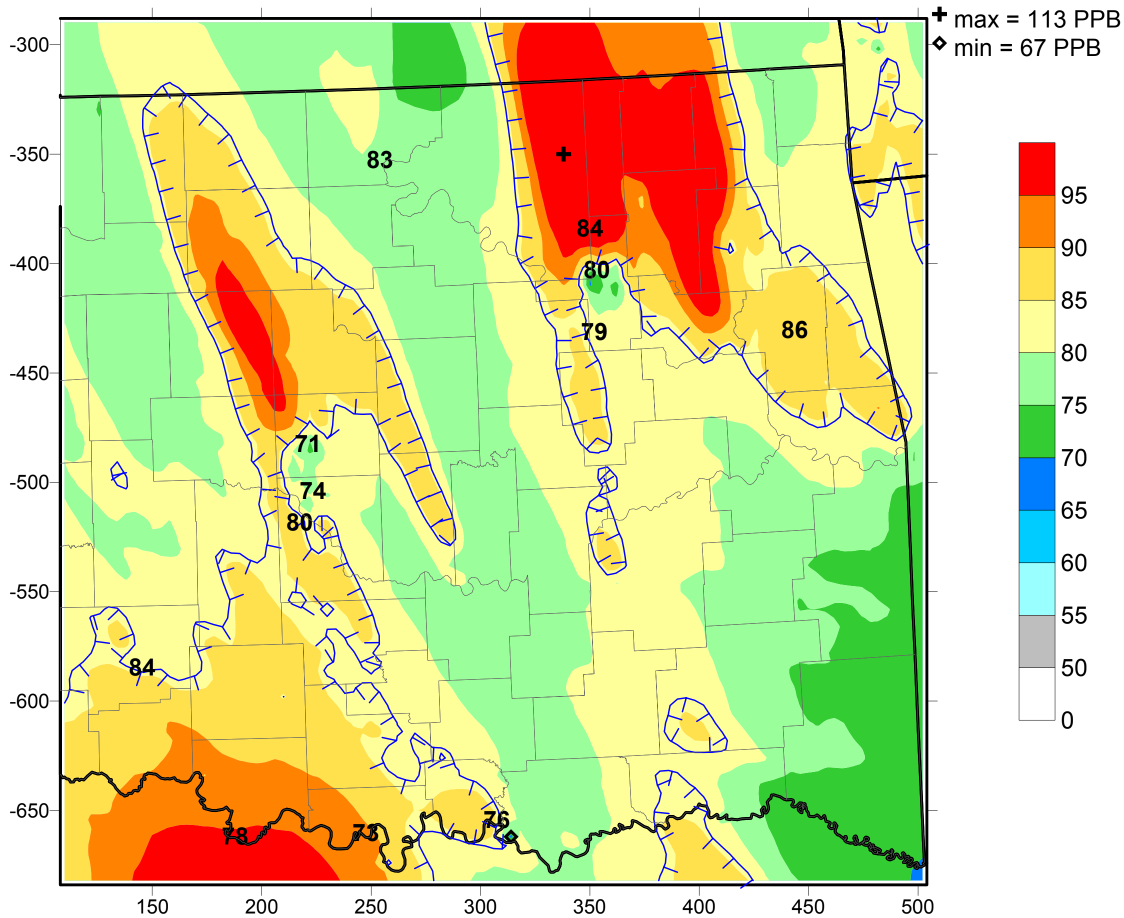

ODEQ CAMx 4km Domain 8hr O3
September 01, 1999
1999 Base Case run20

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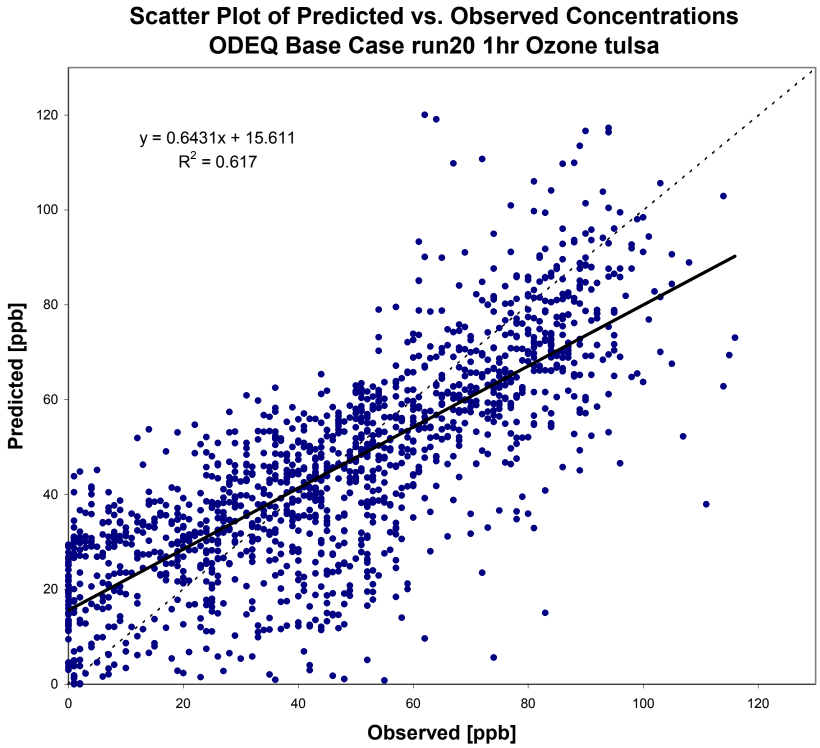
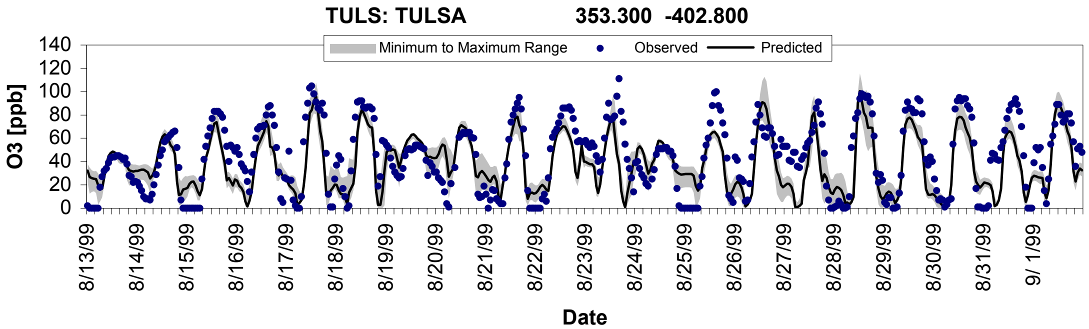
Appendix B

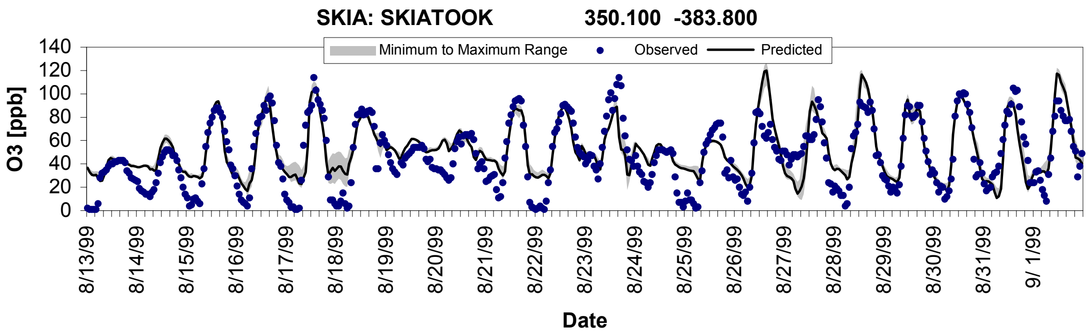
Time Series of Predicted Estimated and Observed
Hourly Ozone Concentrations (ppb)
for the Run20 Base Case Simulation and
the August 13 – September 1, 1999
Oklahoma Ozone Episode

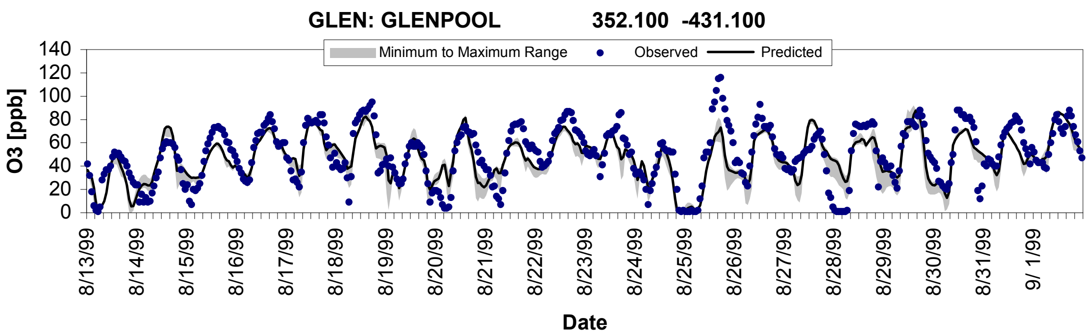
Tulsa Sites
Oklahoma City Sites
Southern Oklahoma (Red River) Sites
Lawton
Ponca City
Tahlequah

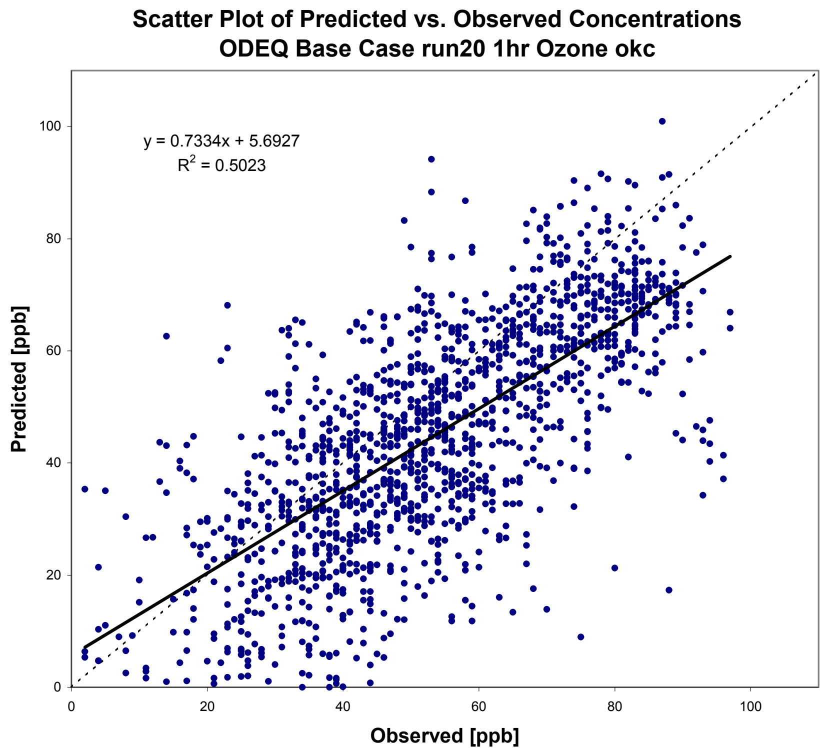

Scatter Plot of Predicted vs. Observed Concentrations
ODEQ Base Case run20 1hr Ozone tulsa
y = 0.6431x + 15.611
R2 = 0.617
Predicted [ppb]
Observed [ppb]
0
20
40
60
80
100
120

ODEQ Base Case run20 1hr Ozone tulsa

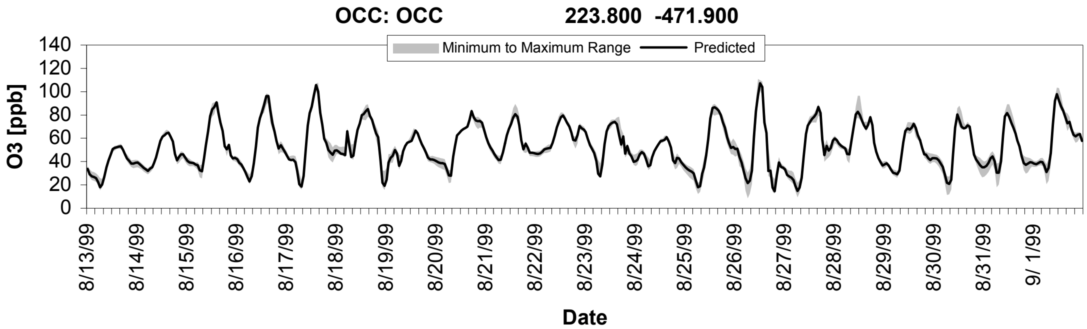


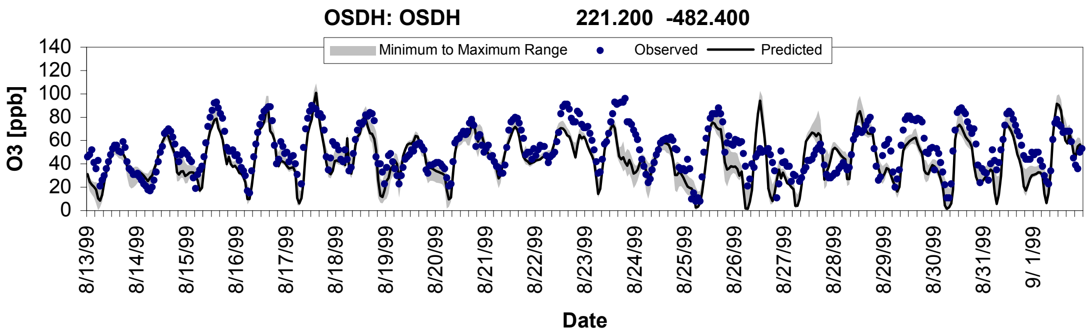


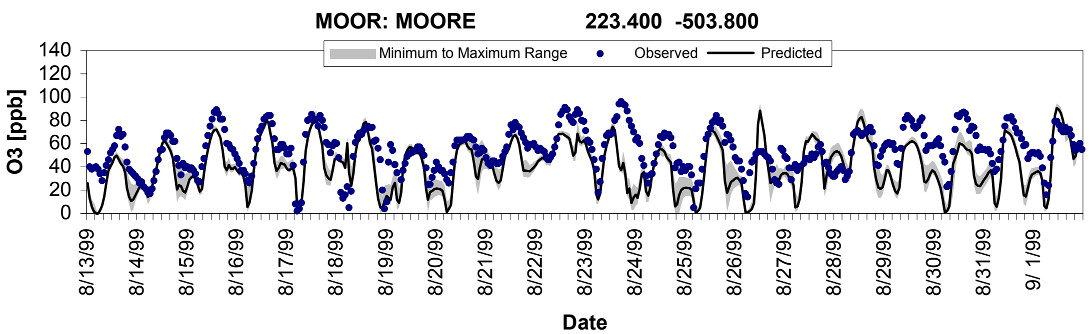


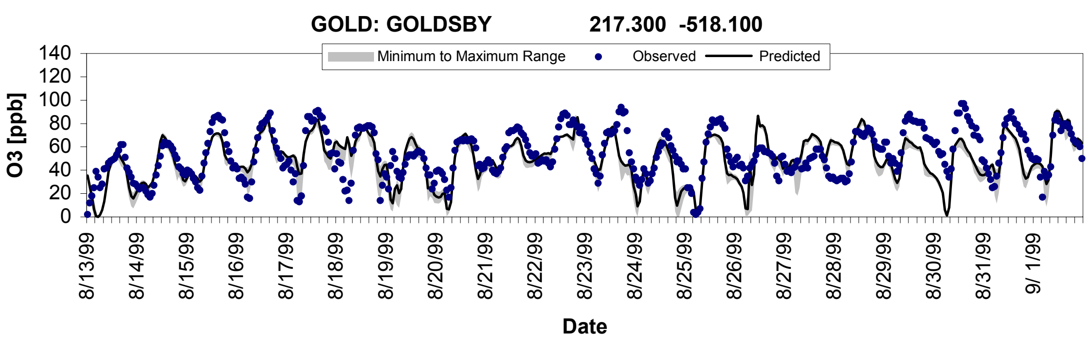

Scatter Plot of Predicted vs. Observed Concentrations
ODEQ Base Case run20 1hr Ozone okc
y = 0.7334x + 5.6927
R2 = 0.5023
Predicted [ppb]
Observed [ppb]
0
20
40
60
80
100

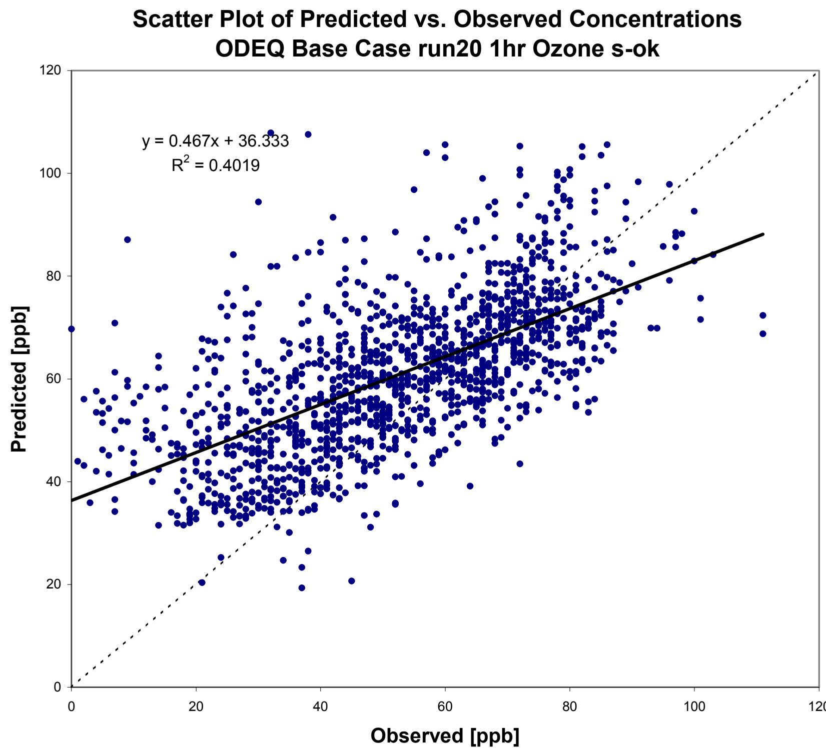
ODEQ Base Case run20 1hr Ozone okc





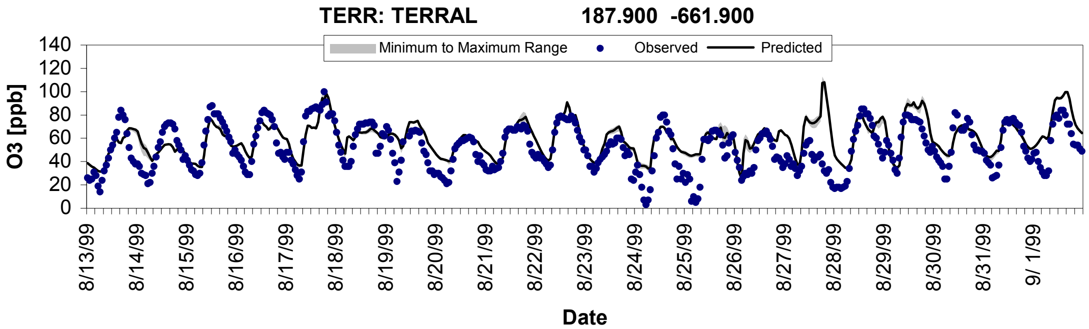


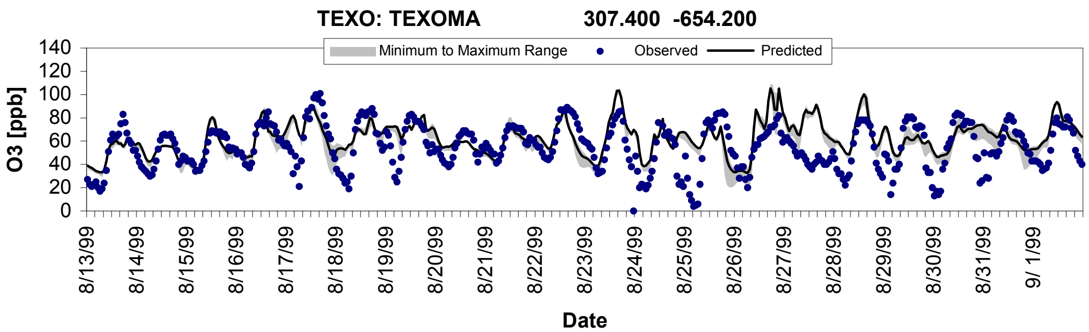


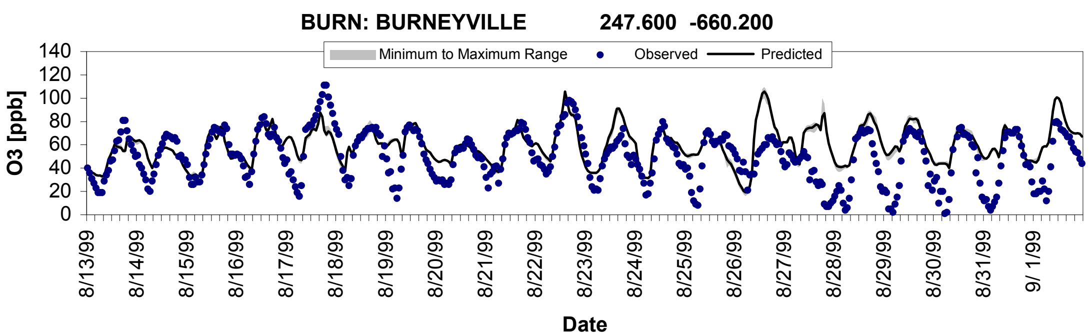


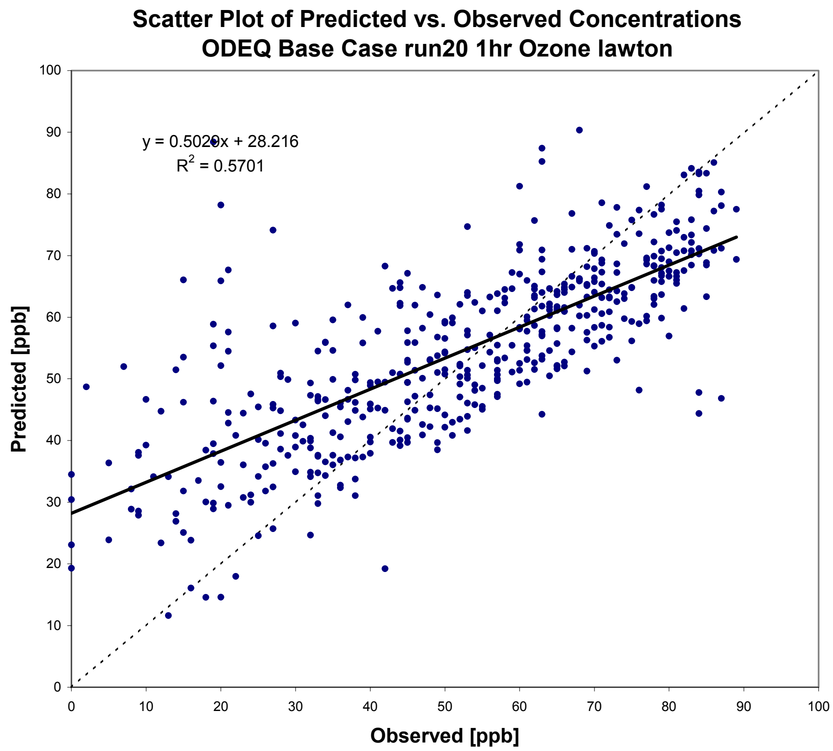
Scatter Plot of Predicted vs. Observed Concentrations
ODEQ Base Case run20 1hr Ozone s-ok
y = 0.467x + 36.333
R2 = 0.4019
Predicted [ppb]
Observed [ppb]
0
20
40
60
80
100
120

ODEQ Base Case run20 1hr Ozone s-ok









Scatter Plot of Predicted vs. Observed Concentrations
ODEQ Base Case run20 1hr Ozone lawton
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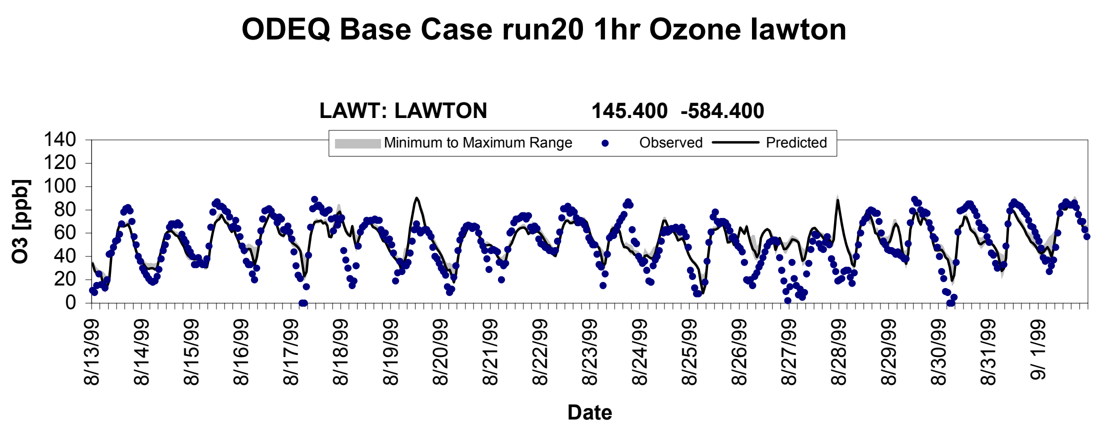
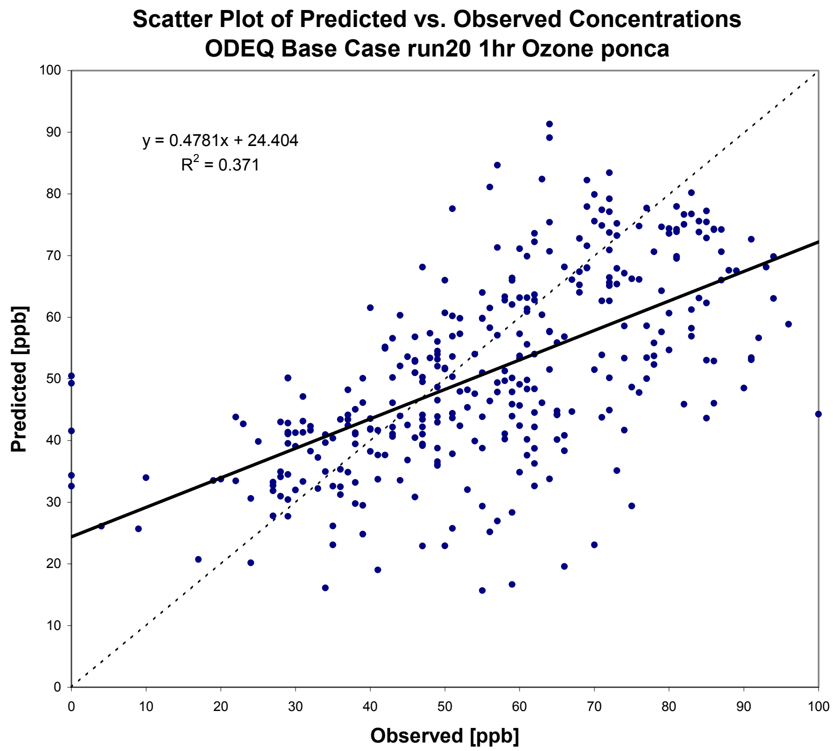
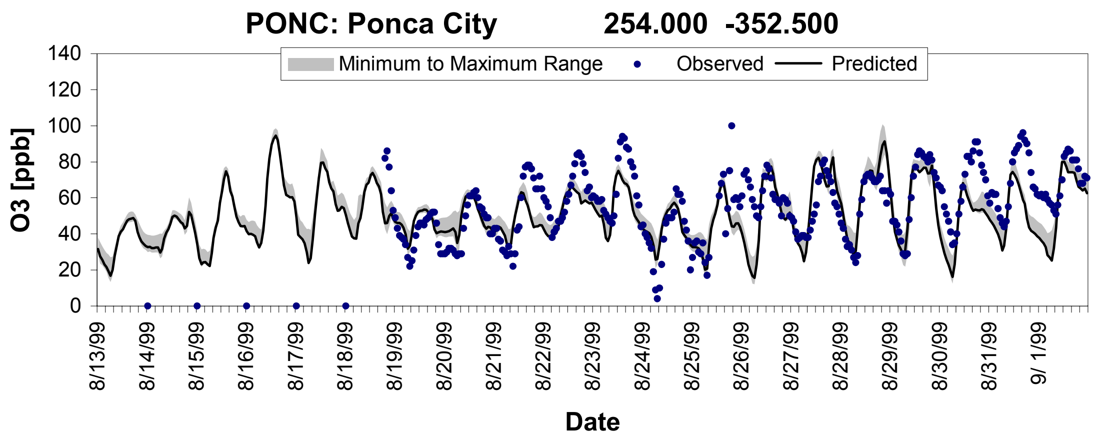
R^2 = 0.5701
Predicted [ppb]
Observed [ppb]

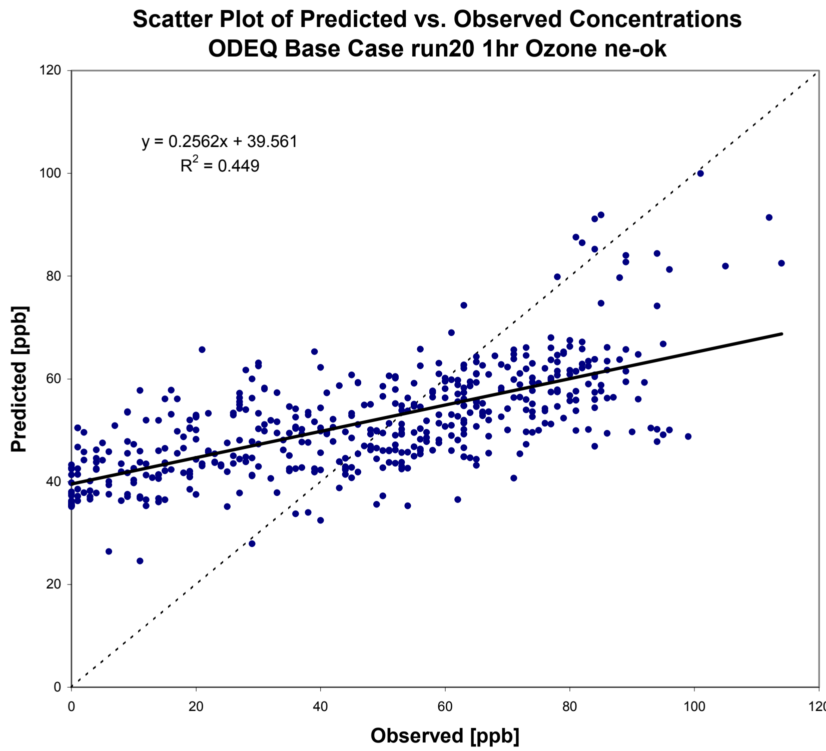


ODEQ Base Case run20 1hr Ozone lawton
LAWT: LAWTON 145.400 -584.400
Minimum to Maximum Range
Observed
Predicted
O3 [ppb]
Date



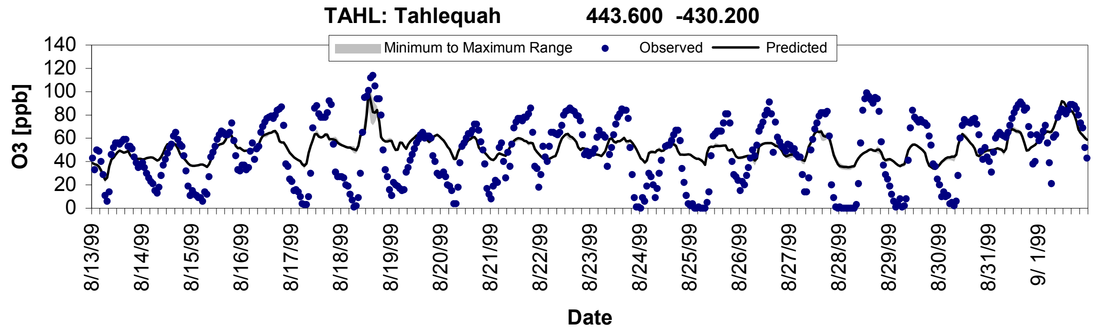
ODEQ Base Case run20 1hr Ozone ponca

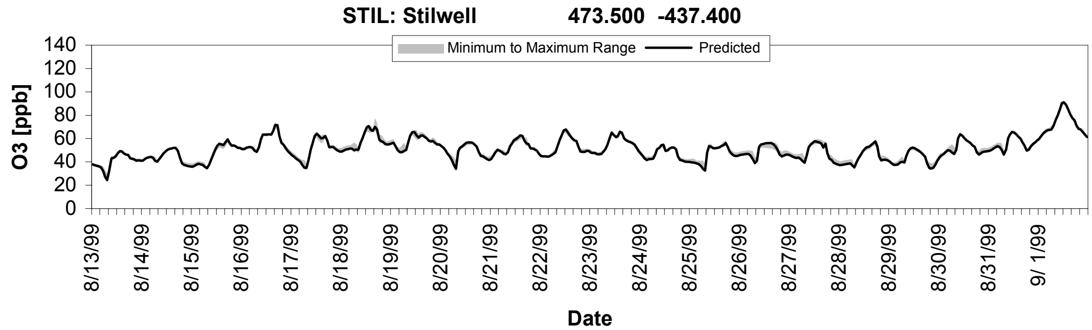


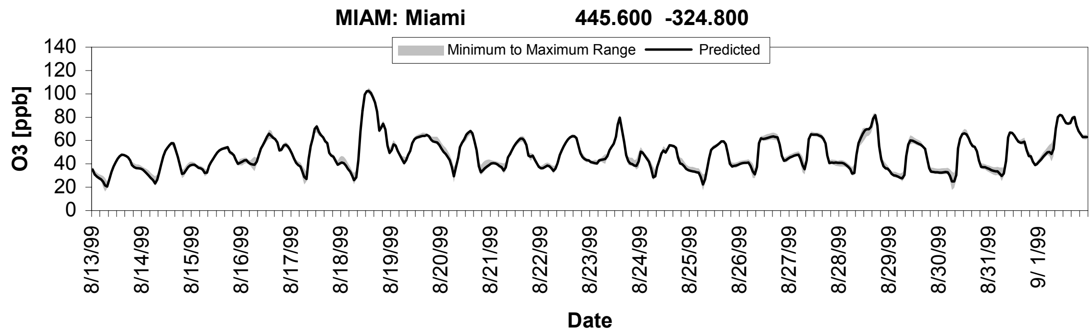


Scatter Plot of Predicted vs. Observed Concentrations
ODEQ Base Case run20 1hr Ozone ne-ok
y = 0.2562x + 39.561
R2 = 0.449
Predicted [ppb]
Observed [ppb]
0
20
40
60
80
100
120

ODEQ Base Case run20 1hr Ozone ne-ok







Appendix C

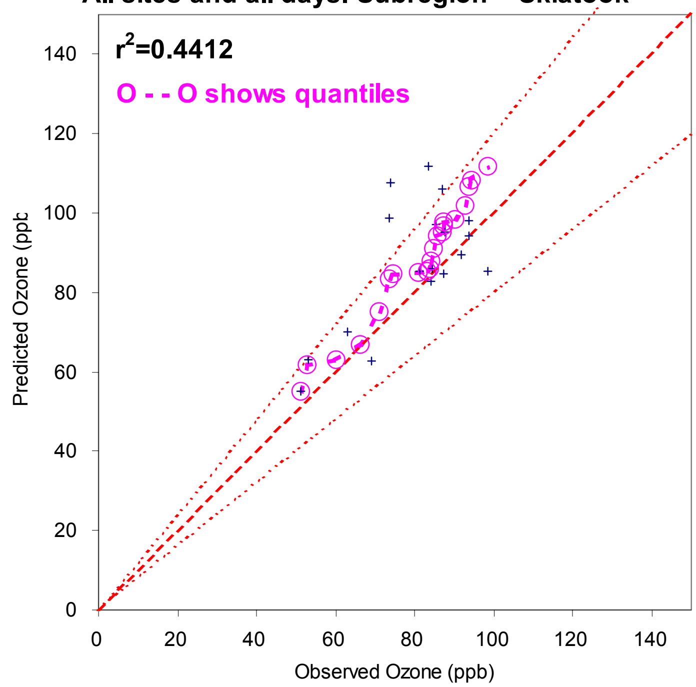
Scatter Plots of Estimated and Observed
8-Hour Ozone Concentrations (ppb) at
Key Ozone Monitors in the Tulsa and
Oklahoma City Areas for the
Run20 Base Case Simulation and the
August 13 – September 1, 1999
Oklahoma Ozone Episode

Maximum Predicted Near the Monitor
Closest Predicted near the Monitor
Spatial Paired at the Monitor

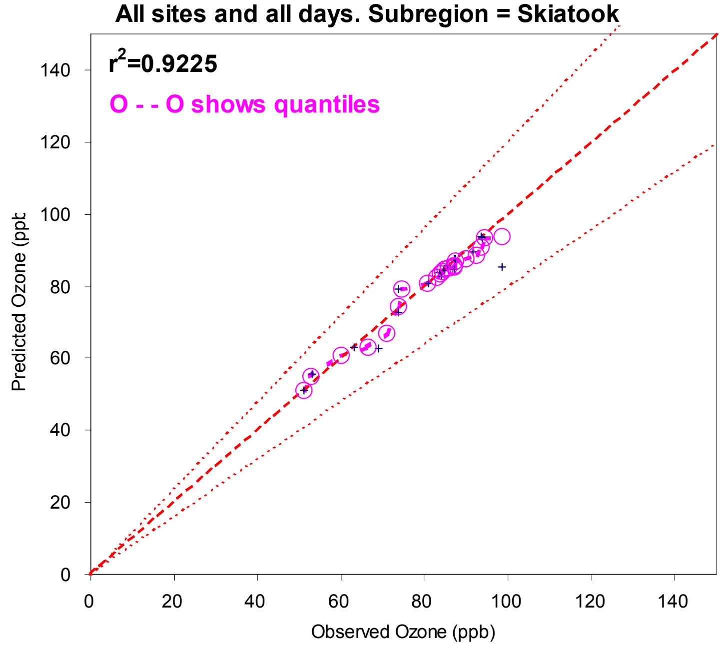
Tulsa Sites
Skiatook
Tulsa
Glenpool

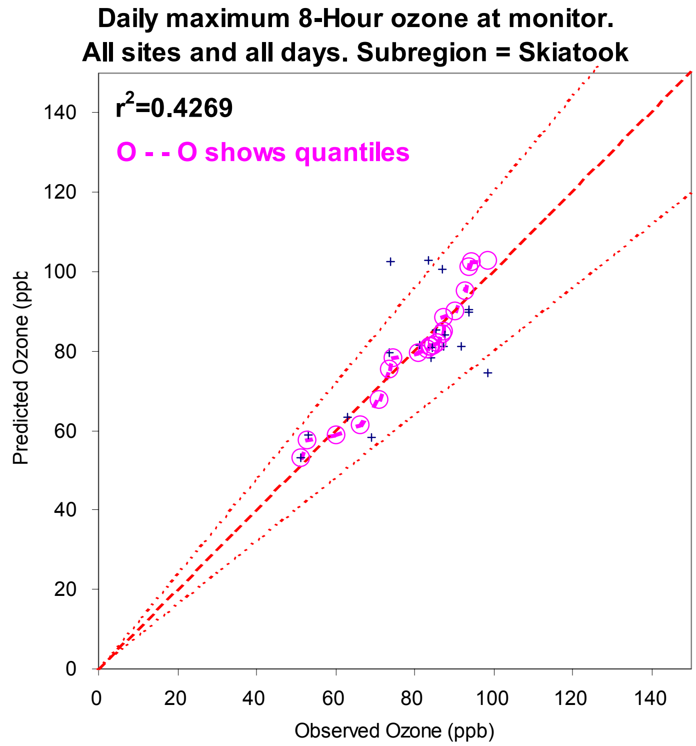
Oklahoma City Sites
OSDH
Moore
Goldsby

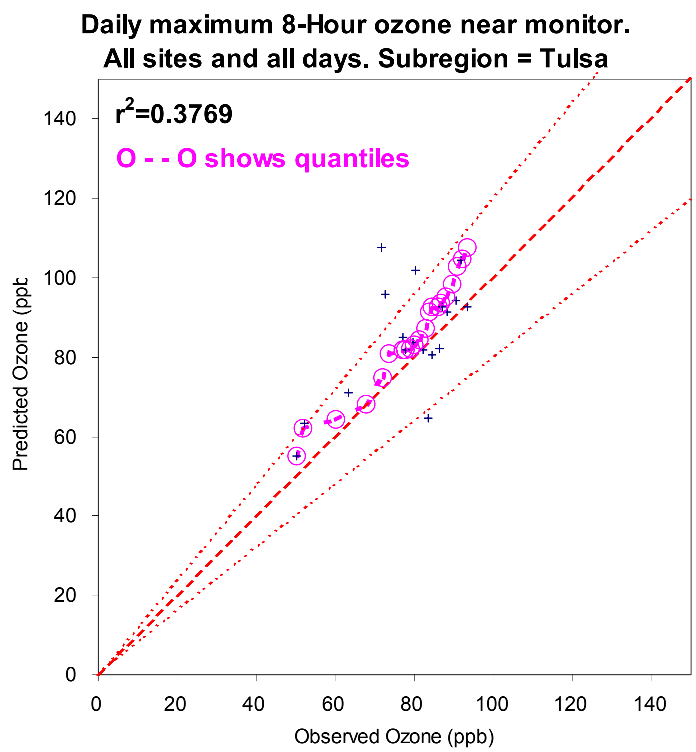
Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Skiatook



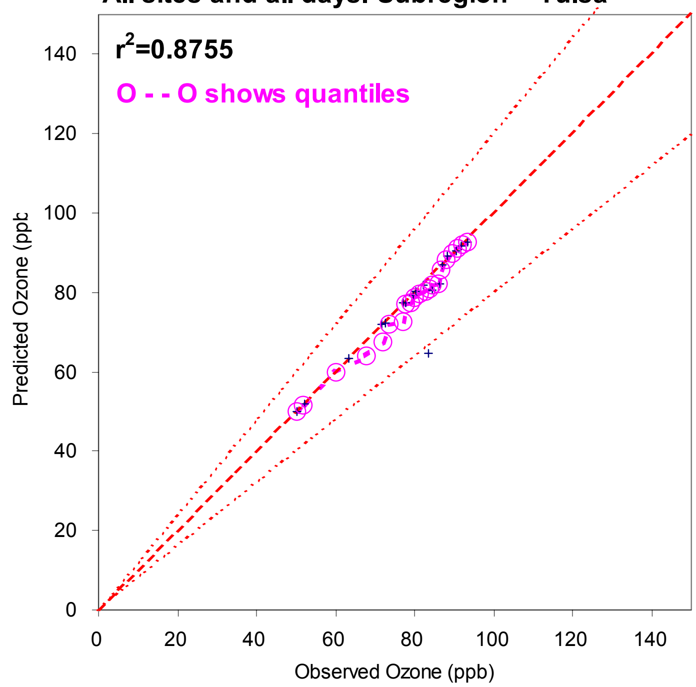
Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Skiatook



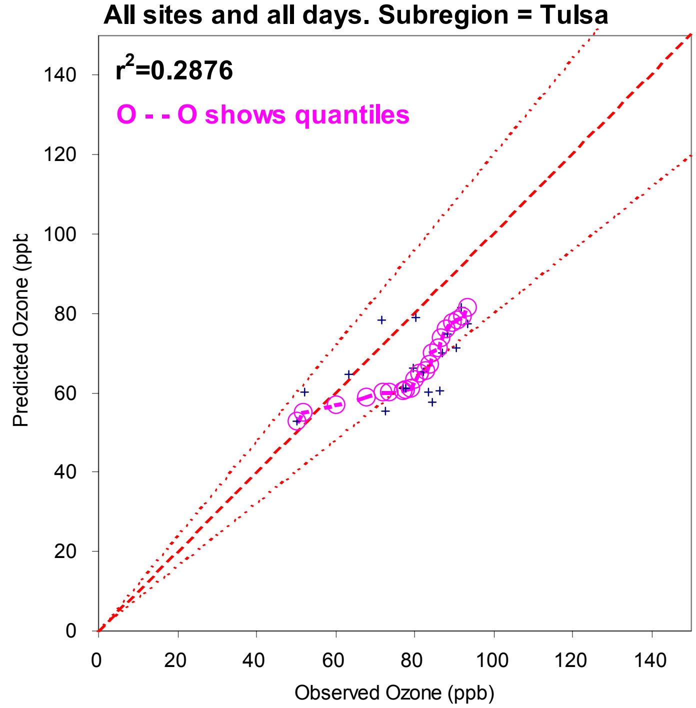

Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Skiatook
r²=0.4269
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140


Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Tulsa
r²=0.3769
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140

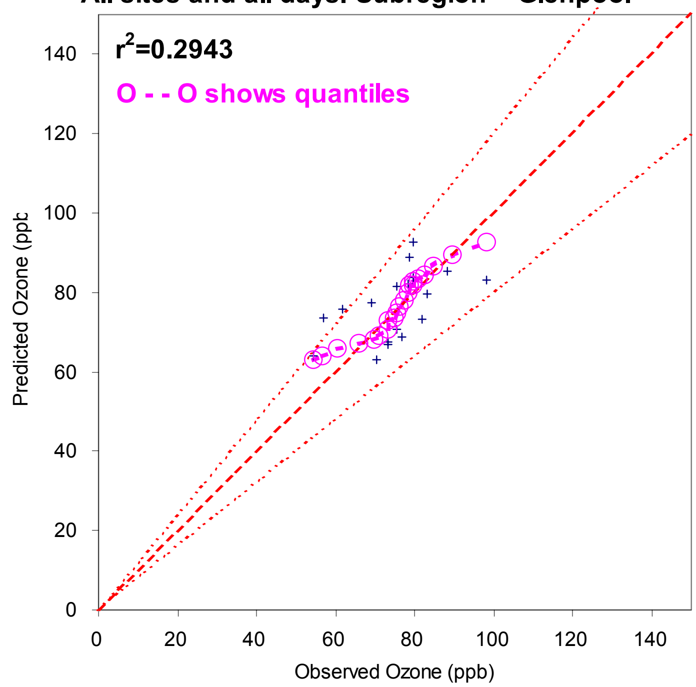
Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Tulsa



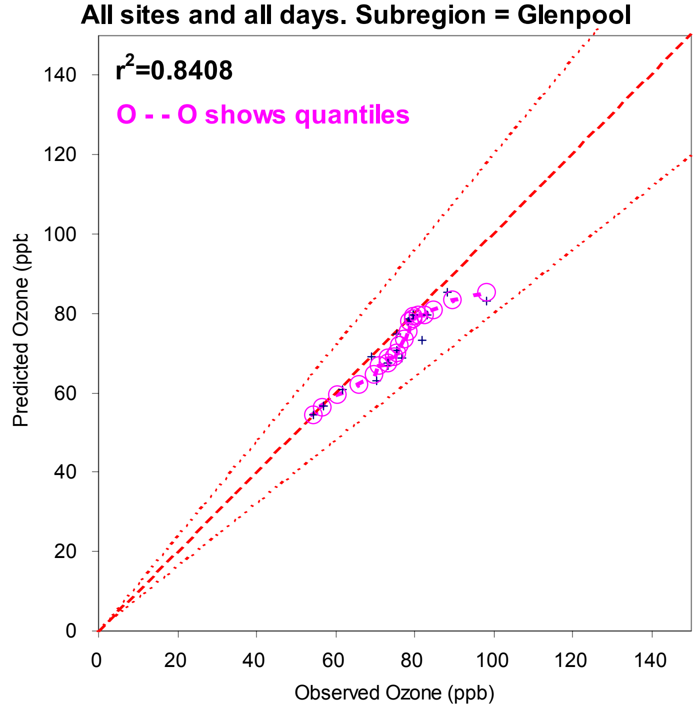
Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Tulsa



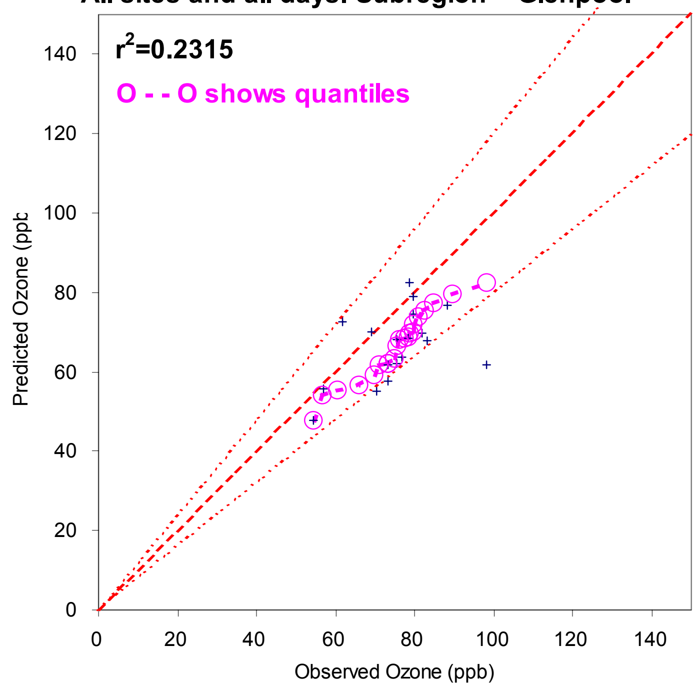
Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Glenpool



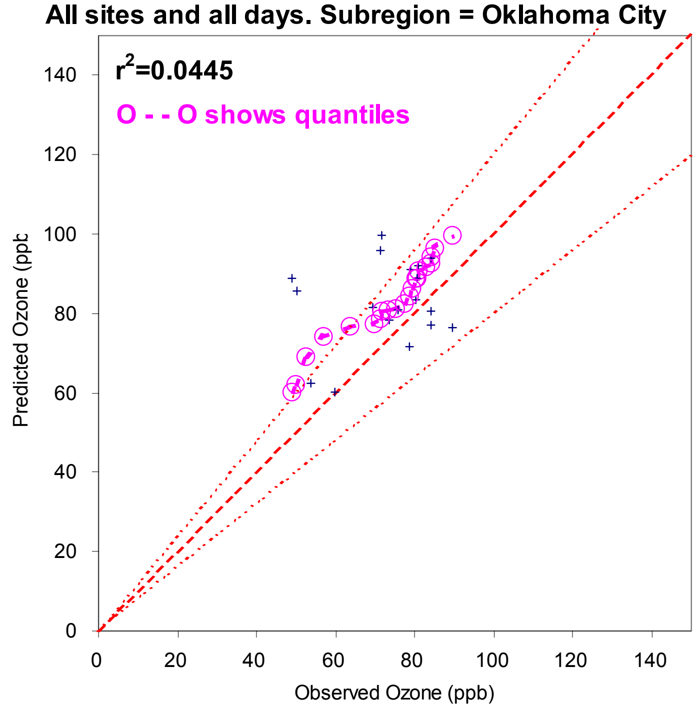
Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Glenpool

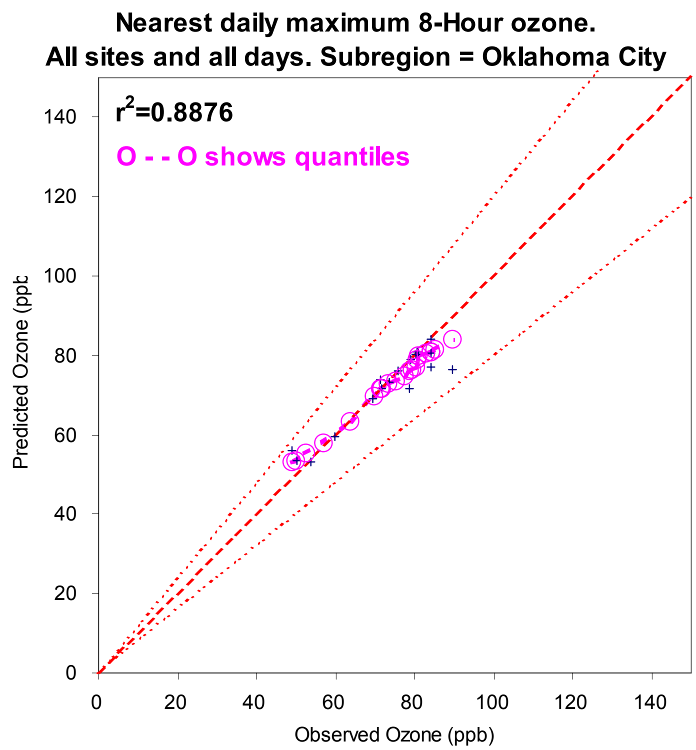


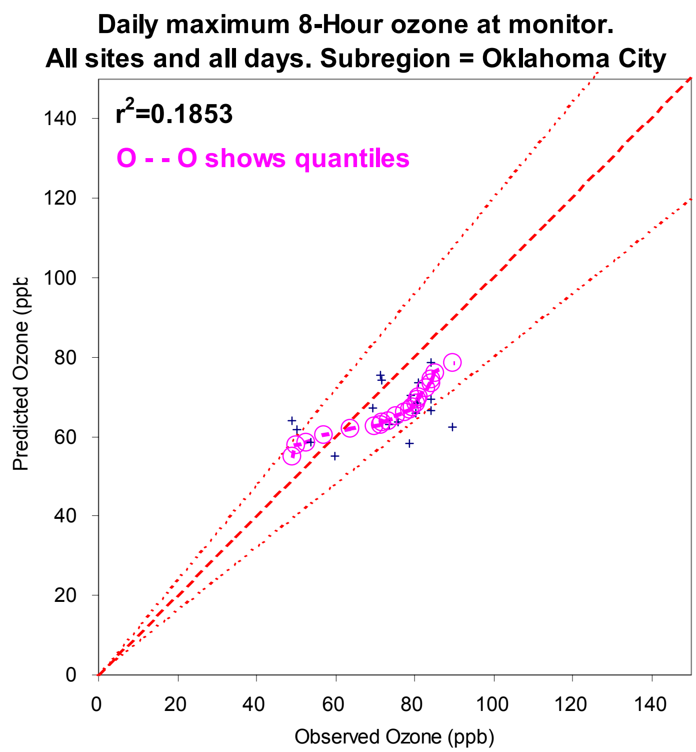
Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Glenpool

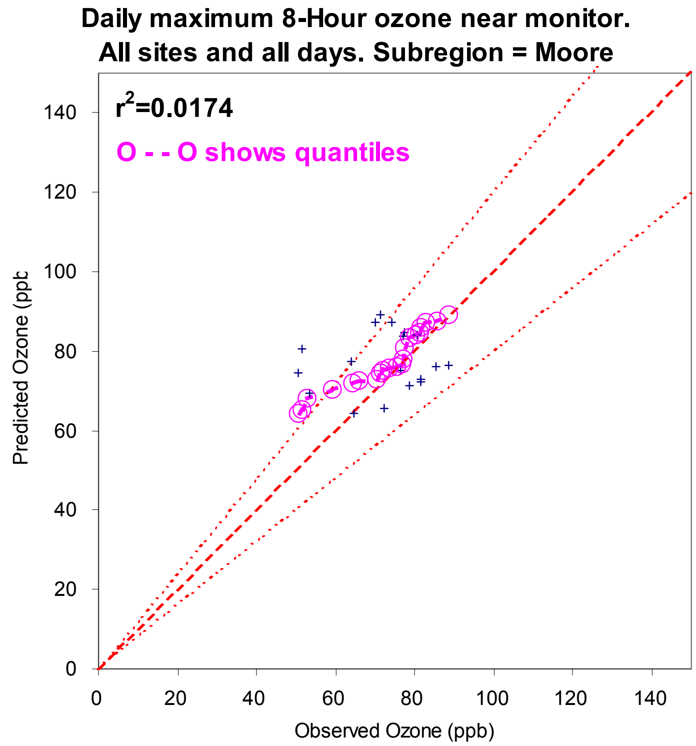


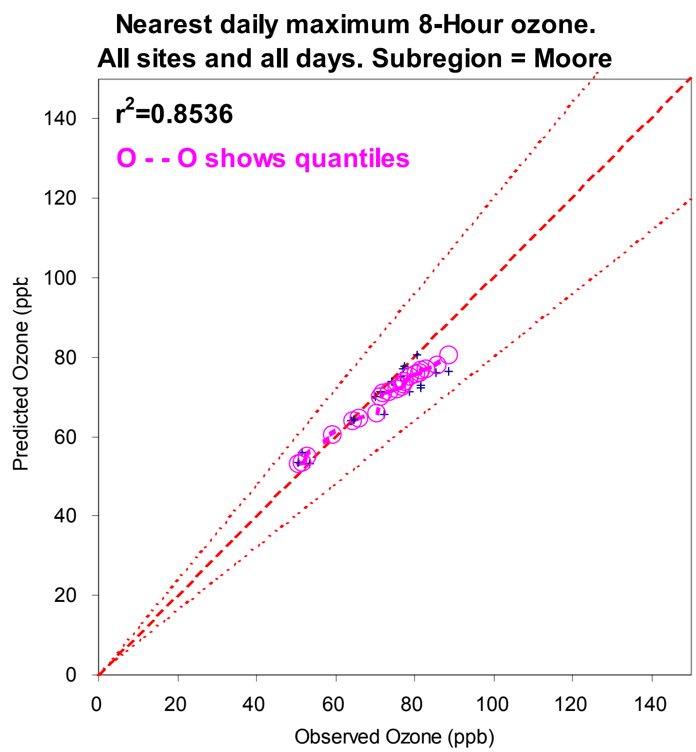
Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Oklahoma City

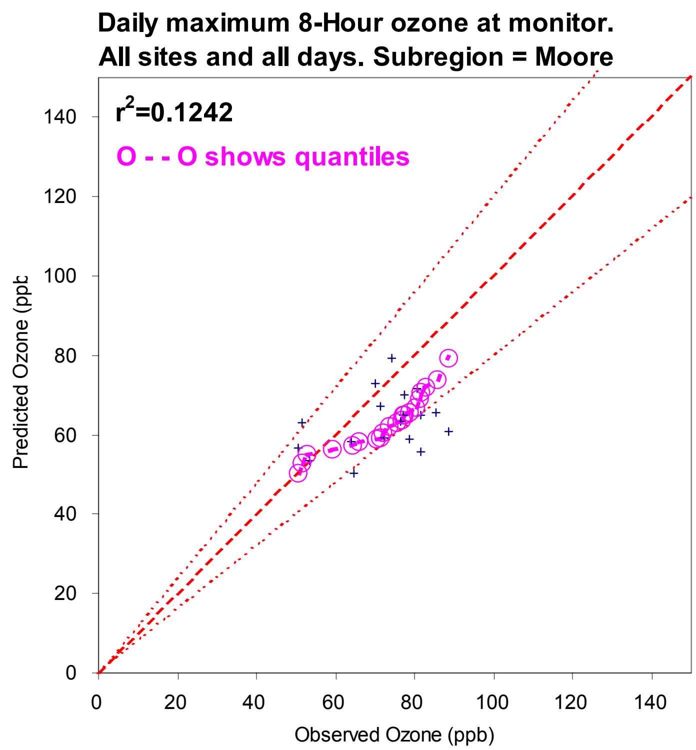



Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Oklahoma City
r2=0.8876
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140

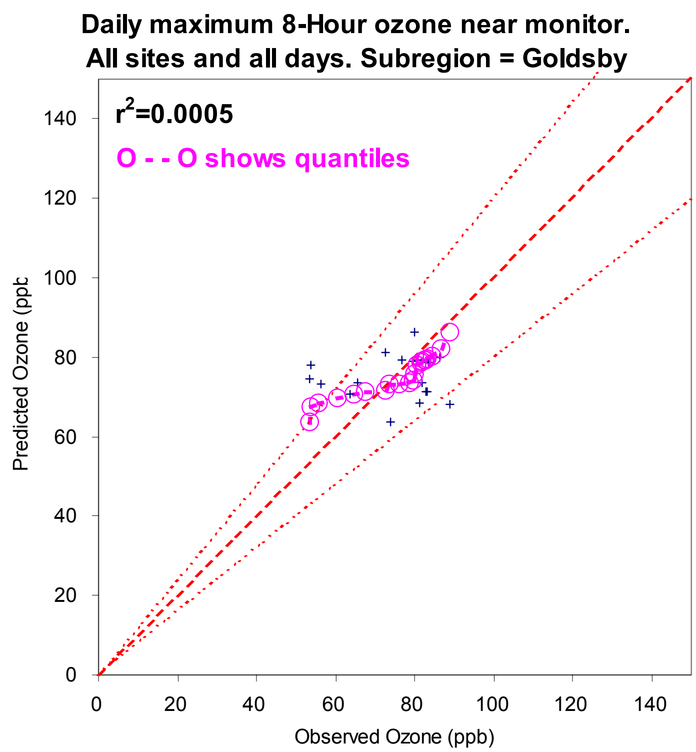

Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Oklahoma City
r2=0.1853
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140


Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Moore
r^2=0.0174
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140

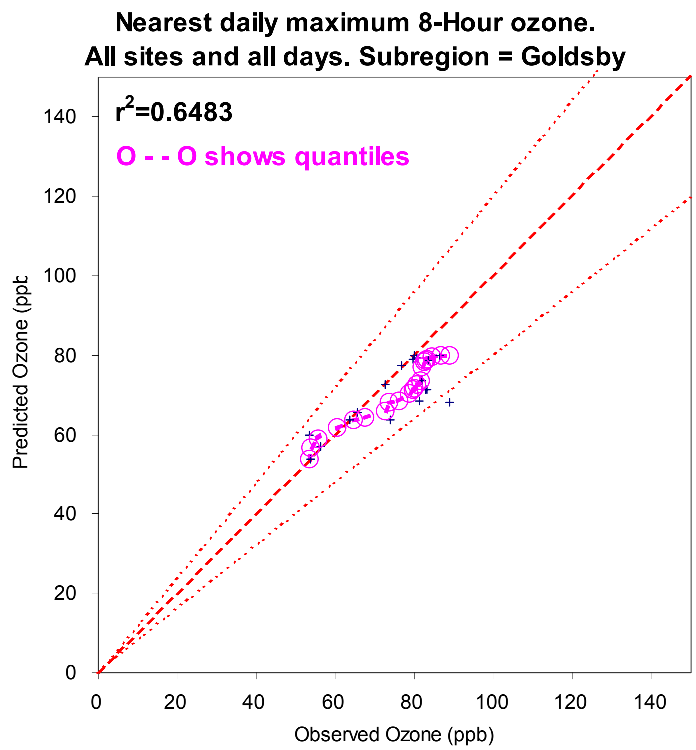

Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Moore
r^2=0.8536
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140



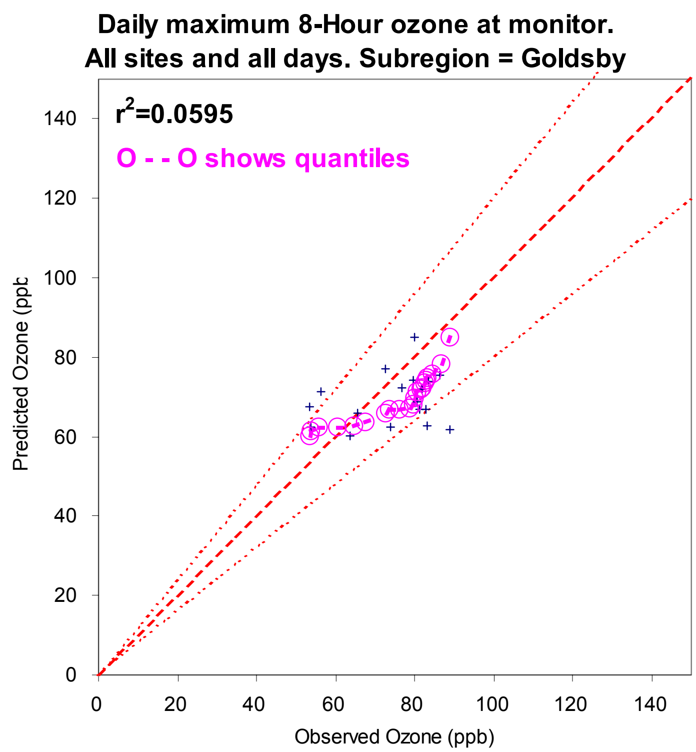
Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Moore
r²=0.1242
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)



Daily maximum 8-Hour ozone near monitor.
All sites and all days. Subregion = Goldsby
r²=0.0005
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)



Nearest daily maximum 8-Hour ozone.
All sites and all days. Subregion = Goldsby
r^2=0.6483
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140



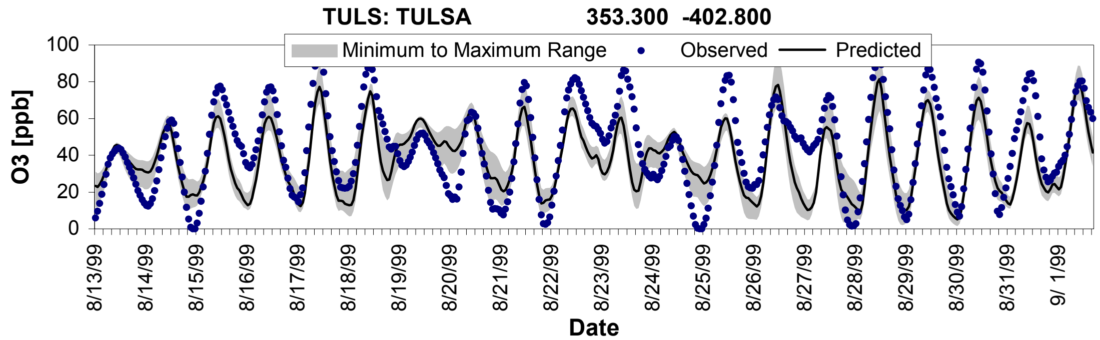
Daily maximum 8-Hour ozone at monitor.
All sites and all days. Subregion = Goldsby
r^2=0.0595
O - - O shows quantiles
Predicted Ozone (ppb
Observed Ozone (ppb)
0
20
40
60
80
100
120
140

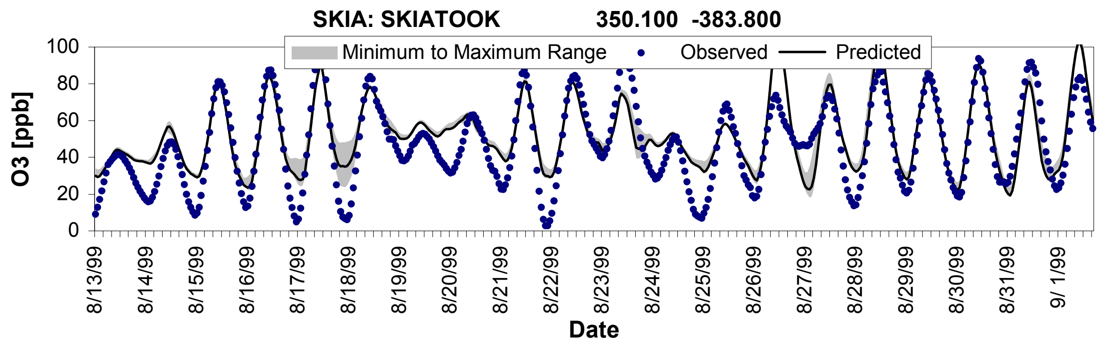
Appendix D

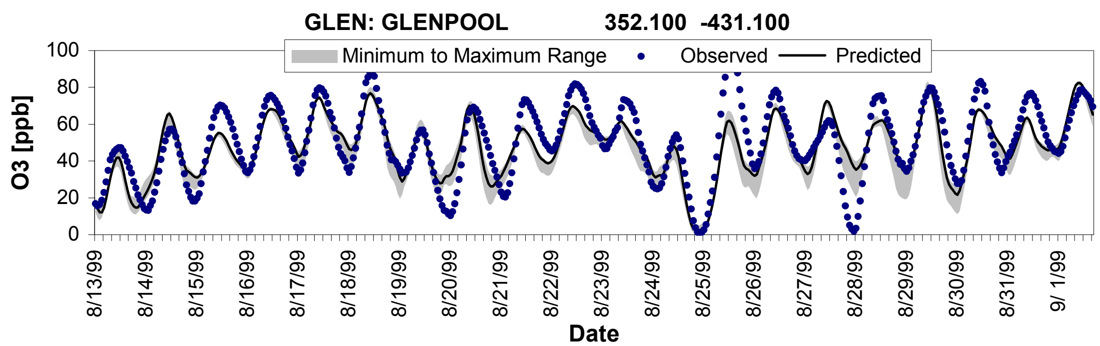
Time series of Estimated and Observed
Running 8-Hourl Ozone Concentrations (ppb)
In Oklahoma for the
Run20 Base Case Simulation and the
August 13 – September 1, 1999
Oklahoma Ozone Episode

Shading indicates maximum and minimum range of values
within a 3 x 3 array of grids cells centered on the monitor

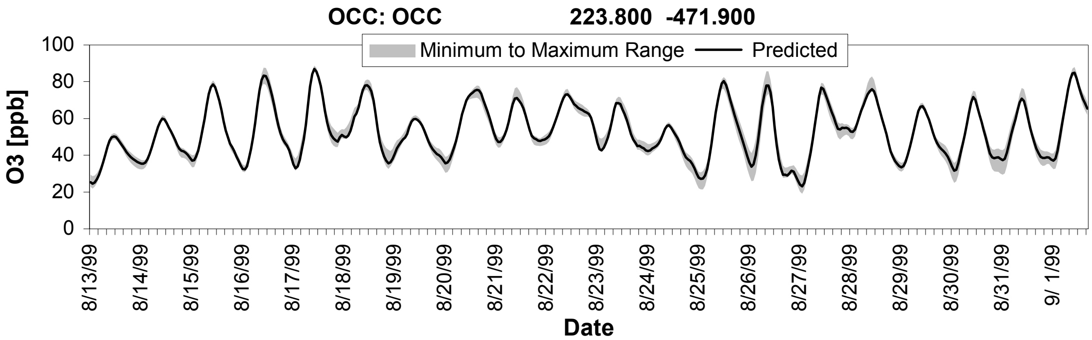
ODEQ Base Case run20 8hr Ozone tulsa

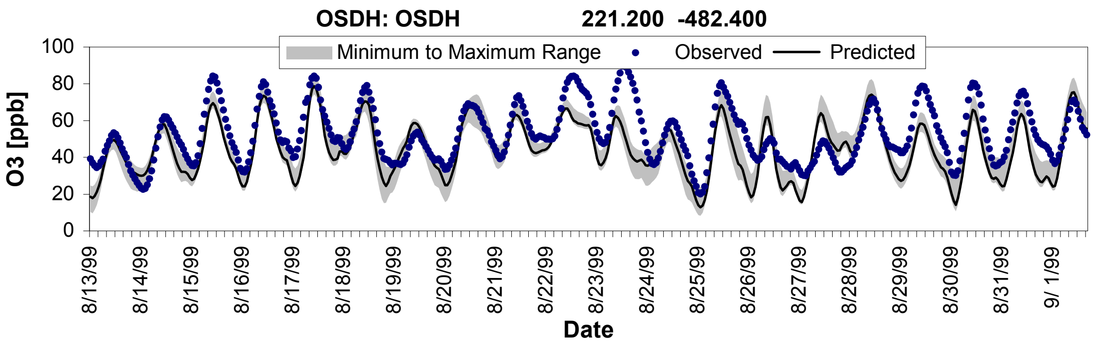


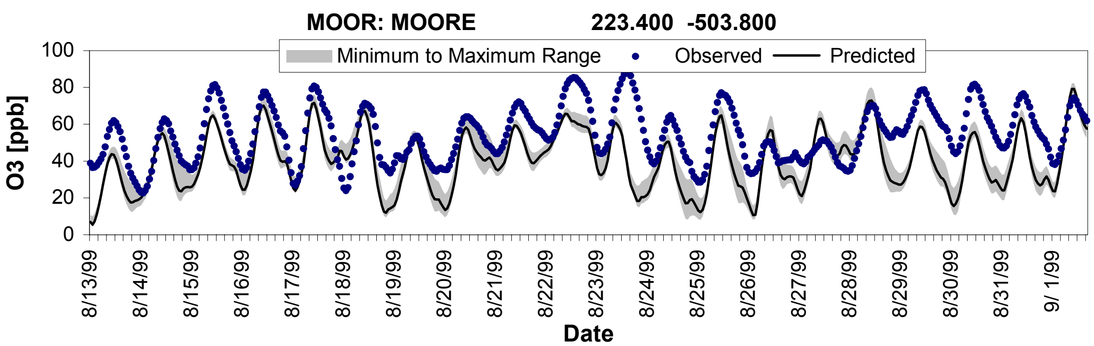


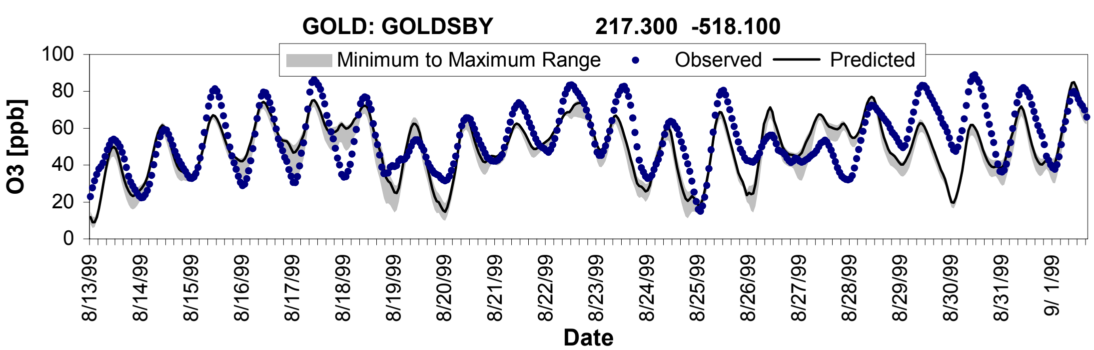


ODEQ Base Case run20 8hr Ozone okc

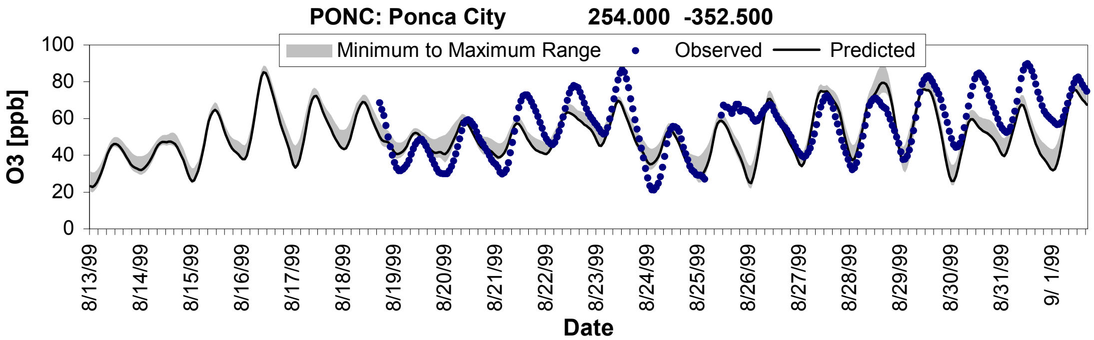




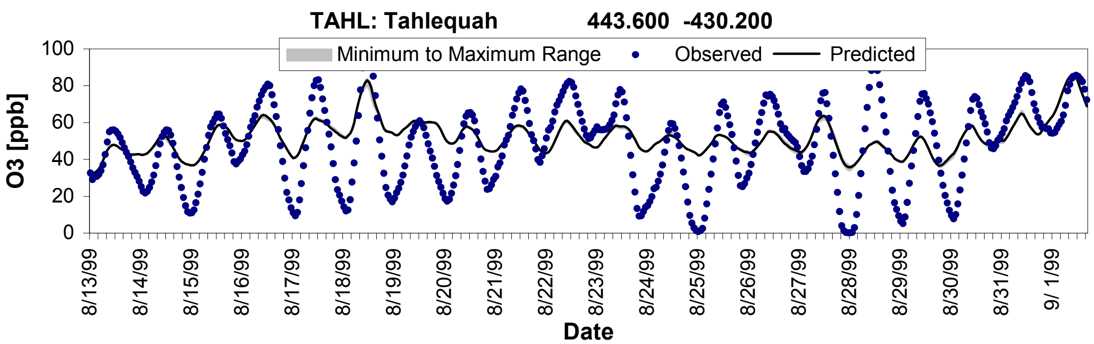


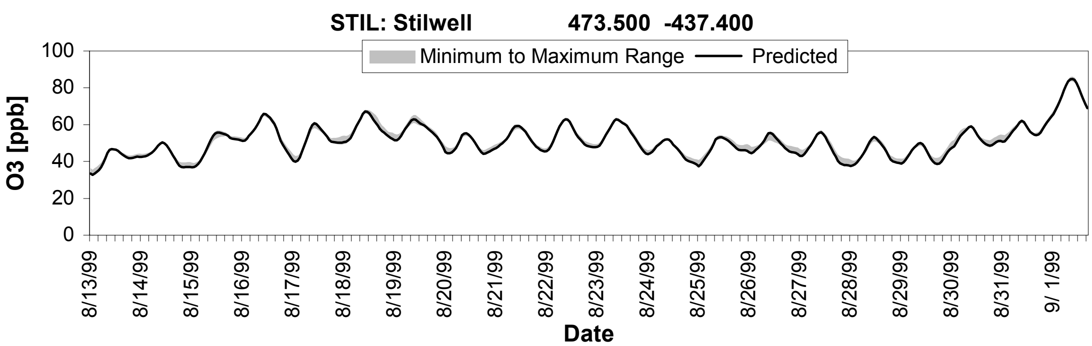


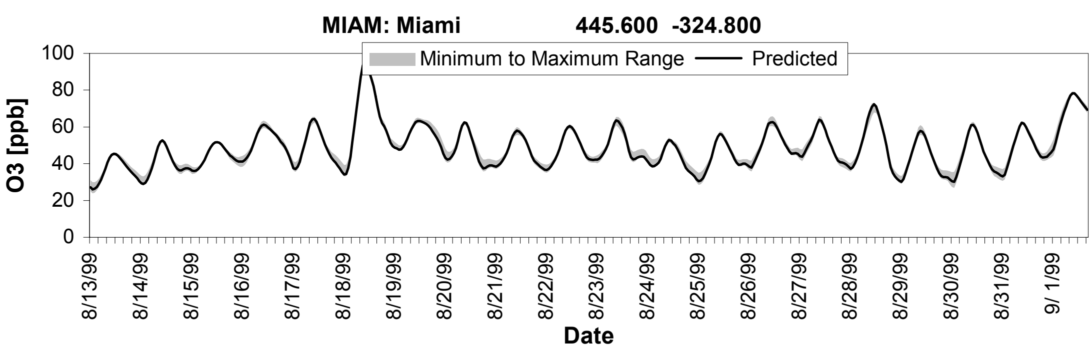
ODEQ Base Case run20 8hr Ozone ponca



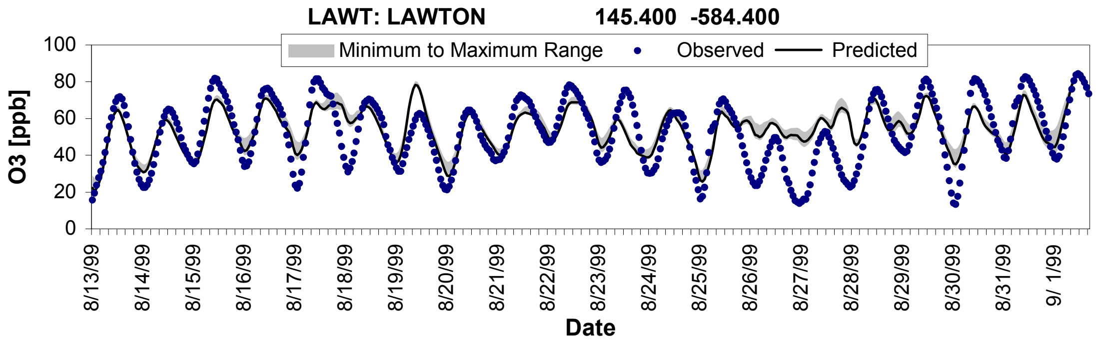
ODEQ Base Case run20 8hr Ozone ne-ok



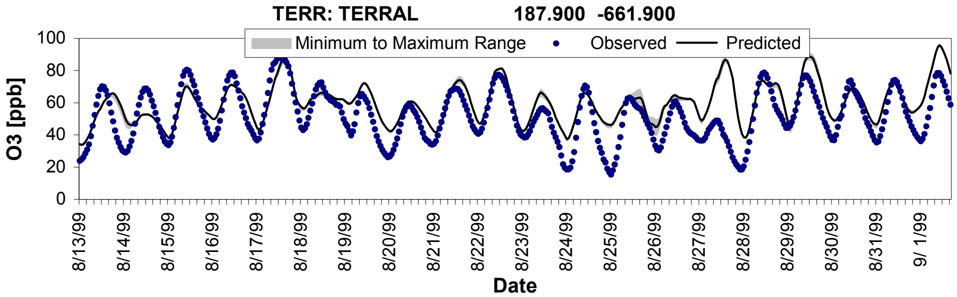


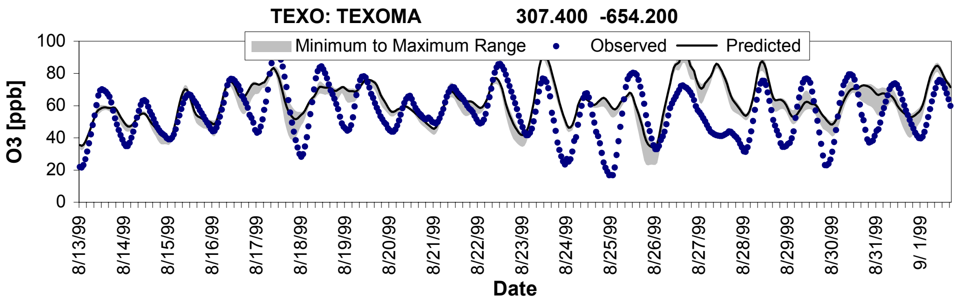


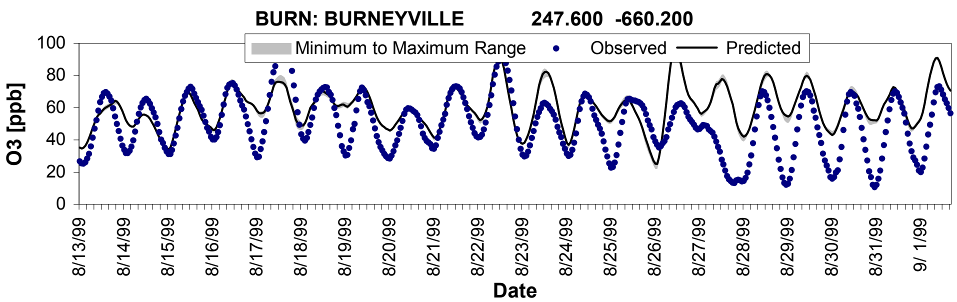
ODEQ Base Case run20 8hr Ozone lawton



ODEQ Base Case run20 8hr Ozone s-ok







Appendix E

Applications of EPA's screening test attainment demonstration
for grids cells without monitors

1997-1999 8-Hour Ozone Design Values

Screening cells

Cell center

LCPx	LCPy	Nearest ob	DV Region	Max regional 1999 DV	2007 Scaled DV (Run 20 series) 07 Base	Cntl 02	Cntl 03	Cntl 04	Cntl 05	Cntl10	Cntl11	Cntl12	Cntl13
130	-642	Lawton	Lawton	83	78.8	78.8	78.8	78.8	78.8	78.7	78.8	78.8	78.8
126	-634	Lawton	Lawton	83	78.6	78.6	78.6	78.6	78.6	78.5	78.6	78.6	78.6
130	-634	Lawton	Lawton	83	78.9	78.9	78.9	78.9	78.9	78.8	78.9	78.9	78.9
130	-630	Lawton	Lawton	83	78.9	78.9	78.9	78.9	78.8	78.7	78.8	78.8	78.8
130	-626	Lawton	Lawton	83	79.0	79.0	79.0	79.0	79.0	78.9	79.0	79.0	79.0
130	-622	Lawton	Lawton	83	79.1	79.1	79.1	79.1	79.1	79.0	79.1	79.1	79.1
130	-618	Lawton	Lawton	83	79.2	79.2	79.2	79.2	79.2	79.1	79.2	79.2	79.2
134	-618	Lawton	Lawton	83	79.0	79.0	79.0	79.0	79.0	78.9	79.0	79.0	79.0
150	-558	Lawton	Lawton	83	78.3	78.3	78.3	78.3	78.3	77.8	78.3	78.3	78.3
238	-502	Moore	OKC	86	81.7	81.7	81.7	81.7	81.6	77.7	81.6	81.6	81.6
242	-502	Moore	OKC	86	81.7	81.7	81.6	81.6	81.6	77.7	81.6	81.5	81.5
234	-498	Moore	OKC	86	81.9	81.9	81.9	81.9	81.8	78.3	81.8	81.8	81.8
238	-498	Moore	OKC	86	81.9	81.9	81.8	81.8	81.8	78.2	81.8	81.8	81.8
242	-498	Moore	OKC	86	81.8	81.8	81.8	81.8	81.7	78.1	81.7	81.7	81.7
238	-494	Moore	OKC	86	81.9	81.8	81.8	81.8	81.6	78.8	81.6	81.6	81.6
242	-494	Moore	OKC	86	81.8	81.8	81.8	81.8	81.7	78.7	81.7	81.7	81.7
242	-490	OSDH	OKC	86	81.4	81.4	81.3	81.3	81.3	78.9	81.3	81.3	81.3
270	-490	Moore	OKC	86	81.0	81.0	80.9	80.9	80.8	79.5	80.8	80.8	80.7
274	-490	Moore	OKC	86	80.9	80.9	80.9	80.9	80.7	79.7	80.7	80.7	80.7
234	-486	OSDH	OKC	86	81.4	81.4	81.3	81.3	81.1	78.2	81.1	81.1	81.1
238	-486	OSDH	OKC	86	81.0	81.0	81.0	81.0	80.8	78.4	80.8	80.8	80.7
242	-486	OSDH	OKC	86	81.1	81.1	81.0	81.0	80.8	78.9	80.8	80.8	80.8
230	-482	OSDH	OKC	86	81.8	81.8	81.8	81.8	81.7	77.8	81.7	81.6	81.6
234	-482	OSDH	OKC	86	81.4	81.4	81.4	81.3	81.2	78.3	81.2	81.2	81.2
238	-482	OSDH	OKC	86	81.1	81.1	81.0	81.0	80.9	78.6	80.8	80.8	80.8
242	-482	OSDH	OKC	86	81.1	81.1	81.1	81.1	80.9	79.0	80.9	80.9	80.9

210	-478	OSDH	OKC	86	82.0	82.0	82.0	82.0	81.9	78.6	81.9	81.9	81.9
214	-478	OSDH	OKC	86	82.1	82.1	82.0	82.0	81.9	78.7	81.9	81.9	81.9
218	-478	OSDH	OKC	86	81.8	81.8	81.8	81.8	81.7	78.6	81.7	81.7	81.7
222	-478	OSDH	OKC	86	81.9	81.9	81.9	81.9	81.7	78.3	81.7	81.7	81.7
202	-474	OSDH	OKC	86	82.0	82.0	81.9	81.9	81.9	79.4	81.9	81.8	81.8
206	-474	OSDH	OKC	86	82.1	82.1	82.1	82.1	82.0	79.4	82.0	82.0	82.0
342	-406	Tulsa	Tulsa	88	84.1	84.0	84.1	84.0	83.9	83.9	83.9	83.9	83.8
338	-402	Tulsa	Tulsa	88	83.6	83.5	83.4	83.3	83.4	83.3	83.3	83.3	83.2
342	-402	Tulsa	Tulsa	88	83.7	83.6	83.5	83.4	83.5	83.4	83.4	83.4	83.3
370	-402	Tulsa	Tulsa	88	83.7	83.7	83.5	83.5	83.6	83.6	83.6	83.6	83.5
338	-398	Tulsa	Tulsa	88	83.3	83.2	83.0	82.9	83.1	83.0	83.0	83.0	82.9
342	-398	Tulsa	Tulsa	88	83.3	83.3	83.1	83.0	83.2	83.1	83.1	83.0	83.0
346	-398	Tulsa	Tulsa	88	83.8	83.6	83.6	83.5	83.6	83.5	83.5	83.5	83.4
350	-398	Tulsa	Tulsa	88	83.7	83.6	83.5	83.4	83.5	83.5	83.5	83.4	83.4
354	-398	Tulsa	Tulsa	88	83.7	83.6	83.5	83.4	83.5	83.5	83.5	83.5	83.4
370	-398	Tulsa	Tulsa	88	83.5	83.5	83.2	83.2	83.4	83.4	83.4	83.3	83.3
406	-398	Tahlequah	NE OK/Tulsa	88	82.0	82.0	81.9	81.9	81.5	81.5	81.5	81.5	81.5
350	-394	Tulsa	Tulsa	88	83.5	83.4	83.3	83.2	83.3	83.3	83.3	83.2	83.2
354	-394	Tulsa	Tulsa	88	83.4	83.3	83.1	83.0	83.2	83.2	83.1	83.1	83.1
358	-394	Tulsa	Tulsa	88	83.2	83.2	82.9	82.8	83.1	83.1	83.0	83.0	82.9
362	-394	Tulsa	Tulsa	88	83.3	83.2	83.0	82.9	83.2	83.1	83.1	83.0	83.0
366	-394	Tulsa	Tulsa	88	83.1	83.0	82.7	82.6	82.9	82.9	82.9	82.8	82.8
370	-394	Tulsa	Tulsa	88	83.3	83.3	83.0	82.9	83.2	83.1	83.1	83.1	83.0
374	-394	Tulsa	Tulsa	88	83.1	83.1	82.8	82.7	83.0	83.0	82.9	82.9	82.8
374	-390	Tulsa	Tulsa	88	83.1	83.0	82.7	82.6	82.9	82.9	82.9	82.8	82.8
410	-390	Tahlequah	NE OK/Tulsa	88	82.4	82.4	82.3	82.3	82.0	82.0	82.0	82.0	82.0
410	-386	Tahlequah	NE OK/Tulsa	88	82.5	82.5	82.4	82.4	82.2	82.2	82.2	82.2	82.2
410	-382	Tahlequah	NE OK/Tulsa	88	82.6	82.6	82.5	82.5	82.3	82.2	82.3	82.2	82.2

Red cell centers are within the 7x7 cells of an observation site

1998-2000 8-Hour Ozone Design Values

Screening cells W

Cell center

2007 Scaled DV (Run 20 series)

LCPx	LCPy	Nearest ob	DV Region	Max regional 2000 DV	07 Base	Cntl 02	Cntl 03	Cntl 04	Cntl 05	Cntl10	Cntl11	Cntl12	Cntl13
130	-642	Lawton	Lawton	84	79.8	79.8	79.8	79.8	79.8	79.7	79.8	79.8	79.8
126	-634	Lawton	Lawton	84	79.5	79.5	79.5	79.5	79.5	79.4	79.5	79.5	79.5
130	-634	Lawton	Lawton	84	79.8	79.8	79.8	79.8	79.8	79.7	79.8	79.8	79.8
130	-630	Lawton	Lawton	84	79.8	79.8	79.8	79.8	79.8	79.7	79.8	79.8	79.8
130	-626	Lawton	Lawton	84	80.0	80.0	80.0	80.0	79.9	79.8	79.9	79.9	79.9
130	-622	Lawton	Lawton	84	80.0	80.0	80.0	80.0	80.0	79.9	80.0	80.0	80.0
130	-618	Lawton	Lawton	84	80.1	80.1	80.1	80.1	80.1	80.0	80.1	80.1	80.1
134	-618	Lawton	Lawton	84	80.0	80.0	80.0	80.0	80.0	79.9	80.0	80.0	80.0
150	-558	Lawton	Lawton	84	79.2	79.2	79.2	79.2	79.2	78.7	79.2	79.2	79.2
238	-502	Moore	OKC	84	79.8	79.8	79.8	79.8	79.7	75.9	79.7	79.7	79.7
242	-502	Moore	OKC	84	79.8	79.8	79.7	79.7	79.7	75.9	79.7	79.6	79.6
234	-498	Moore	OKC	84	80.0	80.0	80.0	80.0	79.9	76.5	79.9	79.9	79.9
238	-498	Moore	OKC	84	80.0	80.0	79.9	79.9	79.9	76.4	79.9	79.9	79.8
242	-498	Moore	OKC	84	79.9	79.9	79.9	79.9	79.8	76.3	79.8	79.8	79.8
238	-494	Moore	OKC	84	79.9	79.9	79.9	79.9	79.7	76.9	79.7	79.7	79.7
242	-494	Moore	OKC	84	79.9	79.9	79.9	79.9	79.8	76.9	79.8	79.8	79.8
242	-490	OSDH	OKC	84	79.5	79.5	79.5	79.4	79.4	77.1	79.4	79.4	79.4
270	-490	Moore	OKC	84	79.1	79.1	79.1	79.1	78.9	77.7	78.9	78.9	78.9
274	-490	Moore	OKC	84	79.1	79.1	79.0	79.0	78.8	77.8	78.8	78.8	78.8
234	-486	OSDH	OKC	84	79.5	79.5	79.5	79.5	79.3	76.4	79.3	79.2	79.2
238	-486	OSDH	OKC	84	79.2	79.1	79.1	79.1	78.9	76.6	78.9	78.9	78.9
242	-486	OSDH	OKC	84	79.2	79.2	79.1	79.1	79.0	77.0	79.0	78.9	78.9
230	-482	OSDH	OKC	84	79.9	79.9	79.9	79.9	79.8	76.0	79.8	79.7	79.7
234	-482	OSDH	OKC	84	79.5	79.5	79.5	79.5	79.3	76.5	79.3	79.3	79.3
238	-482	OSDH	OKC	84	79.2	79.2	79.2	79.2	79.0	76.8	79.0	79.0	79.0
242	-482	OSDH	OKC	84	79.2	79.2	79.2	79.2	79.0	77.2	79.0	79.0	79.0
210	-478	OSDH	OKC	84	80.1	80.1	80.1	80.1	80.0	76.7	80.0	80.0	79.9
214	-478	OSDH	OKC	84	80.2	80.1	80.1	80.1	80.0	76.9	80.0	80.0	80.0
218	-478	OSDH	OKC	84	79.9	79.9	79.9	79.9	79.8	76.7	79.8	79.8	79.8
222	-478	OSDH	OKC	84	80.0	80.0	80.0	80.0	79.8	76.5	79.8	79.8	79.8
202	-474	OSDH	OKC	84	80.1	80.1	80.0	80.0	79.9	77.5	79.9	79.9	79.9
206	-474	OSDH	OKC	84	80.2	80.2	80.2	80.2	80.1	77.6	80.1	80.1	80.1

342	-406	Tulsa	Tulsa	93	88.9	88.8	88.8	88.7	88.7	88.7	88.6	88.6	88.6
338	-402	Tulsa	Tulsa	93	88.3	88.2	88.1	88.0	88.1	88.0	88.1	88.0	88.0
342	-402	Tulsa	Tulsa	93	88.4	88.3	88.2	88.1	88.2	88.2	88.2	88.1	88.1
370	-402	Tulsa	Tulsa	93	88.5	88.4	88.3	88.2	88.4	88.3	88.3	88.3	88.3
338	-398	Tulsa	Tulsa	93	88.0	87.9	87.7	87.6	87.8	87.7	87.7	87.7	87.6
342	-398	Tulsa	Tulsa	93	88.1	88.0	87.8	87.7	87.9	87.8	87.8	87.7	87.7
346	-398	Tulsa	Tulsa	93	88.5	88.4	88.3	88.2	88.3	88.3	88.2	88.2	88.1
350	-398	Tulsa	Tulsa	93	88.5	88.4	88.3	88.2	88.3	88.2	88.2	88.2	88.1
354	-398	Tulsa	Tulsa	93	88.5	88.4	88.2	88.1	88.3	88.2	88.2	88.2	88.1
370	-398	Tulsa	Tulsa	93	88.3	88.2	88.0	87.9	88.1	88.1	88.1	88.1	88.0
406	-398	Tahlequah	NE OK	89	82.9	82.9	82.8	82.8	82.4	82.4	82.4	82.4	82.4
350	-394	Tulsa	Tulsa	93	88.3	88.2	88.0	87.9	88.1	88.0	88.0	87.9	87.9
354	-394	Tulsa	Tulsa	93	88.1	88.0	87.8	87.7	87.9	87.9	87.9	87.8	87.8
358	-394	Tulsa	Tulsa	93	88.0	87.9	87.6	87.5	87.8	87.8	87.8	87.7	87.6
362	-394	Tulsa	Tulsa	93	88.0	88.0	87.7	87.6	87.9	87.8	87.8	87.8	87.7
366	-394	Tulsa	Tulsa	93	87.8	87.7	87.4	87.3	87.6	87.6	87.6	87.5	87.5
370	-394	Tulsa	Tulsa	93	88.0	88.0	87.7	87.6	87.9	87.9	87.9	87.8	87.7
374	-394	Tulsa	Tulsa	93	87.9	87.8	87.5	87.4	87.7	87.7	87.7	87.6	87.6
374	-390	Tulsa	Tulsa	93	87.8	87.7	87.4	87.3	87.6	87.6	87.6	87.5	87.5
410	-390	Tahlequah	NE OK	89	83.3	83.3	83.2	83.2	83.0	82.9	83.0	82.9	82.9
410	-386	Tahlequah	NE OK	89	83.4	83.4	83.3	83.3	83.1	83.1	83.1	83.1	83.1
410	-382	Tahlequah	NE OK	89	83.5	83.5	83.4	83.4	83.2	83.2	83.2	83.2	83.2

Red cell centers are within the 7x7 cells of an observation site

1999-2001 8-Hour Ozone Design Values

Screening cells

Cell center					2007 Scaled DV (Run 20 series)								
LCPx	LCPy	Nearest ob	DV Region	Max regional 2001 DV	07 Base	Cntl 02	Cntl 03	Cntl 04	Cntl 05	Cntl10	Cntl11	Cntl12	Cntl13
130	-642	Lawton	Lawton	81	76.9	76.9	76.9	76.9	76.9	76.8	76.9	76.9	76.9
126	-634	Lawton	Lawton	81	76.7	76.7	76.7	76.7	76.7	76.6	76.7	76.7	76.7
130	-634	Lawton	Lawton	81	77.0	77.0	77.0	77.0	77.0	76.9	77.0	77.0	77.0
130	-630	Lawton	Lawton	81	77.0	77.0	77.0	77.0	76.9	76.8	76.9	76.9	76.9
130	-626	Lawton	Lawton	81	77.1	77.1	77.1	77.1	77.1	77.0	77.1	77.1	77.1
130	-622	Lawton	Lawton	81	77.2	77.2	77.2	77.2	77.2	77.1	77.2	77.2	77.2
130	-618	Lawton	Lawton	81	77.3	77.3	77.3	77.3	77.3	77.2	77.3	77.3	77.3
134	-618	Lawton	Lawton	81	77.1	77.1	77.1	77.1	77.1	77.0	77.1	77.1	77.1
150	-558	Lawton	Lawton	81	76.4	76.4	76.4	76.4	76.4	75.9	76.4	76.4	76.4
238	-502	Moore	OKC	81	77.0	77.0	76.9	76.9	76.9	73.2	76.9	76.8	76.8
242	-502	Moore	OKC	81	76.9	76.9	76.9	76.9	76.8	73.2	76.8	76.8	76.8
234	-498	Moore	OKC	81	77.2	77.2	77.1	77.1	77.0	73.7	77.0	77.0	77.0
238	-498	Moore	OKC	81	77.1	77.1	77.1	77.1	77.0	73.7	77.0	77.0	77.0
242	-498	Moore	OKC	81	77.1	77.1	77.0	77.0	77.0	73.6	77.0	76.9	76.9
238	-494	Moore	OKC	81	77.1	77.1	77.0	77.0	76.9	74.2	76.9	76.9	76.9
242	-494	Moore	OKC	81	77.1	77.1	77.0	77.0	77.0	74.1	77.0	77.0	76.9
242	-490	OSDH	OKC	81	76.7	76.7	76.6	76.6	76.5	74.3	76.5	76.5	76.5
270	-490	Moore	OKC	81	76.3	76.3	76.2	76.2	76.1	74.9	76.1	76.1	76.1
274	-490	Moore	OKC	81	76.2	76.2	76.2	76.2	76.0	75.0	76.0	76.0	76.0
234	-486	OSDH	OKC	81	76.7	76.7	76.6	76.6	76.4	73.6	76.4	76.4	76.4
238	-486	OSDH	OKC	81	76.3	76.3	76.3	76.3	76.1	73.9	76.1	76.1	76.1
242	-486	OSDH	OKC	81	76.4	76.4	76.3	76.3	76.1	74.3	76.1	76.1	76.1
230	-482	OSDH	OKC	81	77.1	77.0	77.0	77.0	76.9	73.2	76.9	76.9	76.9
234	-482	OSDH	OKC	81	76.7	76.7	76.6	76.6	76.5	73.8	76.5	76.4	76.4
238	-482	OSDH	OKC	81	76.4	76.4	76.3	76.3	76.2	74.0	76.1	76.1	76.1
242	-482	OSDH	OKC	81	76.4	76.4	76.4	76.4	76.2	74.4	76.2	76.2	76.2
210	-478	OSDH	OKC	81	77.2	77.2	77.2	77.2	77.1	74.0	77.1	77.1	77.1
214	-478	OSDH	OKC	81	77.3	77.3	77.2	77.2	77.2	74.1	77.2	77.1	77.1

218	-478	OSDH	OKC	81	77.1	77.1	77.0	77.0	76.9	74.0	76.9	76.9	76.9
222	-478	OSDH	OKC	81	77.2	77.2	77.1	77.1	77.0	73.8	77.0	77.0	77.0
202	-474	OSDH	OKC	81	77.2	77.2	77.2	77.2	77.1	74.8	77.1	77.1	77.1
206	-474	OSDH	OKC	81	77.4	77.3	77.3	77.3	77.2	74.8	77.2	77.2	77.2
342	-406	Tulsa	Tulsa	90	86.1	85.9	86.0	85.9	85.8	85.8	85.8	85.8	85.7
338	-402	Tulsa	Tulsa	90	85.5	85.4	85.3	85.2	85.3	85.2	85.2	85.2	85.1
342	-402	Tulsa	Tulsa	90	85.6	85.5	85.4	85.3	85.4	85.3	85.3	85.3	85.2
370	-402	Tulsa	Tulsa	90	85.6	85.6	85.4	85.4	85.5	85.5	85.5	85.5	85.4
338	-398	Tulsa	Tulsa	90	85.2	85.1	84.9	84.8	85.0	84.9	84.9	84.9	84.8
342	-398	Tulsa	Tulsa	90	85.2	85.1	85.0	84.9	85.0	85.0	85.0	84.9	84.9
346	-398	Tulsa	Tulsa	90	85.7	85.5	85.5	85.4	85.5	85.4	85.4	85.4	85.3
350	-398	Tulsa	Tulsa	90	85.6	85.5	85.4	85.3	85.4	85.4	85.4	85.3	85.3
354	-398	Tulsa	Tulsa	90	85.6	85.5	85.4	85.3	85.4	85.4	85.4	85.4	85.3
370	-398	Tulsa	Tulsa	90	85.4	85.4	85.1	85.1	85.3	85.3	85.3	85.2	85.2
406	-398	Tahlequah	NE OK	85	79.2	79.2	79.1	79.1	78.7	78.7	78.7	78.7	78.7
350	-394	Tulsa	Tulsa	90	85.4	85.3	85.2	85.1	85.2	85.2	85.2	85.1	85.0
354	-394	Tulsa	Tulsa	90	85.3	85.2	85.0	84.9	85.1	85.1	85.0	85.0	84.9
358	-394	Tulsa	Tulsa	90	85.1	85.1	84.8	84.7	85.0	84.9	84.9	84.9	84.8
362	-394	Tulsa	Tulsa	90	85.2	85.1	84.9	84.8	85.0	85.0	85.0	84.9	84.9
366	-394	Tulsa	Tulsa	90	84.9	84.9	84.6	84.5	84.8	84.8	84.8	84.7	84.6
370	-394	Tulsa	Tulsa	90	85.2	85.1	84.8	84.8	85.1	85.0	85.0	85.0	84.9
374	-394	Tulsa	Tulsa	90	85.0	85.0	84.7	84.6	84.9	84.8	84.8	84.8	84.7
374	-390	Tulsa	Tulsa	90	85.0	84.9	84.5	84.5	84.8	84.8	84.7	84.7	84.6
410	-390	Tahlequah	NE OK	85	79.6	79.6	79.5	79.5	79.2	79.2	79.2	79.2	79.2
410	-386	Tahlequah	NE OK	85	79.7	79.7	79.6	79.6	79.4	79.4	79.4	79.4	79.4
410	-382	Tahlequah	NE OK	85	79.8	79.7	79.7	79.7	79.5	79.4	79.5	79.4	79.4

Red cell centers are within the 7x7 cells of an observation site

Section B

Project Status Report for OCART's Area Transportation Control Measure Commitments

prepared by

The Association of Central Oklahoma Governments

Table 1:
Early Action Compact
Clean Air Action Plan Emission Reduction Strategy:
OCARTS area Transportation Control Measure (TCM) Commitments
Intersection Improvement, Signal Modification/ Interconnect and Continuous Left Turn Lanes

Agency	Project Name	From	To	Project Description	Project Status
Del City	SE 29th St.	@ Sooner Rd.		Signal Modification	Planned (Expected Completion 2006)
Del City	SE 29th St.	@ Bryant Ave.		Signal Modification	Under Construction
Del City	SE 15th St.	Vickie Dr.	Sooner Rd.	Continuous Left Turn Lane	Planned
Del City	SE 29th St.	Bryant Ave.	Sooner Rd.	Signal Interconnect	June 2005 Bid Letting
Edmond	Kelly Ave.	@7th St.		Intersection Improvement	Under Construction
Edmond	2nd St.	@ Vista Lane		Intersection Improvement	Under Construction
Edmond	2nd St.	@ Bradbury Dr.		Intersection Improvement	Under Construction
Edmond	Danforth Rd	@ Coltrane Rd.		Intersection Improvement	Planned (Expected Completion 2006)
Edmond	15th St.	@ Edgewood Dr.		Signal Modification	Complete
Edmond	15th St.	@ Pine Oak		Signal Modification	Complete
Edmond	Kelly Ave.	@ 33rd St.		Signal Modification	Complete
Edmond	Kelly Ave.	@ 15th St.		Signal Modification	Complete
Edmond	15th St.	@ Boulevard		Signal Modification	Complete
Edmond	2nd St.	@ Bauman Ave.		Signal Modification	Complete
Edmond	2nd St.	@ University Dr.		Signal Modification	Complete
Edmond	2nd St.	@ Walmart entrance		Signal Modification	Complete
Edmond	33rd St.	@ Edmond Crossing		Signal Modification	Complete
Edmond	Danforth Rd.	@ Boulevard		Signal Modification	Complete
Edmond	Danforth Rd.	@ Chowning Ave.		Signal Modification	Complete
Edmond	Danforth Rd	@ Fretz Ave.		Signal Modification	Complete
Edmond	Edmond Rd.	@ Santa Fe Ave.		Signal Modification	Complete
Edmond	Danforth Rd.	@ Blackwelder		Signal Modification	Complete
Edmond	15th St.	@ Rankin St.		Signal Modification	Complete
Edmond	Boulevard	@ Covell Rd.		Intersection Improvement	Design Phase (2005 Construction)
Edmond	33rd St.	@ Lincoln Ave.		Intersection Improvement	Complete
El Reno	US-66	@ 27th St.		Signal Modification	Complete

Agency	Project Name	From	To	Project Description	Project Status
Midwest City	Douglas Ave.	SE 29th St.	SE 15th St.	Continuous Left Turn Lane	Complete
Midwest City	NE 10th St.	@ Air Depot Blvd		Intersection Improvement	Complete
Midwest City	NE 10th St.	@ Midwest Blvd.		Intersection Improvement	Complete
Moore	SW 19th St.	@ Santa Fe Ave.		Intersection Improvement	Under Construction
Moore	SW 19th St.	@ Telephone Rd.		Intersection Improvement	Under Construction
Moore	Telephone Rd.	@ S. 4th St.		Intersection Improvement	Under Construction
Moore	Telephone Rd.	@ S. 17th St.		Intersection Improvement	Under Construction
Moore	SE 19th St.	@ Eastern Ave.		Intersection Improvement	July 2005 Bid Letting
Moore	Eastern Ave.	@ Moore H.S.		Signal Modification	Planned (Expected Completion 2006)
Moore	SW 4th St.	@ Classen Ave.		Signal Modification	Planned (Expected Completion 2006)
Moore	SW 4th St.	@ Wilson St.		Signal Modification	Design Phase (Fall 2005 Construction)
Norman	Robinson Ave.	@ 48th Ave. NW		Intersection Improvement	Under Construction
Norman	Robinson Ave.	@ Brookhaven Blvd.		Intersection Improvement	Complete
Norman	Porter Ave.	@ Robinson Ave.		Intersection Improvement	Complete
Norman	Porter Ave.	@ Rock Creek Rd.		Intersection Improvement	Complete
Norman	Gray St.	Flood Rd.	Porter Ave.	Signal Mod. / Interconnect	Under Construction
Norman	Jenkins Ave.	@ Imhoff Rd.		Intersection Improvement	Fall 2005 Bid Letting
Norman	24th Ave. SW	@ SH-9		Intersection Improvement	Fall 2005 Bid Letting
Norman	Robinson Ave.	@ Woods Ave.		Signal Modification	Complete
Norman	Robinson Ave.	@ Crossroads Ct.		Signal Modification	Planned
Norman	Boyd St.	@ Flood Ave.		Intersection Improvement	Cancelled
Norman	36th NW Ave.	@ Rock Creek Rd		Signal Modification	Planned (Expected Completion 2006)
ODOT	I-35	@ SH-9		Interchange Modification	Under Construction
ODOT	I-35	@ I-240		Interchange Reconstruction	Under Construction
ODOT	SH-9	@ Berry Rd.		Intersection Improvement	Complete
ODOT	SH-130	@ US-62		Intersection Improvement	Complete
Oklahoma City	Eastern Ave.	@ SE 44th St.		Intersection Improvement	Complete
Oklahoma City	Eastern Ave.	@ SE 59th St.		Intersection Improvement	Complete
Oklahoma City	Meridian Ave.	SW 29th St.	Reno Ave.	Continuous Left Turn Lane	Design Phase
Oklahoma City	Eastern Ave.	@ I-240		Intersection Improvement	Summer 2005 Construction
Oklahoma City	Meridian Ave.	@ SW 29th St.		Intersection Improvement	Design Phase
Oklahoma City	Meridian Ave.	@ SW 15 St.		Intersection Improvement	Complete
Oklahoma City	Meridian Ave.	@ Reno		Intersection Improvement	Complete

Agency	Project Name	From	To	Project Description	Project Status
Oklahoma City	MacArthur	@ 104th St.		Intersection Improvement	Planned (Expected Completion 2006)
Oklahoma City	MacArthur	@ SH-152		Intersection Improvement	Planned (Expected Completion 2006)
Oklahoma City	SW 54th St.	@ MacArthur Ave.		Intersection Improvement	Design Phase
Oklahoma City	SW 54th St.	@ Portland Ave.		Intersection Improvement	Design Phase
Oklahoma City	Drexel Blvd.	@ NW 23rd St.		Intersection Improvement	Design Phase
Oklahoma City	Lake Hefner Pkwy	@ NW 122nd St.		Intersection Improvement	Design Phase
Oklahoma City	NW 150th St.	@ Penn Ave.		Intersection Improvement	Design Phase
Oklahoma City	NW 150th St.	@ Western Ave.		Intersection Improvement	Complete
Oklahoma City	Sooner Rd.	@ I-240		Intersection Improvement	Planned (Expected Completion 2006)
Oklahoma City	Lincoln Ave.	NW 4th St.		Intersection Improvement	Planned (Expected Completion 2006)
Oklahoma City	Tulsa Ave.	@ NW 50th St.		Intersection Improvement	Design Phase
Oklahoma City	Tulsa Ave.	@ NW 10th St.		Intersection Improvement	Design Phase
Oklahoma City	May Ave.	@ NW 10th St.		Intersection Improvement	Design Phase
Oklahoma City	Rockwell Ave.	@ Reno Ave.		Signal Modification	Design Phase
Oklahoma City	Santa Fe Ave.	@ Kilpatrick Turnpike		Signal Modification	Design Phase
Oklahoma City	Council Rd.	@ Riverbend Dr.		Signal Modification	Complete
Oklahoma City	SW Western	@ SW 66th St.		Signal Modification	Fall 2005 Construction
Warr Acres	MacArthur Blvd.	@ NW 50th St.		Intersection Improvement	Fall 2005 Construction
Warr Acres	MacArthur Blvd.	@ NW 63rd St.		Intersection Improvement	Fall 2005 Construction
Warr Acres	MacArthur Blvd.	@ NW 36th St.		Intersection Improvement	Planned

Table 2:
Early Action Compact
Clean Air Action Plan Emission Reduction Strategy:
OCARTS area Transportation Control Measure (TCM) Commitments
Bicycle/Pedestrian Facilities

Agency	Projects Name	From	To	Distance	Project Description	Project Status
Edmond	Mitch Park Trail	Santa Fe Ave. n/o Covell Rd	Kelly Ave. n/o Covell Rd.	4 miles	Bike/Pedestrian	Complete
Oklahoma City	North Canadian Central Greenway Trail	May Ave.	Eastern	14 miles	Bike/Pedestrian	Complete
Oklahoma City	Lake Overholser East Trail	NW 39th Expwy.	NW 16th St.	2.5 miles	Bike/Pedestrian	Complete
Harrah	Community Trail Project: Phase II	NE 10th St./ Church Ave.	Heritage Park	1 mile	Bike/Pedestrian	Design Phase
Moore	Little River Commuter Trail	NW 5th St. w/o I-35	Janeway Rd.	1.5 miles	Bike/Pedestrian	Under Construction
Norman	Legacy Trail North	Acres St.	24th Ave. NW	3 miles	Bike/Pedestrian	Under Construction
Oklahoma City	KATY Trail	Reno Ave.	NE 50th St.	7.5 miles	Bike/Pedestrian	July 2005 Bid Letting
Oklahoma City	Lake Hefner to Lake Overholser Trail	W. Lakeshore Dr.	NW 39th Expwy.	5.5	Bike/Pedestrian	Design Phase
Oklahoma City	Lightning Creek Trail	SW 51st St. / Harvey Rd.	Blackwelder to I-240	3 miles	Bike/Pedestrian	Summer 2005 Bid Letting
Oklahoma City	North Canadian Central Greenway Trail Link	S. High St.	N. Bryant Ave.	1.5 miles	Bike/Pedestrian	Design Phase
Tuttle	Tuttle Ped. & Bicycle Trail	Main St. @ Cimarron		1.5 miles	Bike/Pedestrian	Design Phase
Edmond	Hafer Park Trail Reconstruction	Hafer Park		1.5 miles	Bike/Pedestrian	Complete
Edmond	Fink Park Trail	Fink Park	Hafer Park	1 mile	Bike/Pedestrian	Design Phase

Table 3:
Early Action Compact
Clean Air Action Plan Emission Reduction Strategy:
OCARTS area Transportation Control Measure (TCM) Commitments
Intelligent Transportation System Projects

Agency	Projects Name	From	To	Project Description	Project Status
ODOT	2 CCTV 3 Webcams	I-44	@ I-204	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-44	@ SW 59th St.	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-44	@ Airport Rd.	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-44	@ SW 29th St.	ITS	Complete
ODOT	2 CCTV 5 Webcams	I-44	@ I-40	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-44	@ NW 10th St.	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-44	@ NW 23rd St.	ITS	Complete
ODOT	2 CCTV 4 Webcams	I-44	@ SH-66	ITS	Complete
ODOT	1 CCTV 4 Webcams	SH-74	@ SH-3	ITS	Complete
ODOT	1 CCTV 2 Webcams	SH-74	@ Grand Ave.	ITS	Complete
ODOT	1 CCTV 3 Webcams	SH-74	@ Britton Rd.	ITS	Complete
ODOT	1 CCTV 3 Webcams	SH-74	@ Hefner Rd.	ITS	Complete
ODOT	1 CCTV 4 Webcams	SH-74	@ Memorial Rd.	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-40	@ Meridian Ave.	ITS	Complete
ODOT	1 CCTV 6 Webcams	I-40	@ Gaylord	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-40	@ I-235	ITS	Fall 2005Bid Letting
ODOT	1 CCTV 2 Webcams	I-40	@ Byers St.	ITS	Fall 2005 Bid Letting
ODOT	1 CCTV 4 Webcams	I-40	@ I-35 S.	ITS	Fall 2005 Bid Letting
ODOT	1 CCTV 3 Webcams	I-40	@ Reno Ave.	ITS	Fall 2005Bid Letting
ODOT	1 CCTV 2 Webcams	I-40	@ Scot St.	ITS	Fall 2005Bid Letting
ODOT	1 CCTV 2 Webcams	I-40	@ SE 29th St.	ITS	Complete
ODOT	1 CCTV 2 Webcams	I-40	@ Air Depot Blvd.	ITS	Complete

Agency	Projects Name	From	To	Project Description	Commitment Year (CY)
ODOT	1 CCTV 3 Webcams	I-40	@ Lockheed Blvd.	ITS	Complete
ODOT	3 Webcams	I-40	@ H Blvd.	ITS	Complete
ODOT	1 Webcam	I-40	@ Industrial Blvd.	ITS	Complete
ODOT	1 CCTV 3 Webcams	I-40	@ Douglas Blvd.	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-35	@ I-240	ITS	Complete
ODOT	1 CCTV 4 Webcams	I-35	@ Reno Ave.	ITS	Fall 2005 Bid Letting
ODOT	1 CCTV 5 Webcams	I-35	@ NW 4th St.	ITS	Fall 2005 Bid Letting

Section C

Monitoring Update

prepared by

The Oklahoma Department of
Environmental Quality

Monitoring Update

The Oklahoma City area has continued to monitor attainment of the 8-hour ozone standard. The latest design values developed from the 4th high 8-hour ozone values for the years 2002 to 2004 for monitoring sites in Central Oklahoma are listed below.

Site 33--Oklahoma City	78 ppb
Site 1037--Edmond	79 ppb
Site 096--Choctaw	74 ppb
Site 49--Moore	73 ppb
Site 1073--Goldsby	74 ppb
Site 0101--Yukon	76 ppb

All of these values are well under the standard, and we do not foresee a change to our attainment status in the near future unless we experience adverse meteorological conditions over a prolonged period of time.

As of June 17th 2005, the highest 4th high 8-hour value in the Oklahoma City area was a 72 ppb recorded at site 1037. Current 4th high values can be found at http://www.deq.state.ok.us/AQDnew/monitoring/charts/Oz8hr2005.htm.